DCN 242

Located in Central New York State, Rome Lab is situated on approximately 200 acres inside the boundaries of the realigned Griffiss Air Force Base. The lab's facilities include some of the most sophisticated research and development equipment available today. A total of 850 people are employed within the Lab's 3 main buildings.

The Rome Lab's Mission:

- Advance the science and technology of information for Air Force C3(4)I (Command/Control/Communications/(Computers)/Intelligence)
- Fulfill the needs of its non-AF customer base, primarily other branches of the Department of Defense.
- Promote the transfer of its technology to universities, government agencies and the private sector.

The Lab's Technological Thrusts:

- Command & Control
- Communications
- Intelligence
- Surveillance
- Computer Science & Technology
- Photonics
- Signal Processing
- Electromagnetics
- Reliability Sciences

The Lab's Irreplaceable Physical Resources – Uniquely situated and instrumented test sites:

- Rurally located in a quiet, electromagnetic environment
- Unique capability for high quality radio frequency antenna measurements
- Capacity to perform a wide spectrum of electromagnetic measurements

GLDC
Griffiss Local Development Corporation
153 Brooks Road, Griffiss AFB, New York 13441

ROME LAB & THE RETOOLING OF CENTRAL NEW YORK

The presence of Rome Lab will play a vital role in assuring New York competitiveness in the 21st Century.

- Numerous R&D company spinoffs, including PAR Technology, Dove Electronics, Land Care Aviation and Oneida Research.
- 24 R&D firms directly connected to the Lab.
- 257 contracts generated $132 million for New York State organizations, creating 2,000-2,5000 direct jobs, between 1991 and 1993.

The lab has attracted widespread support in the regional corporate community. Senior executives at NYNEX, PAR Technologies, Grumman, Kaman Sciences, Hazeltine and Sterling Software have all cited Rome Lab's . . .

- High standard and level of research integrity;
- Staff understanding of corporate interests; and
- Its record of "getting the job done" more effectively and more quickly than other labs around the country.

Rome Lab is also vital to the reuse of a realigned Griffiss AFB.

The plan developed by the community depends on steering first-phase development to the sites surrounding the lab; providing open space amenities convenient to the lab; and improving circulation access to and around the lab. The lab is working with Griffiss Local Development Corporation and local government to identify financial and service delivery options that will further reduce its overhead costs.

Rome Lab and New York State's Commitment: NYSTEC

Responsible for identifying, developing and transferring dual-use technologies to non-military users, the state-funded New York State Technology Enterprise Corporation (NYSTEC) will work with the Lab to build needed technical support for dealing with issues of economic development and global competitiveness. New York State has committed $6 million to the preservation of Rome Lab.

Rome Lab's Contribution to the Area

Rome Lab is responsible for at least 3,000 direct and indirect jobs in Rome-Utica region, generating over $14 million in local and county revenue. Its loss would reduce local population by 6,000; increase residential vacancies to 35%; remove 750 students from Rome schools; and cut over $13 million from local city, county and school district revenues. It would also deprive the region of its cornerstone in high-tech economic development efforts.

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153 Brooks Road, Griffiss AFB, New York 13441

ROME LAB'S ACHIEVEMENTS

A PROVEN TRACK RECORD

Rome Lab, supplemented by the individual initiatives of its scientists and engineers, has been stimulating the development of technology and products which until developed, seem too futuristic to be possible. Among these achievements:

- Compact Disk (CD) Technology
- 3-D Optical Memory (two photon absorption) provides massive storage of digital data
- Speech enhancement unit, for use in air safety devices, radios, hearing aids and other voice systems, reduces background noises.
- Care-net, a telemedical program that brings together a consortium of university, corporate and high performance computing partners in the world's first active effort to create health care systems of the future.
- "Black Box" analysis, the primary method for investigating airplane disasters, which derives from the Lab's work in speech algorithms
- Advanced security systems, based on the Lab's work in infrared cameras

Rome Lab is known for efficient Technology Transfer, facilitated by its emphasis on research that relies on commercially available technology. This ensures near-term utilization by private industry, including surveillance, communications, command & control, intelligence, signal processing and photonics. It has already developed new technologies in environmental control, virtual reality, speech processors, optical memory and programmable processors.

The Lab's work in high-quality optics and complex optical instrumentation developed the technology for the latest generation of large telescopes, including the Texas Telescope; the Air Force Phillips Lab Starfire Telescope; and the telescopes at the Air Force Optical Station in Maui.

The Lab has also adapted military technology to support the requirements of other government agencies, including the Federal Aviation Administration, the National Institute of Justice, and the Federal Highway Administration's effort through the New York State Department of Transportation to develop Intelligent Vehicle Highway Systems (IVHS) testbeds. The Lab also oversees the work of two Department of Defense Information Analysis Centers.

The State Police has used mobile digital terminals developed by Rome Lab. Pending collaborations include forensics (State Police) and a new regional law enforcement technology center sponsored by the National Institute of Justice.

Future economic development is already on the drawing boards. NYNET, the Lab's partnership with NYNEX and several universities, has developed Infomall, a multi-service/product information network, which among its many other activities will promote growth of High-Performance Computing & Communications (HPCC) firms throughout the state. The area of HPCC is projected to become a $100 billion industry within 7 years, creating 250,000 jobs nationally and 15,000 in New York State. Infomall itself will have a major impact on the future of manufacturing, product design, health care, government, education and home entertainment.

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WHEN IN ROME . . .

COST-EFFECTIVENESS AND PROJECT CONTROL

Rome Lab is a customer focused organization as evident by their diverse customer base.

- *Department of Justice*
- *National Institute of Health*
- *National Institute of Science & Technology*

Other Military/DOD including:

- *Advanced Research Projects Agency*
- *Central Imagery Office*

Irreplaceable Synergy of Place and People

The loss of Rome Lab would equal:

- The loss of C3(4)I technological advances
- The loss of Air Force pre-eminence
- Disruption of inter service teams led by Rome Lab
- Dilution of military capability

Rome Lab's established cadre of professionals:

- 850 total employees at Griffiss Air Force Base with average 17 years C3(4)I experience.
- Two-thirds of these employees are scientists and engineers, 61% of whom have advanced degrees.
- 740 employees (87%) are civilians.
- All technical employees participate in continuing training programs.

Air Force experience indicates that less than 20% of civilian employees relocate. Generally, those who possess expertise and experience that make them most desirable do not relocate, choosing instead to find employment in the private-sector. This would cause an irretrievable loss of valuable contacts, status and efficiencies. The Air Force might never regain its C3(4)I expertise if Rome Lab is relocated.

42% of the lab's funding is from agencies other than the Air Force. This strong inter-agency support is a result of the relationships and reputations of key individuals, not just of the facility. Lab employees have, for example, built up strong relationships with the Intelligence Community over a long period of time that are extremely sensitive, and are not likely to be replicated by others.

Previously, the Air Force has estimated that the relocation cost could be $135-162 million. The time horizon for this investment to break even is well into the next century.

Privatization & The Smart Buyer: The Best of Both Worlds

Rome Lab already outsources over 80% of its projects to private research corporations and institutions. Outsourcing minimizes investment in permanent facilities and personnel, and enhances corporate and university capacity to conduct research in militarily critical areas. In-house capabilities are still maintained in areas where specific military expertise is needed. In this way, Rome maintains expertise necessary to assert control over the work that is being done. This "technology spin-on" conforms with DOD's latest policy to adapt and build on the best of commercially available technology for military use.

Rome Lab is also a low overhead organization. Only 8% of FY'93 revenues represented institutional support provided by the S&T program.

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ROME LAB IS THE FUTURE

INFORMATION TECHNOLOGY FOR AMERICA'S NEEDS

"In each of the two world wars of this century, new technologies debuted that revolutionized the way we fought . . . The revolution occurring today is in C3(4)I."

General John A. Shalikashvili,
Chairman of the Joint Chiefs of Staff
February 22, 1994

C3(4)I: Command/Control/Communications/(Computers)/Intelligence

C3(4)I:
Central to the Air Force's future focus.
The specific mission of the Rome Lab.

AWAC's, Joint Stars, Patriot Missile System Support:
C3(4)I achievements of the Rome Lab that led to victory in the Gulf War.
Detection Technology now on the front lines in the fight against cancer.

Technology for 21st Century Military Superiority

RSI (Real Time All-Source Intelligence System):
JSIPS/CARS; Common Ground System; Combat Intelligence System

Responsive Battlefield Surveillance:
Enhanced All-Source Joint Stars; Users-Focused Multi-Mission Surveillance

Global Communications:
Seamless Global Networks; On-Demand Global LPI/LPD Multimedia Communications

Technology for 21st Century Living

Technology Transfer may be the primary mechanism to enhance the competitiveness of American corporations in the new global marketplace. Creation & retention of American jobs will depend upon the ability of government, industry and academia to research, develop and share the next generation of high technology applications.

Rome Lab: The National Leader in Technology Transfer
Over 35 active Cooperative Research Development Agreements, more than any other Air Force Lab. Perennial winner of the Federal Laboratory Consortium's aware for Excellence in Technology Transfer.

Photonics: Rome Lab's Thrust in Hyperfast Data Processing
Specific applications of this technology include optical pattern recognition, automated optical target recognition, optical 3-D memory, optical disk storage, high-performance analog fiber optics links and fiber optics switching. Experts project that photonics will be used by every type of company in the future, from the board room to the shop floor.

NYNET: Rome Lab's Contribution to the National Information Infrastructure
In partnership with NYNEX and with several major universities, including Columbia, Cornell, Syracuse and Brooklyn Polytech, Rome Lab is developing an experimental broadband communications network utilizing wideband fiber optics, programmable hardware and Asynchronous Transfer Mode switching technology. It will link Rome Lab with labs at Brookhaven and Cold Spring Harbor, with universities, and with research centers at NYNEX and Grumman, all of which will benefit from enhanced access to super computing facilities, ready-made environments for collaborative research and a testbed for developing applications. NYNET will further serve as a demonstration project for applications in education, telemedicine and law enforcement.

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Reuse Strategy is Un

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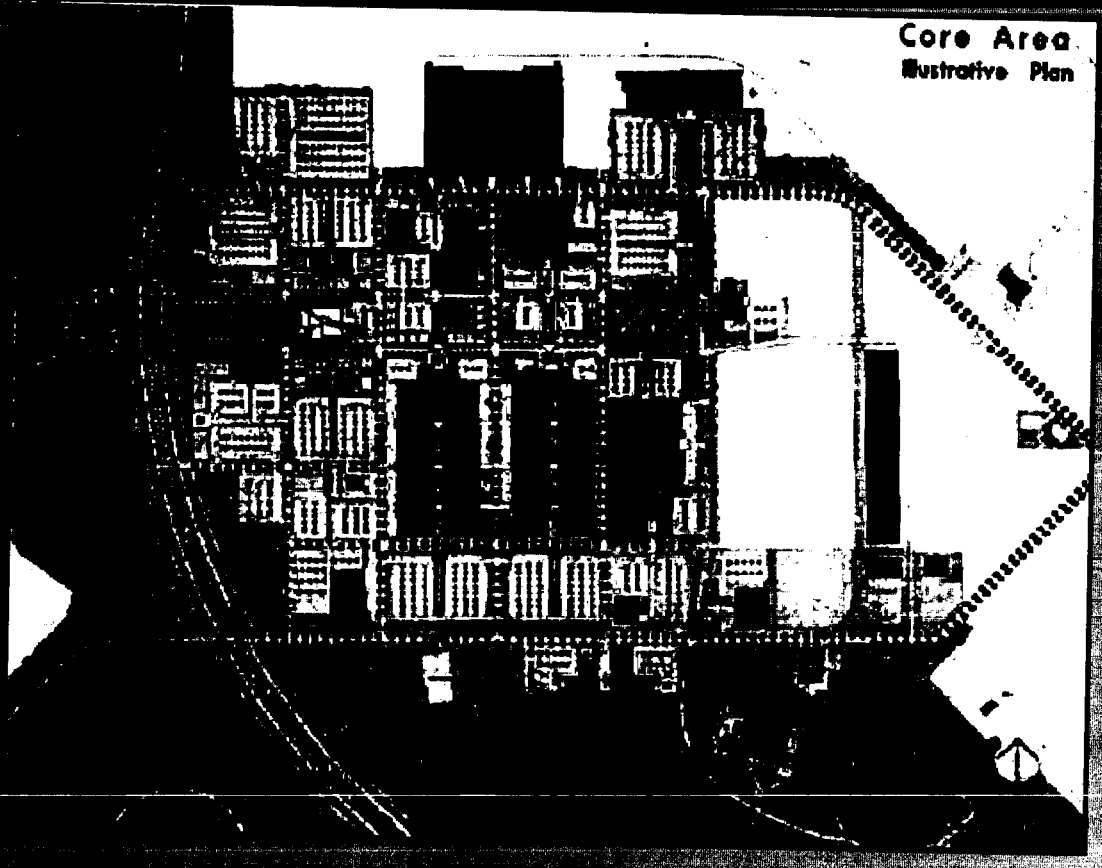
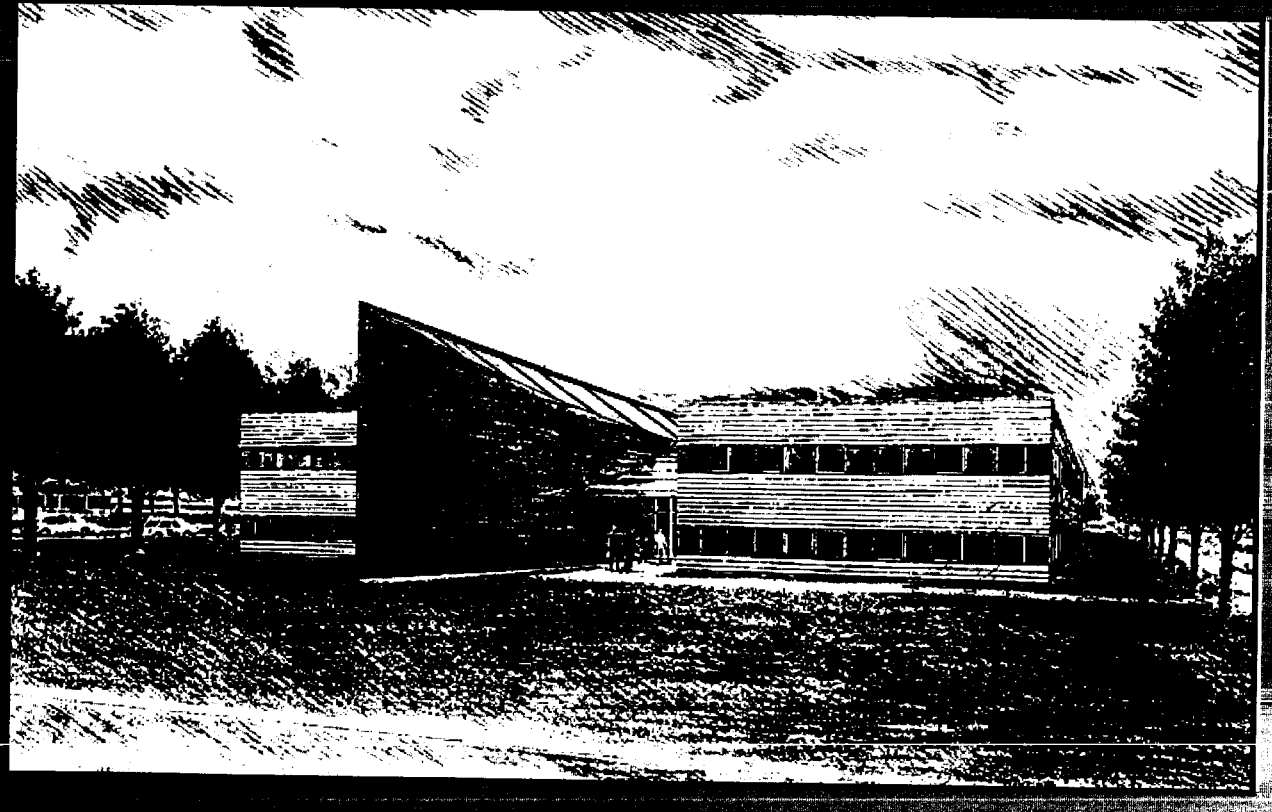


Reuse Strategy is Unusual

New York S



Reuse Strategy is Unw

Rome Lab
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Conclusion

The BRAC Commission should reject the DOD recommendation to break apart Rome Lab:

- **Military value is at risk**
- **Return on investment analysis is flawed**
- **Economic impact is severe**
- **Reuse strategy is undermined**

Dismantling Rome Lab: Risk Without Return

Defense Base Closure and Realignment Commission
5 May 1995
U.S.S. Intrepid

Document Separator

Overview

- C4I is vital to national security.
- Rome Lab is the military's pre-eminent C4I Lab.
- The recommendation to break apart Rome Lab should be rejected by the BRAC Commission.

Preserving Rome Lab is Vital to National Security

"In each of the world wars of this century, new technologies debuted that revolutionized the way we fought. The revolution occurring today is in C4."

General John M. Shalikashvili
Chairman of the Joint Chiefs of Staff
February 1994

Preserving Rome Lab is Vital to National Security

The essence of C4I is the integration of multiple disciplines.

- Command & Control
- Communications
- Computers
- Intelligence

C4I

- Strategic Planning
- Information Warfare
- Global Reach, Global Power
- Force Projection

Rome Lab is a Model of Excellence

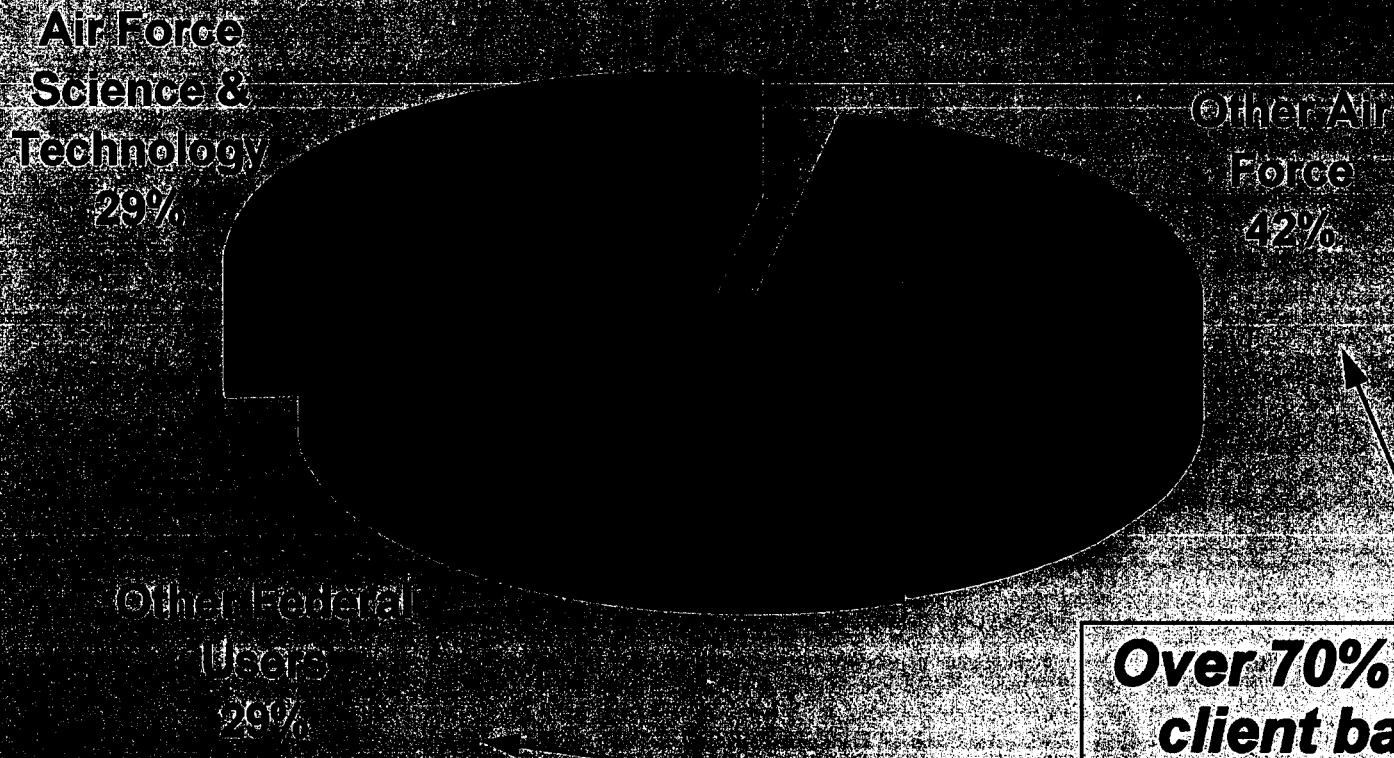
The Air Force gave Rome Lab the highest ranking in its 1995 BRAC review.

Air Force BRAC '95 Ranking

Rome Lab Hanscom AFB Wright-Patterson AFB	TIER ONE
Kirtland AFB Los Angeles AFB	TIER TWO
Brooks AFB	TIER THREE

Rome Lab is a Model of Excellence

Rome Lab is a C4I vendor of choice



1995 Budgeted Revenue Sources

Over 70% of the Lab's client base choose Rome Lab over all other C4I labs.

Dismantling Rome Lab: Risk Without Return

The recommendation to relocate Rome Lab should be reversed:

- Military value is at risk
- Return on investment analysis is flawed
- Economic impact is severe
- Reuse strategy is undermined

Military Value is at Risk

"We think of [Rome Lab] as a 'can do' outfit that, frankly, is determined largely by the quality of its people...I fear that this quality and this excellent laboratory will be totally destroyed by the fragmenting and move of its parts."

John N. Entzminger
Chief, Advanced Technology
Dept. of Defense Advanced Research Projects Agency
March 1995

Military Value is at Risk

Rome Lab is at the center of an irreplaceable network of businesses and universities

SUNY/Utica R

MVCC

Utica

Syracuse

Museum of

company

s in Rome

area

ral Electric

RPI

X

SUNY-Stonybrook

Colum

Polytech

ven

Grumman

Military Value is at Risk

Breaking apart Rome Lab would destroy the only fully integrated high-technology C4I Lab in the military.

Intelligence
Surveillance
Reconnaissance
Command &
Control
Space
Communications

C4I

Test
Sites

Computer Systems
Electromagnetics/
Reliability
Communications
Networks
Photonics
Radio
Communications

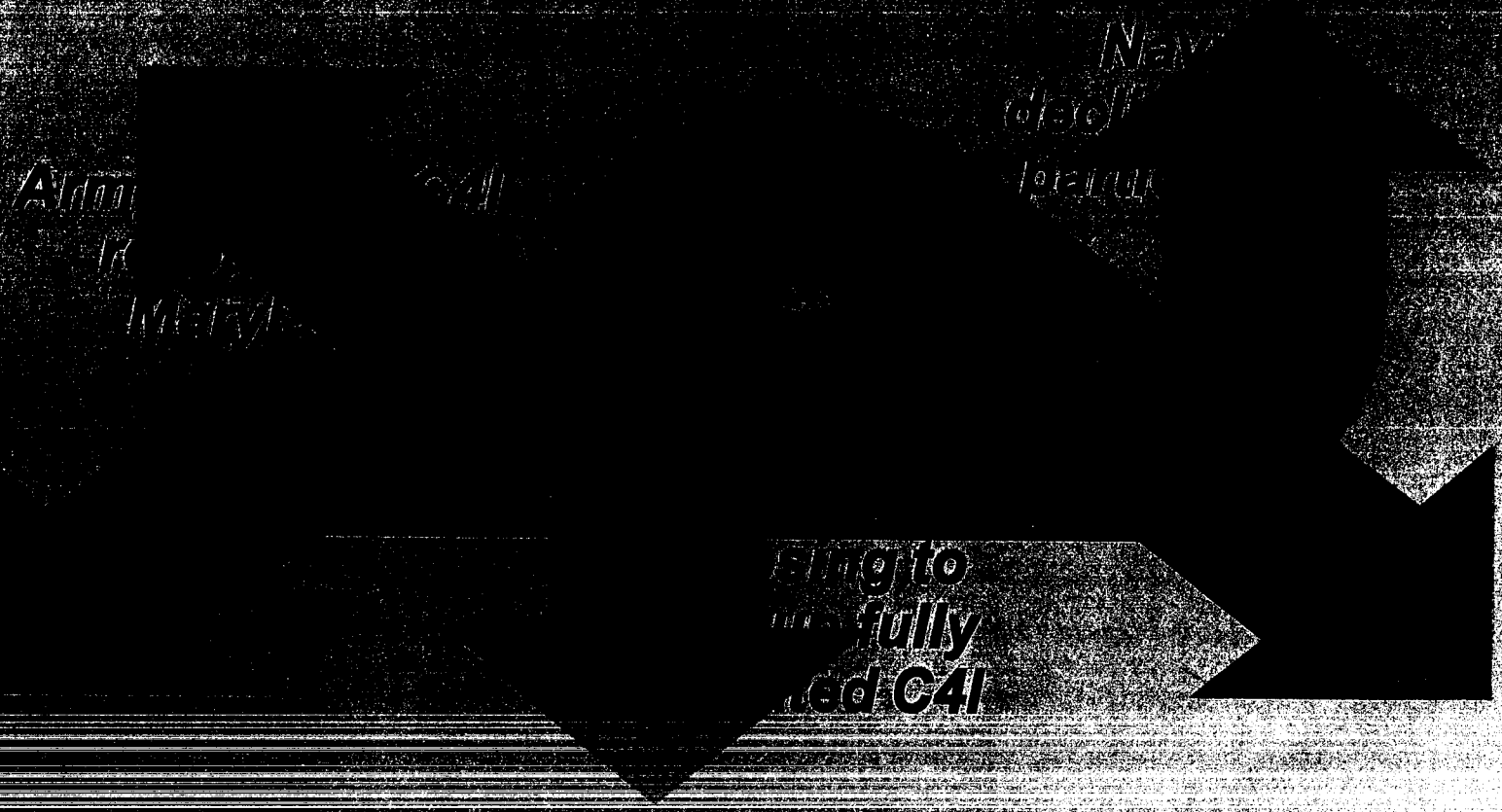
Joint Stars

Global Command & Control System

Jam Resistant Radar

Military Value is at Risk

This recommendation does not accomplish cross-servicing of C4I laboratories.



Return on Investment Analysis Is Flawed

"...the Air Force does not want to close or realign any installation if it's not cost-effective."

Former Deputy Assistant Secretary of the Air Force
James F. Boatright
Testimony to the BRAC Commission
17 April 1995

Return on Investment Analysis is Flawed

Air Force estimates of one-time costs have changed repeatedly:

- January 1993 — $203.0M
- October 1993 — $133.8M
- February 1995 — $52.8M
- May 1995 — ?

Return on Investment Analysis Is Flawed

Construction costs understated by as much as $100 million.

Construction Comparison	Reasonable Estimate	Air Force Recommendation
Space Needs (sq. ft.)	490,000	224,000
Avg. Cost (per sq. ft.)	$250	$98
Construction Cost	**$122M**	**$22M**

Return on Investment Analysis is Flawed

Over $30 million in one-time costs are omitted:

- Information management costs omitted
- Equipment purchase costs omitted
- Maintenance savings costs grossly overstated

Return on Investment Analysis is Flawed

As much as $9.4M of the estimated $11.5M annual savings is illusory.

Annual Savings Comparison	Reasonable Estimate	Air Force Recommendation	Annual Difference
Locality Pay Adjustment	$2.3M	$0.0M	$2.3M
Real Property Maintenance	$15.0M	$8.1M	$7.1M

Annual Savings Overestimate $9.4M

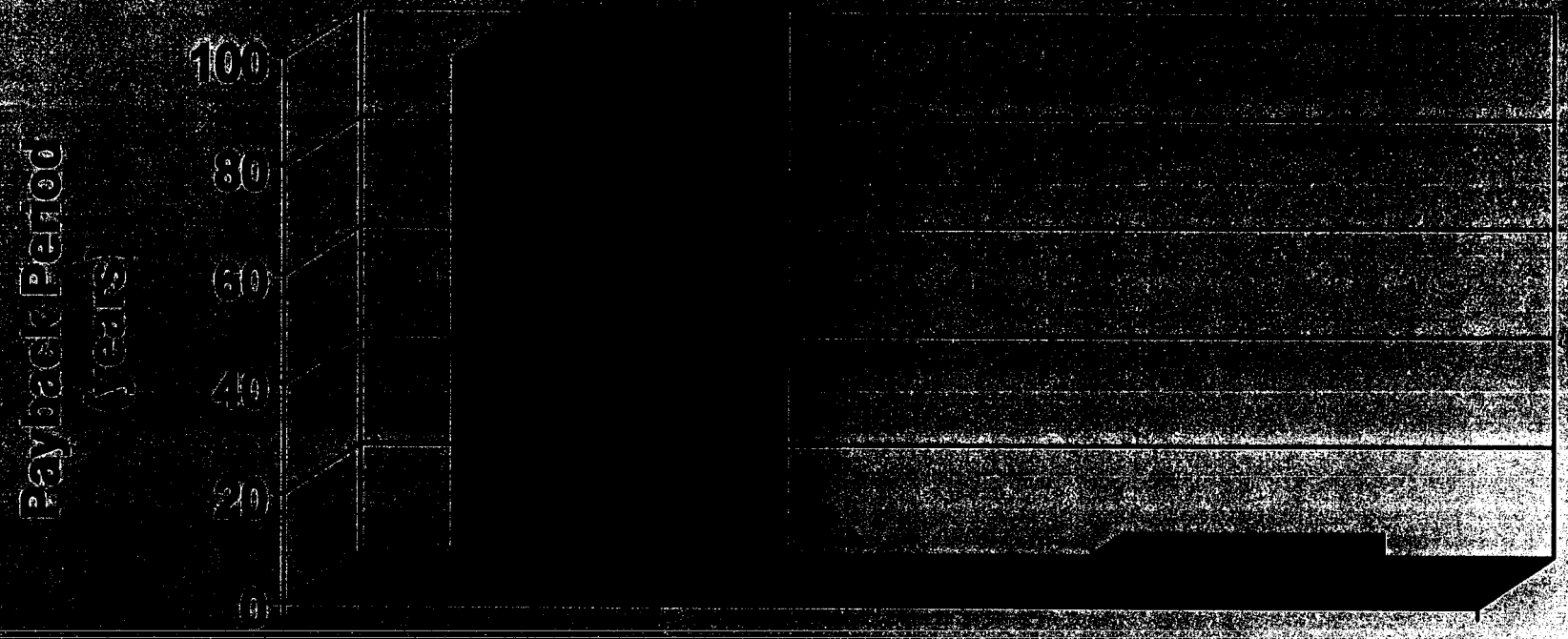
Return on Investment Analysis Is Flawed

Costs are underestimated. Savings are overestimated.

	One-Time Cost	Annual Savings
Air Force Analysis	$2.2M	$11.5M
Federal Analysis	$165M	$2.1M

Return on Investment Analysis is Flawed

Return on investment is unlikely to occur for 100 years.



Reasonable Analysis

Air Force Analysis

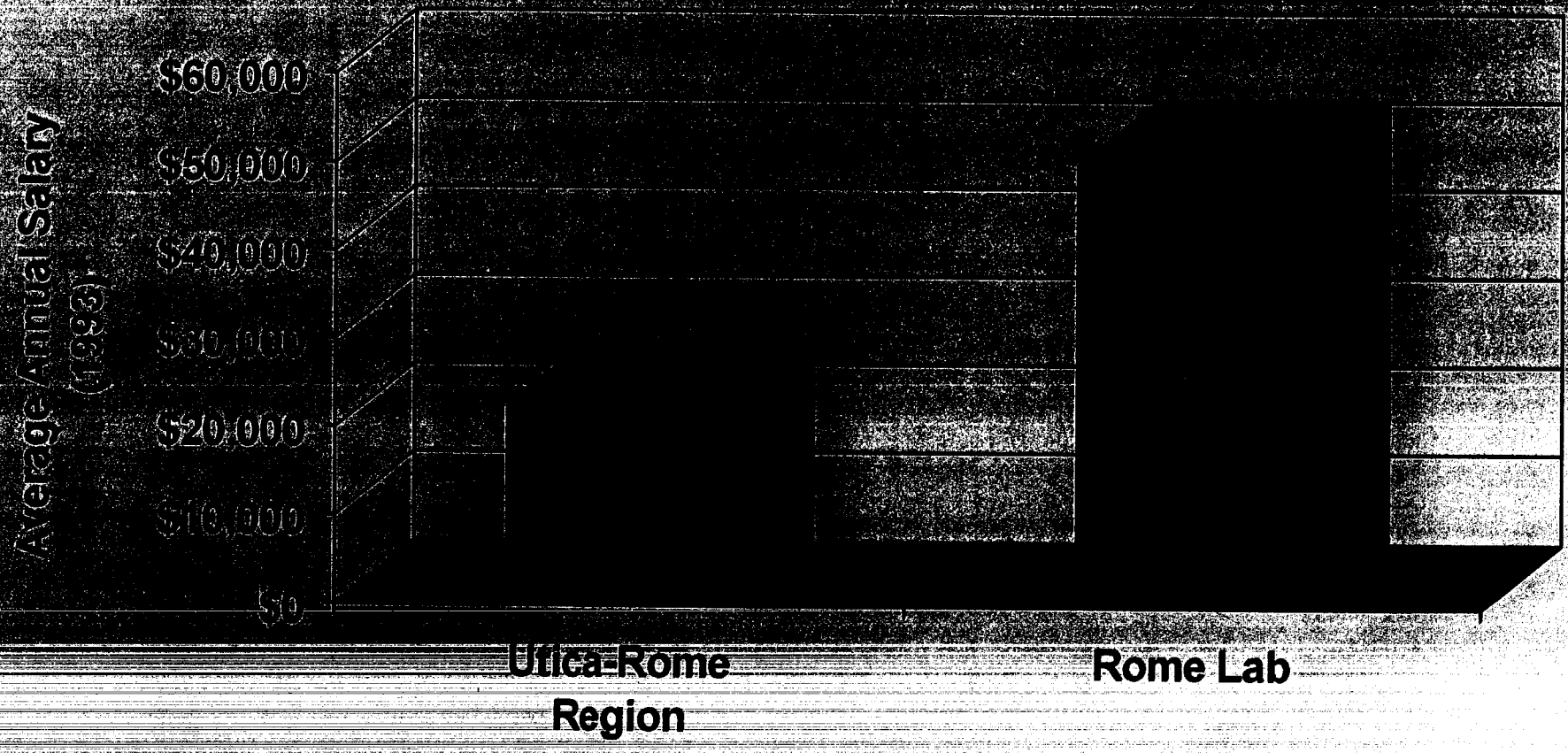
Economic Impact is Severe

"The highest of the negative job impacts occurs in the Utica-Rome MSA which will lose a total of 9,631 jobs - or 6.2% of the area's job base."

Air Force Deputy Secretary Rudy deLeon
memorandum to Bob Bayer
regarding BRAC Job impacts
14 February 1995

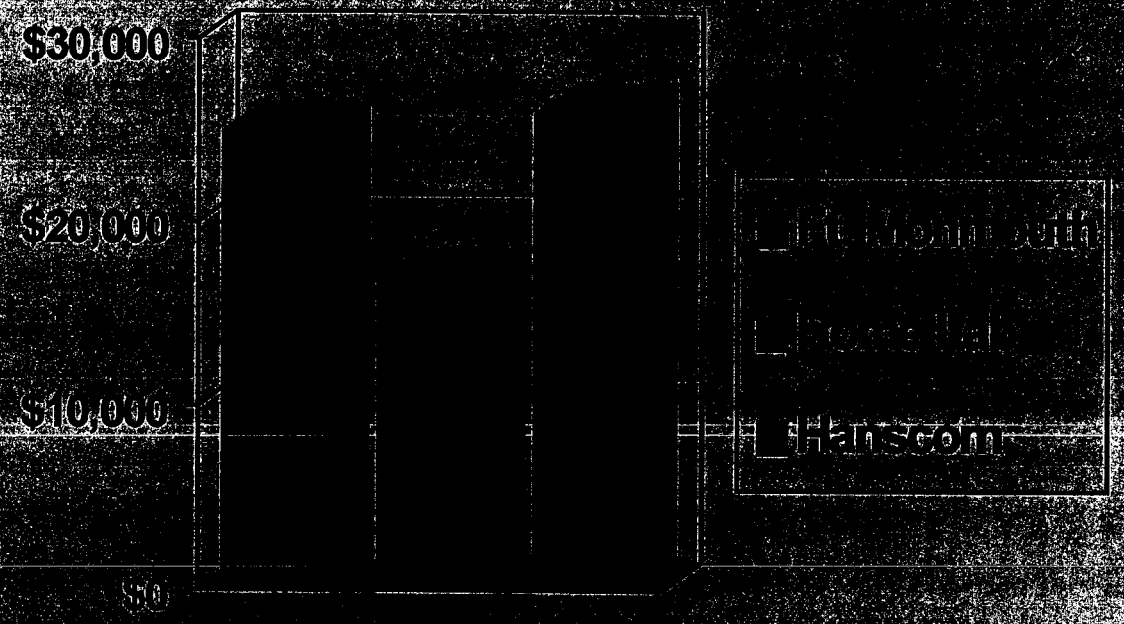
Economic Impact is Severe

Rome Lab jobs pay more than double the regional average, thereby doubling the effect of the loss.

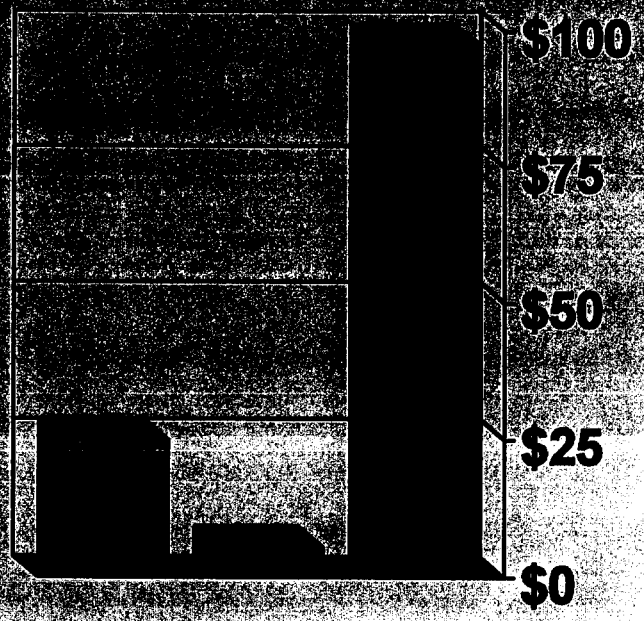


Economic Impact is Severe

The Rome economy is smaller and less affluent than is the economy around either Ft. Monmouth or Hanscom.



Regional Per Capita Income (1992)



Total Personal Income in Region in Billions (1992)

Reuse Strategy is Undermined

"I know that [the Griffiss reuse effort] will serve as a model for future bases facing similar difficulties..."

Air Force Under Secretary Rudy deLeon
Letter to GRPC
1 June 1994

Document Separator

Rome Lab Research Park

Facts for Consideration

Spring 1995

Document Separator

Document Separator

Cardinal®

Steven J. DiMeo
Executive Director

March 14, 1995

Alan J. Dixon, Chairman
Base Realignment and Closure Commission
1700 North Moore Street
Arlington, Virginia 22209

Dear Mr. Dixon:

As you know, the Department of Defense recommended to you on March 1, 1995, the closure of the Air Force's Rome Laboratory, located at the realigned Griffiss Air Force Base in Central New York's Mohawk Valley. The proposal is to maintain the Lab's mission at three locations: Hanscom Air Force Base in Massachusetts, Fort Monmouth in New Jersey, and Rome, New York which will continue as the venue for the Air Force's uniquely situated and instrumented test sites.

The local community, with the full backing of the State of New York, will refute this recommendation before the BRAC Commission and seek to have Rome Lab omitted from the list that the Commission sends to the President on June 30, 1995. We will be making our arguments to you throughout the formal BRAC process.

For your convenience, we are sending you a loose-leaf binder which, by the end of your deliberations, will provide a comprehensive record of *Facts For Consideration* by the Commission when determining the future of Rome Lab. As you may be aware, Rome Lab is at the heart of the community's reuse plan and so, though we understand the Commission hearings on reuse are not a part of your formal BRAC '95 deliberation, we have chosen the occasion of the March 16 hearings to begin to inform you about Rome Lab and its envisioned future at the hear of *Rome Lab Research Park.*

We are well aware that ours is not the only matter before you for consideration. We will therefore endeavor to send you materials on only two remaining occasions, those being immediately prior to: (1) April 5 BRAC Commissioner(s) visit to Rome Lab and (2) May 5 Regional Hearing. Materials will be carefully marked for easy insertion into the binder we are providing you today.

Though we regret that our community must endure another BRAC fight only two years after we fought the realignment of Griffiss, we are confident that on the merits our case is strong and that our cause is just. We lock forward to a fair hearing.

Sincerely,

Raymond Meier, County Executive

Joseph Griffo, Mayor

GRIFFISS
Local Development Corporation
153 Brooks Road
Griffiss AFB, New York 13441
Phone (315)338-0393 Fax (315)338-5694

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OVERVIEW

WHY ROME LAB SHOULD BE PRESERVED: *AN OVERVIEW*

OVERVIEW: THE DEPARTMENT OF DEFENSE HAS RECOMMENDED THAT ROME LAB BE SPLIT INTO THREE PARTS

DOD has recommended that Rome Lab be "closed" by splitting it into three parts – one to be located at Fort Monmouth in New Jersey, another to be located at Hanscom Air Force Base in Massachusetts, and a third to remain in New York.

- **The Recommendation Follows the 1993 BRAC Realignment of Griffiss Air Force Base.** In the 1993 round of Base Realignment and Closure Commission decisions, Griffiss Air Force Base, the home of Rome Laboratory, was realigned. At that time, the Base lost the 416th Bomb Wing. Rome Lab was to remain as a "stand alone" lab, an arrangement which the Air Force has recognized as being viable from a cost point of view on at least two other occasions, at Armstrong (Williams Air Force Base) and Phillips Laboratories.

- **In this Round, DOD is Recommending the Fragmentation of Rome Lab and the Closure of the Minimum Essential Airfield.** This recommendation will result in the virtual closure of the Base.

- **The Recommended Closure of the Airfield is Not Disputed.** The community does not dispute the recommendation to close the minimum essential airfield, which was intended to serve the needs of 10th Mountain Division.

- **The Recommended Closure of Rome Lab is Highly Disputed.** However, the recommendation to close the Rome Laboratory deviates substantially from the Force Structure Plan and the established criteria. The community strongly urges the BRAC Commission to reject the DOD recommendation.

OVERVIEW: THE ROME LAB RECOMMENDATION DEVIATES FROM THE FORCE STRUCTURE PLAN AND DOES NOT MEET ESTABLISHED BRAC CLOSURE CRITERIA

BRAC should find that DOD's recommendation to split Rome Laboratory into three parts deviates substantially from the Force Structure Plan and the final criteria.

- **Military Value Will be Compromised.** Rome Lab's essential mission cannot be accomplished at multiple locations. The Lab's excellence depends upon the face to face interaction of scientists working together with staff in inter-related departments, local academia, and contractors.

- **Department of Defense Costs Will Rise.** The Return on Investment projected by DOD is grossly overstated. Capital and operating costs related to the move will be higher than projected. Savings realized after the move will be smaller than projected.

- **The Rome Community Will be Subject to Severe Economic Impact.** The cumulative economic impact of this and the previous round of BRAC will be unusually harsh. Furthermore, economic development that would have occurred as a consequence of realization of the community's Reuse Plan will be precluded.

Why Rome Lab Should Be Preserved: *An Overview*

- **Military Value Will Be Compromised**
- Department of Defense Costs Will Rise
- The Rome Community Will Be Subject to Severe Economic Impact

MILITARY VALUE: FRAGMENTATION OF A TOP-RATED LAB WILL DETRACT FROM A MISSION OF VITAL IMPORTANCE

Rome Lab's mission is of unquestioned value, as is its superlative history of performance of that mission. Breaking up the Lab will destroy this top-rated Lab's ability to perform its essential mission.

- **C4I Research and Development is Essential.** The primary mission of Rome Lab is to advance research and development of command, control, communications, computers, and intelligence (C4I) systems and processes for the Air Force and the other services, as well as for a host of non-DOD customers. The military command structure has repeatedly stated that C4I research and development is essential to the future of the Air Force and the Department of Defense.

- **Rome Lab is a Top-Rated Facility.** Rome Lab has been consistently rated as among the best DOD labs. The Air Force, itself, rates Rome Lab as a "Tier One" lab. It has not, in this nor any previous round, recommended the closure of any other Tier One lab.

- **Splitting Up the Lab Will Not Allow it to Perform its Mission.** Effective performance of the mission depends upon strong existing relationships among Lab departments and with local academia and contractors. Virtually all leading scientists will testify that creative, productive scientific output depends on the regular, face to face interaction of individuals working in related fields. As with a variety of other highly skilled, creative occupations, telecommutation will not suffice.

MILITARY VALUE: THE DOD RECOMMENDED ACTION WILL DESTROY ESSENTIAL RELATIONSHIPS AMONG DEPARTMENTS

Collaborative relationships among Rome Lab departments are vital to effecting the formal and informal exchange of ideas and information that is referred to as *technology exchange*. DOD's recommendation splits closely inter-related departments, destroying existing technology exchange.

- **Surveillance and Photonics Will be Separated.** Surveillance and Photonics have worked collaboratively to develop more efficient radar and infrared surveillance systems.

- **Intelligence and Photonics Will be Separated.** Intelligence and Photonics are collaboratively developing more efficient optical memory devices that are essential to the next generation of computers.

- **On-Site and Off-Site Reliability Personnel Will be Separated.** Collaboration between Reliability personnel located at Rome Lab and at the off site-facilities permitted the timely diagnosis of plane-mounted antenna problems encountered by battlefield commanders during the Gulf War.

- **The C4I Team that is Working on the Global Command and Control System is Being Divided.** GCCS will allow air, land, and naval battlefield commanders; combat planners located in the United States; and other war managers all over the world to simultaneously evaluate and immediately communicate information to war fighters. GCCS represents a rejection of so-called "stove piping," where all information flows up a rigid chain of command, then has to be reorganized and re-disseminated, leading to loss of valuable time and information.

MILITARY VALUE: HOPED FOR INTRA- AND INTER-SERVICE SYNERGIES WILL NOT DEVELOP

Relationships among DOD staff at the new locations will never develop as productively as at the Rome location.

- **New Locations are System Centers Rather than Labs.** The development of new collaborations among staff is less likely at the proposed Massachusetts and New Jersey locations because these are primarily staffed by acquisition personnel and individuals concerned with system engineering, not R&D scientists and engineers.

- **Research Synergies with the Army have been Precluded.** Army research organizations at the New Jersey location that would have provided synergistic research relationships in the areas of Photonics and Reliability are being moved to Adelphi, Maryland, pursuant to a BRAC 1991 Army recommendation.

- **The Navy Rejected the Suggestion to Move C4I Capabilities to the New Jersey Site.** Thus it is impossible for the proposed move to cause the development of research synergies among the other services.

MILITARY VALUE: THE DOD ACTION WILL DESTROY ESSENTIAL RELATIONSHIPS WITH CIVILIAN INSTITUTIONS

The recommendation will also destroy technology exchange with civilian contractors and academics, collaboration that has resulted in a variety of important military and civilian technologies.

- **Leadership in Cooperative R&D is Threatened.** A recent independent study found that the Lab was more aggressive, focused, and productive in this area than most other DOD, federal and industry labs reviewed. The Lab has developed almost twice as many Cooperative Research and Development Agreements as any other DOD lab. Among the collaborations that will be destroyed is the relationship with NYNEX that resulted in development of NYNET, a wide band, fiber optic, asynchronous network, with civilian applications that include telemedicine, and military applications that include assistance to MASH units.

- **Highly Productive Relationships with the Critical Mass of Local Universities Will be Lost.** The Lab undertakes cooperative R&D with local universities, including Cornell and Syracuse Universities and Rochester Polytechnic Institute. Usage of Cornell's National Nanno Fabrication Facility has saved the Lab millions of dollars by avoiding the need to construct a separate facility at the Lab.

- **The Air Force's Acknowledgment of the Importance of These Relationships is Inconsistent.** The Secretary of the Air Force has correctly stated that closure of the research function of Los Angeles Air Force Base would result in a loss of its connectivity with the local aerospace community. The Air Force's failure to recognize the connectivity that will be lost at Rome Lab is inexplicable.

MILITARY VALUE: NEW COLLABORATIONS WITH CIVILIAN INSTITUTIONS WILL TAKE YEARS TO BUILD

The restructuring of the Lab is not likely to result in the development of new professional relationships with the local academic and industrial community anytime soon.

- **Networks Take Years to Build and Maintain, and are Highly Dependent on Personal Relationships.** Numerous studies suggest that, due to loss of non-relocating civilian expertise, relocation of a lab causes severe disruption of research. New relationships with local industry and academia will be developed only as remaining personnel gain local credibility, a process that will take years to occur.

- **It is Irresponsible to Undermine Existing, Long Standing and Highly Productive Relationships.** There is little intuitive logic to destroying strong existing relationships in the interest of possibly, at some point down the line, creating new ones.

Why Rome Lab Should Be Preserved: *An Overview*

- Military Value Will Be Compromised
- **Department of Defense Costs Will Rise**
- The Rome Community Will Be Subject to Severe Economic Impact

COST: DOD'S ESTIMATED RETURN ON INVESTMENT IS OVERSTATED

Review of the COBRA runs conducted by the Air Force indicates that the proposed restructuring of the Lab will not result in cost savings.

- **Required Elements Have Been Omitted from the COBRA Runs.** The model run supporting the Air Force's decision does not recognize a variety of costs required to be included. This assessment is supported by the fact that estimated costs are not comparable to actual experience with similar actions.

- **The COBRA Model is Inadequate for Examination of Both Labs and Realigned Bases.** The COBRA model simply does not consider a variety of costs that are unique to labs and realigned bases, costs which will significantly reduce projected savings and increase costs.

COST: THE COBRA RUN OVERLOOKS ESSENTIAL FACTORS

The COBRA model run supporting the Air Force's decision does not recognize a variety of costs required to be included.

- **Omissions Appear to be a Function of an Incomplete Understanding of the Mission of the Lab and the Nature of the Locations to which it is Moving.** Some of these deficiencies were acknowledged by the Air Force in its record of closure deliberations, yet the recommendation was allowed to stand. Unrecognized costs include:
  - locality pay differentials for civilian employees in Massachusetts and New Jersey,
  - increased cost to maintain the off-site test facilities in the absence of local support capability,
  - understated capital costs for new construction or reconfiguration of existing space,
  - underestimated test equipment movement and purchase costs,
  - absence of real property maintenance costs at the two receiver locations for Lab and administrative facilities, and
  - costs required to prepare the two sites for unique Lab operations.
- **Unsurprisingly, Historical Experience Does Not Bear Out Air Force Estimates.** For instance, the BRAC 1991 consolidation of the Army Research Laboratory in Maryland involved a similar number of research positions, but at a cost approximately six times higher than the Air Force's $52.8 million estimate.

COST: THE COBRA MODEL IS INADEQUATE FOR EXAMINATION OF LABS AND REALIGNED BASES

The COBRA model does not consider a host of significant costs, unique to labs and/or realigned bases.

- **Loss of Non-Air Force Customers is Likely.** The likely loss of key personnel will result in significant loss of customers, whose loyalty is to people, not the institution. Over 40% of Rome Lab's budget is funded by non-Air Force customers.

- **Use of Non-Air Force Facilities Has Not Been Factored in.** The Lab currently shares a variety of facilities that were developed and are operated by local universities. While these facilities are not among the Lab's assets — and hence could not be accounted for in the COBRA model — they are essential to the Lab's mission. Many of these facilities will have to be purchased or constructed and maintained by the Lab at the new locations.

- **Caretaker Costs are Likely to Rise.** In addition, DOD assumes responsibility for operating costs of the site in the interim between realignment or closure and achievement of the community's vision. These so-called "caretaker costs" are likely to rise, because implementation of the Lab closure recommendation will significantly delay redevelopment of the former Base and the community's ability to assume responsibility for the property.

- **Base Conversion Investment was Not Considered.** DOD — through subsidy of the Reuse Plan development process, contracting for the preparation of an Environmental Impact Statement, and funding of the local Air Force Base Conversion Agency office, among other efforts — has invested several million dollars in the transition of Griffiss Air Force Base to civilian use. Some portion of this investment may have to be redirected and refunded due to the major change in planning focus and marketing of the excess property; for instance, reprioritization of environmental clean up efforts may be required.

Why Rome Lab Should Be Preserved: *An Overview*

- Military Value Will Be Compromised
- Department of Defense Costs Will Rise
- **The Rome Community Will Be Subject to Severe Economic Impact**

ECONOMIC IMPACT: REGIONAL ECONOMIC IMPACT WILL BE DIRE, AND A VARIETY OF OPPORTUNITIES WILL BE LOST

Both the immediate consequences and the long term outcome of the DOD recommendation will have an unusually harsh economic impact on the Rome region.

- **Opportunities Will be Lost.** The Reuse Plan provides for a unique public/private partnership between the Lab, the community, and the State of New York. Approval of the DOD recommendation will mean that the benefits to the region and to the military of this partnership – which is well into the implementation stage – will be foregone. This is particularly unfortunate given the fact that the Air Force and DOD participated in every phase of Reuse Plan development and encouraged the community in its focus on Rome Lab.

- **Immediate Consequences are Severe.** The combined impacts of the 1993 and 1995 BRAC decisions will have an unusually harsh impact on the Rome community.

ECONOMIC IMPACT: JOB GROWTH RESULTING FROM A NEW PUBLIC/PRIVATE PARTNERSHIP WILL BE PRECLUDED

A critical goal of the BRAC process is to assist in the retooling of the country's economy, allowing communities to generate growth as they move from a military to a civilian economy. The proposed closure of the Rome site undermines the credibility of the BRAC process, because it nullifies the community's efforts to develop a Reuse Plan that achieves that aim.

- **The Reuse Plan Features a Collaborative Partnership Between the Military and the Community.** The Reuse Plan that the community has developed actively seeks to contribute to the Lab's achievement of cost effective stand alone status. It features a partnership between the public and private sectors to develop a research-based commercial park that will establish the Lab as a more productive asset for both the military and the region.

- **The Plan is a Model for New Business Growth.** The Plan will result in new business growth and could serve as a model for other communities trying to strike a balance between the demands of a downsized military and the challenges of a civilian economy transforming to the information age.

- **The Reuse Plan will Enhance Technology Exchange.** Development of the commercial park envisioned by the Reuse Plan will result in greater technology exchange — leading to enhancement of the military mission, improvement of the nation's competitive position in information technology development, and significant regional economic development.

ECONOMIC IMPACT: PROGRESS TOWARD IMPLEMENTATION OF THE JOB-GENERATING PARTNERSHIP HAS BEEN MADE

A variety of entities have already recognized that the public/private partnership which is the central feature of the Reuse Plan is the essence of the ideal reuse plan and is the best means of redeveloping the site.

- **Public Funding Commitments for NYSTEC have Already been Received.** Among the most significant of these is the $12 million, five year commitment of State funds to the New York State Technology Enterprise Corporation (NYSTEC), which will work with the Lab to identify, develop and facilitate the transfer of Lab technologies to non-military users. The President himself has offered encouragement to this effort.

- **Implementation of NYSTEC is Underway.** NYSTEC is to be operated by the well-regarded Syracuse Research Corporation. NYSTEC headquarters have already been designed and will be located adjacent to the Lab. In addition to containing space for NYSTEC staff, the headquarters will include new research facilities for the Lab.

ECONOMIC IMPACT: THE VISION OF A PUBLIC/PRIVATE PARTNERSHIP WAS DEVELOPED WITH THE SUPPORT OF DOD

The community's Reuse Plan, which will accomplish vital military and BRAC goals, received the support and encouragement of DOD officials at every stage of development.

- **Closure is Recommended Despite Assurances to the Contrary from the Air Force.** During and subsequent to the BRAC 1993 decision, the community sought and received assurances from the Air Force that the Lab would remain in place for at least five years.

- **The Reuse Plan Has Been Pursued with DOD Encouragement.** DOD and other federal officials who have overseen the development of the Plan have encouraged the community in its pursuit of a Rome Lab-oriented development vision.

ECONOMIC IMPACT: THE DOD RECOMMENDATION WILL HAVE DIRE, IMMEDIATE CONSEQUENCES FOR THE REGION

The proposed restructuring of the Lab represents an inconsistent application of the "cumulative economic impact" criterion employed by DOD in evaluating installations for closure or realignment.

- **DOD Acknowledges the Grave Impact on the Local Economy.** DOD itself notes that the cumulative impact of the BRAC 1993 and proposed BRAC 1995 decisions on the Rome community will be greater than in any other community in the country experiencing an Air Force installation closure or realignment. Notwithstanding this recognition, the Air Force recommended the Lab for closure.

- **Other Services Appear to have Given Cumulative Economic Impact More Weight.** The Secretary of the Navy indicated that four California installations were not recommended for closure in this round because of the cumulative economic impact of prior rounds of BRAC. Thus the weight given cumulative economic impact appears to vary inexplicably among the services.

- **The Impact of Loss of High-Skilled Civilian Jobs Has Not Been Taken Into Account.** The DOD-reported impact on Rome would be even greater if it took into account the fact that the loss of highly skilled, professional, civilian jobs has a far greater effect on a community's economy than the loss of military jobs. This consideration should be part of the economic impact assessment.

WHY ROME LAB SHOULD BE PRESERVED: *CONCLUSION*

CONCLUSION: CLOSURE WOULD DEVIATE SIGNIFICANTLY FROM THE FORCE STRUCTURE PLAN AND BRAC CRITERIA

The Rome community urges the BRAC Commission to find that DOD's recommendation to close the Rome site of the Lab significantly deviates from the Force Structure Plan and the established criteria on these grounds:

- **Military Value Will be Compromised.** The Lab's mission is critical to the military. Achievement of the mission is dependent on technology exchange, existing skill in which will be destroyed.

- **The Estimated Return on Investment is Grossly Overstated.** Capital and operating costs required to implement the recommendation will be significantly higher than those projected by the Air Force. Savings will be significantly less than those projected.

- **Devastating Cumulative Economic Impacts Have Been Ignored and the Potential for New Growth Precluded.** The recommendation ignores the DOD-determined cumulative economic impact on the Rome community. The restructuring would also destroy Reuse Plan-created opportunities to generate new civilian jobs.

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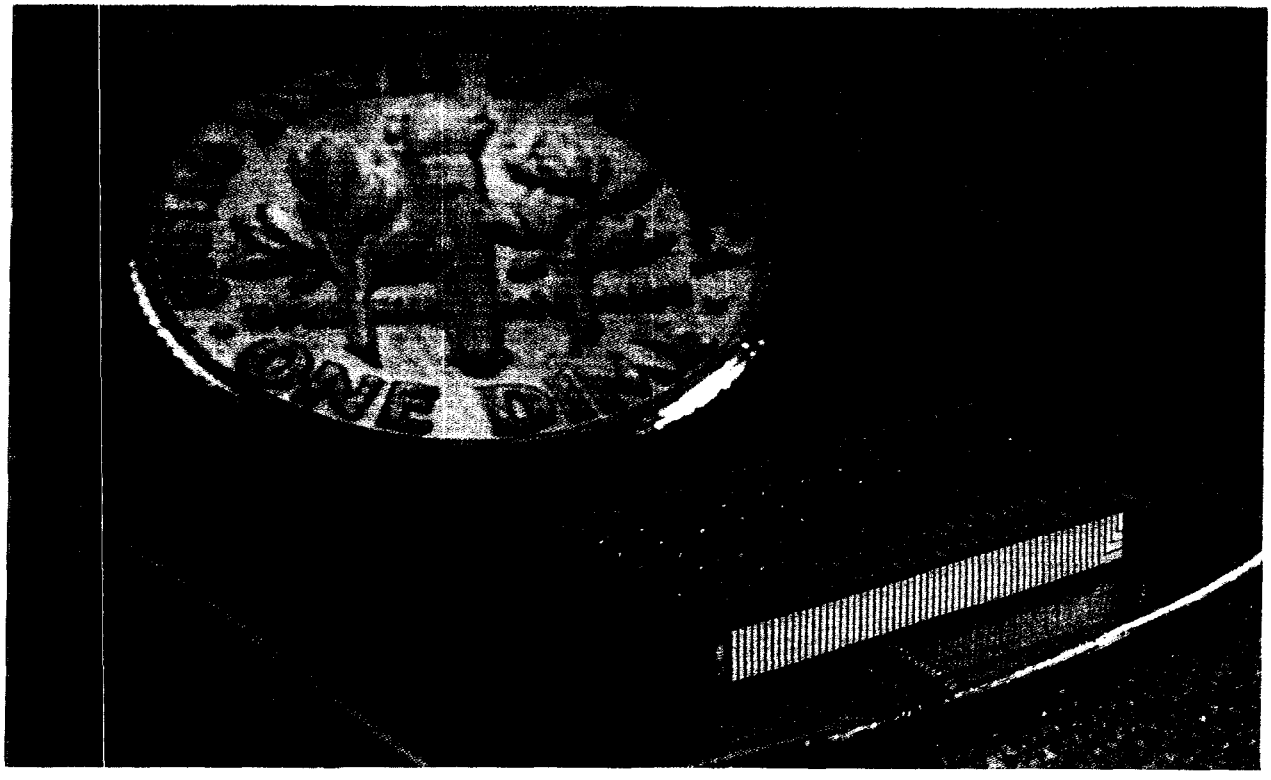
Tomorrow's IC Today by Irvine Sensors.



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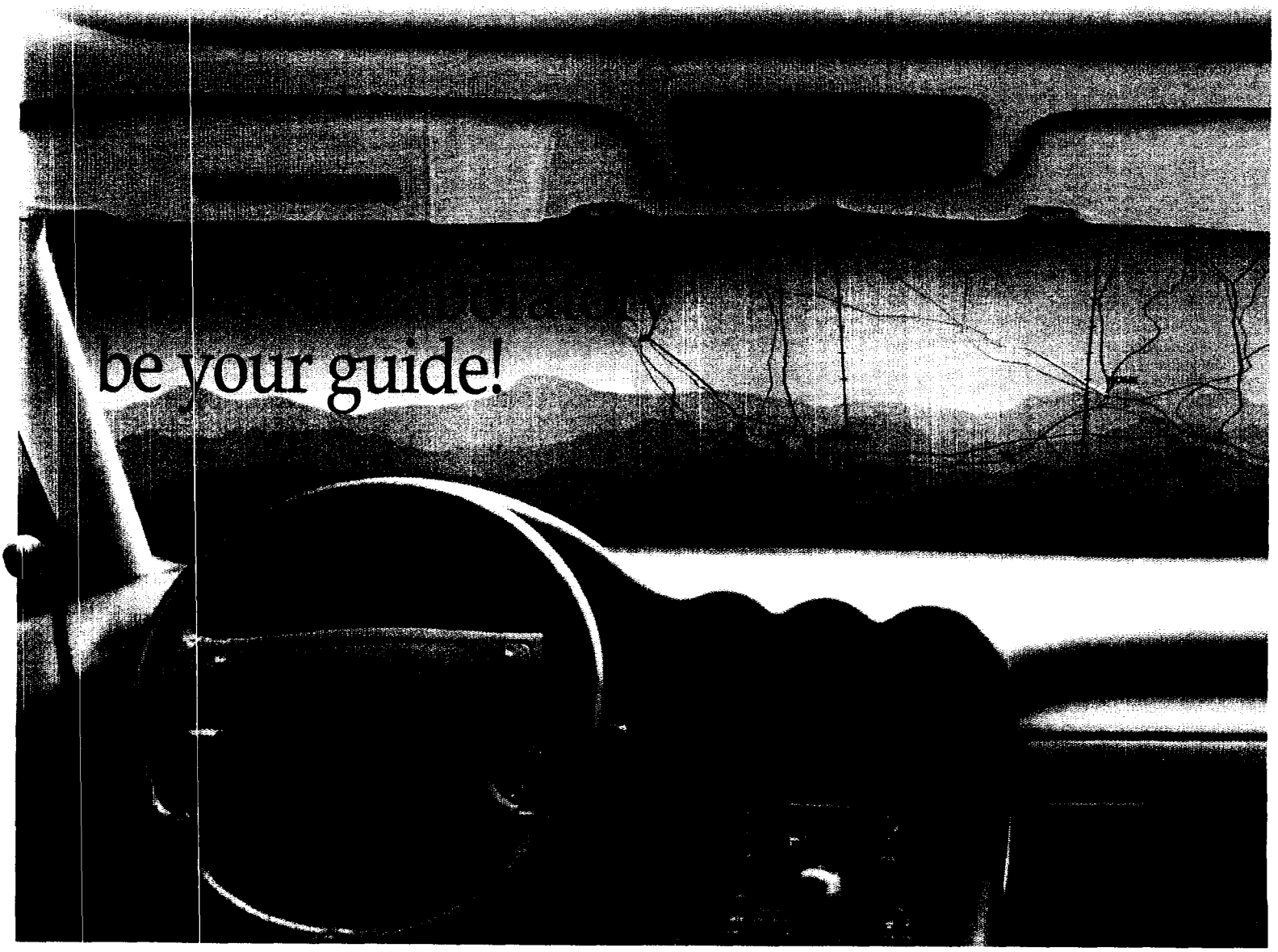
When you don't know how to get there from here,



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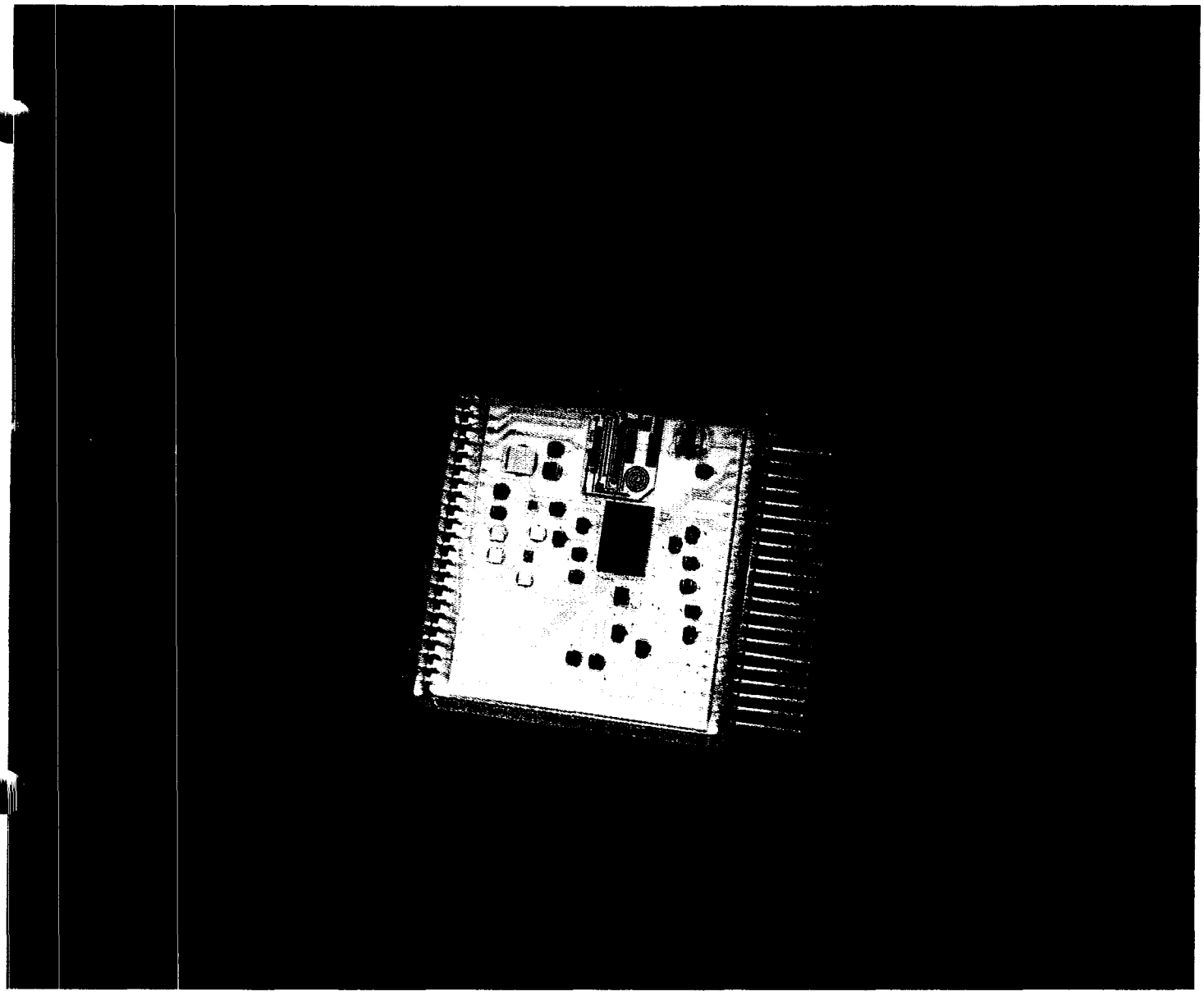

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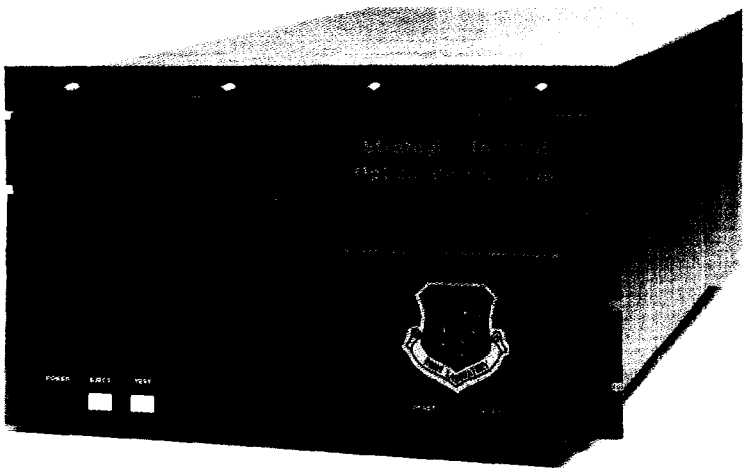
Photography: Michael Beaudette

At Rome Laboratory, this is not your average CD player.



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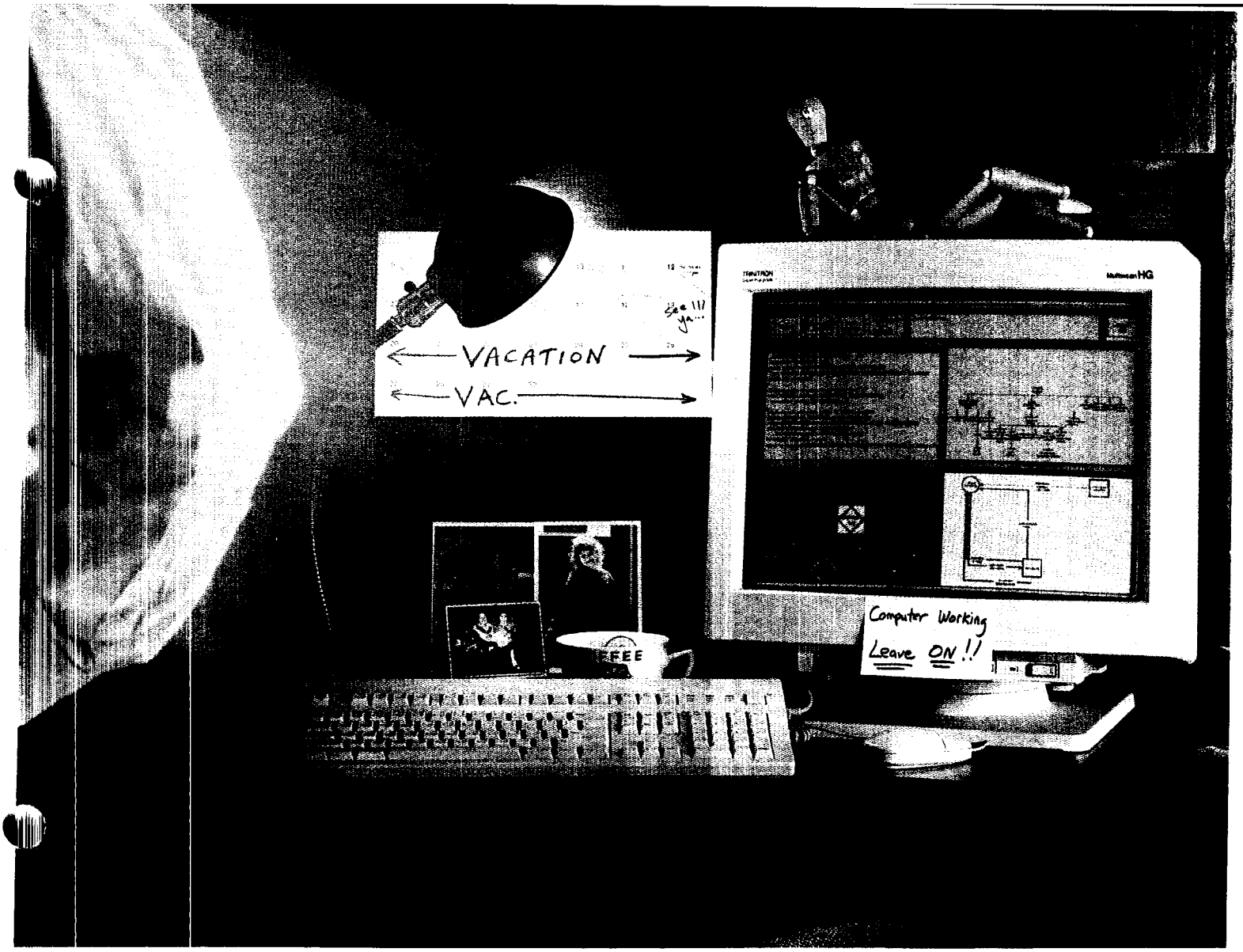

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Photography: Albert Santacroce & Michael Beaudette

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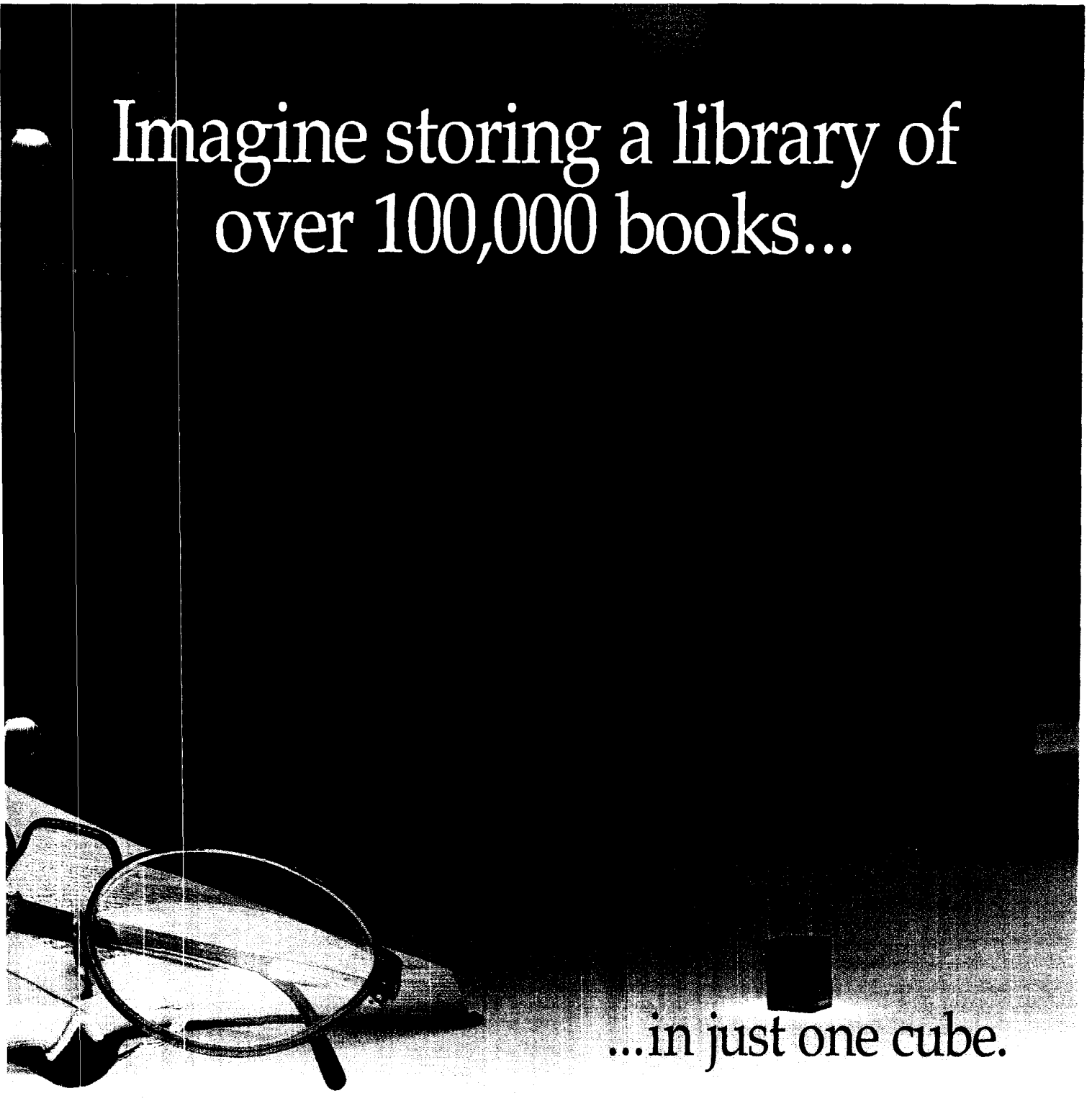

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Reader Service No. 103

BASICS OF REUSE

Rome Lab Research Park

The Master Reuse Strategy for Griffiss AFB

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In response to the BRAC '93 recommendation to substantially realign Griffiss Air Force Base, the community of Central New York's Mohawk Valley set out to develop a national model for creative and responsible reuse planning. The culmination of this effort was the creation of the Rome Lab Research Park – a military/civilian cooperative vision that builds upon a technology-based foundation to establish a public/private research and commercial environment for the 21st Century.

We believe that this plan is an essential element in understanding why Rome Lab's future as a military resource would be most valuable if the Lab remains in place. Furthermore, the vision for a Rome Lab Research Park becomes only more compelling when one's perspective is expanded to consider the economic implications of the base reuse process.

This section sets forth the key elements of how the reuse plan relates to the Rome Lab decision. Where appropriate, we have provided background materials that elaborate upon these points.

Rome Lab Research Park is exactly what base reuse should be about. It would be short-sighted to close the book on this unfolding public/private success story.

The Rome Lab Research Park represents the very essence of what base reuse is supposed to be about. The plan is a partnership that serves as a catalyst for new business growth and as a model for achieving a balance between the demands of a downsized military and the challenges of a civilian economy transitioning to an information age. It is not the mere shifting of assets and liabilities from federal to local governments, nor a narrow-minded effort to lure businesses from one region to another. Economic development cannot be about zero-sum solutions. The opportunity to reuse closed or realigned military bases represents a critical link in the retooling of America. We must take new approaches that transcend traditional notions of public or private, military or civilian. Rome Lab Research Park is just such an approach.

Ultimately, base reuse and economic development is about jobs. By the military's own calculations, the Rome-Utica area in New York will experience the most negative job impact due to Air Force actions of any area in the United States. Over 3,000 New York State jobs will be immediately impacted by proposed Rome Lab

closure. More important, though, while short-term job loss can be devastating, the appropriate focus for base reuse is the future. Over the next 20 years, it is estimated that the Rome Lab Research Park plan could yield over 8,000 jobs that are of the kind we as a nation are seeking to create – jobs grown out of high technology entrepreneurship and forward thinking public/private partnerships. This is what base reuse should be and must be all about.

The Rome Lab Research Park represents a shared military/civilian vision for research and technology cooperation in the 21st Century.

The public/private reuse vision for Griffiss is built upon an existing dynamic where technology ideas and applications flow back and forth between military and commercial users is an evolutionary process of mutual benefit. We call this concept *technology exchange*. The reuse plan for Griffiss leverages this concept by placing Rome Lab among new and expanding high tech businesses, many of which have been nurtured by the military and with which new technology relationships can thrive. The plan's goal is to leverage this dynamic in order to both support the military mission and boost the regional economy.

Under the 1993 proposed realignment, Rome Lab was to become a "stand-alone" facility. The concept of a "stand alone" military research laboratory, however, is something of a misnomer. Unlike combat missions, laboratories have a natural and, indeed, essential need to be linked to a vast array of university and private business researchers and technicians. Rather than "standing alone," these military facilities can be positioned to operate amidst newly established public/private research parks such as is proposed for Griffiss. Indeed, this military/civilian technology exchange vision is at the heart of the plan for Rome Lab Research Park.

The Air Force has embraced the "stand alone" vision for several of its other laboratories, particularly in the context of supportive research environments.

Due largely to the potential of technology exchange, the idea of "stand-alone" laboratories has come to be embraced by the Air Force and others. The potential for "stand-alone" laboratories is explicitly invoked by the Air Force in their defense of several actions under the 1995 BRAC recommendations.

- In reference to the proposed realignment of Kirtland AFB, wherein it is proposed that Phillips Laboratory, another of the Air Force's "super labs", remain in place, the Air Force's justification specifically cites that this activity is "capable of operating with minimal military support." (see DoD's Report to the Commission, Volume V, page 49 of the Executive Summary).

- When discussing a reversal of a 1991 BRAC decision to relocate Armstrong Lab from Williams AFB in Arizona, the Air Force's justification includes the following:

> It [Armstrong Lab] is largely a civilian operation that is well-suited to remain in a stand-alone configuration.....the present facilities are consolidated and well-suited to research activities, including a large secure facility...the activities are consistent with the community's plans for redevelopment of the Williams AFB property, including a university and research park.

Simply put, this passage provides an elegant defense for why Rome Lab would be best-suited to remain as a "stand-alone" facility at the core of the Rome Lab Research Park.

The New York State Technology Enterprise Corporation (NYSTEC) was created to ensure the success of Rome Lab Research Park.

In order to maximize the prospects for forging the successful business and research-based relationships with Rome Lab and In conjunction with the State of New York, the community created NYSTEC – The New York State Technology Enterprise Corporation. Infused with over $4 million of State funding NYSTEC's primary mission is to identify, develop, and facilitate opportunities for the development of dual-use technologies with non-military entities. An important part of NYSTEC's mission is to develop a non-DoD, but not necessarily non-government, customer base for Rome Lab's ongoing research. A diverse customer base not only aids Rome Lab but promotes good economic development policy.

The already designed NYSTEC headquarters is slated for a newly assembled site immediately adjacent to Rome Lab at the core of new Rome Lab Research Park. In addition to housing NYSTEC, this state-of-the-art facility will provide cost-effective space for several Rome Lab operations. From this location, the NYSTEC team will assist businesses both on- and off- site in developing cutting edge technologies which will have tremendous military *and* commercial value well into the 21st Century. A rendering and plan for the NYSTEC facility is attached.

The driving force behind NYSTEC is not a dream but a reality. Rome Lab is already a national model for technology exchange. The Lab has nurtured numerous research and development companies in Central New York and has been a recognized leader in leveraging outstanding commercial and academic research to enhance the military's technological supremacy. Whether in areas such as forensics collaborations with our State Police, or with NYNET, a national prototype for the Information Highway, led by NYNEX and Rome Lab with a consortium of New York State-based businesses and universities, the Lab is at the forefront of using technology to at once protect the national security while building the nation's prosperity.

NYSTEC is but another reason why the case is so strong for keeping Rome Lab where it is, at the core of the Rome Lab Research Park. The NYSTEC plan has been widely applauded. The attached exhibits include a letter of support from the President of the United States.

The Community responsibly sought and received support from DoD officials in developing the plan for Rome Lab Research Park.

Even amidst the 1993 BRAC deliberations, the community recognized that Rome Lab might provide an effective foundation for reuse. Cognizant, however, of the precarious nature of the closure and realignment process, the community sought some assurance that the Lab's future in Rome was sufficiently safe to focus resources on developing a reuse plan that not only built upon the Lab's strengths but also created an environment that would enhance the ongoing research activities within the Lab itself. True, then, to the goals of the base reuse process, the Griffiss community worked closely with the federal government in preparing a reuse strategy. Numerous DoD officials were briefed. Others were at least aware of the plan. The Office of Economic Adjustment not only generously funded the effort but embraced it as a model of responsible and creative planning. Internally, members of the Rome Lab staff were enthused that the proposed reuse environment would support their military mission.

Ultimately, the impetus to take this direction was fueled not only by DoD's support, but by the recognition that the Rome Lab Research Park plan was good for both the economy and for the military. The attached letter from James Boatright, obtained during BRAC '93, is an example of the types of assurances that were sought and received in conjunction with the Griffiss realignment. The second letter, from Air Force Under Secretary Rudy de Leon, is an example of the kind of support that the community received during the reuse process.

Rome Lab Research Park enhances the Lab's standing under the BRAC '95 Criteria.

Ultimately, the BRAC Commissioners' mission is to evaluate DoD's recommendations according to eight established criteria. For Rome Lab, this mission is complicated by the fact the Lab ranked so highly in the Air Force's analysis, and yet eventually was recommended for closure. Rome Lab Research Park does not dispositively secure Rome Lab's standing under any of the BRAC '95 criteria. It does, however, provide considerable support on several fronts for why Rome Lab should remain in place. Briefly summarized, the Rome Lab Research Park's relevance for BRAC categories are as follows:

Military Value – The reuse plan for Griffiss AFB explicitly seeks to create a technology-based environment that will assist the Lab in maintaining its hold on the cutting edge of C4I and related research. In considering the military value criteria,

and especially Rome Lab's capacity to enhance DoD operational readiness, the Rome Lab Research Park is unquestionably an asset.

Return on Investment – Costs savings are an important part of the ROI analysis. One of the attractions of the Rome Lab Research Park plan is that it offers the potential for operational cost savings to Rome Lab based on economies of scale that can be achieved with multiple site users, instead of just one or two military facilities. Further amplification of this point will be possible once DoD is able to provide the full portrait of their baseline operating analysis.

Impacts – Rome Lab Research Park has the potential to dramatically affect the lives of thousands of citizens in Central New York. It has already been noted, that, based on Air Force actions, the Utica-Rome MSA is the worst hit area in the nation. But, more important, the Rome Lab Research Park has the potential to generate over eight thousand high-quality jobs in the region, and to provide a model for how bases can be successful reuse for economic development. The impact of killing that opportunity now, by relocating Rome Lab, will be devastating.

***

Steven J. DiMeo
Executive Director

March 31, 1995

Alan J. Dixon, Chairman
Base Realignment and Closure Commission
1700 North Moore Street
Arlington, Virginia 22209

Dear Mr. Dixon:

Attached are materials for inclusion your loose leaf binders entitled *Rome Lab Research Park -- Facts for Consideration* that were sent to you earlier this month. We hope that these materials will be of assistance as you continue your deliberations. The materials, which have been marked to show where they should be inserted in the binders, make these basic points:

The recommendation to split and relocate Rome Laboratory represents a substantial deviation from the Force Structure Plan and the established criteria:

No Return on Investment. The Air Force's hastily made decision is replete with omissions and mistaken assumptions. Costs have been understated, and recurring savings have been overestimated. An analysis correcting for these errors suggests that a return on investment is far more likely to be achieved in 100+ years, not the four years suggested by the Air Force.

Loss of Military Value. Relocating the Laboratory, which, according to every observer including the Air Force, superbly performs a mission of unquestioned importance, will significantly degrade military value. This degradation will occur as a function of the destruction of professional networks among staff and between staff and the surrounding academic and industrial community, networks upon which the Laboratory's military value is based.

Extraordinary Economic Impact. The cumulative economic impact of this and the previous round of BRAC will have a greater impact on the Rome community than on any other such community in the nation. In addition to the 10,000 jobs the Air Force estimates will be lost, an additional 18,000 potential jobs will be lost as a consequence of inability to realize the vision of the Rome Lab Research Park.

We look forward to welcoming you to the Rome Lab community and to elaborating on these points on April 5.

Sincerely,

Raymond A. Meier

Raymond Meier,
County Executive

Joseph A. Griffo

Joseph Griffo,
Mayor

GRIFFISS
Local Development Corporation
153 Brooks Road
Griffiss AFB, New York 13441
Phone (315)338-0393 Fax (315)338-5694

THE WHITE HOUSE

WASHINGTON

October 25, 1994

The Honorable Mario M. Cuomo
Governor of New York
New York, New York

Dear Mario:

Thank you for your recent letter informing me about the formation of NYSTEC, the New York State Technology and Enterprise Corporation. I was pleased to learn that the State of New York has pledged its support to working with Rome Lab to develop and implement dual use technology projects.

As I am sure you are aware, since 1980 Congress has enacted a series of legislative measures mandating that technology transfer be incorporated as part of the essential missions of the military services. My Administration has sought to underscore this congressional imperative by making the promotion of dual use technology an important part of my agenda for the retooling of America in the post-Cold War era.

It is encouraging to hear that New York State and Rome Lab are developing such an exciting project. I truly believe that as the nation moves forward, the next generation of economic development efforts must develop public-private partnerships, such as NYSTEC, focused on dual use technologies.

Congratulations on this important project. Please keep me advised on your efforts.

Best wishes.

Sincerely,

Bill Clinton

STATE OF NEW YORK
EXECUTIVE CHAMBER
ALBANY 12224

MARIO M. CUOMO
GOVERNOR

October 20, 1994

Dear Mr. President:

I am writing to inform you of an exciting development in science and technology taking place in conjunction with the Air Force's Rome Laboratory. On October 3, New York State issued a Request for Proposals to create a new organization, the New York State Technology Enterprise Corporation (NYSTEC), dedicated to dual-use technology. As I mentioned in my letter to you of May 19, NYSTEC is an innovative initiative that can serve as a national model for state-federal partnerships to advance dual-use technology.

NYSTEC, a not-for-profit corporation, will be committed to providing technology transfer and related services to Rome Laboratory, the Air Force's "superlab" charge with the furtherance of information sciences and technology, located at Griffiss AFB in Rome, New York. The State has allocated $2 million to establish NYSTEC, and anticipates requesting an additional $10 million for operations through 1999.

NYSTEC's primary purpose is to identify, develop and facilitate opportunities for the development of dual-use technologies to non-military users. This, coupled with the work Rome Lab currently does for the Air Force, makes Rome Lab a very valuable resource for the nation.

NYSTEC plans to carry out the following functions to achieve its mission:

- Applications Engineering -- NYSTEC will employ a growing cadre of scientists and engineers who will work closely with Rome Lab scientists to assist in the actual adaptation and conversion of military products to non-military and commercial applications.

- Marketing -- NYSTEC will address the emerging needs of commercial industry and government from throughout the United States that can be competitively addressed by Laboratory resource.

PRINTED ON RECYCLED PAPER

NYSTEC will be a vivid demonstration of partnership among the military, the State and the community. Using State financial resources and Rome Lab expertise, NYSTEC will be a model for a new form of military contribution to the development and growth of commercial companies throughout the United States. It will also facilitate the transfer of technology to non-military public uses like law enforcement and transportation innovations.

NYSTEC is consistent with the dual-use technology initiative that has been promoted by your Administration. NYSTEC will also contribute to your efforts to stimulate the economy and to improve the global competitiveness of American industry.

As you can see, Mr. President, "tech transfer" is happening, it is happening now, and it is happening in New York. I look forward to working with your Administration on this important venture.

Sincerely,

Mario M. Cuomo

The Honorable Bill Clinton
President of the United States
1600 Pennsylvania Avenue
Washington, D.C. 20500

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

file

OFFICE OF THE UNDER SECRETARY

June 1, 1994

JUN 1994
RECEIVED

Mr. Steven J. DiMeo, Executive Director
Griffiss Redevelopment Planning Council
325 Brooks Road, Suite 210
Griffiss Air Force Base, New York 13441-4501

Dear Mr. DiMeo:

Thank you for your informative presentation on the progress made by the Redevelopment Planning Council in the successful realignment of Griffiss Air Force Base.

It is encouraging to see the Rome/Griffiss community pull together to face the challenges of the base closure process. I know that this community will serve as an ideal model for future bases facing similar difficulties as we continue to downsize our military.

Sincerely,

Rudy de Leon

STATE OF NEW YORK
EXECUTIVE CHAMBER
GEORGE E. PATAKI, GOVERNOR

Press Office
518-474-8418
212-417-2126

FOR RELEASE:
IMMEDIATE, THURSDAY
February 23, 1995

GOVERNOR ANNOUNCES FUNDING TO HELP ROME LABS

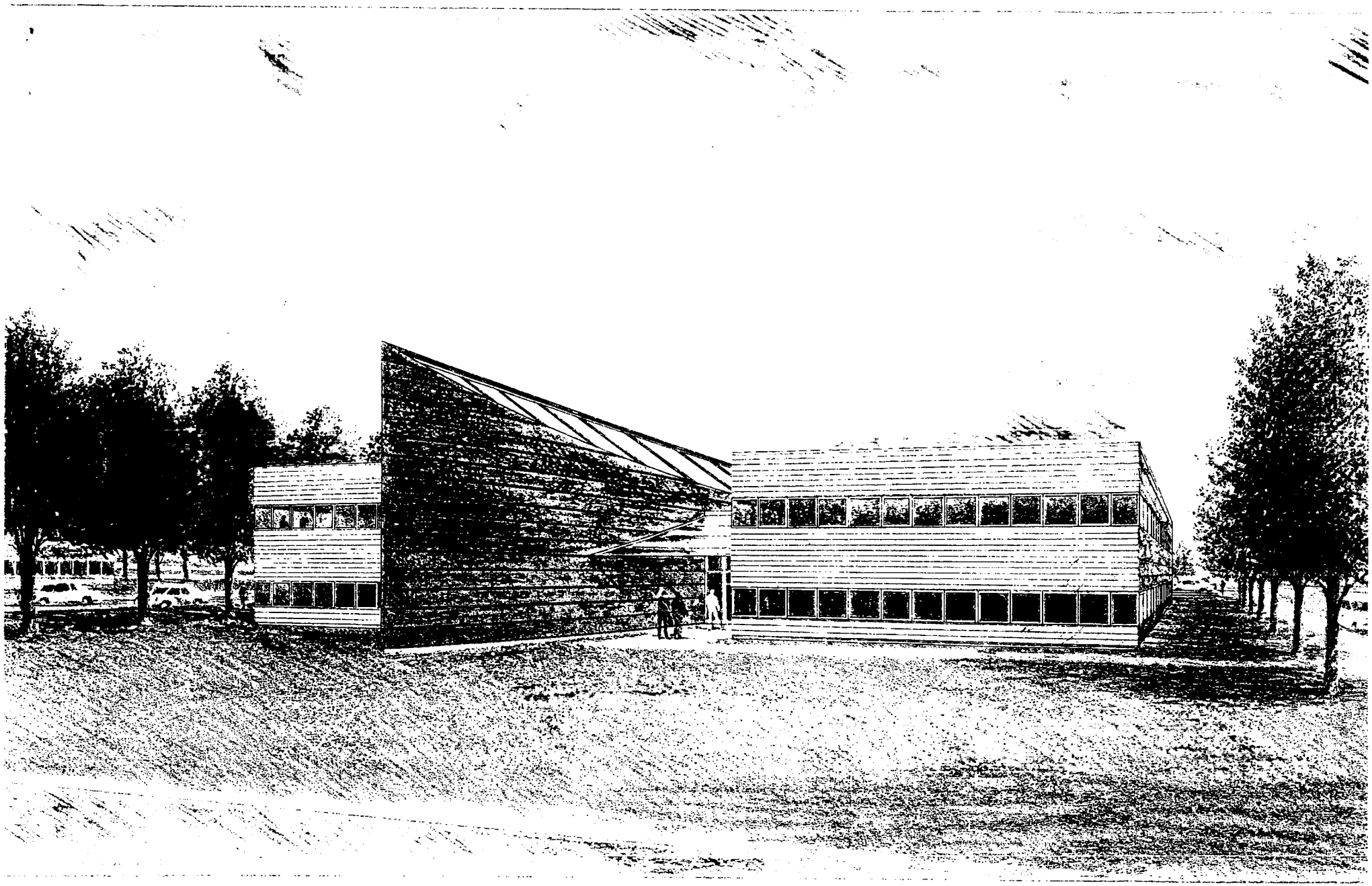
Governor George E. Pataki today announced the approval of up to $2.2 million in state funds for the establishment and creation of the New York State Technology Enterprise Corporation (NYSTEC), a not-for-profit organization that will utilize the resources of Rome Laboratory in the development and promotion of "dual-use" technologies by New York companies and the federal government.

"New York State has a tremendous resource in Rome Lab, one of only four U.S. Air Force 'super' laboratories in the country," Governor Pataki said. "Working together with Rome Lab and local leaders from the Mohawk Valley, we have formed NYSTEC as a means of helping both New York companies and military organizations to commercialize technologies developed at the Lab, thereby ensuring long-term economic growth across our state."

Commissioner of Economic Development Charles A. Gargano said funding was approved today by the Executive Committee of the Science and Technology Foundation Board of Directors. Mr. Gargano also serves as Chairman of the Foundation.

The Executive Committee authorized the Science and Technology Foundation to negotiate and execute a contract with Syracuse Research Corporation (SRC) for operation of NYSTEC. SRC, a not-for-profit organization, was among seven firms to submit final proposals on response to a Request for Proposals issued by the Foundation last October. The proposals were reviewed by a team of senior foundation staff and private-sector executives.

Under terms of the contract, SRC will be required to work directly with Rome Laboratory management to build the technical support necessary for collaboration with non-military industries and the development of dual-use technologies.



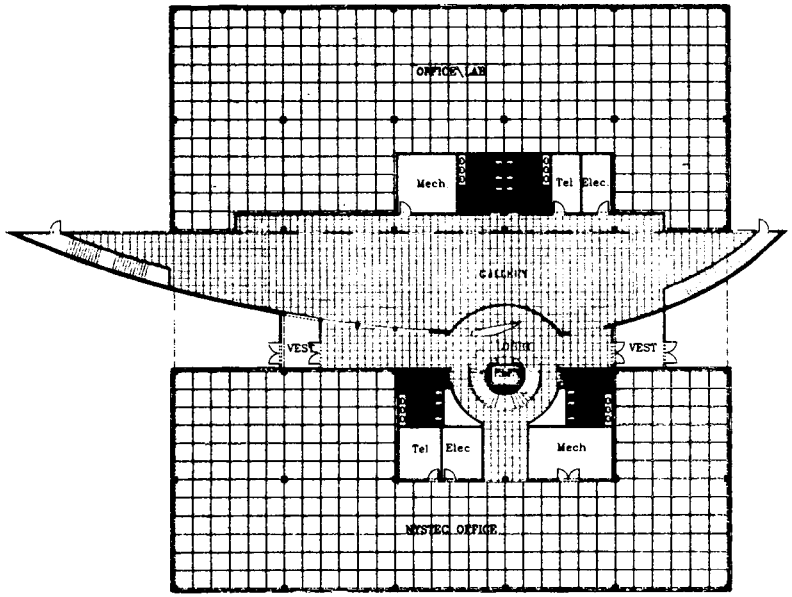
SASAKI ASSOCIATES, INC.

NYSTEC

Center For Technology Transfer

Rome, New York

OCTOBER 17, 1994

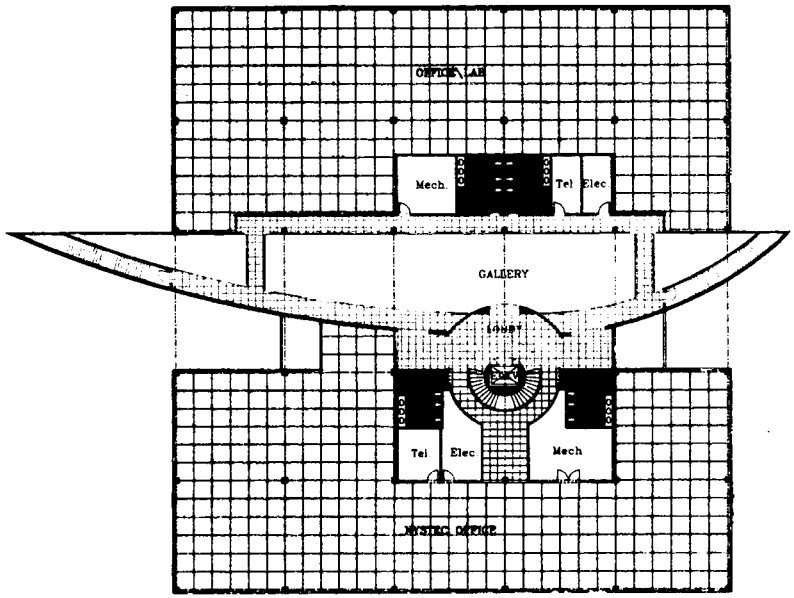


FIRST FLOOR PLAN

SASAKI ASSOCIATES, INC.
OCTOBER 17, 1994

NYSTEC
Center For Technology Transfer
Rome, New York

SCALE:



SECOND FLOOR PLAN

SASAKI ASSOCIATES ,INC.
OCTOBER 17,1994

NYSTEC
Center For Technology Transfer
Rome , New York

SCALE:

TESTIMONY OF
GEORGE E. PATAKI
GOVERNOR
NEW YORK STATE

BEFORE THE 1995
DEFENSE BASE CLOSURE AND REALIGNMENT COMMISSION

MARCH 16, 1995

The 1995 Defense Base Closure and Realignment Commission, under former Sen. Alan Dixon's able leadership, is sending a positive and important signal today as it convenes a hearing on the challenges associated with the reuse of military installations across the United States. It is encouraging that the Commission is focusing much-needed attention on the long-term repercussions of its actions. As the Commissioners know well, the Base Realignment and Closure Commission (BRAC) recommendations represent not the end, but rather the beginning of long and complex efforts to transform significant parts of the nation's military landscape into productive civilian assets.

A healthy debate is going on in this country regarding the role of our military in the post-Cold War era. There is a clear consensus, however, that in this new era, we must reduce the massive physical infrastructure which has been built up at military installations across this country over the course of the last 50 years. This restructuring is a difficult process for countless communities, including many in New York State. I firmly believe, however, that this process can and must provide tremendous opportunities for economic development. As a nation, we must look to forge new partnerships that

embrace the realities of the 21st century economy and that maximize the value of these closed and realigned facilities.

I would have hoped to use this statement today to boast about the tremendous success that we have had in New York State in building a model reuse plan at Griffiss Air Force Base - a plan that represents a shared vision between military and civilian leaders to create a technology-based partnership for the future based on the continued presence of a "stand alone" Rome Laboratory. Unfortunately, I must address this plan today in the context of the recently-announced decision to break up Rome Laboratory -- one of the Air Forces premier "super labs" and arguably the Department of Defense's (DoD) leader in the information technology field of C4I (Command, Control, Communications, Computers and Intelligence). General Shalikashvili himself cites C4I as one of the most important areas of America's future military strength.

The proposed action to break up Rome Laboratory, will be closely scrutinized over the next several months and, I believe, when the process is done, the collective wisdom of the Commission, with DoD's support, will see fit to reverse this recommendation. The subject before the Commission today, however, is base reuse. And so, I will describe for you today New York State's experience in preparing a reuse strategy which was designed to enhance both the military effectiveness of Rome Lab and the State's potential for economic growth, and which now is threatened by DoD's 1995 BRAC recommendations.

The 1993 BRAC Commission recommended a substantial realignment of Griffiss Air Force Base in Rome, New York. The Community, of course, had actively sought to avert this action, but once the decision was made, leaders in Central New York's Mohawk Valley wasted little time, turned to the future, and began to craft an exemplary reuse plan. Following the proposed realignment, the greatest remaining resource at Griffiss was to be Rome Lab. The community, understandably, was apprehensive about relying upon the enduring presence of the Lab; but, after seeking reassurance from the Air Force regarding the Lab's future, the reuse team set out to develop a plan that would place Rome Lab at the center of a technology-based research and industrial park. During this process, the Griffiss team enjoyed the active participation of Air Force and DoD officials in developing what all involved hoped would be a model for responsible and creative reuse planning.

The public/private reuse vision for Griffiss is built upon an existing dynamic where technology ideas and applications flow back and forth between military and commercial users in an evolutionary process of mutual benefit. We call this concept technology exchange. The reuse plan for Griffiss leverages this concept by placing Rome Lab among new and expanding high tech businesses, many of which have been nurtured by the military and with whom new technology relationships can thrive. Under the 1993 proposed realignment, Rome Lab was to become a "stand alone" facility. Due largely to the potential of technology exchange, the idea of "stand alone" laboratories has come to be embraced by the Air Force and others. Part of the rationale for this support points up the term's misnomer for labs, since rather than "standing alone," such facilities are

increasingly being positioned to operate amidst newly established public/private research parks. In its 1995 BRAC recommendations, the Air Force explicitly recognized this positive dynamic when it proposed a stand-alone status for Phillips Laboratory - also an Air Force "super-lab".

In the Empire State, we try to leave as little as possible to chance. In order to maximize the prospects for forging the successful business and research-based relationships with Rome Lab which enhance technology exchange, we created, and funded with over $4 million, the New York State Technology Enterprise Corporation (NYSTEC). The entity is primarily charged with identifying and facilitating opportunities for the development of dual-use technologies between Rome Lab and a host of non-military, although not necessarily non-government, users. Headquartered at the core of the Rome Lab Research Park (the post-realignment Griffiss facility), NYSTEC will assist business in developing cutting-edge technologies which will have tremendous military and commercial value well into the 21st Century.

The driving force behind NYSTEC is not dreams, but reality. Rome Lab is already a national model for technology exchange. Not only has it nurtured numerous research and development companies in Central New York, but Rome Lab has been a recognized leader in leveraging outstanding commercial and academic research to enhance the military's technological supremacy. Whether in areas such as forensics collaborations with our State Police, or NYNET, a national prototype for the Information Highway, led by NYNEX and Rome Lab with a consortium of New York State-based

business and universities, the Lab is at the forefront of using technology to at once protect the national security while building the nation's prosperity.

The Rome Lab Research Park represents the very essence of what base reuse is supposed to be about but so rarely is -- not the mere shifting of assets and liabilities from federal to local governments, nor a narrow-minded effort to lure businesses from one region to another; but, rather, the development of a partnership that serves as a catalyst for new business growth and as a model for achieving a balance between the demands of a downsized military and the challenges of a civilian economy in transition to an information age. Economic development cannot be zero-sum solutions. The opportunity to reuse closed or realigned military bases represents a critical link in the retooling of America. We must take new approaches that transcend traditional notions of public or private, military or civilian. Rome Lab Research Park is just such an approach.

At the end of the day, economic development is about jobs. By the military's own calculations, the Rome-Utica area in New York will experience the most negative job impact due to Air Force actions of any area in the United States. As Governor, my mission is protect the State's economy, whether it means one job or the over 3,000 jobs that will be immediately impacted by the proposed Rome Lab closure. More important, though, my job is to secure the State's economic future. Short-term job loss can be devastating and we have had more than our share. But, with the Rome Lab Research Park plan, I am not talking about just holding on to the status quo. Over the next 20 years, it is estimated that this plan could yield over eight thousand jobs that are of the

kind we as a nation are seeking to create -- jobs grown out of high-technology entrepreneurship and forward-thinking public/private partnerships. This is what base reuse should be and must be all about.

On March 1, 1995, the reuse vision for Griffiss -- a vision that sought to advance the goals of both the community and the military - was thrown into disarray. The DoD's recommendation for Rome Lab was not a reduction in the scope of the military's laboratory mission but merely the relocation and disruption of a cohesive research enterprise. We will be making the appropriate arguments and believe that the case for rescinding the Rome Lab relocation recommendation can be made and won on the basis of military value. Today, however, we are talking about the role of base reuse in the nation's economic and military future.

We in New York State are not unaware of the long-term vulnerability of any military installation, including Rome Lab. In this case, however, the community responsibly marshaled the necessary support to create a mutually-beneficial civilian/military reuse vision that presumed the continued presence of the Lab. New York State premised its own investment of over $6 million largely on the importance of this vision. In a time of severe fiscal austerity, such investments are not made lightly. However, with the promise of a high-technology future leading to over eight thousand new jobs, I understood that this was an investment that we could not afford to pass up.

The shared vision for a Rome Lab Research Park was compelling when we created it in response to BRAC '93 and it remains so today. The irony of our situation is that our plan was developed in close cooperation with the Air Force and DoD officials.

Now, DoD's recommendations to the 1995 Commission threaten to undermine what is poised to be a collective success story. It would be painfully short-sighted to let this vision disappear. Regrettable decisions can be reversed. That is where good leadership can make a difference.

I would like to thank the Commission for the opportunity to present this testimony. I wish you well in a difficult and complicated process. This concludes my statement regarding the special challenges of reuse. It is not, however, the end of my State's efforts to bring about what we believe to be the right decision for both New York and the Nation. Thank you.

Joint Statement by
City of Rome Mayor Joseph Griffo and
Oneida County Executive Raymond Meier

Submitted on March 16th, 1995
Base Re-use Hearing

Griffiss Air Force Base Reuse Evaluation

In our capacities as representatives of the Griffiss Local Development Corporation (GLDC), we are very pleased to have this opportunity to submit testimony concerning the re-use of Griffiss Air Force Base. As you may know, GLDC is the local redevelopment authority that is responsible for developing and implementing a plan for the re-use of Griffiss.

Although it would be tempting to use this hearing to discuss the merits of rejecting the Department of Defense's recommendation to relocate Rome Laboratory to other parts of the country, we are aware that this is not the appropriate forum to make such arguments. To be sure, we look forward to the occasions when we will have such opportunities to present to the members of the Commission and your staff the overwhelming case in favor of the continued operation of Rome Lab at its current location.

In this regard, while we could argue that the Lab's absolute superiority in the development of new technologies has ensured the success of our military for generations, and that moving the lab would diminish the United States' technological edge, we will leave these discussions for another time.

Our testimony today will focus on the BRAC process, how it should be viewed as a single continuous effort rather than a series of disjointed actions taken by different entities. That is to say, if communities are ever to recover from the devastation that can be caused by the removal of military facilities, the process for determining a viable re-use for realigned bases must be fair and of integrity.

Simply stated, promises made by one set of BRAC Commissioners and officials at the Pentagon should be promises kept by all subsequent decision makers. The BRAC Commission was created and has been structured to allow for objectivity in the decision making process. Reversing decisions that were made after consideration of the merits of the issues not only removes that objectivity, but also can be the death knell of any community's efforts to recover from its loss.

When the Griffiss Air Force Base was realigned in 1993, people in Central New York, though understandably shaken, set about developing and implementing a re-use plan for the base. The plan, which has gained broad-based support in the community, seeks to build upon Rome Lab as the anchor of a high-technology research park.

Why use Rome Lab as the centerpiece of such a plan? The answer is three-fold. First, success seemed virtually assured due to Rome Lab's long record of working with the private sector to create "dual use" technologies based on its research and development. It seems as though the Lab is an irreplaceable asset that would serve to draw companies to the base,

and would help "grow" new companies in the area. Second, assurances given at the time of Griffiss' realignment led us to believe that the Lab would not be targeted for closure or relocation. Third, the master plan focused on aspects of Griffiss that can anchor the successful reuse of the base. Rome Lab and the linkage with NYSTEC is the anchor that makes the reuse of Griffiss possible.

By any measure, the indicators for the successful re-use of Griffiss Air Force Base are all positive. Rome Lab has an unparalleled history in transferring its advanced technologies into commercial use. Technology used to track SCUD missiles in the Persian Gulf War has been adapted to detect breast cancer. Radar technology developed at Rome has been used for cash registers. CD technology, "black boxes" and numerous other products we take for granted were developed at Rome Lab. With that kind of history, the economic viability of the realigned Griffiss Air Force Base seemed assured. Indeed, an estimated 8,000 jobs were to be created in the area over the next 20 years.

These projections were based not on hope alone. Rather they are a reflection of what has already happened in Rome New York. Companies like PAR Technologies, which started as a research partner of the Lab and today employs over 1,000 people involved in the manufacturing of new products that have been developed using technologies from the Lab.

To help facilitate the technology exchange process that would foster the growth of new companies like PAR, the State of New York created NYSTEC, the New York State

Technology Enterprise Corporation. With a commitment of funding from the state, NYSTEC is to be the link between the Lab, its research partners and private industry, enabling a better understanding of the technologies available, and how those technologies can be transferred to other uses.

And then February 28, it was announced that Rome Lab would be on the list of sites recommended for closure or realignment. In Rome and throughout New York, there is a feeling that even though we played by rules, the rug was taken out from under our feet.

The irony is that no other realigned base has the potential for success that Griffiss had. Rome Lab's past successes in technology exchange served the dual role of spurring technology-based economic growth in New York while enhancing the quality of Rome Lab's military mission. There is no telling what technologies could be invented, what industries could be established, what jobs could be created, were the re-use plan given a chance. That is why the original agreement was put into place. And that is why the reuse plan must be allowed to continue.

If this hearing is to evaluate the progress of reuse plans across the nation, you must consider the problem with reuse process itself. Let us be clear. We know of the importance of the BRAC process, and we stand firmly behind its painful but necessary mission. But the example being set at Rome, where plans have been made and are now being dashed, can only cause a loss of confidence in other communities now creating re-use plans across the nation. This is particularly true for bases that are being realigned. How can a community

develop a reuse strategy not knowing whether the realignment is a preview to eventual closure?

Where once investment was channeled and plans were made, now we might see hesitancy, insecurity and trepidation -- characteristics clearly detrimental to such large-scale and serious undertakings. Not only is the economy of Central New York in peril, not only is the irreplaceable infrastructure and resources of Rome Lab in jeopardy, but the integrity of the BRAC and re-use process is now at stake.

We will continue our efforts to implement the Griffiss re-use plan, even as we work to save Rome Lab. We sincerely hope this testimony has been helpful in assessing not only the Griffiss re-use plan, but the entire BRAC and re-use process in general.

Thank you.

MILITARY VALUE

Rome Lab

Military Value

***

Overview

- Rome Laboratory performs superbly at a function universally judged to be vital to the Air Force, as measured by all observers including the Air Force.
- Rome Laboratory's excellence is wholly based on the quality of its professional staff. Rome Lab *is* its people.
- Thus, its ability to continue to perform as well depends on maintenance of professional networks among Lab departments and with the surrounding industrial and academic community.
- Splitting and relocating the Lab will destroy those networks. Replicating the networks will be difficult or impossible, disruption is inevitable; hence, military value will be degraded.

***

Technological innovation is crucial to furtherance of the Air Force and the Department of Defense's missions.

It is unarguable that technological innovation – the advancement of which is the mission of Rome Laboratory – is crucial to preservation of military value. Over the years, the Air Force has recognized science's importance by granting its Chief Scientists extremely high level access to Air Force decision makers, by promoting technical officers to the highest ranks of service, and by encouraging its Scientific Advisory Board to play a very active role in Air Force policy making.

"In each of the two world wars of this century, new technologies debuted that revolutionized the way we fought...The revolution occurring today is in C4I."

General John M. Shalikashvili
Chairman to the Joint Chiefs of Staff
Testimony to the House Armed Services Committee
February 22, 1994

"A commander without the proper commander and control assets controls nothing except his desk."

General Ronald R. Fogelman
Chief of Staff, United States Air Force
Presentation to the American Defense Preparedness Association Symposium
December 15, 1994

Likewise, there is no one who will argue that research and development of command, control, communications, computer and intelligence (C4I) systems is not among the Department of Defense's top scientific priorities. (Some observers subsume computers in the other categories and call this area of technological development "C3I.") Advancement of C4I technology is Rome Laboratory's primary mission. Its highly regarded C4I work is conducted by an interrelated set of departments that have enjoyed a long and productive working relationship.

Rome Lab consistently performs superior C4I research and development.

Year after year, in technology area after technology area (or, as the Lab calls them, technology "thrusts"), Rome Lab's work has been rated as being of the highest quality and relevance to the Air Force by the Scientific Advisory Board. Late last year, when asked by the Laboratory Joint Cross Service Group to assess the Lab's military value, the Air Force stated that Rome Lab was a "Tier One" lab on a scale of one to three, one being the most valuable (see Exhibit 3-1). The Lab's diverse customer base – including the Air Force and other defense agencies – has consistently agreed with that assessment.

Maintaining scientific excellence depends upon preservation of personal networks among lab staff and their peers in the academic and industrial communities. A lab is only as good as its people.

The conduct of superior science is absolutely dependent on the ability of scientists to interact on a daily basis with their peers in related fields. This is particularly true of materials and systems research where many advances are dependent on cooperation and collaboration among researchers in related fields. The Department of Defense recommendation to split and relocate Rome Laboratory erroneously suggests that C4I research can be advanced by

small, discrete departments working without the benefit of day to day interaction with their peers in related fields and at related institutions.

Top research managers and scientists agree that face to face interaction among colleagues in inter-related fields is essential to the conduct of superior science. They note that these relationships are often the single greatest strength of a research organization. In the words of one such scientist, the value of these relationships often offsets the value of any savings – which, in this case, do not in any event exist – that are projected to accrue as a consequence of relocation.

Although various means of telecommunication (e.g., the internet and electronic mail) permit coordination of research, they cannot replace the inter-personal by-play, sharing of lab space, conduct of joint projects, exchange of personnel among related labs, and other means of achieving face-to-face communication that are possible in a large, heterogeneous laboratory located in a region of thriving scientific activity. We call the result of this formal and informal interaction *technology exchange*.

A variety of academic studies demonstrate that such communication is essential to maximizing productivity and obtaining technology exchange, due to the fact that new ideas flow more freely and are more easily received in an organization which has a high degree of social interaction. As discussed in greater detail in Exhibit 3-2, academic findings include:

- Individuals rely heavily on social interaction to help direct their own opinions about new technology.
- Not only the level of interaction, but also the size of the network determines the likelihood of innovation.
- Innovation has been shown to be positively correlated with the diversity of experience of the work force.
- The speed with which innovation is achieved is dependent on the strength of links between related disciplines. Developing strong inter-disciplinary links requires direct personal contact across functions, establishment of liaisons in each unit, and encouragement of inter-disciplinary project teams

In sum, the larger, the more diverse, and the more frequently used an employee's interpersonal network is, the more productive that worker will be in creating and implementing new technology. The bottom line is – a lab is only as good as its staff and the people with whom those staff interact regularly.

As argued below, Rome Laboratory has successfully used all available mechanisms for engendering technology exchange that leads to the generation of military value. These include collaboration among departments and with the industrial and academic community

surrounding the Lab. All these relationships will be destroyed by the move; none will be easily replicated at the new locations. Rome Lab should be viewed as a model for other technology exchange centers, not a candidate for elimination.

Personal interaction vital to the preservation of military value will be destroyed as a consequence of dramatic attrition.

The damage to inter-departmental networks and academic/industrial collaborations would be severe if every staff member of the Lab were to move with the Lab to the designated new location. But every staff member will not move. The Air Force's own analysis suggests that only 60% of Lab personnel will move. The Defense Department generally plans on an even smaller figure – as low as 15-20%. It is, of course, impossible to predict exactly how many people will choose to move, but it is clear that, even by the Air Force's own estimation, substantial numbers are likely to opt not to move. Of great concern are these facts:

- Most retirement eligible personnel will elect not to move. These are the people who provide the Lab its leadership.
- Most young people, especially those engaged in doctorate programs at local universities, will elect to stay. These are the people at the most creatively productive period of their scientific lives.
- Many of the very best of the personnel in the middle age brackets will choose not to relocate, because they will have the choice to re-establish their careers at private and academic institutions in the local community in which they have put down roots.
- In all age brackets, the loss of personnel may be greater than might otherwise be expected because of the significantly higher cost of living in the Fort Monmouth and Hanscom areas.

Professional networks essential to the preservation of military value will be destroyed by the splintering of inter-departmental collaborations.

The Department of Defense recommendation urges the split of Rome Lab as follows:

To Fort Monmouth:	To Hanscom Air Force Base:	To remain in place:
Electromagnetics/ Reliability	Intelligence (C4I)	Electromagnetics/ Reliability (test sites)
Photonics	Surveillance	
Computer Systems (C4I)	Software Technology (C4I)	
Communication Networks (C4I)	Command and Control (C4I)	
Radio Communications (C4I)	Space Communications (C4I)	

Relocating personnel as suggested will result in the destruction of inter-departmental collaborations achieved through face to face interaction, collaborations which were responsible for key military advances. For instance, as discussed at greater length in Exhibits 3-3, 3-4, and 3-5, respectively:

- The highly regarded C4I team is to be split between the Fort Monmouth and Hanscom locations. If nothing else, the existence of the term "C4I" indicates the necessity of inter-relationship among these units. Exhibit 3-6 depicts the organic nature of C4I: it demonstrates that C4I is a tightly-coupled, closed loop process. All the various components of C4I have to interact closely to be successful, since the development of C4I systems often involves analyzing trade offs between various system capabilities, for instance, between the capacity of a computing function and its ability to easily communicate information. Rome Lab's C4I team has been responsible for development of a variety of valuable military technologies and is currently working on the Air Force's contribution to the Defense Department's C4I for the Warrior program, a mega-system that will allow airborne, land, and naval commanders and analysts all over the world to simultaneously evaluate information and jointly plan responses. Continued contribution to this program will be threatened by the proposed move.

- The existing Photonics and Surveillance department is to be split in two. Working collaboratively, these units have developed a next generation of cheaper, more efficient radar systems that are to be deployed in the next three years.

- The Intelligence department is to be moved to Hanscom, while the Photonics unit is to be moved to Fort Monmouth. Their recent collaborations include a variety of work with optical memory devices that have military and civilian applications.

- Rome Lab-based Reliability personnel and off-site Reliability personnel are to be moved hundreds of miles from each other. Physical proximity and close working relationships allowed them to diagnose plane-mounted antenna problems encountered by battlefield commanders in the Gulf War in a timely fashion.

New inter-departmental synergies are not likely to develop at the new locations.

Hanscom is a systems center, not a laboratory. This means that its personnel are primarily concerned with the acquisition of major systems, not with research and development of new technologies. Indeed, in the judgment of knowledgeables, unless the movement to Hanscom is very carefully managed, collocation with a systems center runs the substantial risk of the lab being dominated by the systems center and directed to focus on the short term problems of the systems center, rather than on the long term R&D needs of the Air Force and the Department of Defense.

The Air Force has stated that collocation of a portion of Rome Laboratory at Fort Monmouth is a first step toward cross-servicing – which would permit the joint development of military systems. Cross-servicing may be an idea worth pursuing, but this move has nothing to do with cross-servicing. It is simply the relocation of part of one service's facility to another service's real estate. Fort Monmouth is both a laboratory and a systems center. The systems focus, however, is dominant and heavily influences the lab's priorities. In addition, research conducted by Rome Lab personnel and lab personnel at the Army installation personnel is quite different; hence, there is little reason to expect new synergies to develop. These differences arise out of the fact that the Army and the Air Force have quite different C4I needs; for instance, the Army is concerned with communications systems for mobile, slow moving platforms, e.g. tanks; the Air Force's communications capabilities must be designed for very fast planes. (See Exhibit 3-7, which depicts the difference in C4I needs among the services arising out of the services' different means of waging war). Given the very different C4I needs of the Air Force and the Army, the potential for domination of Rome Lab research by the Army systems center is troubling. Finally, synergies with the Photonics and Reliability personnel that might have developed have been precluded, because the Army unit doing similar research – the Army Research Laboratory – is being moved from Fort Monmouth to Adelphi, Maryland pursuant to a BRAC 1991 recommendation.

The Navy apparently concurred in this assessment of the potential for synergistic developments at Fort Monmouth since it rejected the proposal to move its C4I capabilities to Fort Monmouth out of hand. Further, the services have agreed on a number of other

occasions that collocation is not necessary for achievement of inter-service coordination, notably including the 1995 Army request that the move of the Fort Detrick research functions to Wright Patterson be reconsidered.

The move will destroy vital relationships with private sector contractors participating in the development of critical military technologies.

An important source of military value is the relationship a lab develops with the surrounding industrial community. The Air Force benefits enormously – through exchange of technology and extension of scientists' networks of professional relationships – if lab personnel develop cooperative research arrangements with the private sector. The Air Force has acknowledged the importance of these relationships on a variety of occasions, notably when, during BRAC deliberations, Secretary Widnall noted that the research functions at Los Angeles Air Force Base – a Tier Two lab – were not recommended for closure because doing so would destroy connectivity with the surrounding aerospace community. The Air Force's failure to recognize the synergies that will be destroyed if the Rome Lab recommendation is effected is baffling in light of Rome Lab's success at creating those synergies.

The strength of the Lab's professional networks with the private sector is well established:

- The Lab contracts out 80% of the work it undertakes to private industry and universities. Its success at "out-sourcing" is a function of its ability to act as a contract manager.

- The Lab has developed almost double the number of Cooperative Research and Development Agreements (CRADAs) as other DOD labs, a noteworthy statistic given the tendency of some other federal labs to count one CRADA several times by splitting a project into its component parts. Since 1990, when it signed its first CRADA, Rome Lab has or will be involved in 49 CRADAs. Of these, 16 have been completed, 28 are active, and 5 are ready for signature. Moreover, Rome Lab is in process of negotiating another 10 CRADAs with prospective partners.

- Rome Lab is particularly active in pursuing cooperative R&D with industry. Cooperative R&D with industry has particularly value to the Air Force in that industry tends to be more applications-oriented than are universities.

- The Lab participates in a host of cooperative R&D efforts outside of formal CRADAs, including partnership with 13 companies in two Technology Reinvestment Projects; partnership with NYNEX in development and operation of the NYNET Upstate Corridor, a wideband, fiber optic network that will provide high quality videoconferencing and multimedia services with military and civilian applications; and active participation in three prestigious research and development consortia concerned with software development – a key Air Force need.

- The Lab routinely permits use of its unique equipment by the private sector where benefit to the Air Force can be established. In addition, it fields something like 500 technical inquiries from industry a year.

In addition, the strength of the Lab's efforts in this area – and the importance of the results to both the military and the civilian sector – has been recognized by a variety of third parties (see Exhibit 3-8) including:

- A Virginia consulting firm that measured the strengths and weaknesses of more than 530 public and private sector laboratories and noted the excellence of Rome Lab's relationship with the industrial community.

- The Federal Laboratory Consortium (comprised of more than 400 laboratories) which has recognized the Lab's efforts in this area, making the Lab the only recipient of an Excellence in Technology Transfer award for every year since the awards program was initiated.

- Technology Transfer magazine, which recently named Rome Lab as one of the top 40 federal labs in the country.

- The corporate community which has lauded the Lab's standards, quality of personnel, superiority of equipment, understanding of corporate culture, and efficiency of project management.

The move will also destroy highly productive relationships with universities, relationships that foster the development of high quality scientific research.

Rome Lab is a short drive from three of the country's finest graduate degree granting institutions, all of which are known for the quality of their work in fields related to those in which Rome Lab engages. Relationships with these three institutions – Rennsalear Polytechnic Institute, and Cornell, and Syracuse Universities – as well as with a host of other New York State institutions have permitted the development of these forms of technology exchange:

- The Lab educates its young people at local universities. Currently, an estimated 74 staff members are seeking graduate degrees at local universities.

- The Lab maintains nine educational partnerships, with New York State universities, including one between the Lab and City University of New York in the area of photonics.

- Rome Lab currently hosts three to four outside researchers for one year stints on-site to work on projects of mutual interest to the Air Force and the researcher. Most of these scientists are from local universities.

- The Lab also hosts between 12 and 18 academic researchers each summer, under the auspices of the Air Force Office of Scientific Research Summer Faculty Program.

- The Lab shares university-owned facilities that it would otherwise have to construct or purchase, notably Cornell University's unique Nanofabrication Facility (see Exhibit 3-9), which is used by the Photonics department.

Few of these relationships with the academic and private sectors are portable.

Cooperative research with the private and academic sectors depends upon the growth of respect and trust among individuals and, in some cases, on actual physical proximity. Given the likely loss of much of the Lab's leadership and many of its best scientists, most of these relationships will be lost in the relocation. For instance, it is clearly the case that the benefit received by the Air Force as a function of its participation in development of the NYNET will be lost. Similarly, the move will necessitate the purchase or construction of some equipment now shared with universities.

EXHIBIT 3-1

CORRESPONDENCE FROM

JAMES F. BOATRIGHT

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

OFFICE OF THE ASSISTANT SECRETARY

15 NOV 1994

MEMORANDUM FOR THE CHAIRMAN, LABORATORY JOINT CROSS-SERVICE GROUP

FROM: SAF/MII

SUBJECT: Military Values for Air Force Laboratory Installations

The Air Force has been asked to provide military site values to the Laboratory Joint Cross-Service Group (LJCSG) for Air Force installations where laboratory activities, including product centers, are performed. I have this day delivered results to date of the Air Force process to the Air Force representative to the LJCSG Working Group, for use in your process. A copy is also attached for your ready reference. Since the Air Force does not determine a "military value" in its process, I have provided the tiering our process has produced. This is, of course, only one measure of the relative merit of a base within its primary category as determined at this point in the Air Force process. It is not a closure or retention recommendation.

The Air Force categorizes its bases according to the primary mission, and some of the activities for which values were requested by your group are not in the Laboratory Subcategory. I have annotated on the list those bases considered in the Laboratory Subcategory. For bases not in that subcategory, their tier reflects a relative merit compared to the bases of the subcategory in which they are analyzed. In addition, the operations at San Bernadino, California, formerly Norton AFB, and Mesa, Arizona, formerly Williams AFB, have been given a tiering that reflects the fact that both of these bases have closed. It is possible, however, that the Mesa operation could remain in its current location.

The tiering (1(top), 2, or 3) of the bases results from the Air Force BRAC analysis and there is no predetermined number of bases to go into any of the three tiers. Within each tier, bases are listed alphabetically. Each of these installations is capable, efficient, and possesses excellent physical assets and labor forces. The fact that a particular installation was placed in a given tier represents only its merit relative to the other installations in its category/subcategory at this stage in the process and as a result of one of various analyses. It certainly does not imply that the laboratory or product center activity or the base is not providing a valuable contribution to the Air Force mission.

In addition to the installation tiering, I have provided tiers that reflect relative merits of the lab and product center assets alone, without consideration of the installation on which those assets are located. Once again, the activities are listed alphabetically within each tier. The analysis on which this tiering was based was performed as one part of our overall comparative analysis of bases. I offer this for use in your process as appropriate. As with the installation tiering, this tiering represents only one relative weighting of the assets at this preliminary stage in the Air Force analysis, and is not a recommendation for closure or realignment.

The Air Force supports the OSD goal of retaining those assets which represent the best combination of functional capability and cost effectiveness, based on the selection criteria and force structure. We look forward to receiving the input from your analysis for inclusion in the Air Force process.

JAMES F. BOATRIGHT
Co-Chairman, Air Force Base Closure Executive Group

Attachment
Tiering Information

Lab Joint Cross-Service Group Air Forces Bases by Tier

Installation Tiering

Tier 1

Edwards AFB
Eglin AFB
Hanscom AFB*
Hill AFB
Peterson AFB
Rome Lab (Rome, New York)*
Tinker AFB
Wright-Patterson AFB*

Tier 2

Kirtland AFB*
Los Angeles AFB*
Robins AFB
Tyndall AFB

Tier 3

Brooks AFB*
Kelly AFB
McClellan AFB
Mesa, Arizona, Armstrong Lab (former Williams AFB)**
San Bernadino (former Norton AFB)**

* Considered in the Lab/Product Center Subcategory
** Installation closed, so lowest grade given

Tiering By Lab Asset

Tier 1

Armstrong Lab, Wright-Patterson AFB
Philips Lab, Kirtland AFB
Philips Lab, Hanscom AFB
Rome Lab, Hanscom AFB
Rome Lab, Rome, NY
Wright Lab, Wright-Patterson AFB

Tier 2

Armstrong Lab, Brooks AFB
Armstrong Lab, Mesa

Tier 3

None

Tiering By Product Center Asset

Tier 1

Aeronautical Systems Center (SPO), Wright-Patterson AFB
Electronic Systems Center, Hanscom AFB

Tier 2

Aeronautical Systems Center (Mod) - Wright-Patterson AFB
Human Systems Center, Brooks AFB
SMC - San Bernadino
Space & Missile Systems Center, Los Angeles AFB

Tier 3

None

Exhibit 3 - 2

Discussion of Academic Findings on Technological Innovation

Academics who study the means by which technological innovation occurs agree that face to face interaction among colleagues in inter-related fields is essential to the conduct of superior science. Although various means of telecommunication (e.g., the internet and electronic mail) permit coordination of research, they cannot replace the inter-personal by-play, sharing of lab space, exchange of personnel among related labs, and other means of achieving face-to-face communication that are possible in a large, heterogenous laboratory located in a region of thriving scientific activity. A variety of academic studies demonstrate that such communication is essential to maximizing productivity, due to the fact that new ideas flow more freely and are more easily received in an organization which has a high degree of social interaction. Among other academic findings:

- **Individuals rely heavily on social interaction to help direct their own opinions about new technology.** A classic study of the medical profession found that among the different types of network connections, the most effective for fostering innovation was the friendship network: doctors who had large interpersonal networks displayed a greater propensity for integrating innovation. Doctors with only one or no peer consultants were markedly slower in adopting new techniques.[1]

- **"It is not just the absolute level of interaction employees have with one another, but the size ... of their communication networks [that determines the likelihood of innovation."**[2] In the process of researching new technology, Rome Lab scientists often encounter unique problems that cause them to seek assistance from their peers in other departments and at local universities and private sector institutions. The larger and more diverse the communications networks, the more likely an employee will receive the needed information to solve the problem.

- **Further, innovation has been shown to be positively correlated with the diversity of experience of the work force.** Individuals with similar educational and work experiences often approach a problem from the same perspective, while someone with a different background may approach it from a slightly altered angle. A more complexly composed organization encourages members to develop and suggest innovations. Thus, when employees with different educational and experiential

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[1]Rogers, Everett M. *Diffusion of Innovations*, The Free Press: New York, 1995, p.302.
[2]Papa, Michael. "Employee Networks and New Technology," Communications Research, June 1990 v17:344-367.

backgrounds interact, a more useful transfer of information is likely to occur than when employee interaction is limited to coworkers in similar positions[3].

- **Indeed, "[t]he speed of product development is strongly influenced by the links between problem-solving cycles ... that ... linking requires direct personal contacts across functions, liaison roles at each unit, cross-functional task forces, cross-functional project teams, and a system of product manager as integrator."[4]** A recent study of a major national R&D company demonstrated that a reorganization which resulted in replacement of a traditional management structure (which maintained separate divisions for engineering, research, and marketing) with flexible interdisciplinary work teams resulted in a ten-fold increase in market share in a single year.[5]

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[3]Papa, Michael. "Employee Networks and New Technology," Communications Research, June 1990, v17:364.

[4]Cohen, Wesley M. and Levinthal, Daniel A. "Absorptive Capacity: A new Perspective on Learning and Innovation," Administrative Science Quarterly, March 1990, p.134.

[5]Rogers, Emerett. Diffusion of Innovations, The Free Press: New York, 1995, p.373.

Exhibit 3 - 3

Inter-Departmental Case Study: C4I Team

DOD Recommendation: Split up the C4I Team–sending 28 Computer Systems and Communications Networks personnel and 22 Radio Communications personnel to Fort Monmouth, and sending 50 Software and Artificial Intelligence Planning, 36 Command and Control, 17 Space Communications, and 152 Intelligence personnel to Hanscom Air Force Base.

C4I Team Collaboration: Collaboration among the C4I team is permitting the Air Force's contribution to C41 for the Warrior and that system's midterm initial operational capability – known as the Global Command and Control System (GCCS).

The Problem Addressed by the Collaboration: Currently, battlefield communication is limited by the fact that the services are frequently unable to effectively talk to each other, to obtain data from other sources (including satellite transmissions and intelligence analysts) in a timely manner, and to communicate that information to warriors. The C41 for the Warrior concept is a broadly connected mega-system that will provide total battle space information to the warrior. This information infrastructure will provide seamless connectivity for the warrior to "plug in" and obtain the information – offensive and defensive – needed to carry out any mission, at any time and at any place. It will permit simultaneous analysis and planning by naval, airborne, and ground commanders, as well as battle managers stationed all over the world. Rome Laboratory is unique in the service laboratory structure in that it is the only laboratory to have all the information technologies that are necessary and that must operate seamlessly and efficiently to achieve this vision. These include: Artificial Intelligence-based Planning and Computer Security, Ground, Air and Space Communications and Communications Networks, Intelligence Technologies, and Software Engineering.

The Result of the Collaboration: Rome Laboratory has recently delivered C4I products that are now being used by the Air Force and/or that are among the items nominated by the Air Force as being desirable capabilities for GCCS. These include the Advanced Planning System, the Force Level Execution System, and the Intelligence-based targeting system. The Lab has also demonstrated initial operation of a distributed air operations center, which will permit the global dispersion of analytic functions that currently have to performed at one site, using a local area network. This capability is critical if the goal of joint service planning is to be realized. The collaboration which resulted in development of these same information technologies is now working to transfer the technologies to the education, law enforcement, transportation, and health care industries through multi-disciplinary collaborations with New York State and federal agencies.

How Collaboration was Achieved: Rome Lab staff in the various C4I departments interact on a daily basis, participating in joint demonstrations and developments, analyzing the interactions of various technologies, and consulting the associated academic and industrial communities. Key to the success of these interactions has been the Rome Lab infrastructure which supports individual technologies in specialized laboratories, but connects the departments through use of on-site customized demonstration centers to facilitate collaboration and joint problem-solving.

Exhibit 3 - 4

Inter-Departmental Case Study: Surveillance and Photonics

DOD Recommendation: Split the 152 person Surveillance and Photonics department in two, sending the 56 person Photonics Division to Fort Monmouth and the 96 person Surveillance Division to Hanscom Air Force Station.

Photonics and Surveillance Collaboration: The benefits of applying photonics technology to surveillance problems – and the desirability of having a single, merged department to deal with collaborative issues – has been recognized through several reorganizations of the Lab.

The Problem Addressed by the Collaboration: The Air Force needs more capable and reliable, smaller, and higher speed radar systems.

The Results of the Collaboration: In the next three years, it will be possible to deploy radar systems that meet the Air Force's stringent future requirements. These systems will incorporate photonic innovations. Two of the most important components of these systems are:

- **Cheaper, smaller, more deployable antennas**. Today, radar beams are directed at intended targets by arrays of small antennas. Each antenna must be "turned on" in a precisely synchronized manner. Photonics technology allows the replacement of the bulky electronic transmitters with compact photonics processors (essentially, mirrors). It also allows replacement of the heavy microwave plumbing that connects the transmitter to the antennas with fiber optics.

- **Jam-resistant radars**. In the past several years, our potential enemies have developed the capability to field systems that can jam existing radars. We have responded with systems that "blindfold" the unneeded edges of our radars, which would otherwise receive unwanted enemy transmissions, while allowing the use of the central portion of the radar that is actually sending radar beams. However, these blinding systems – called side lobe cancelers – do not work fast enough or screen out enough misinformation, because they rely on electronics. New devices and materials jointly developed by the Photonics and Surveillance staff now allow the effects of enemy jammers to be quickly, effectively nullified. These techniques have already been transferred to major radar developers, including Westinghouse and Lockheed-Martin, which will employ them in the next generation of Air Force radars.

How Collaboration was Achieved: The current and preceding Photonics Division managers were reassigned from the Surveillance Division. The goal was to have the Photonics Division managed by staff with both surveillance and photonics experience. Labs used by the two divisions are located in close physical proximity to each other, which has allowed enormous formal and informal personal interplay. On a formal level, temporary assignment of personnel between the divisions, joint experiments and committee assignments, and co-authored technical papers are common. Informal "strolls down the hall" and lunch time conversations were one of the key factors in development of the radar antijamming program.

Exhibit 3 - 5

Inter-Departmental Case Study: On-Site Electromagnetics and Reliability and Off-Site Electromagnetics and Reliability Organizations

DOD Recommendations: Send the 99 person on-site Electromagnetics and Reliability organization to Fort Monmouth. Retain the 21 person and 55 Stand Alone (Base Operating Support) authorizations in place at five test sites located within 30 miles of Griffiss Air Force Base.

On-Site and Off-Site Collaboration: Collaboration between the Electromagnetics Environmental Effects portion of the on-site Reliability personnel and the personnel located at the off-base facilities permitted the timely diagnosis of a problem associated with communications antennas located on the Joint STARS aircraft that was encountered by battlefield commanders during the Gulf War.

The Problem Addressed by the Collaboration: The UHF and VHF radios located on the Joint STARS aircraft were limited in their ability to communicate from the aircraft to ground terminals. The JSTARS Program Office contacted the Rome Laboratory and asked that an antenna placement study be conducted to determine the optimum location for improved air-to-ground communications.

The Result of the Collaboration: On-Site Electromagnetics and Reliability personnel performed computer aided analysis of the antenna-airframe interactions. The simulations were validated in the on-site radio frequency anechoic chamber using a 1/20th scale model of the Joint STARS aircraft. The operational aircraft was then sent from Melbourne, Florida and flown against the precision antenna measurement system located at the Verona Test Site located near Griffis. This final proof of improved communications system performance was the basis for modification of the design of 18 additional Joint STARS aircraft. The Joint STARS Program Office was so pleased that they have continued to send Rome Lab additional projects.

How Collaboration Was Achieved: The computer aided simulation, scale model testing and flight test measurement capabilities all existed within the Electromagnetics and Reliability Directorate. Ken Siarkiewics, the liaison with the JSTARS Program Office, formed a project team comprised of Directorate, ESC, MITRE, Grumman Corp., and test site measurement personnel. Working collaboratively, the team's efforts, from receipt of the problem to solution, took only three months to complete. This coordinated effort is but one example of the integrated team approach used by the Laboratory to solve operational problems.

Exhibit 3-6

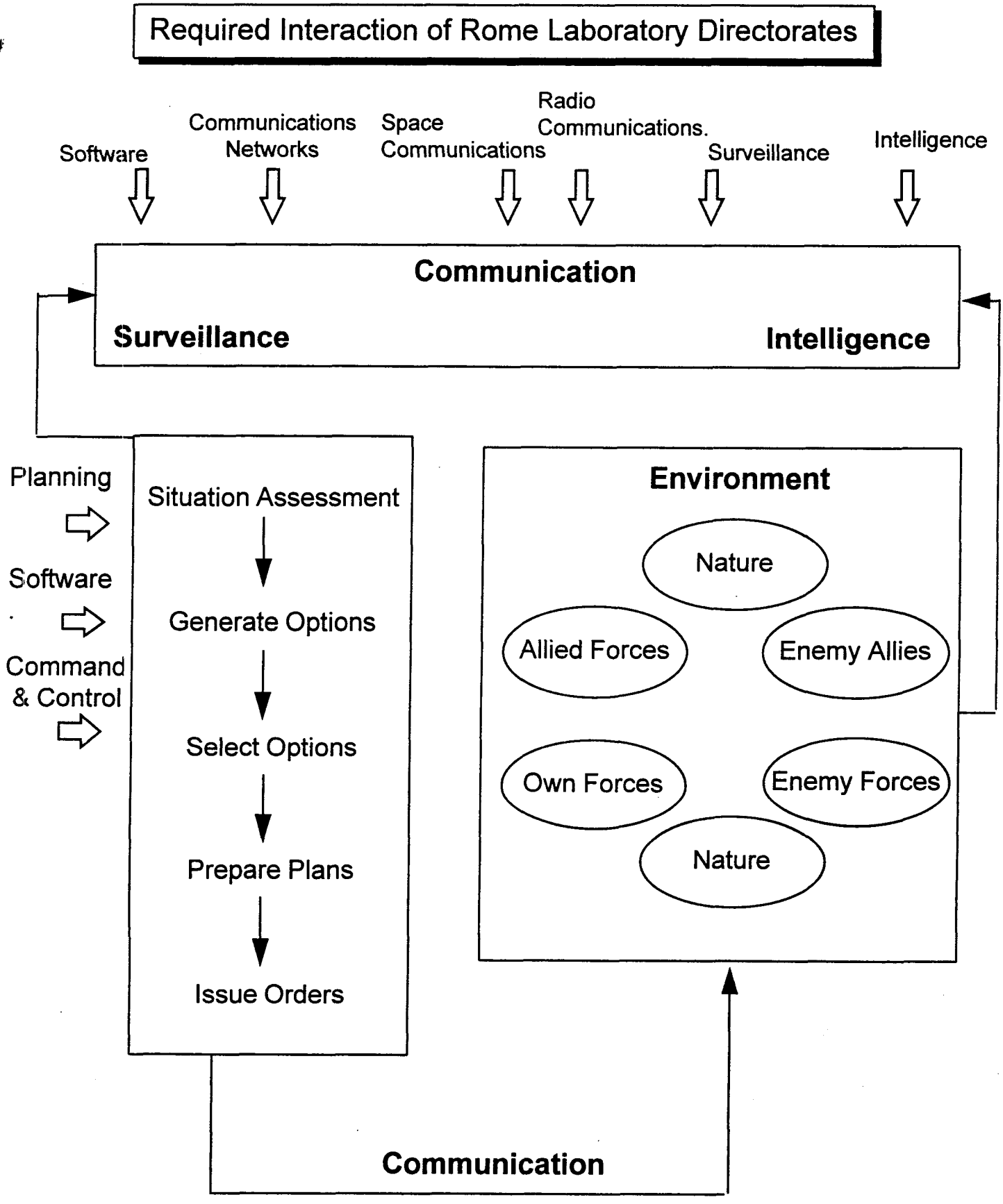
Required Interaction of Rome Laboratory Directorates
Software
Communications Networks
Space Communications
Radio Communications.
Surveillance
Intelligence
Communication
Surveillance
Intelligence
Planning
Software
Command & Control
Situation Assessment
Generate Options
Select Options
Prepare Plans
Issue Orders
Environment
Nature
Allied Forces
Enemy Allies
Own Forces
Enemy Forces
Nature
Communication

Exhibit 3-7

Different services have different C4I needs.

	US Navy	US Air Force	US Marine Corps	US Army
MOVEABLE ASSETS	10-100 vessels	100-1,000 aircraft	1,000-10,000 troops	10,000-100,000 troops
RANK OF SUBORDINATE LEADERS	HIGHEST →			LOWEST
COMMUNICATIONS WITH SUBORDINATES	BEST →			WORST
INFORMATION RE SUBORDINATES	PRECISE →			VAGUE
TACTICAL FLEXIBILITY	GREATEST →			LEAST
COMMAND PRINCIPLE	CENTRALIZE →			DECENTRALIZE

EXHIBIT 3-8

CORRESPONDENCE FROM

THE CORPORATE COMMUNITY

MOTOROLA

March 28, 1995

Alan J. Dixon, Chairman
Base Realignment and Closure Commission
1700 North Moore Street
Arlington, Virginia 22209

Subject: Rome Laboratory

Dear Mr. Dixon,

We write this letter to express our support for the continued operation of Rome Laboratory, located at Griffiss Air Force Base, New York. We recognize the necessity of reducing military spending and the obvious requirement to close some redundant bases. However, Rome Laboratory, the Air Force's top ranked Lab, is a powerful catalyst for military as well as commercial technology advancement.

Rome Lab's strong interface with the private sector serves as a powerful economic development tool. Rome Lab contracts out approximately 80% of its annual budget. Last year, that translated into over 250 contracts worth approximately $132 million for New York State alone. This resulted in almost 3,500 jobs, primarily in small, high technology businesses which are the backbone of the retooling of the American economy in the post-Cold War era. Private industry serves as both supplier to the Lab and consumer of the Lab's product. Because of the excellent formal and informal networks that have been established over the years, Air Force scientists and engineers avail themselves of the technology that is commercially available, even as industry is developing applications for technology the Lab has developed for the military.

Virtually every company that has ever done contractual work with Rome Lab is using Lab technology in some form or another in its business. In fact, we could argue that all of the Lab's work could be characterized as dual use; even programs that do not have direct commercial applications have enabling technologies which contribute to an overall system with dual use applications.

Rome Laboratory is in the middle of completing the vital effort of developing a tri-service multiband, multimode programmable radio (the Speakeasy radio) to solve the extremely difficult communications problems facing our highly mobile modern field forces. Currently communications between the various operational elements requires a myriad of dedicated communications systems rendering inter-service communications nearly impossible. This complexity of field communications systems caused severe Desert Storm operational difficulties during the rapid moves across the desert expanse. Numerous operations were hampered while waiting for communications to be established between field units, support elements, theater command elements, intra and inter service elements, and national/international command elements. Because of its programmability and diversity, the Speakeasy radio solves the above problems by permitting all operational, command, and service elements to communicate directly over their independent communications systems via Speakeasy. This capability is vital to all our military services.

In addition to the visionary solution to the military communications problems, the Rome Lab Speakeasy program has other significant attributes that must continue:

- It eliminates unnecessary military specifications to permit use of commercial parts and processes to ensure best value to DOD;
- Development of the technology required for Speakeasy is useful in commercial industries for numerous applications such as police radios, FBI networks, and cellular base stations. This program makes significant contributions to continued US technology leadership in high performance radios;
- Open architecture and reprogrammability permit both military and commercial communications systems to grow while minimizing significant infrastructure expense each time a new standard is generated.

There are countless examples of the successful science and technology public-private partnership that is anchored by Rome Lab. This partnership has been fostered through years of hard work, relationship building, and definition of shared goals. We urge you to consider the value of Rome Lab to the nation.

Sincerely,

David M. Neuer
Vice President and General Manager
Government Electronics Division
Motorola Government and Space Technology Group

Dr. Marvin Sambur
President
ITT Aerospace/Communications Division

Douglas M. Barrett
General Manager
Surveillance System Division
Sanders, a Lockheed Martin Company

SYNECTICS
CORPORATION
AN EMPLOYEE-OWNED COMPANY

28 March 1995

LabStay3-IC95-032895-GD

The Honorable Alan Dixon
Chairman
Defense Base Closure and
Realignment Commission
Suite 1425
1800 North Moore Street
Arlington, Virginia 22200

Dear Sir:

I am writing to express support for Rome Laboratory, located at Griffiss Air Force Base in Rome, New York. Our small, employee-owned New York State business has been providing C4I services to Rome Laboratory for more than a quarter century. Because of this long association we are acutely aware of the significant economic and technical benefit which has been realized by this unique partnership between the Air Force and New York State industry, working together to achieve our mutual goals of military and economic security.

Rome Laboratory is a powerful engine for economic development. Contracts they award consistently generate significant numbers of jobs, primarily in small, high technology firms (like Synectics Corporation) which are the backbone of retooling the American economy in the post-Cold War era. For example, over the past 12 months we received contracts with Rome Laboratory worth approximately $15 million, providing stable employment for 120 persons.

Rome Laboratory's work is dual use. An excellent example is our soon-to-be signed partnership with three other commercial firms to develop TerrainMapper™ using private investment funds. The device will use a Global Positioning System and a dead reckoning system to provide geodetic location linked to digital cameras. This will permit the highway and right-of-way to be imaged as the vehicle is towed. In developing TerrainMapper™ we will use stereo mensuration software developed for DoD applications plus our extensive experience (gained through contract work with Rome Laboratory) in processing digital image data for photogrammetric applications and hardware and software integration.

TerrainMapper™ has the potential to provide more than 200 new, high technology jobs in the Rome, New York area within the next five years. It also has the potential to save state and local highway departments untold millions of dollars in surveying cost. I believe TerrainMapper™ represents a very tangible example of the successful science and technology public-private partnership that is anchored by Rome Laboratory.

10400 Eaton Place, Suite 200 ◆ Fairfax, Virginia 22030-2208 ◆ Voice (703) 385-0190 ◆ Fax (703) 385-1987

I would also like to point out that this is a particularly bad time to split Rome Laboratory's intelligence mission from its command, control and communications (C3) mission. In the current world order potential military threats are much more diverse. Combine these diverse threats with the expanding spectrum of potential military missions and it becomes very difficult to link intelligence with C3.

A growing community of interest is also increasing the importance and complexity of linking intelligence and C3. Factors such as drugs, terrorism, humanitarian missions, organized crime and illegal immigration are all expanding domestic and international C3 communities for the application of intelligence.

Two contradictory trends are emerging. On the one hand we see a need to mount an ever-expanding range of military operations rapidly and resolve situations quickly. On the other hand these more stringent requirements must be fulfilled with diminished operational assets. The best way to cope with these contradictions is to effectively integrate intelligence with C3. Another important trend underscoring the need for close linkage between intelligence and C3 is the significant reduction in U.S. military forces deployed internationally. Projecting U.S. military force from domestic bases is very difficult without a seamless integration of intelligence and C3.

Years of hard work, relationship building and defining shared goals have been invested in the unique science and technology public-private partnership centered on Rome Laboratory. In addition, Rome Laboratory's premier and unique strength has been its ability to integrate information technology considerations across intelligence and C3. On behalf of our 120 employee-owners, I urge you to consider the value of Rome Laboratory to the military, to New York State and to the nation.

SYNECTICS CORPORATION

Gil Dannels
President

GD:mt

Copy: The Honorable D. Patrick Moynihan
United States Senate
464 Russell Senate Office Building
Washington, DC 20510

The Honorable Alphonse D'Amato
United States Senate
520 Hart Senate Office Building
Washington, DC 20510

The Honorable Sherwood Boehlert
U.S. House of Representatives
2246 Rayburn House Office Building
Washington, DC 20515

The Honorable John W. Warner
United States Senate
225 Russell Senate Office Building
Washington, DC 20510-4601

The Honorable Charles S. Robb
United States Senate
493 Russell Senate Office Building
Washington, DC 20510-4603

The Honorable James P. Moran, Jr.
U.S. House of Representatives
405 Cannon Building
Washington, DC 20515-4308

The Honorable Thomas Davis III
U.S. House of Representatives
1609 Longworth Office Building
Washington, DC 20515-4311

The Honorable Frank R. Wolf
U.S. House of Representatives
241 Cannon Building
Washington, DC 20515-4610

TASC
THE ANALYTIC SCIENCES CORPORATION

555 French Road, New Hartford, NY 13413, tel. 315-724-1100

March 30, 1995

Mr. Alan J. Dixon
Chairman, Base Realignment
and Closure Commission
1700 N. Moore Street
Arlington, VA 22209

Subject: Rome Laboratory

Dear Chairman Dixon:

I am writing to you to express TASC's strong support for the continued operation of Rome Laboratory at Griffiss Air Force Base in Rome, New York. Rome Lab prides itself in advancing technology for the military by working as a team with technology leaders in the commercial, academic, and government sectors. Their mission is to develop world-class technology solutions that advance our military capabilities while at the same time providing a economic stimulus to the commercial marketplace. Our national economy is directly and positively impacted through the dual-use potential of many of the technologies developed by Rome Lab.

TASC has benefitted from a strong partnership with Rome Laboratory for more than ten years. Together, TASC and Rome Lab have pushed the state-of-the-art and advanced the US technology base in areas such as multi-media collaborative systems, image compression and software system development tools. In each of these areas, commercial products have evolved directly from work sponsored by Rome Lab and have been successfully marketed in both the continental United States and Internationally.

One such commercial product is ImageShare. ImageShare is an advanced image viewer which will be integrated with InSoft's Communique! to provide the most advanced and widely used desktop video conferencing and collaborative tool available today. This product was leveraged off of work done under TASC's interactive, multi-media collaborative environment effort sponsored by Rome Lab.

TASC has also performed a number of image compression efforts for Rome Laboratory. The application of image compression techniques and algorithms are endless in the military and commercial marketplace due to the bandwidth (size and speed) and memory constraints placed on our stationary and mobile systems today. From this work funded by Rome Lab, TASC has evolved a commercial image compression product called PictureCom which has been purchased by several companies in the United States, Canada, Spain, Singapore, Finland, Ireland and the Netherlands, to name a few.

In the early 1980s, Rome Lab's vision went beyond the many stovepipe solutions that exist in the military today. They recognized the need for a plug and play environment that supported the integration of different, yet complementary functions to provide a more open and flexible system. Rome Lab sponsored the development of the Attack Management Development Facility which integrated existing intelligence, weapon, sensor, target, atmosphere and space models in a plug and play simulation environment that would allow scientists to study different wargaming scenarios. As the prime contractor, TASC developed a tool call Spectran that allowed the user to create objects and link them into the system of interest. This tool was used to not only build the underlying object-oriented framework that supported the plug and play simulation capability but it also allowed users to create their own scenarios and execute them. Although TASC has chosen not

to commercialize this product, TASC uses this tool as the development foundation for all of our large system development efforts, including ARPA's WARBREAKER and the Army's Joint Precision Strike programs.

I believe Rome Lab has effectively met its military mission while at the same time acting as a powerful catalyst for private sector technology advancement. Personnel are key to the technology thrusts and the impact that these programs have on maintaining our country's technological superiority in the military and in the world economy. The loss or major restructuring of Rome Lab would certainly disrupt, if not destroy, the existing technology leadership that is provided by Rome Laboratory today. Key personnel in highly scientific fields would be lost. The cohesion that has evolved over the years, between the Technology Directorates at Rome Lab and their military customers, will be lost.

I speak for myself personally and for TASC Corporately, and respectively request that you give consideration to the value and contribution of Rome Lab and this unified technical community as you deal with the difficult challenges associated with our military downsizing.

Sincerely,

Patricia J. Baskinger

Patricia J. Baskinger
Department Manager
TASC Rome New York Office

Kaman Sciences Corporation
Utica Office
258 Genesee Street
Utica, NY 13502-4627
(315) 732-1955

KAMAN

John F. Spina
Vice President

Mr. Alan J. Dixon
Chairman, Base Realignment and Closure Commission
1700 N. Moore Street
Arlington, VA 22209

Subject: Rome Laboratory

Dear Chairman Dixon,

The purpose of this letter is to express my support for the continued operation of Rome Laboratory. Rome Lab has been a stalwart performer in meeting the DoD's objectives for the past 40 years and, in addition, has been a significant contributor to many advances in the private sector.

Kaman Sciences, for the past 10 years, has been closely affiliated with Rome Lab in a number of technology activities. In particular, two examples are worth noting in terms of the impact RL has had on the national defense effort and significant technology transfer to the commercial sector. Under RL leadership, Kaman Sciences operates the Data and Analysis Center for Software (DACS), a DoD Information Analysis Center specializing in the collection, analysis, and dissemination of information related to software technology and software engineering.

The DACS has been, and will continue to be, a center of excellence for the defense community in the critically important area of software technology. Over the past two years, the DACS has gone on-line and is now featured as a "virtual" information center on the Internet. Software researchers around the nation can now access information on software technology via the network. As you know, software technology is an important technology and the US is the world leader in this area. The DACS, and RL, continue to play a significant role in maintaining that leadership for our nation.

As a direct model of the DACS, the US electric utility industry, headed by the Electric Power Research Institute, Palo Alto, CA, has set up a similar information center. This center, the Knowledge Based Technology Applications Center (KBTAC), specializes in the acquisition, analysis, and dissemination of knowledge based technology applications (artificial intelligence, expert systems, and artificial neural networks) to the electric power industry. The KBTAC center, in operation since 1989, has been a valuable contributor to the industry in terms of providing cost-effective solutions to enduring utility industry problems. There is a direct correlation between RL's DACS initiatives and KBTAC's ability to aid an important US industry, the electric power industry.

There are many examples of RL's leadership that can be cited where direct and indirect benefits have been realized to the benefit of the national well-being. The plan to re-locate RL, I believe, is the wrong thing to do at the wrong time. I understand and appreciate the need for re-structuring our nation's military establishment, but strongly urge you to give full consideration to leaving RL intact.

Respectfully,

John F. Spina

RIVERSIDE RESEARCH INSTITUTE

Lawrence H. O'Neill Research Center
330 West 42nd Street / New York, New York 10036-6991 / (212) 502-1704

OFFICE OF THE PRESIDENT

March 28, 1995

Mr. Alan Dixon, Chairman
Commission on Base Realignment and Closure
1700 North Moore Street
Arlington, VA 22209

Dear Mr. Dixon:

I am the President of a high-technology non-profit research institute that has worked side-by-side with the Air Force Rome Laboratory's excellent people for over three decades and I fear that crucial intangible factors that cannot be presented on organization charts and spreadsheets were inadequately weighed in the Administration's recommendation to break up and move the Rome Laboratory out of Rome, New York.

Dispersing the Air Force Rome Laboratory would destroy the Laboratory's uncommonly productive technical cross-pollination that has paid off repeatedly in better Air Force C3I. It is hard to believe this unusually well-integrated operation, with all its benefits, would be easy to replace if the Laboratory were separated in two and reestablished elsewhere.

I hope you will consider this and other important intangibles such as Rome's excellent academic and commercial supporting infrastructure and the high quality of Rome Laboratory's products in formulating your Commission's final judgments on base closings and realignments.

Sincerely,

Marvin King

Marvin King, Eng.Sc.D.

MK:rr

DOVE ELECTRONICS, INC.

PHOTONICS & VIDEO PROCESSING TECHNOLOGY

227 LIBERTY PLAZA
ROME, NEW YORK 13440

JOHN F. DOVE
President

Business 315/336-0230
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March 29, 1995

Honorable Alan J. Dixon
Chairman, Base Realignment and Closure Commission
1700 N. Moore Street
Arlington, VA 22209

Subject: Rome Laboratory

Dear Mr. Dixon:

I am writing to express my support for Rome Laboratory as a part of the Rome/Utica community partnership. This partnership has been particularly effective in technology areas. Stop and think about it: Photonics which is proudly talked about throughout this country and possibly the world was invented in Rome, New York. It was invented here because creative minds worked together to define the need and find a solution to some specialized problems. This solution is photonics which I first pioneered for RADC. The compact disk, the video disk and the CD-ROM are Rome, New York, inventions that grew out of the creative environment that was a hallmark of RADC and is now that of Rome Laboratory.

This close-knit partnership should continue to create technology and jobs for this nation. The creative chemistry between individuals is an important ingredient for technological competitiveness and job creation. Rome Laboratory, the technological community and Rome citizenry have bonded into a total partnership that is rare and unique.

My first job as a contractor (as Dove Electronics) was to interface optical disks to the computer. Much of this work dealt with the required specifications for the laser disk and its ultimate capability. Today, we know this computer/laser disk interface as the CD-ROM/computer interface.

More innovations and discoveries are possible with continued operation of Rome Laboratory as a catalyst for the creative minds of the Rome community.

My work on the holographic radar whose trademark is HOLODAR® grew out of and was made possible in part by use of Rome Laboratory facilities and the cooperation

of Rome Laboratory scientists and other personnel. HOLODAR® measures wind speed, wind direction and atmospheric turbulence at many points along the path of light propagation. My technical staff has spent many night and day hours testing HOLODAR® at Verona, New York, and later discussing the results with Rome Laboratory technical staff.

Dove Electronics has worked with Rome Laboratory in applying new concepts in signal and image processing. The hardware used is digital signal processing and the algorithms are wavelet transforms and neural networks. These are powerful tools that need more development and wider applications.

Another research and development success has been the cooperative effort of Dove Electronics and Rome Laboratory in developing a concept that will increase the information handling capability of a communication system by a hundred fold or more. This pioneering effort in optical node design was further supported by NASA and is an ideal dual-use candidate.

Rome Laboratory/the Rome technical community can bring about the dual-use applications that could mean revenue for the entrepreneurs, and the Federal government as well as local governments.

Some of the techniques developed and patented while working at Rome Air Development Center are now being used by the steel industry to increase efficiency and profitability.

This technical partnership with the local productive environment has made possible outstanding contributions to the United States and to the world. Now we need Rome Laboratory as a partner in the advancement of technology and its commercialization. Rome Laboratory has been a tremendous stimulus to the development of ideas and the development of people.

Sincerely,

John F. Dove

John F. Dove, President

March 29, 1995

Mr. Alan J. Dixon
Chairman, Base Realignment
and Closure Commission
1700 N. Moore Street
Arlington, VA 22209

Subject: Rome Laboratory

Dear Chairman Dixon:

I am writing to you to express my support for the continued operation of Rome Laboratory, located at Griffiss Air Force Base in Rome, New York. As the Air Force's top ranked Lab, Rome Lab has effectively met its military mission while at the same time proving to be a powerful catalyst for private sector technology advancement.

I would like to share a few examples with you from my company's relationship with Rome Lab. For the past decade, SPS has been a contractor-partner with Rome Lab in the development and technology transfer of advanced, high payoff technologies for software and systems engineering process maturation. Not only does Rome Lab develop first class technology-based solutions, but both the Lab and its contractors have a track record of successful technology transfer. This technology transfer ensures effective use of R&D successes by Rome Lab's military customer base, while at the same time providing a powerful economic stimulus that overflows into the commercial marketplace. This overflow is possible because of the dual-use potential of many of the technologies developed by the Lab.

Both of SPS' two commercially available software products leverage Rome Lab funded R&D. Our first product, Classic-Ada, was originally developed to support Rome Lab R&D efforts. Today, Classic-Ada is strengthening American competitiveness in the global marketplace. For example, General Electric's Drives Division is using Classic-Ada to improve productivity and decrease cycle time in the development of process control systems for steel mills. GE Drives is the only U.S. competitor in this world-wide market. Rome Lab deserves a share of the credit for GE's success.

Our second product, InQuisiX, a system for managing reusable software assets, was built on top of a major subsystem that had been developed under a Rome Lab sponsored R&D effort. SPS has recently spun off a separate commercial products company that is aggressively marketing InQuisiX to both the commercial and government sectors. Rome Lab helped to make this possible.

In addition to using spin-off technology that forms the basis for commercial products, SPS is working in partnership with Rome Lab to jointly accomplish technology transfer of Rome Lab's technologies for software quality improvement and quality measurement. Organized around a consortium approach using Cooperative Research and Development Agreements, this effort is improving the quality engineering methods of the defense contractor community. Rome Lab is the driving force behind this initiative.

These are only a few examples, taken from our direct experience with Rome Lab, of the Lab's positive impact in both the defense and non-defense communities. Multiply this by the dozens of technology thrusts and the many contractors supporting the Lab, and the immense positive impact of the Lab can quickly be seen. In Rome Lab we have a shining example of the kind of R&D facility needed as we move into the next century. The loss or major restructuring of Rome Lab would be a terrible set back. I strongly feel that if the Lab is dismantled and its functions are allocated to other facilities, not all of the Lab's talented personnel will elect to move. This would result in the Air Force losing critical expertise in a variety of highly scientific fields. In addition, I am concerned that many of those personnel who do elect to move may be reassigned to support functions rather than R&D. I most respectfully request that you give consideration to the value and contribution of Rome Lab as you deal with the difficult challenges associated with our military downsizing.

Yours truly,

Peter B. Dyson,
President

EXHIBIT 3-9

CORRESPONDENCE FROM

THE ACADEMIC COMMUNITY

National
Nanofabrication
Facility at Cornell

March 30, 1995

The Honorable Alan Dixon, Chairman
Defense Base Closure and
Realignment Commission
Suite 1425
1800 North Moore Street
Arlington, VA 22200

Dear Chairman Dixon:

I am writing to express my support for the continued operation of Rome Laboratory, located at Griffiss Air Force Base in Rome, New York.

Rome Laboratory is heavily involved in the development of technology for smart communications and distributed processing systems. There is an ever increasing need for high speed, high capacity communication systems for both military and civilian aerospace applications.

For the past several years, Cornell University and in particular the National Nanofabrication Facility have enjoyed a mutually profitable relationship with Rome Laboratory. In particular the proximity of Rome Labs to Cornell has allowed the Laboratory staff access to equipment and expertise which are unique in the United States. Access to the NNF would be severely weakened by the proposed re-location. It is not simply a matter of our equipment, but it is our 18 years' experience in serving users such as the Rome Laboratory staff which makes our relationship so valuable to the Laboratory.

I most respectfully request that you give consideration to this highly refined relationship between Cornell and Rome Laboratory. In my opinion, the Air Force and the nation would not be well served by the dismantling of this relationship.

Yours sincerely,

H. G. Craighead aHC.

Harold G. Craighead
Lester B. Knight Director, NNF

xc: N.F. Scott
file
HGC/cc

Cornell University
Knight Laboratory
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RETURN ON INVESTMENT

Rome Lab

Return on Investment

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Overview

- The Air Force's hastily made, eleventh hour recommendation to break up Rome Laboratory is replete with financial errors and deviates from the Air Force's own evaluative criteria.
- Major errors include those related to one-time costs – which are actually higher than estimated – and on-going savings – which are actually lower than suggested.
- An alternative analysis, adjusting for these errors, suggests that no return on investment will result for 51-100+ years.

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The recommendation to break up Rome Laboratory deviates substantially from the Department of Defense's own evaluative criteria for base closure.

Return on Investment (ROI) has a high priority in the base closure decisions. According to applicable law and pre-established criteria, after military value, the return on investment (ROI) of a proposed base closure or realignment action has the highest priority in the decision-making process. The number of years by which savings exceeds costs is called the period of ROI, and is used by DOD and the Military Departments to indicate the relative cost-effectiveness of a closure or realignment recommendation. The smaller the number of years; the more cost-effective the recommendation.

The COBRA model is used to calculate Return on Investment. To calculate the Return on Investment (ROI) period and to provide comparative financial data for recommendations, DOD requires all Military Departments to use the COBRA (Cost Of Base Realignment Actions) model. The model was developed for DOD and has been improved over the last two rounds of base closure recommendations. The model uses standard input data, but can make allowances for customization of data inputs where facility functions are atypical of those normally performed at military installations. The COBRA model was used to characterize the cost-effectiveness of the recommendation to close Rome Laboratory.

Cost effectiveness is a preeminent goal of the Air Force. The Air Force states in the executive summary of its BRAC 95 recommendations that "retention of an affordable

base structure which supports our national strategy must be the preeminent goal of any base closure process."

The recommendation to break up Rome Laboratory was a hastily made, eleventh-hour decision.

On November 29, 1994, the Laboratory Joint Cross Service Group directed the Air Force to consider the closure of Rome Laboratory. In response to this request, the Air Force developed the so-called level play COBRA. The level-play COBRA contemplated the relocation of Rome Laboratory functions to newly constructed space at Hanscom AFB. The level play COBRA analysis indicated the ROI period was 100+ years, or essentially, beyond the period contemplated by the model.

During this analysis, Rome Lab was rated a Tier One facility. As part of its evaluative process, the Air Force assigned rankings to installations based on a series of functional attributes and conformance with the DOD base closure decision-making criteria. According to the Air Force "a high tier ranking would typically indicate an installation should be retained, while those in the lower tiers serve as potential closure or realignment candidates, with the lowest tier considered first."

Based on the outcome of the level-play COBRA analysis, the Co-Chair of the Air Force Base Closure Executive Group rejected the consideration of the closure of Rome Laboratory. In a January 19, 1995 memorandum, he stated: "Closure of Rome Lab, New York, is inconsistent with our analysis. However, since cost and savings (DOD Criteria IV and V) had considerable influence on the resultant tier, a cost effective alternative might change this conclusion."

On March 1, 1994, the Secretary of the Air Force recommended the closure of Rome Laboratory by splitting its functions between Air Force and Army facilities. The Secretary stated "The recommendation to close Rome Laboratory is a result of this joint cross-service process. The Laboratory Joint Cross-Service Group recommended the Air Force consider the closure of Rome Labs, and the Air Force adopted this proposal, recommending that the activities at Rome Laboratory be relocated (sic) Fort Monmouth and Hanscom Air Force Base. The movement to Fort Monmouth will increase interservice cooperation and common C-3 research." This recommendation was based on a second COBRA analysis, called the decision COBRA.

The recommendation to break up Rome Laboratory is based on in flawed assumptions about one-time costs and ongoing expenses and savings.

A comparison between the assumptions and outcome of the level play and decision COBRA analyses demonstrates that the Air Force based its recommendation on mistaken assumptions and data omissions. A comparison of the results of the level play and decision COBRAs is shown in the following tables:

Comparison of Critical Factors - One-Time Costs
(FY 96 $M)

	Level Play COBRA	Decision COBRA
Total Square Feet	328,459 sf	223,480 sf
Construction Costs	95,100,000	21,900,000
Construction Costs/Square Foot	$289[1]	$98[2]
Equipment Moving Expenses	15,700,000	6,800,000

Comparison of Critical Factors - Ongoing Expenses/Savings
(FY 96 $M)

	Level Play COBRA	Decision COBRA
Locality Pay Differential	0	0
Real Property Maintenance Savings	3,200,000	8,100,000
Return on Investment (ROI)	100+ years	4 years

Based on a comparison to certified data provided by the Laboratory, space requirements are understated by over 100% in the decision COBRA. Based on the current configuration of Rome Laboratory, at its current location, the Air Force's certified data identifies the need for 501,822 square feet to house laboratory functions. In the level play COBRA analysis, the Air Force identified 328,459 square feet of space required for new construction of the Laboratory at Hanscom AFB. In the decision COBRA analysis, however, the total requirement for space at both Hanscom AFB and Fort Monmouth has been reduced to a total of 223,480 square feet at the two facilities. While these disparities are jarring, by means of a letter dated March 24, 1995, the Air Force continues to assert that the numbers contained in the decision COBRA are correct.

The credibility of the entire construction cost estimate is questionable, which throws the entire COBRA analysis into question. The accuracy of the COBRA model depends on appropriate and reasonable construction cost inputs. If the costs are not appropriately characterized, the calculations of the model and the conclusions drawn from the calculations are flawed. The level play COBRA analysis estimated that construction would cost approximately $95.1M for new facilities for Rome Laboratory functions. The decision COBRA analysis has a construction estimate of $21.85M for

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[1] New Construction
[2] Blended average for both locations. Renovation.

both Hanscom AFB and Fort Monmouth and assumes usage of existing facilities, some of which would have to be renovated, to accommodate the Laboratory functions.

Equipment moving expenses are 50% lower in the decision COBRA than in the level play COBRA. The level play COBRA analysis included an estimate for one-time moving costs of $15.7M while the decision COBRA analysis puts this cost at $6.8M. In a response dated March 24, 1995, the Air Force stated that the $6.8M estimate for moving equipment was only for four, large items (a large and small anechoic chamber, a cryogenic chamber, and an RF shielded enclosure). There are no other estimates in the decision COBRA analysis for moving the thousands of other items which the Laboratory would take in a relocation. Furthermore there exists no consolidated list of equipment of the items upon which the Air Force could have based an estimate. It is difficult to understand why the Air Force deviated from the original estimates since any equipment that can be moved will be moved regardless of receiving location. It should be noted that the Air Force certified data questionnaire for the Laboratory lists the relocation costs for "large, unusual items integral to the unit mission, but which cannot be moved as regular freight," as $14.5M.

The proposed recommendation overstates recurring annual savings attributable to real property maintenance costs by $5 million. Real property maintenance costs are costs incurred in the provision of routine maintenance to real property. As part of the analysis of the savings associated with the breakup of Rome Lab, the Air Force assigned a value to the current cost of real property maintenance of the facility and compared it to the cost at the receiving facility. In the level play COBRA analysis, consequent annual savings were estimated at $3.2M. Inexplicably, the decision COBRA analysis inflates these annual savings to $8.1M. The costs of the current facility in the decision COBRA analysis appear to be high since it takes about $20M to run an entire, small Air Force base.

Analysis of the data highlights glaring omissions and internal inconsistencies. The wide disparities in construction costs cannot be explained solely by any single factor. The following table breaks out the Air Force construction estimates in the decision COBRA analysis on a cost per square foot basis. The data shows internal inconsistencies in the estimates for similar categories of space at the two bases.

Comparison of Hanscom AFB and Fort Monmouth Construction Estimates - Decision COBRA Analysis

Function	Total Space (sf)	Hanscom AFB Space (sf)	Hanscom AFB Cost ($M)	Hanscom AFB Cost ($/sf)	Fort Monmouth Space (sf)	Fort Monmouth Cost ($M)	Fort Monmouth Cost ($/sf)
Admin.	95,000	54,762[3]	0	0	40,238	1.37	34
Light Lab	28,000	16,602[3]	0	0	12,198	0.47	39
Medium Lab	52,800[4]	17,236	4.81	279	22,234	1.50	69
Heavy Lab	3,680	2,121	1.29	608	1,559	0.23	148
Light SCIF	20,800	11,990	2.10	175	8,810	0.30	34
Heavy SCIF	23,200	13,373	5.28	395	9,827	0.90	93
Other			2.10			1.50	
Total	223,480	116,084	15.58		94,866	6.27	

The DOD analysis overlooks a $2.3 million annual, recurring differential in civilian salaries. The purpose of the analysis is to weigh the cost effectiveness of breaking up Rome Laboratory. All significant costs of moving must be considered. Neither the level play nor the decision COBRA analysis includes a substantial, annual, recurring cost differential. In certain high cost of living areas, the military offers an adjusted salary to its civilian employees. The increment above base pay is called "locality pay." As a modest cost of living area, Rome, NY area does not have locality pay for civilian employees. However, the two receiving bases, Hanscom AFB and Fort Monmouth, do have locality pay differentials for civilian employees of 5.47% and 5.77% respectively. Applying the locality pay differential to the 504 civilian positions slates to go to Hanscom AFB and 369 civilian positions moving to Fort Monmouth with an average salary of $46,642/year would create approximately $2.3M/year of higher, annual recurring costs for the closure alternative. The impact of including locality pay in the COBRA calculations would reduce the projected $11.5M annual, recurring savings by 20%, or $2.3M.

Recurring real property maintenance costs at Hanscom AFB and Fort Monmouth are assumed to the zero in the decision COBRA analysis. The absence of recurring real property maintenance costs in the decision COBRA analysis at the receiving locations significantly skews the calculation of ROI to a lower number since there are no costs to offset the savings attributable to the closure of Rome Laboratory. The assertion that there are no additional real property maintenance costs at either of the receiving bases is not credible because it fails to account for the impact of substantial numbers of added personnel at the receiving bases.

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[3] Space assumed to be adequate without renovation.
[4] Includes 13,200 sf of excess space at Hanscom AFB without renovation.

Gross miscalculations in previous decisions provide a context for evaluating the recommendation to break up Rome Laboratory.

In the absence of procedures to monitor the efficacy of cost estimates and assumptions, careful review of previous decisions is needed. Past recommendations had the benefit of a follow-up Commission, which reviewed substantial differences between original estimated costs and assumptions and the actual issues that arose during implementation of the recommendation. Consequently, this Commission bears an additional burden and will need to look carefully at previous decisions on laboratories to draw conclusions about the recommendation to close Rome Laboratory.

Several prior DOD and Air Force laboratory recommendations represent important precedents to the situation confronted by Rome Laboratory. These precedent cases demonstrate that underestimates of construction, relocation and procurement costs can undermine cost effectiveness.

Rome Laboratory costs are substantially understated when compared to a similar relocation undertaken by the army pursuant to a 1991 BRAC decision. In 1991, the Army recommended the consolidation of a number of research functions into the Army Research Laboratory (ARL) at Adelphi and Aberdeen, MD. While the research functions at the ARL are not wholly comparable to Rome Laboratory, the relocation involves movement of almost the same number of personnel – the ARL consolidation moves 877 positions, while the Rome Laboratory closure moves 883. After almost four years of extensive planning, requirements definition and major construction project initiation, the Army's budget for the ARL consolidation indicates significantly higher costs than what the Air Force projects for closure of Rome Laboratory: In several key areas, the costs associated with the consolidation of ARL are substantially higher than the Air Force's estimates of the cost to close Rome Laboratory:

- *Construction Costs.* While ARL package is primarily new construction and the Rome Laboratory package a renovation of existing space, this difference fails to justify the discrepancy between the estimated construction costs for the two facilities. If renovation is assumed to cost 70% of new construction (the methodology used by the Air Force to estimate construction costs at Hanscom AFB), Rome Laboratory construction costs should be about $113M (0.7 x $162M).

- *Procurement Costs for New Equipment.* In the ARL consolidation, procurement costs for equipment that cannot be moved is approximately $58.4M. There is no similar estimate in the decision COBRA analysis for procurement of equipment that cannot be moved from Rome Laboratory.

As demonstrated by the effort to relocate environmental and occupational toxicology research, underestimates of relocation expenses can undermine cost effectiveness. In 1991, the Army recommended the relocation of environmental and

occupational toxicology research from Fort Detrick, MD to the Wright-Patterson AFB, OH. Now, in 1995, the Army has requested a reconsideration of this action. The reason for this request is that the Army has become aware of the necessity to build a new research facility at Wright-Patterson AFB when no facilities were projected in the 1991 decision process. The requirement for approximately $8M in new construction for a small research facility with approximately 10 personnel, eliminates the cost effectiveness of the recommendation. This example clearly demonstrates the loss of cost effectiveness when the cost to relocate research activities are significantly underestimated.

The reconsideration of the Williams AFB research facility must be heeded as a warning against pursuing actions that are costly to the military. In its BRAC 95 recommendations, the Air Force has requested a change in its 1991-approved recommendation to relocate its Aircrew Training Research Facility to Orlando, FL. In its justification the Air Force states: "this recommendation was based on assumptions regarding Navy training activities and the availability of facilities. Subsequent to that Commission's report, it was discovered that the facilities were not available at the estimated cost." Because of the changes, the Air Force recommended the laboratory remain in its current location in a stand-alone configuration since "... the present facilities are consolidated and well-suited to the research activities, including a large, secure facility."[5]

The Air Force's cost estimates at Rome Laboratory were not based on past precedents of realignments at comparable facilities. Assessment of the validity of the construction cost estimate by comparison to past experience at the decision stage is a reasonable approach, due to the nonstandard nature of research facilities and test equipment. Unfortunately, it does not appear that this was the approach taken in assessing the construction cost estimates for the COBRA analysis that supported the Air Force decision.

In making its recommendation, DOD failed to take into account numerous other cost considerations including information management needs, procurement costs and increased costs for operating and maintaining the test sites.

There are no costs to accommodate the information management needs of the relocating research functions. The decision COBRA analysis does not include estimates for modifying the facilities for information management functions, a major cost for a laboratory facility that is usually accomplished during construction or

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[5] This request for a redirect of a previous BRAC Commission action also notes "...finally, the activities are consistent with the community's plans for redevelopment of the Williams AFB property, including a university and research park."

renovation. Information management includes funds for items such as alteration or extension of existing telephone lines or capacity, upgrades or increases in telephone capacity on the base caused by the addition of the function, and wiring within the buildings to electronically connect offices or users of computer or test equipment, such as in a local or wide area network. For functions such as these, the information management costs could run into tens of millions depending on the extent of connectivity required.

The cost of interconnecting lab space at and between Hanscom AFB and Fort Monmouth was not addressed by the Air Force. Directorates at Rome Lab are interconnected and networked through wide band high speed fiber optic telecommunications. This state of the art capability does not exist at Hanscom AFB and Fort Monmouth and will need to be duplicated.

Procurement costs for equipment that cannot be moved from Rome Laboratory are not included in the current analysis and are significant. The decision COBRA analysis includes no estimate to replace equipment which cannot be moved to the receiving locations. This appears to be a glaring omission of a significant cost item by the Air Force in light of the Army's estimate of $58.4M to replace test equipment that cannot move for their ARL consolidation.

Higher moving costs for Air Force Career Program civilian employees were not included for 468 employees. In its response of March 24, 1995, the Air Force acknowledged that 468 civilian employees at Rome Laboratory are in the Air Force Career Program. The cost estimates in the decision COBRA analysis failed to consider the impact on moving costs for these personnel. Personnel in the Career Program have greater moving entitlements than other employees, and the high percentage of the employee base in this program at the Laboratory make this a significant cost omission.

Costs to compensate for the current use of non-Air Force facilities at Rome Laboratory were not included. Rome Laboratory currently shares a variety of facilities that are operated by local universities. For example, the Laboratory uses the facilities and personnel located at Cornell University to perform fabrication of a range of photonic semiconductor devices. The proximity to Cornell is extremely beneficial and obviates the need for a large investment in foundry facilities in the Photonics Center. This allows the Photonics function to concentrate its resources on more valuable activities of photonic concept development and engineering. While these facilities are not among the Laboratory's real property assets, they are essential to the Laboratory's mission. Many of these facilities will have to be purchased, constructed, or leased by the Laboratory at the new locations.

New York State investment in Rome Laboratory has not been included in the decision COBRA analysis. The New York State Urban Development Corporation has approved a $3.2M grant to fund special projects and infrastructure improvements to benefit the Rome Laboratory. The Griffiss Local Development Corporation intends to

use these funds to construct a 50,000 square foot facility, part of which would be leased to Rome Laboratory. This space would help the Laboratory consolidate some of its requirements into newer space, vacate underutilized space, and reduce an estimated, annual $200,000 in real property maintenance costs. These benefits were not included in the decision COBRA analysis. If they had been included, they would have increased the ROI period and detracted from the cost effectiveness of the recommended action.

Estimates for additional investments in base conversion and caretaker costs were not included. The approved recommendation in 1993 to close Griffiss AFB began a series of investments by the Air Force and the Department of Defense that will have to be re-examined if the recommendation to close Rome Laboratory is approved. The Griffiss Local Development Corporation has received $1.5M in planning grants from the Department of Defense Office of Economic Adjustment to plan for the reuse of the excess property at Griffiss AFB. These planning funds have been matched by approximately $1.6M from state and local agencies. In addition, the Air Force has undertaken an environmental analysis of the reuse plan to culminate in a Final Environmental Impact Statement in Spring 1995. The development of the reuse plan also focused on the environmental clean up of contamination on the base and was the basis for development of the BRAC Cleanup Plan (BCP) for the base property. These planning and clean up efforts have been ongoing for almost two years. If the reuse plan development and implementation is delayed, the caretaker costs for the excess real property assets at Griffiss AFB will increase because the Air Force will have to retain these assets for a longer period of time. While the COBRA model was not configured to consider these costs, they are none the less real costs that will have to be borne if the recommendation to close Rome Laboratory is approved.

Increased costs for operating and maintaining the Test Sites, as well as a possible construction cost to replace existing support shop space, were not included. The closure recommendation for Rome Laboratory leaves the Test Site O&M operations in place. These activities provide the active test environments for Laboratory research operations. Located close to the Laboratory in its current location, the Test Sites function as an integral part of the Laboratory. Use of the Test Sites by Laboratory personnel is quick and easy and does not entail temporary duty trips with overnight stays. The cost of Test Site operations can be expected to increase as a result of the closure and management by activities located at Hanscom AFB, almost 300 miles distant. The Laboratory has also identified approximately 85,000 square feet of shop space used to build prototypes that will have to be reproduced at the Test Sites or the function relocated to another base. Including these increased costs would extend the ROI period and detract from the cost effectiveness of the closure recommendation.

An alternative analysis correcting for all omissions and faulty assumptions would yield a return on investment ranging from 51 to 100+ years.

A simple, conservative change of assumptions to the current analysis clearly indicates that the recommendation to close Rome Laboratory is not cost effective. Due to the significant shortcomings in the decision COBRA analysis and unexplained discrepancies between the level play and decision COBRA analyses, it was necessary to run an alternative analysis to get an approximation of the lowest level of ROI that could reasonably be expected from the recommendation to close Rome Laboratory. Using all information in the foregoing as background, the following changes were made to the decision COBRA analysis to calculate an alternative ROI:

- Civilian personnel pay was adjusted for locality pay at Hanscom AFB and Fort Monmouth using an average of 5.5% of base pay. (Actual is 5.77% at Fort Monmouth and 5.47% at Hanscom AFB).

- One-time unique and moving costs were adjusted to reflect full Air Force estimates from the level play COBRA analysis ($31.4M versus $24.8M in the decision COBRA analysis).

- The Rome Laboratory real property maintenance costs were adjusted to the Air Force estimate ($3.2M) in the level play COBRA analysis.

- The military construction estimate was adjusted and a reasonable range established. The lower end of the range was established as follows: The level play COBRA construction estimate of $95M was based on an unsubstantiated space requirement of 328,459 square feet of space of new construction at Hanscom AFB. For purposes of a conservative analysis, we will accept the Air Force's March 22, 1995 statement that there is sufficient excess space available at Hanscom AFB and Fort Monmouth to accommodate Rome Laboratory's space needs and that the level play space needs have some as yet unexplained basis in fact. To adjust for the difference between the cost of new construction and the cost of renovation, the Air Force's own 70% factor was used. Therefore, the result of this analysis is that the $95.1M construction cost in the level play COBRA was used to arrive at a new, estimated cost of $67M. This is the bottom of the ROI range and is unlikely to reflect the actual square footage requirement.

- Using a reasonableness standard, space requirements for our alternative analysis were also arrived at in the following way: The certified data from the lab establishes space needs of 615,803, including laboratory and administrative space. We assumed a 20% reduction for efficiency. We then subtracted known identified space at both locations of approximately 210,950 square feet. The remaining 281,692 square feet would be new construction. Costing new

construction at $289 per square foot as per the level play analysis and applying the Air Force's standard 70% renovation factor for the remainder, the new construction estimate is approximately $124M.

The one-time cost of the recommendation to close Rome Laboratory, using only the foregoing assumptions would be $113.8M to 155.5M with an ROI of 51 years to 100+ years. The inclusion of other costs which were omitted or understated, such as moving costs, procurement of equipment that cannot be moved, information management costs, increased cost for operation of the Test Sites, benefit for the use of non-Air Force facilities, and increased Griffis AFB conversion costs would further extend the ROI period. The combination of higher cost and reduced savings for this recommendation increases the ROI period and results in a marked deviation from the BRAC ROI criteria.

When all additional costs and savings figures are adjusted, the return on investment is expected to closely approximate a 100+ year ROI.

ECONOMIC IMPACT

Rome Lab

The Economic Impacts of Closure and Relocation

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Overview

- The Air Force recommendation to relocate Rome Laboratory will, together with previous BRAC decisions, result in the loss of 10,000 jobs – a proportionately greater impact than in any other community in the nation.

- When the quality of Rome Lab jobs is considered relative to jobs typical of the region, the economic and civic impact is even greater.

- The Lab has a far greater positive impact on the economy of central New York than it will have on the communities to which it is proposed to be relocated.

- The Air Force recommendation to relocate the Laboratory will result in the additional loss of 18,000 potential jobs that might have been generated by the community's Reuse Plan.

***

In analyzing the Rome Lab action, there are two major economic impacts that must be considered:

- **The region's economy will immediately lose almost 10,000 jobs as a result of the cumulative BRAC actions, including the closure of Rome Lab.** This figure represents the worst impact in the nation for all regions affected by Air Force actions. The impact is even worse when one considers the value of Rome Lab's high-paying jobs in the context of the relatively modest standard of living in Utica-Rome metropolitan area.

- **The potential to create as many as 18,000 new jobs through the Rome Lab Research Park will be lost.** The fully-developed plan for a public/private research park centered on Rome Lab is expected to provide a tremendous boost to the region's economic development efforts and could serve as a model for technology-based initiatives in the 21st Century. The "missed opportunity" impact associated with the proposed closure of Rome Lab would render this vision, and its attendant job-creating potential, obsolete.

Based on the Air Force's analysis of its own actions, the Utica-Rome MSA will be the most negatively impacted region in the entire nation.

The Department of Defense has established a series of key indicators by which it evaluates the potential economic impacts of closure or realignment actions that are under consideration. The primary criterion for this evaluation is: the anticipated job loss (or gain) both absolutely and as a percentage of total employment for the Metropolitan Statistical Area (MSA) within which the subject facility is located. Cumulative economic impact considers all of the jobs lost or gained over the course of the prior rounds of BRAC as well as the current round. For this discussion, we have accepted DOD methodology.

Utica-Rome is one of 15 MSAs that will be impacted by the proposed Air Force actions. According to the Air Force's own analysis, seven of these will experience cumulative jobs gains, and eight will experience losses. The MSA with the greatest negative impact is Utica-Rome. At least 6.2% of the entire region's employment base will be lost as result of BRAC actions.

The Rome Lab region will lose almost 10,000 jobs as a result of BRAC actions.

To review, these are the figures for the Utica-Rome job impacts as a result of the Rome Lab and Griffiss actions[1]:

Rome Lab Job Impact	
Direct Civilian	1,057
+ Direct Military	10
+ Indirect Civilian	1,278
= *Total Rome Lab Job Loss*	*2,345*
Cumulative Job Impact:	
Direct Military	3,370
+ Direct Civilian	2,967
= *Total Direct Job Loss*	*6,337*
+ Total Indirect Job Loss	3,294
= ***Total Cumulative Jobs Lost in Region***	***9,631***

[1] As per Dept. of Defense Economic Impact Data 27 February 1995

Prior analyses have put the total loss at closer to 14,200 jobs, or roughly 9% of the region's entire employment base. Nevertheless, using DOD's conservative figure, the negative impacts on the Utica-Rome area are substantial.

Rome Lab is a source of high-quality jobs that pay, on average, more than twice what the typical job pays in the already unstable Utica-Rome economy.

The Utica-Rome economy is relatively weak, and therefore, the potential impacts of the proposed action are especially distressing.

- The average salary for Rome Lab civilians is roughly $50,000 per year. The average salary in the Utica-Rome MSA is $22,500 per year. Hence, the jobs at Rome Lab pay roughly 120% more than the average job in the region (see Exhibit 5-1).
- As a source of excellent, high-paying civilian jobs, Rome Lab's staff and the contractors who service them do not represent a random sampling of Mohawk Valley employment.
- The Utica-Rome economy is struggling. Employment over the last decade has grown at about half of the national average (see Exhibit 5-2). And, even with the presence of the Lab, per capita income in the region is 72% of the New York State average, and 86% of the national average.

It is well-established that Rome Lab represents an important part of the regional economy. In assessing the proposed action, it is also important to consider the proposed action with a comparative view of the losing and gaining regions.

The Lab is a far more significant economic presence in Central New York than it will be at the proposed sites in New Jersey or Massachusetts.

That the proposed Rome Lab action will have an acutely negative impact on the Utica-Rome economy is a painful fact typical of many base closures. However, because this action is simply a shifting of positions from one region to two others, the decision to relocate the Lab's operations to Fort Monmouth and Hanscom is particularly troubling.

Rome Lab is a valuable economic resource. Under a well-considered strategic development policy, this value should be maximized. Such maximization, of course, is not of paramount importance in the BRAC process; but, all other considerations being equal, government generally seeks, quite correctly, to place or retain facilities in locations where their economic impact is or will be most beneficial. This does not

simply mean good jobs should be placed in needy regions. Indeed, a region must have a fertile economic setting to make a facility's presence useful as a tool for fostering economic growth.

The Rome region's success in providing just such fertility to the Lab makes it all the more disturbing that DOD is proposing to uproot Rome Lab from a less affluent region where the economy benefits greatly from the its operations and move it to two more affluent regions where, in all likelihood, the Lab will hardly be noticed.

- **The community around Rome Lab is less affluent than the communities around either Hanscom or Ft. Monmouth.** The average per capita income around Hanscom is 53% greater than it is around Rome Lab, and 49% greater around Ft. Monmouth than around Rome Lab (see Exhibit 5-3).
- **Not only is the Rome area less affluent, but the economy is simply smaller.** The Rome Lab-related jobs and income represent a far greater part of the Utica-Rome economy than they will be in the regional economies of either the Massachusetts or New Jersey destinations (see Exhibit 5-4).
- **Finally, New York State, overall, has been one of the worst impacted states in the nation.** The 1993 BRAC had New York as the second worst hit state as a percentage of DOD employment

More than jobs, Rome Lab and its personnel have become an important part of the civic life in the region.

Rome Lab is not just in Rome. It is part of Rome. Over the years, the personnel at the Lab have developed deep roots in the civic and cultural life of the region. As is discussed elsewhere, one of the greatest disruptions associated with moving labs is that the predominantly civilian population (93% at Rome Lab) rarely moves. This is because civilians often have strong and long-standing commitments to their communities, and the disruption of moving is unthinkable. Nowhere is this more true than with Rome. The lack of civilian movement is generally an issue for cost or military value analyses. However, the flip side is that the Central New York community has long embraced and been embraced by the people of Rome Lab:

- Many of Rome Lab's personnel play leadership roles in the area's civic, educational, and cultural organizations. For example, two of the last three presidents of the respected Jervis Library in Rome have been Rome Lab people.
- The Lab has developed a exemplary program of technology interaction and education with the Rome School System.
- Mohawk Valley Community College spent $5.1 million on its Rome Campus to build a "science and tech building" not more than 100 yards from Griffiss AFB, to support Rome Lab-related efforts. In fact, MVCC's Rome Campus in general was specifically sited to interact with Rome Lab.

- The State University of New York (SUNY) constructed a multi-million dollar Institute of Technology campus at Marcy, ten miles from Griffiss AFB, largely due to a desire to support educational activities for Rome Lab.

Over the years, numerous observers from the military and civilian worlds have cited the relationship between Rome Lab and the City of Rome as a model of cooperation and mutual support.

The Rome Lab Research Park is a catalyst for economic growth which could potentially generate 18,000 high-quality jobs. This will not occur if the Lab is closed.

No community likes to lose jobs or people, particularly jobs like those at Rome Lab. We recognize, of course, that this situation occurs every time a base is closed. The most important economic impact from the proposed Rome Lab action, however, is not the loss of existing jobs, but the loss of the region's capacity to generate new jobs in the future.

The Griffiss Reuse Strategy is a compelling and realistic vision for economic development in the coming decades. As is described in the Basics of Reuse section, the realization of this strategy is the Rome Lab Research Park.

- **Focusing on economic growth.** Rome Lab Research Park is about bringing to reality the dual use technology exchange model that the nation's leaders have rightly held up as an important generator of national economic strength – leveraging federally-funded research to drive economic growth. The key to the Rome Lab Research Park plan is that it focuses on new high-quality job generation, not relocation or typical zero-sum solutions.
- **The potential to generate 18,000 new jobs.** It is impossible to definitively know how many jobs will be generated by the Rome Lab Research Park. However, preliminary estimates for the plan's build-out over a 20-year timeframe yields the potential for 8,200 on-site jobs. Based on a regional employment multiplier of 1.2, as used in DOD's analysis, this means that the creation of the Rome Lab Research Park could lead to as many as 18,000 new jobs in the region over the next twenty years.
- **High-quality jobs for the future.** The key here, however, is not just jobs, but the kind of jobs. Building off of Rome Lab, the Griffiss Master Reuse Strategy is focused on creating the kinds of jobs that enhance America's competitiveness in the 21st Century. These high-quality, good-paying jobs are important not only for the region's economy, but also for the nation's long-term economic strength.

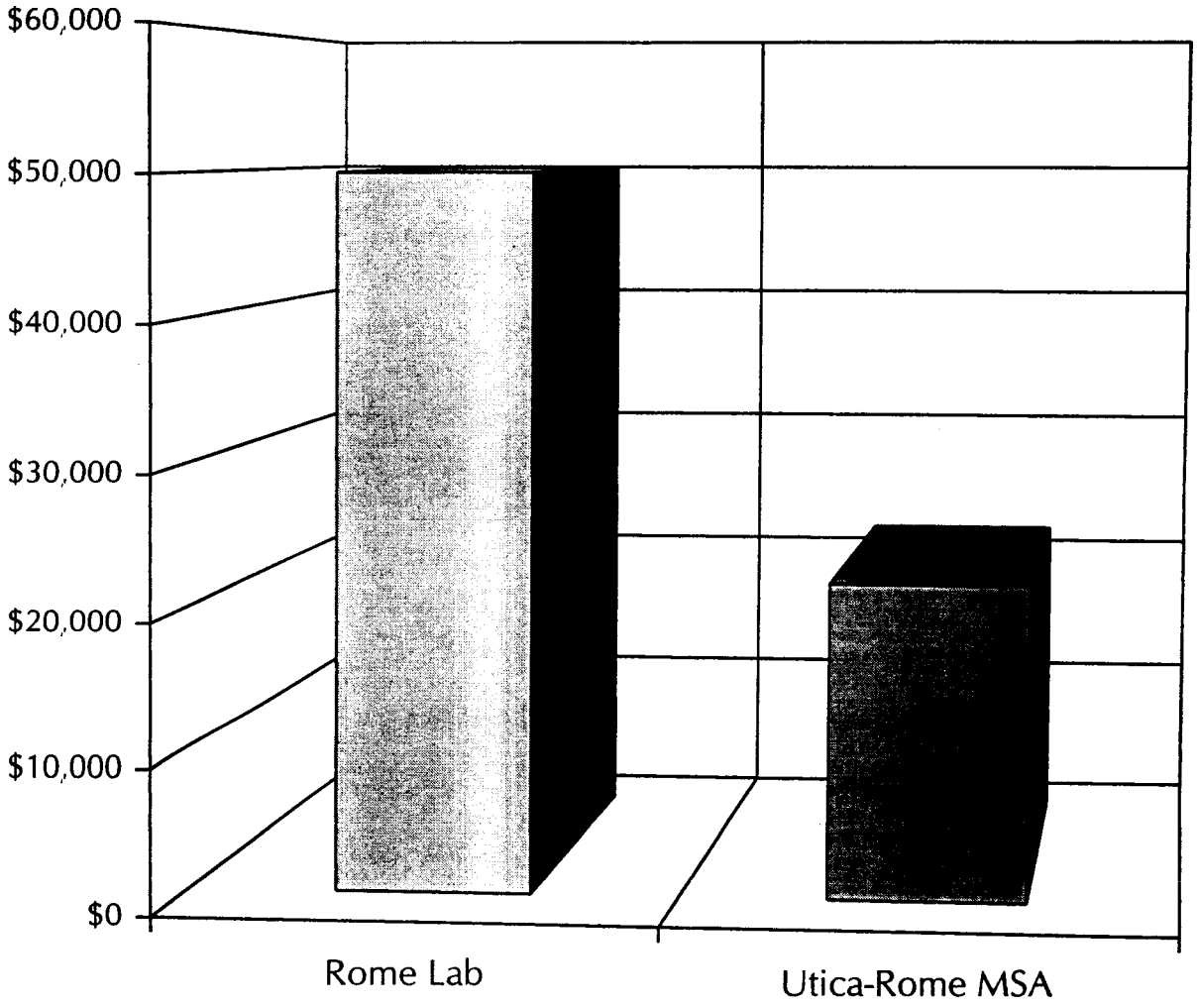
The decision to relocate Rome Lab must be considered in the context of how this action will eviscerate the reuse plan and destroy the potential to generate as many as

18,000 new jobs in Central New York's Mohawk Valley. In a country and a world where national security increasingly translates into the need to maintain economic strength, the potential for the Rome Lab Research Park to make a small but important contribution to this effort should be encouraged.

The immediate impacts on the region's economy of closing Rome Lab will be severe and difficult to overcome. Ultimately, the region's economy may recover even if the BRAC Commission lets stand the Department of Defense's ill-conceived recommendation. If that recommendation is reversed, however, the Commission, in addition to feeling confident about the military logic of their decision, can take pride in having unleashed a success story that will bring economic growth to a struggling region for years to come.

Exhibit 5-1

The average salary of Rome Lab employees is more than twice as much as the region's average salary.

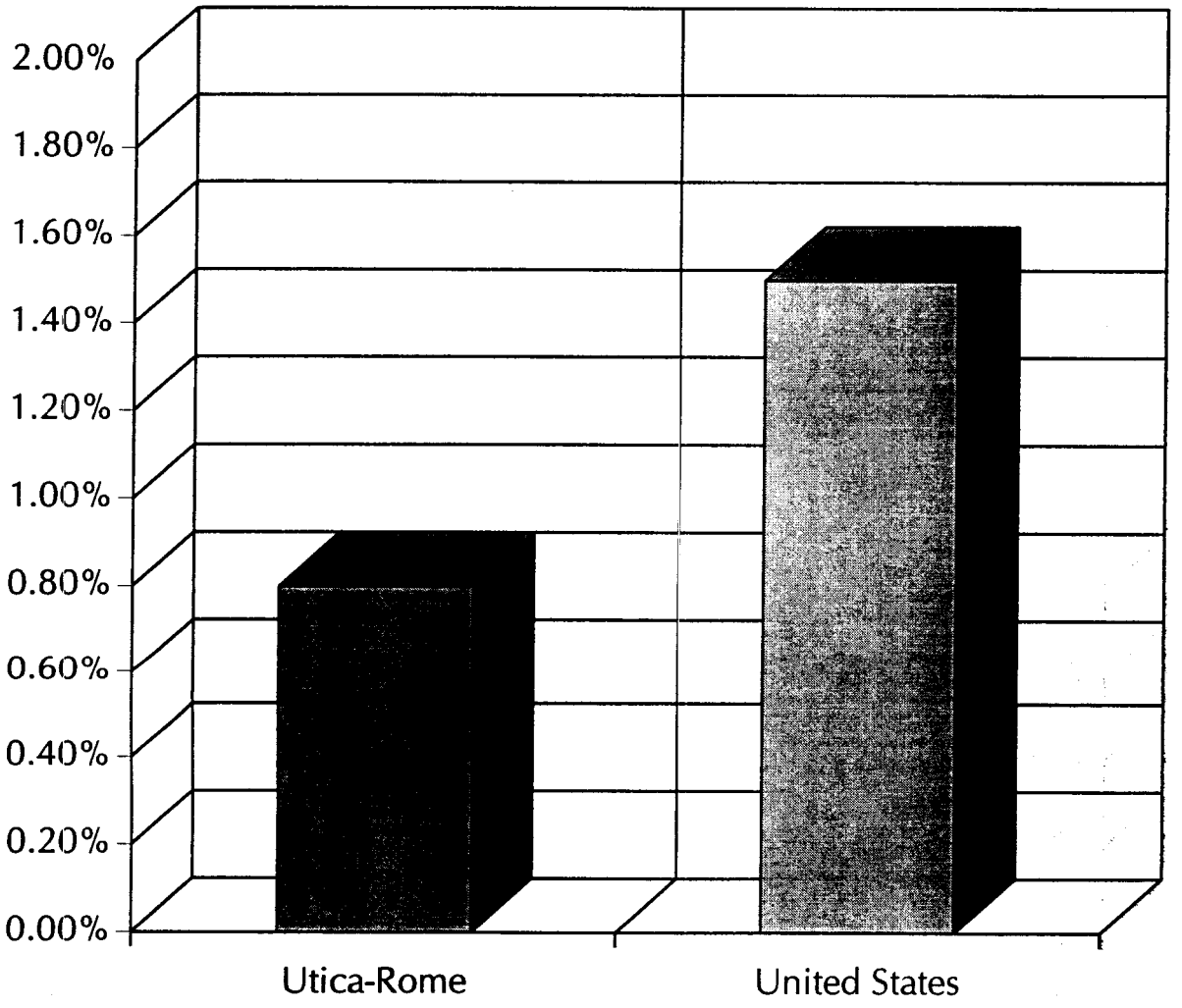


Average Annual Salary for Employees (1993)

(source: NYS Dept. of Labor and Rome Lab Data)

Exhibit 5-2

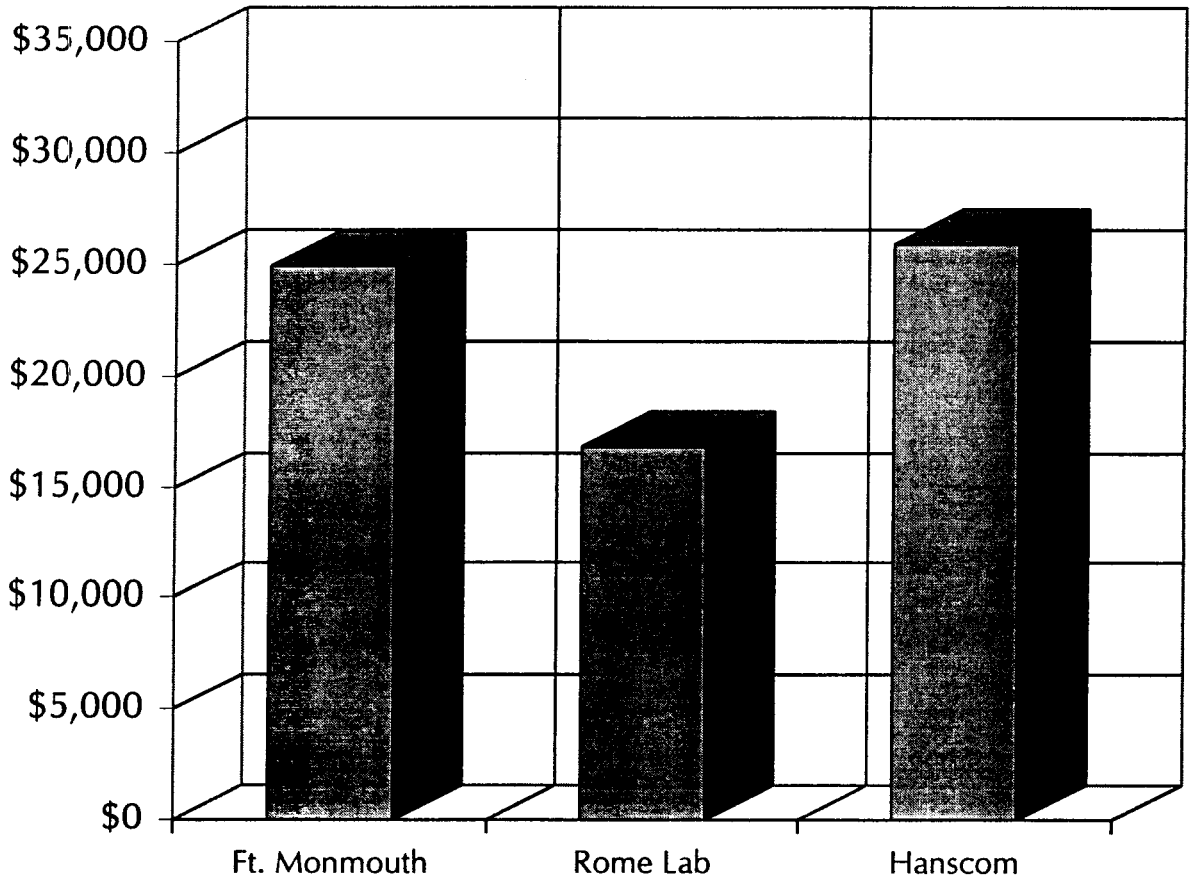
The Utica-Rome economy has grown at about half of the national average during the last ten years.



Average Annual Employment Growth 1984-1993

Exhibit 5-3

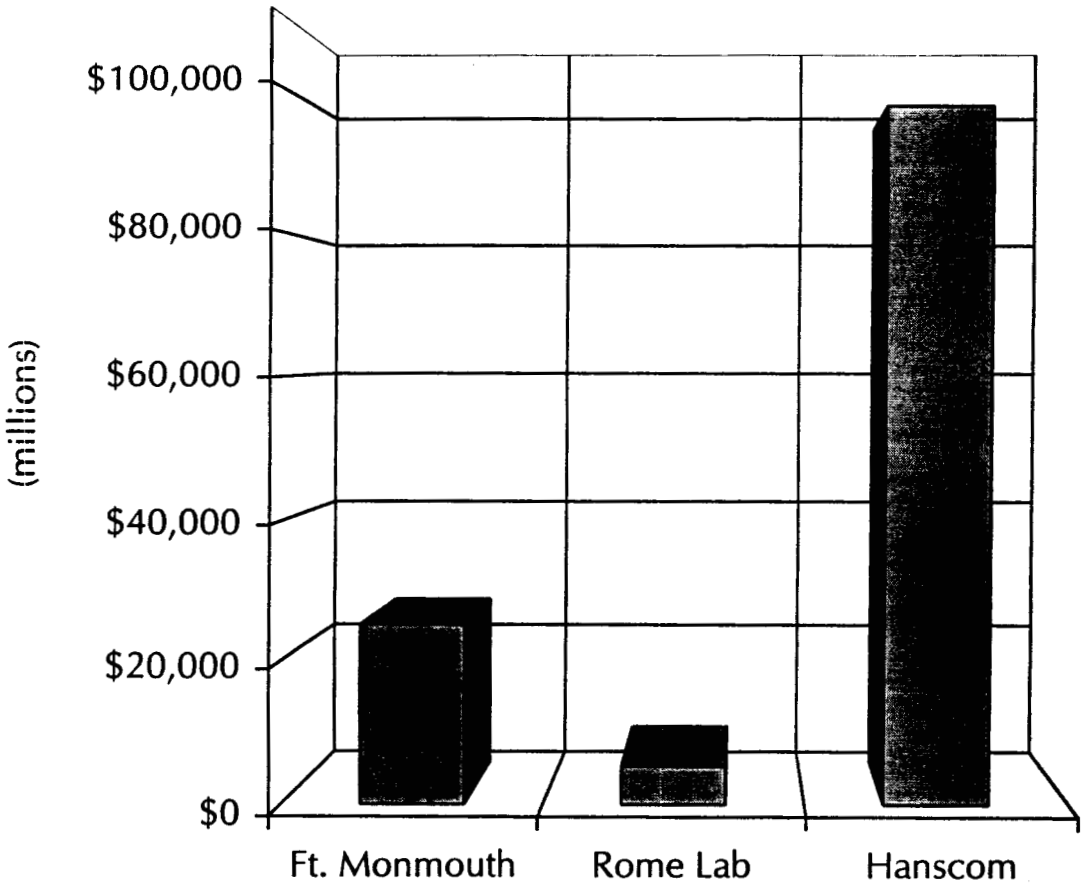
The people living around Rome Lab are roughly 50% less affluent than the people living around either Ft. Monmouth or Hanscom.



Per Capita Incomes by Region
(1992 MSA data)

Exhibit 5-4

Rome Lab's presence in Utica-Rome is especially important because the regional economy is substantially smaller than it is around either Fort Monmouth or Hanscom.



Total Personal Income by Regions
(MSA 1992 data)

EXHIBIT 5-5

CORRESPONDENCE FROM THE BUSINESS COUNCIL OF NEW YORK STATE

CHAIRMAN
Richard A. Jalkut
NYNEX New York
VICE CHAIRMAN
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Alair Townsend
Crain's New York Business
PRESIDENT
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Welch Allyn, Inc.
Harold R. Andersen
Phoenix Metal Fabricating, Inc.
R. Quintus Anderson
The Aarque Companies
Matthew Augustine
Eltrex Industries, Inc.
Frederick D. Berkeley
Graham Corporation
D. Wayne Calloway
PepsiCo, Inc.
David N. Campbell
Buffalo, New York
William I. Campbell
Philip Morris U.S.A.
Renso L. Caporali
Northrup/Grumman Corporation
James A. Carigg
New York State Electric & Gas
J. J. Castiglia
Pratt & Lambert, Inc.
Robert B. Catell
Brooklyn Union Gas Company
James H. Cleave
Manne Midland Bank, N.A.
Harold H. Connor
Business Computer and Software Co.
William H. Donaldson
New York Stock Exchange
Michael J. Doyle
Taylor Vineyards
Allan E. Dugan
Xerox Corporation
Jairo A. Estrada
Garden Way, Inc
Robert F. Flacke
Fort William Henry Corporation
Rose E. Frattali
New York Casualty Company
Eugene M. Freedman
Coopers & Lybrand
David C. Genever-Watling
GE Power Systems
John A. Georges
International Paper Company
Lewis Golub
Golub Corporation
Ray J. Groves
Ernst & Young
W. Craig Heaton
[illegible] National Insurance Group
[illegible] Houghton
[illegible] Incorporated
[illegible] Hyacinthe
Packard Frank Office Furniture
Harry P. Kamen
MetLife
Bernard J. Kennedy
National Fuel Gas Company
Allen J. Krowe
Texaco, Incorporated
Thomas G. Labrecque
The Chase Manhattan Corp.
Donald R. Led Duke
Barry, Bette & Led Duke, Inc.
Stanford Lipsey
Buffalo News
John R. Lord
Carrier Corp./North American Operations
John E. Mack
Central Hudson Gas & Electric
F.X. Matt, II
F.X. Matt Brewing Company
William D. Matthews
Oneida Ltd.
Eugene R. McGrath
Consolidated Edison Co. of New York
James P. Menzies
Key Bank of New York
Timothy S. Mock
ALCOA Wire Rod & Bar Division
Thomas Mooney
Greater Rochester Chamber of Commerce
Gerhard J. Neumaier
Ecology & Environment, Inc.
Paul H. Pearson
Security Mutual Life Insurance
James E. Preston
Avon Products, Inc.
John B. Robinson, Jr.
Fleet Financial Group
Lewis Rudin
Rudin Management Company Inc.
Charles F. Saul
Agway, Inc.
Walter V. Shipley
Chemical Banking Corporation
Muriel Siebert
Muriel Siebert & Company, Inc.
Robin B. Smith
Publishers Clearing House
William C. Steere, Jr.
Pfizer Inc
Jen R. Stuart
Dresser-Rand
[illegible] A. Toole
[illegible]poration
[illegible]h
[illegible] Division GMC
Daniel P. Tully
Merrill Lynch & Co., Inc.
Robert B. Wegman
Wegmans Food Markets, Inc.
Lawrence A. Weinbach
Arthur Andersen & Co. SC
Sheila W. Wellington
Catalyst

DANIEL B. WALSH
President

The Business Council of New York State, Inc.

March 8, 1995

Mr. Alan J. Dixon
Chairman
Defense Base Closure and Realignment Commission
1800 North Moore Street, Suite 1425
Arlington, Virginia 22209

Dear Mr. Dixon:

RE: *Rome Lab at Griffiss Air Force Base*

The Business Council of New York State, Inc. is the principal statewide organization representing business and industry in the State. More than 4,000 businesses are members, including virtually all of New York's major employers.

I am writing to urgently request the reconsideration of the decision to close the Rome Laboratory at Griffiss Air Force Base. You are undoubtedly aware of the value of Rome Lab to the Air Force in the areas of Command, Control, Communications, Computers and Intelligence. This value was created because of a synergistic partnership between the military and New York State industry and universities working together to acheive the mutual goals of military security and economic prosperity.

Closing the Rome Lab and relocating its functions to two separate military bases in New Jersey and Massachusetts will destroy this productive and efficient research and development partnership, thus jeopardizing the continued value of research conducted there. We wonder how this is in the national interest.

The 1993 Base Realignment and Closure Commission recommended realigning and partially closing Griffiss Air Force Base. This will result in the loss of more than 10,000 civilian and military jobs in the region, 25 percent of the City of Rome's revenues, and 9 percent of the revenues of Oneida County.

No single action or event could have had a greater, more immediate impact on the economy of the region and the lives of the people who live there. The response of the community and the state, however, was to rally around an effort to save the most economically significant component of the Base not touched by the 1993 BRAC action: Rome Laboratory.

The State of New York created the New York State Technology Enterprise Corporation (NYSTEC) to develop opportunities for dual use technologies. Community leaders, in conjunction with the State, developed a recovery plan for the region. At the heart of this plan is Rome Lab, which will serve as a magnet for attracting high technology companies, and spawning "spin-off" companies from the lab. With the lab as the anchor tenant, the realigned Griffiss Air Force Base will serve as a model military base reuse facility for the rest of the nation. No where in the country has such a consortium of military, industry, universities and community leaders been replicated.

The effort to save Rome Lab has been overwhelming because the stakes are so high. Rome Lab's interface with the private sector serves as a powerful economic development engine for the region. For example, the lab contracts out 80 percent of its annual budget. Last year, that translated into over 250 contracts valued at more than $132 million for New York State companies. The lab is also directly responsible for the creation of 3,500 jobs in mostly small high technology businesses.

The partnership between the Rome Lab, and the people, businesses and universities of New York State, has benefitted both the military and the Mohawk Valley region of our state. Destroying this partnership would not serve national or regional interests. To the contrary, both would be damaged.

We are privileged to have the Air Force's Rome Laboratory as a resource. Likewise, the Air Force has been privileged to have benefitted from the community, state, corporate and academic support and commitment it has received throughout its existence.

We look forward to working with you to insure that this partnership can continue for many, many more years.

Sincerely,

Copies to Governor Pataki,
Senator D'Amato, Senator Moynihan, Congressman Boehlert, Stephen Dimeo, Raymond Meier

IMPORTANCE TO THE NATION

Rome Lab

Rome Lab's Importance to the Nation

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Overview

- A very substantial percentage of Rome Laboratory funding comes from customers, including many from defense organizations outside of the Air Force, who choose Rome Laboratory over other available options.

- The Lab's ability to attract and satisfy customers generates multiple benefits to the Air Force – increased revenues to cover staff salaries, substantial prestige, learning that can be brought to bear in developing new generations of military technology for the Air Force, and a broadening of the Lab's networks.

- Rome Lab's work with federal and State agencies and with the private sector has led to important developments in education, law enforcement, medicine and transportation.

***

Rome Lab is its people. The reputations of the Lab's staff, established over many years of fostering professional relationships, are the essence of why Rome Lab is the pre-eminent C4I military lab. The problem solving capabilities of the Lab are primarily devoted to military technologies. In addition, leveraging outside funds, the Lab engages in the development of dual use technologies which benefit both the military and outside partners. Rome Lab enjoys a reputation for excellence among non-Air Force customers, many of whom are performing work that is vital to our nation's global economic competitiveness. In evaluating Rome Lab's non-Air Force work, it is important to remember that these outside customers operate in a free market environment – while they could use any lab for their research & development and technology transfer activities, they choose Rome Lab. Rome is the lab of choice not only because of its ability to supervise and conduct complex technology development, but also because of the Lab's reputation for having the ability to interface between customer and user, i.e. the ability to *get technology out the door.*

Year in and year out, Rome Lab is able to generate a significant portion of its revenues from customers who actively choose Rome Lab over other available options. This diversified revenue base allows Rome Lab to leverage substantial outside funds.

Rome Lab receives its revenues from two types of sources. First is its fiscal *sponsor*, the Air Force Science and Technology (S&T) Program. Each year, Rome Lab receives its base funding from the S&T Program. In FY94, this amounted to $113 million, out of a revenue stream of $367 million, or 30% of the Lab's total revenue. The work that the Lab performs for the S&T program is the basis for the evaluation of the Lab's military value.

The remainder of Rome Lab's funding comes from its *customers*, military and civilian organizations (including other branches of the Air Force) who have the option of contracting for their R&D with any qualified military, civilian government, university, or private laboratory. They choose Rome as the most qualified. (See Exhibit 6-1.)

Nearly one-quarter of the Lab's funds come from U.S. defense organizations outside the Air Force.

As Exhibit 6-1 shows, in FY94 Rome Lab captured $93 million in revenues from DOD units outside the Air Force, including the Advanced Research Projects Agency (ARPA), the Army, and the National Security Agency (NSA). The Lab also received $5 million from the Ballistic Missile Defense Office, in addition to $58 million from other Air Force non-Science & Technology departments.

Exhibit 6-3 indicates that the greatest bulk of non-Air Force funding is generated by three thrust areas within the Lab – communications, command and control, and intelligence. Scientists and engineers in each of these thrust areas have developed extensive and ongoing relationships with a customer base outside of the Air Force. For example, the U.S. intelligence community places special reliance on the capacities, skills and creativity of the scientists and engineers in the intelligence thrust area.

Rome Lab's ability to consistently win and satisfy customers generates multiple benefits for the Air Force – increased revenues that cover staff salaries, substantial prestige, learning that can be brought to bear in developing new generations of Air Force technology, and a broadening of the Lab's network of contacts and resources.

Rome Lab's revenues from its non-S&T customer base have a positive impact on the ability of the Lab to fulfill its core mission.

- *Support of the cost of staff salaries.* A significant portion of customer revenues are used to support Lab staff salaries, allowing the Lab to apply additional funding to critical technology areas and to maintain a larger and more diverse staff than would otherwise be possible.

- *Prestige.* Working with outside customers affords the Lab exposure which brings the Lab and the Air Force prestige. This, in turn, can lead to the further involvement of the Lab in vital areas of national security of particular value to the Air Force.

- *Opportunities for new learning.* The Lab's work with outside customers provides substantial and ongoing exposure to new technologies and ideas that can be used in the development of new C4I technologies useful to the Air Force.
- *Establishment of formal and informal networks.* Outside work continually broadens the contacts of Lab scientists and engineers in the military and technical community, facilitating access to a community of technical expertise to solve particular Air Force problems.

- *Leveraging.* The customer revenues allow the Lab to supplement and enhance the resources that are being invested in technology areas in a synergistic way. Therefore, the Lab can do a better job for both the S&T community and the non-S&T customer.

Key Non-Military Customers

Many of Rome Lab's most critical non-military projects take place in four key areas which use military technology to solve social problems:

⇒ *Law enforcement*
⇒ *Medicine*
⇒ *Education*
⇒ *Transportation*

Rome Lab works with a number of federal and State law enforcement agencies in order to research and develop innovative law enforcement technologies.

Examples include:

- *National Institute of Justice* - In December of 1994, the Director of the NIJ and Rome Lab signed an agreement to designate Rome Lab as a National Law Enforcement Technology Center (LETC). The center will serve as a link among laboratories, private industry, state and local law enforcement agencies, corrections departments, other federal agencies and Congress. The LETC will facilitate the development and transfer of Rome Lab technology to law enforcement agencies. One of the first tasks for the Lab is to provide technical oversight for $2.5 million worth of grants to be funded by NIJ for concealed weapon detection. Rome Lab will receive approximately $200,000 for this work. The project takes advantage of technology primarily developed by Rome Lab for perimeter intrusion and will result in prototypes in 18 months.

- *Federal Bureau of Investigation* - With a $300,000 grant from the Office of National Drug Control Policy, the Lab is working with the FBI to enhance its existing "DrugFire" program. Seven law enforcement agencies are all connected via telephone lines into the DrugFire database at the FBI. The Lab has transitioned its advanced neural network technology from Automatic Target Recognition to the area of forensic firearms identification by enhancing the FBI's manually operated database system with a proven high-performance, highly efficient matcher for spent shell casings. Vast amounts of shell casing data make the manual matching process virtually impossible. The process is also tedious, time consuming and cost-ineffective. The automatic system reduces the required search space by up to 98%, enabling the forensics firearms expert to verify results in minimal time.

- *Department of Justice* - Access to critical offender information is one of the greatest problems facing law enforcement officials. Working with the DOJ's Miami field office, Rome Lab has received part of a $2.5 million grant for the development of the Joint Automated Booking Station (JABS). The JABS will allow DOJ's six Miami field divisions including DEA, FBI and INS to share unified text, photograph and fingerprint information through a regional case network. DEA has found that automation has drastically increased efficiency, allowing agents to quickly locate critical information that otherwise would be difficult and time consuming to retrieve. This project was selected as a National Performance Review project.

- *Office of National Drug Control Policy* - This White House office of the so-called "drug czar" has retained Rome Lab for an annual fee of approximately $250,000 per year for consulting services involving state of the art assessments on promising new technologies. One example of these largely confidential projects

is *Northern Lights*, a cooperative effort among New York State, Vermont and New Hampshire which is exploring possibilities for electronic monitoring of the US-Canadian border aimed at reducing illegal drug traffic.

- *New York State Police* - The Lab has a memorandum of understanding to develop a number of technologies including information management systems for a high-tech New York State crime lab. The system will establish a comprehensive evidence catalogue using forensics and other evidentiary techniques. On a broader basis, the NYS Crime Lab will be used as a learning lab to test other Rome Lab technologies.

Rome Lab has been instrumental in the development of NYNET, New York's contribution to the National Information Superhighway. NYNET has given birth to innovative educational applications that exploit information technologies.

NYNET's educational applications include the *Living Textbook*. This New York State funded project is an educational project led by Rome Lab, Syracuse and Columbia Universities. Through the *Living Textbook*, New York State will have access to the state's technology infrastructure for interactive learning programs including "virtual field trips," video on demand, telecollaborations in the classroom and realistic simulations on demand.

Upstate project schools include: Fowler High School in Syracuse, the Rome Free Academy and Whitesboro Middle School. Downstate project schools include: The Ralph Bunch School and the Dalton School in New York City.

In addition there are a host of outside partners including libraries and educational database companies catering to educators and students.

Rome Lab is at the forefront of developing technologies which support the medical community and will lead to the creation of a "virtual hospital" anywhere military or civilian medical personnel are located.

Examples of medical technologies under development include:

- *CareNet* - Rome Lab has been a partner in the demonstration of a telemedicine and infomatics program in association with the SUNY Health Science Center at Syracuse, NYNEX and other corporate partners. This is the first of its kind in the world. Plans include the development of: a Regional Neurosurgical Consultation system which will use desktop video teleconferencing to give regional emergency rooms access to major hospital neurosurgical teams; a fleet of specially equipped vans that take health care and education directly to the community via wireless technology; and will eventually lead to a virtual reality operating theater.

- *Cornell University Hospital* - Using neural network techniques, the Lab has worked with radiologists to develop a Medical Imagery Data Collection process which detects and classifies lung tumors. This procedure eliminates unnecessary biopsies and has been successful in identifying over 97% of malignant tumors.

Rome Lab is developing technologies for use by federal and State agencies in the area of transportation - in the air and on the ground.

Examples of these transportation applications include:

- *Federal Aviation Administration* - Rome Lab and the FAA, using $5 million of FAA funding, recently completed co-development of a radar siting tool. This technology allows the FAA to determine the optimum position for the placement of radar. This software tool was developed by a Rome Lab supervised contractor and validated by in-house scientists and engineers.

- *Intelligent Vehicle Highway System* - Through the United States Department of Transportation's Federal Highway Administration, Rome Lab is working with the New York State Department of Transportation on a $3 million grant to design and build a traffic management control system for the Long Island Expressway. This traffic visualization control program, a direct descendent of Rome Lab command and control technologies, will aid in traffic management efforts on one of the nation's most congested thoroughfares.

- *New York State Metropolitan Transit Authority* - The MTA is preparing to issue Requests for Proposals for upgrading the technologies used to ascertain the position and location of rail transportation systems. This effort involves virtually all C4I technologies. Realizing that they would need high technology support from a laboratory at several stages during the procurement process, the MTA contacted Rome Lab. Discussions regarding the Lab's role are ongoing.

***

In addition to the vital contribution Rome Lab makes to the nation's military, its contribution to federal, state and local governments must not be overlooked. These relationships have been built up over a period of many years and would surely experience severe disruption – resulting in a delay in the development of critical technologies – if the Lab were to be uprooted and many of its human resources lost.

Exhibit 6-1

In FY 94, Rome Lab received over 70% of its funding from customers.

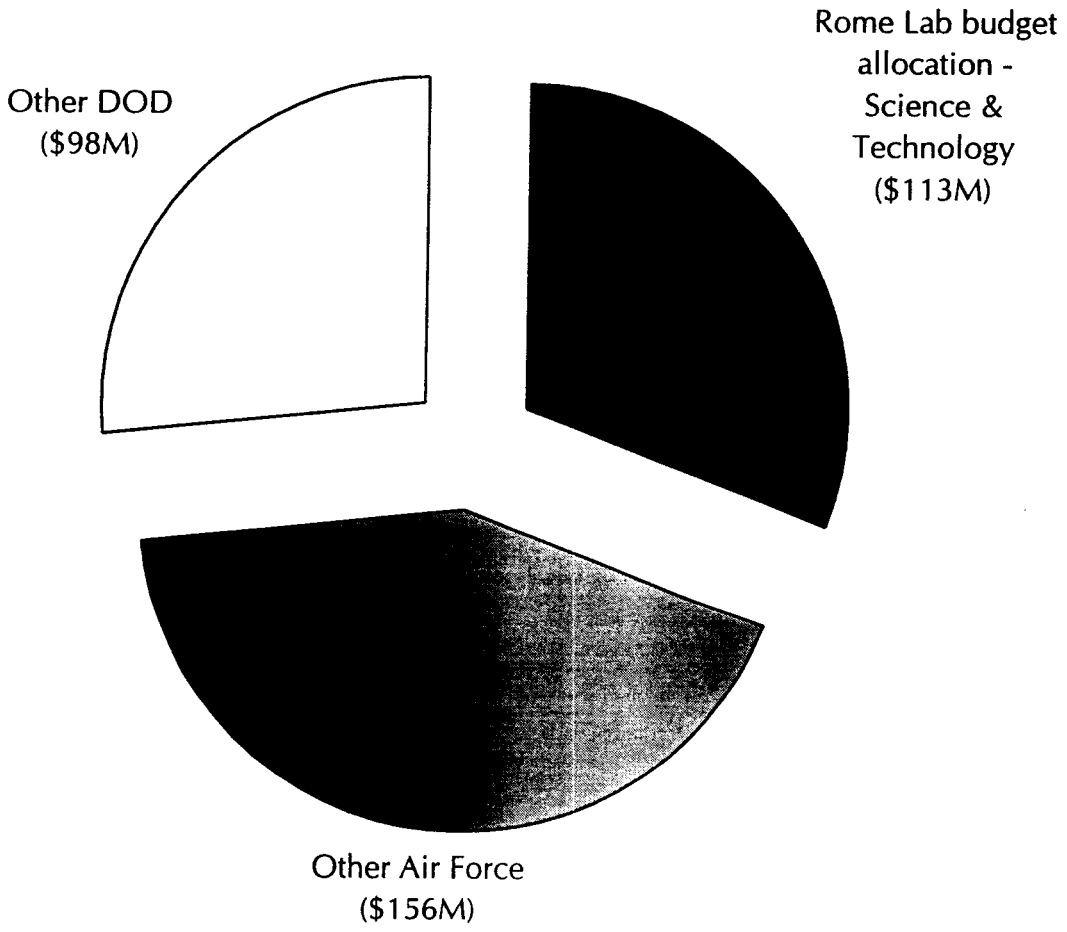
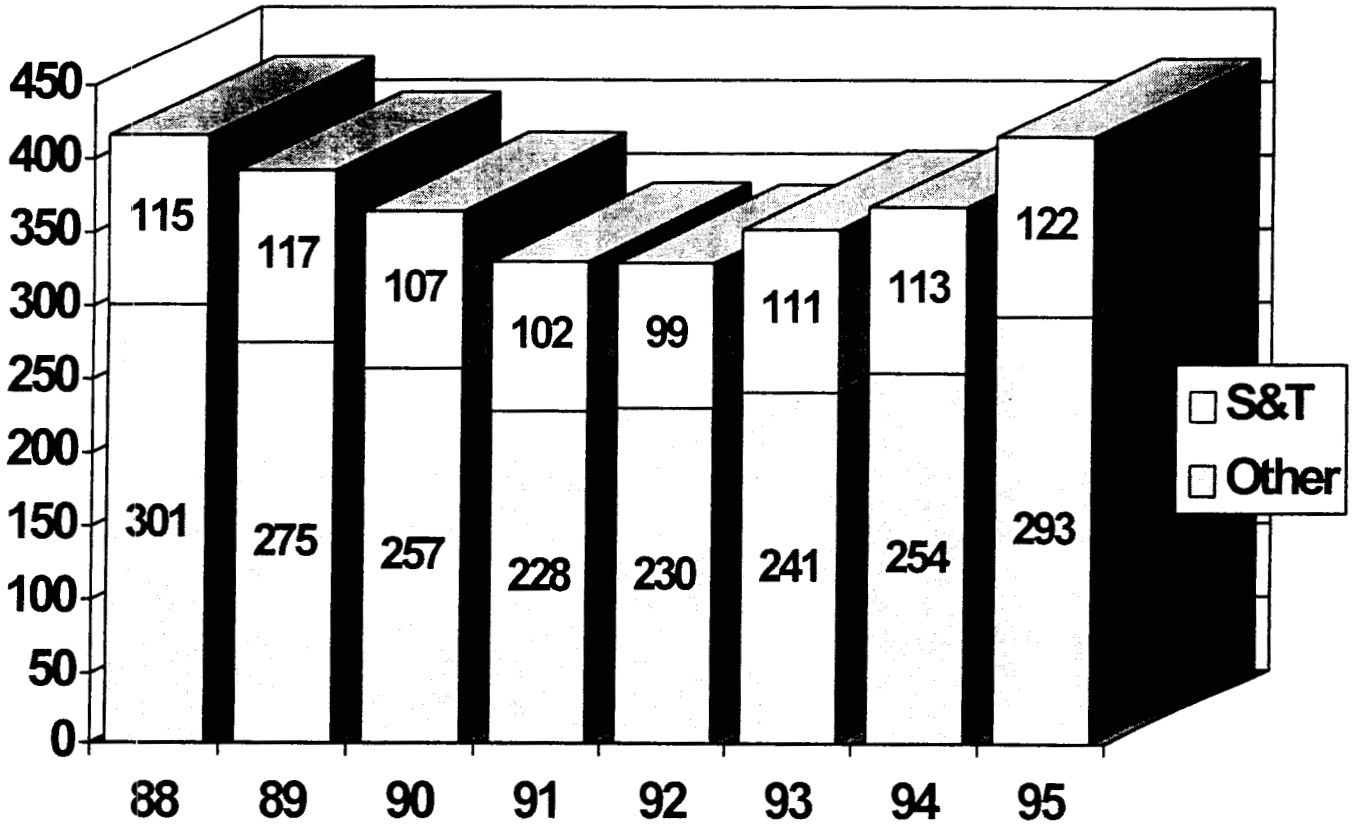


Exhibit 6-2

An analysis of Rome Lab's past and present funding shows and increasing trend toward receiving monies from sources other than the AF S&T program.

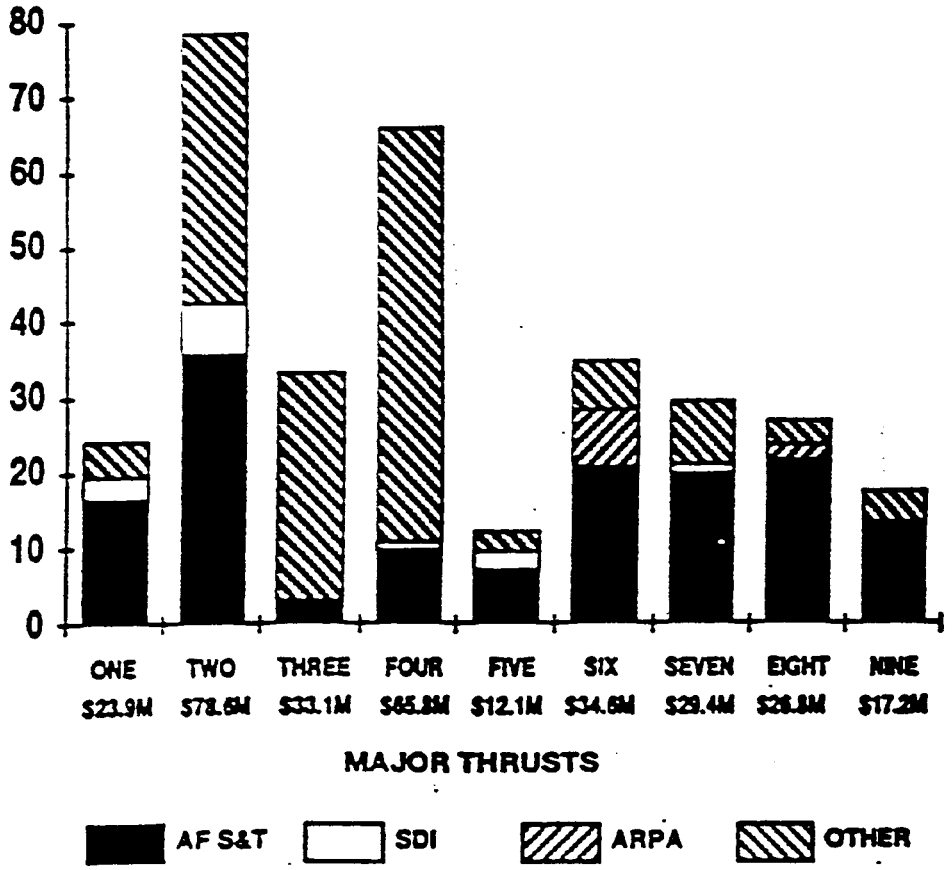


Rome Lab Funding Trend

All Sources - Then Year Dollars ($M)

Exhibit 6-3

Breakout of Rome Lab C31 Funding Sources by Technology Thrust FY 94 Estimated



Thrust #1: Surveillance
Thrust #2: Communications
Thrust #3: Command and Control
Thrust #4: Intelligence
Thrust #5: Signal Processing
Thrust #6: Computer Science & Technology
Thrust #7: Electromagnetic Technology
Thrust #8: Photonics
Thrust #9: Reliability Sciences

Exhibit 6-4

Over 75% of Rome Lab's funding is used to contract out research to New York State businesses & universities.

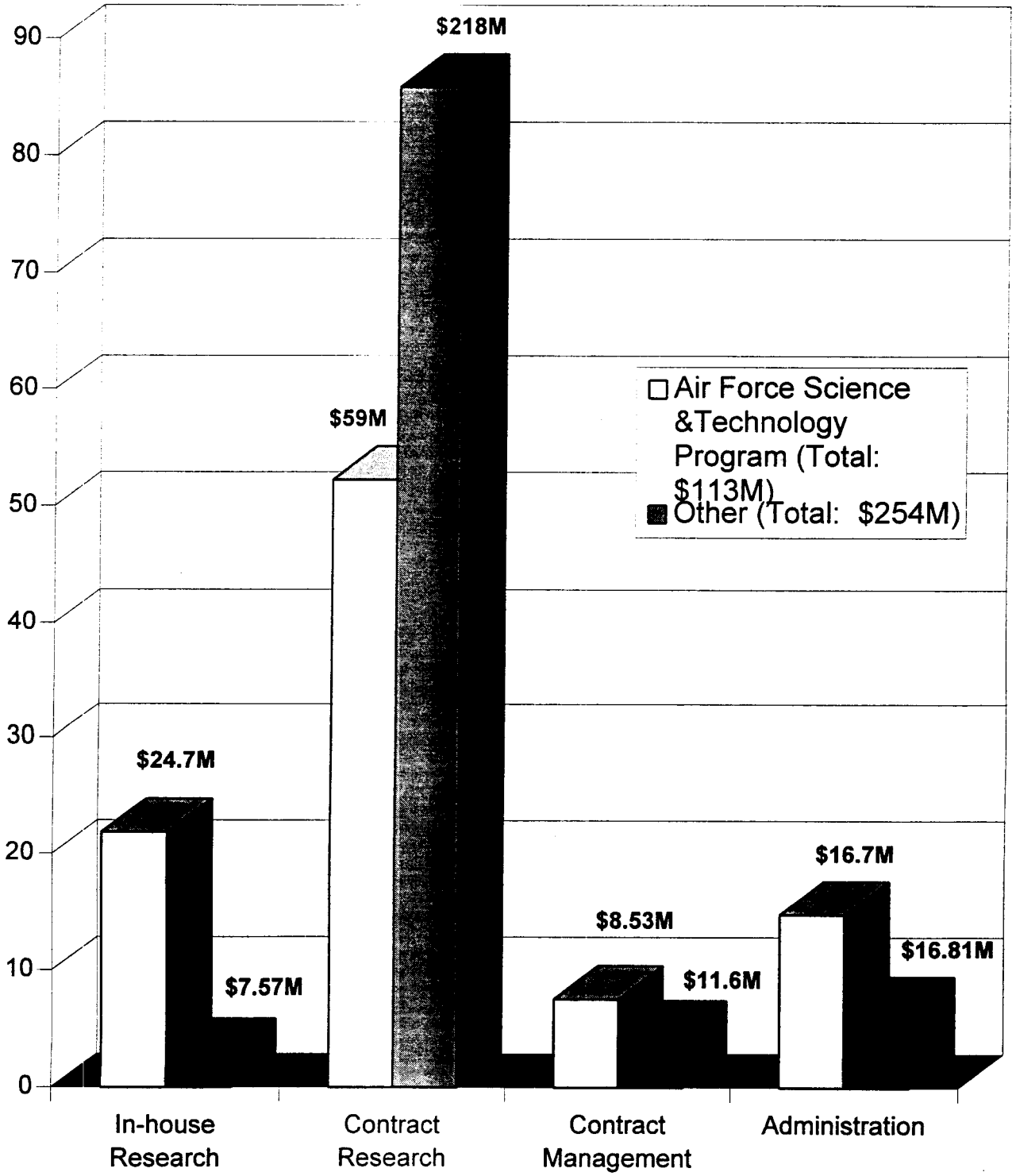
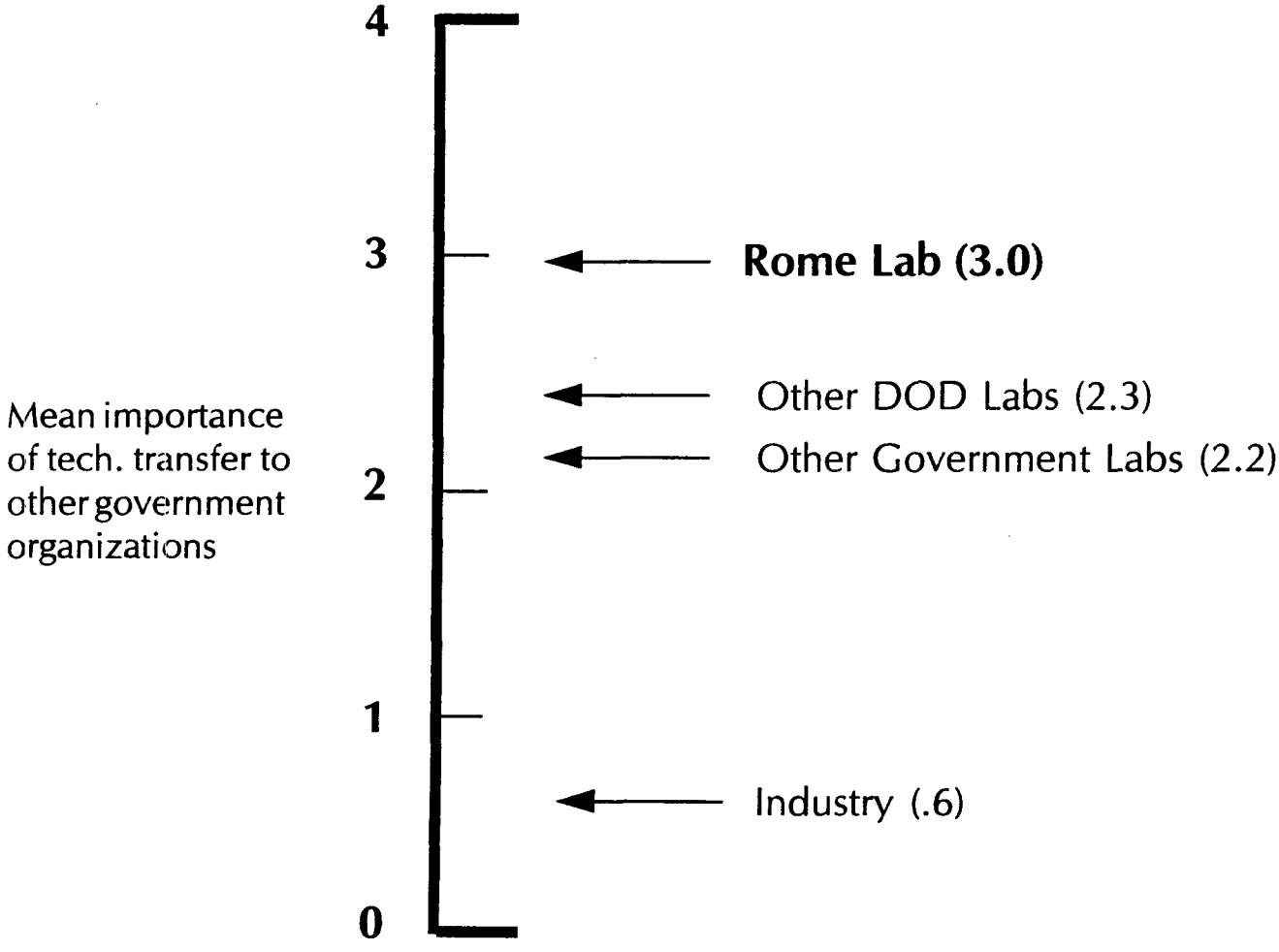


Exhibit 6-5

Rome Lab recognizes the importance of technology transfer to other government organizations.



Scale:
0 = not a mission, 1 = mission of little importance
2 = somewhat important mission, 3 = important mission
4 = single most important mission

Sample Size:
Rome = 1, DOD = 29, Other Government = 152
Industry = 247

EXHIBIT 6-6

CORRESPONDENCE FROM

THE CORPORATE COMMUNITY

NYNEX Corporation
1113 Westchester Avenue, White Plains, NY 10604-3510
Tel 914 644 6440
Fax 914 694 8093

Ivan Seidenberg
Chairman and Chief Executive Officer

NYNEX

March 29, 1995

Alan Dixon, Chairman
Base Realignment and Closure Commission
1700 North Moore Street
Arlington, Virginia 22209

Dear Chairman Dixon:

You will be hearing from me and other New York business, academic and public leaders many times in the immediate future concerning the proposed closing of the Air Force's Rome Laboratories. Rome Lab is an enormously important partner for NYNEX as we develop New York State's technological potential.

And this potential is enormous. Here are some of the fruits of NYNEX's relationship with Rome Lab.

"Infomall" will alter the way business is done in the United States. Infomall is a virtual business development area wherein companies can travel over NYNEX's fiber optic network to supercomputers at Syracuse University. Once there, scientists can design and trial new products, provide high-tech services and make sales.

"The Living Textbook," the development of which was funded by the State of New York, connects schools in underprivileged areas across NYS with each other and with a variety of data, image, video and textual resources that would never otherwise have been available to them.

"CareNet" brings the State's greatest medical resources to rural hospitals. Far more than simple two-way video, CareNet gives doctors access to supercomputers that help in diagnosing and treating illness.

None of these projects would be available today if Rome Lab was not based where it is. Our engineers collaborate regularly with their peers at Rome. This collaboration is at the heart of the Lab's enormous success in developing new technologies and transferring them to the private sector. Obviously, NYNEX's infrastructure based technology requires that Rome Labs remain where it is for our partnership to be effective. But far more important than the physical infrastructure is the network of relationships developed with the professionals of the Laboratory. Although I am the CEO of a telecommunications company, in this instance I believe there is no substitute for proximity. This has always been true in the case of creative collaboration.

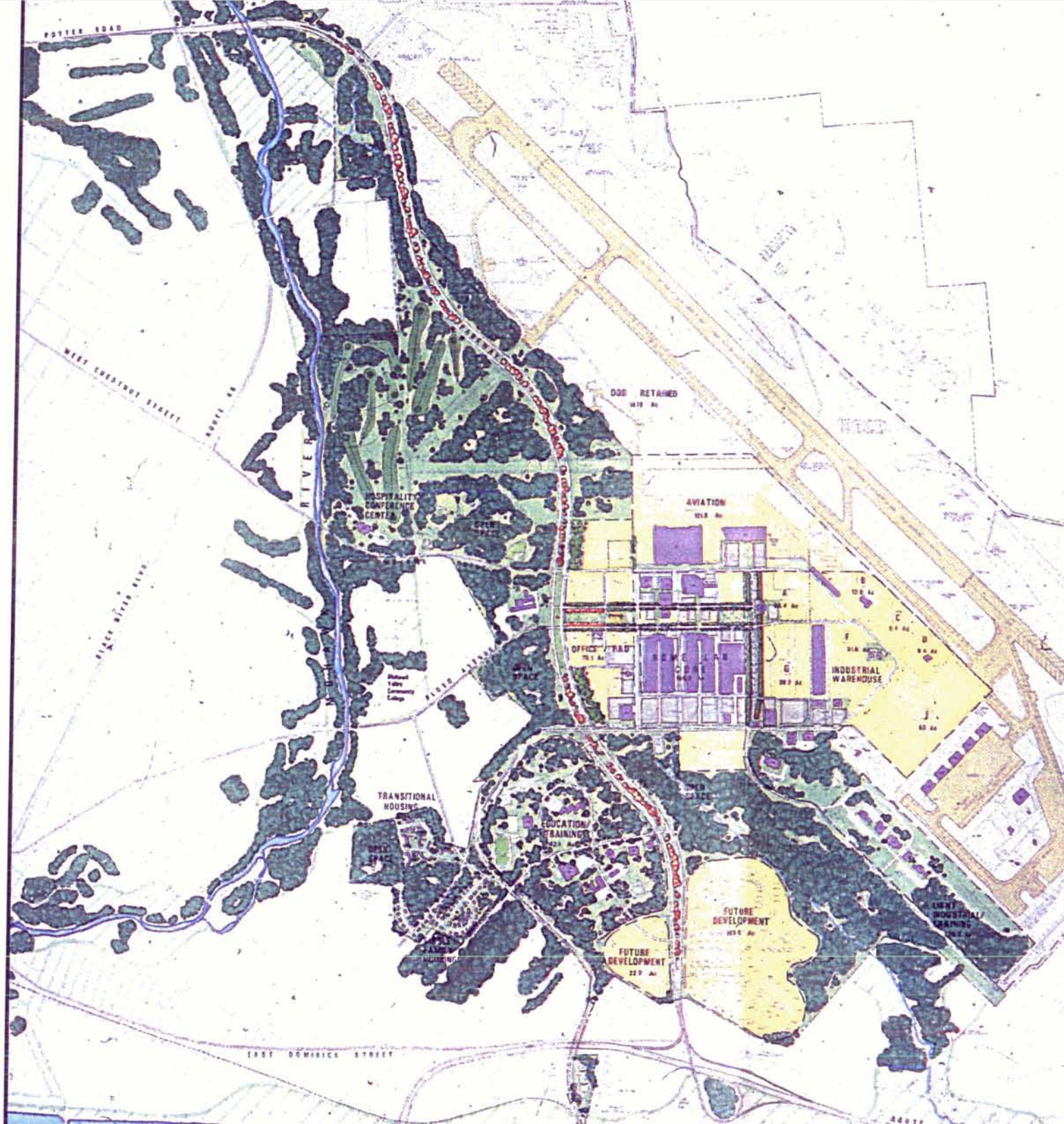
The development of a technology that will affect business operations in this nation for years to come will be partly aided by the presence of Rome Lab in New York. Please consider this in your decision.

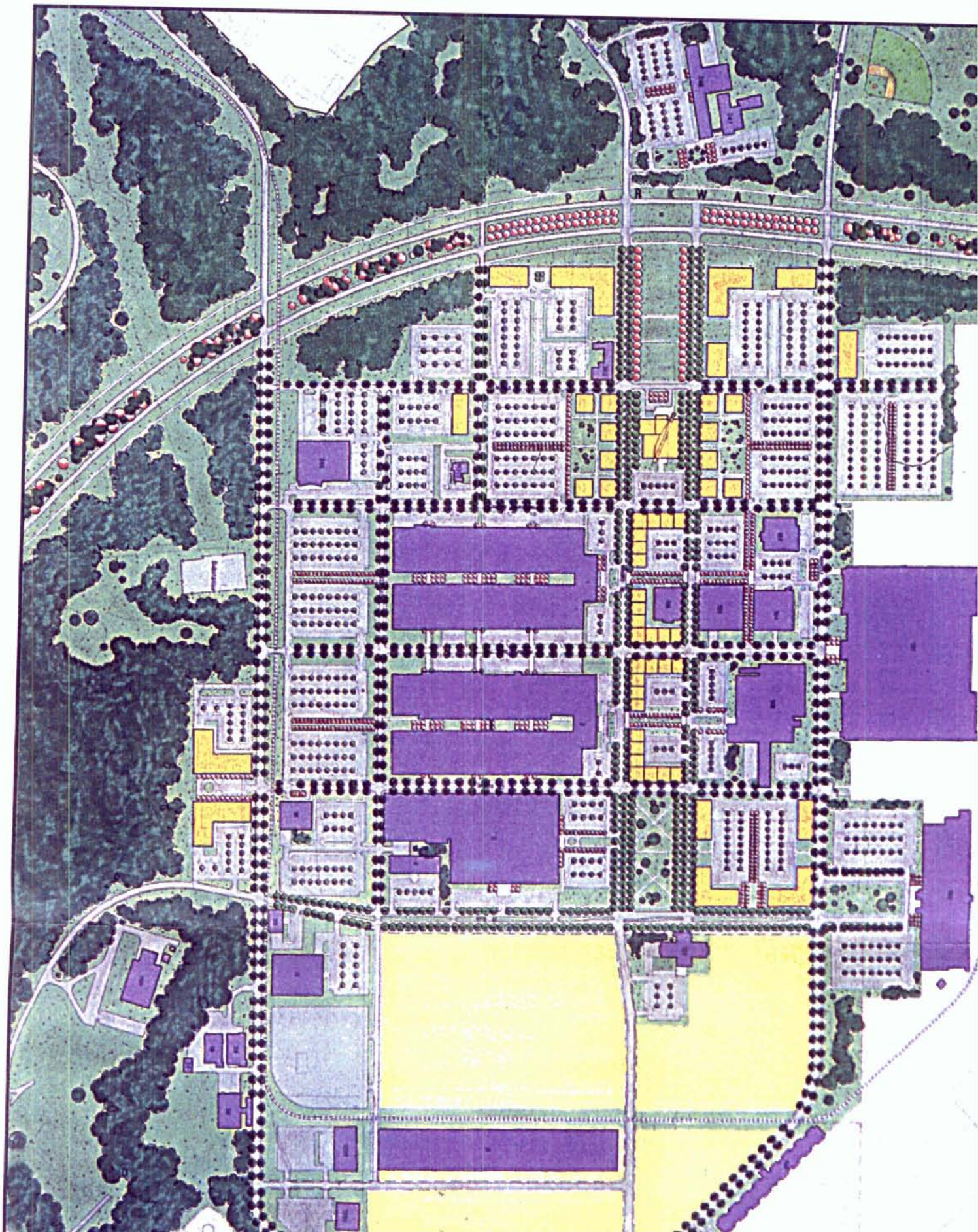
Sincerely yours,

Ivan Seidenberg

RESPONSES TO QUESTIONS ASKED

ADDITIONAL INFORMATION


POTTER ROAD
WEST CHESTNUT STREET
ROUTE 66
RIVER
HOSPITALITY/ CONFERENCE CENTER
DOD RETAINED
AVIATION
OFFICE
R&D
INDUSTRIAL WAREHOUSE
OPEN SPACE
TRANSITIONAL HOUSING
EDUCATION/ TRAINING
FUTURE DEVELOPMENT
FUTURE DEVELOPMENT
EAST DOMINICK STREET


PARKWAY

MASTER PLAN

Development Districts
A Rome Lab /R&D Core
B Office /R&D
C Industrial/Warehouse
D Aviation
E Education /Training
F Skyline Development
G SAC Hill
H Woodhaven
POTTER ROAD
WEST CHESTNUT STREET ROUTE 49
BLACK RIVER BLVD
RIVER
DOD RETAINED
1476 Ac
HOSPITALITY/ CONFERENCE CENTER
OPEN SPACE
AVIATION
121.0 Ac
OFFICE /R&D
75.1 Ac
ROME LAB CORE
109.3 Ac
38.7 Ac
31.6 Ac
LIGHT INDUSTRIAL WAREHOUSE
Mohawk Valley Community College
EDUCATION/ TRAINING
142.1 Ac
RESIDENTIAL
FUTURE DEVELOPMENT
FUTURE DEVELOPMENT
LIGHT INDUSTRIAL/ TRAINING
EAST DOMINICK STREET
ROUTE 365

was held on October 3, 1994. The GLDC succeeded the **Griffiss Redevelopment Planning Council** (GRPC) upon completion and acceptance of the base reuse plan in December.

The GLDC is now charged with implementing the reuse plan upon its acceptance by the local community and the Department of Defense. The GLDC's role is to oversee the redevelopment of base property and to stimulate the local economy through the attraction of new business and jobs.

The local development corporation was formed under state legislation, with the assistance of $700,000 in state funding. The GLDC also will receive $557,219 in Office of Economic Adjustment (OEA) funds and $48,210 in Oneida County funding. Fifteen unpaid directors, who represent a cross-section of state and local business and political interests, were appointed.

Appointments to the board include: County Executive Raymond A. Meier, the board chairman; Rome Mayor Joseph A. Griffo; Secretary of State Gail S. Shaffer; Alan Sullivan, of the New York State Urban Development Corporation; and Also appointed were Frederick J. Tillman, former commander of the 416th Bomb Wing, now with Tucker Anthony, Inc.; Jane Rees, president of Stonehedge Nursing Home; Julian Warrick, director of the Electrical Engineering Division of Martin Marietta Corp. in Utica; Charles M. Sprock, chairman, president, and chief executive officer of Rome Savings Bank; Ted Cupp, owner and president of Rome Country Club; and Joseph A. Ryan, president of Nunn's Hospital Supply Co.

The remaining directors include State Senator William R. Sears; Assemblywoman Roann M. Destito; Richard Smith of Basloe, Levin and Cuccaro, Utica insurance adjusters; and Dr. Patricia K. Laino, executive director of the Entrepreneur Center of the Mohawk Valley.

At the organizational meeting, the new directors were briefed by **Hamilton Rabinovitz and Alschuler**, (HR&A) lead consultants for the master plan. HR&A discussed the status of the base reuse plan being developed by the Griffiss Redevelopment Planning Council and advised the new board members of the importance of their involvement in guiding the community through the implementation of the plan.

ROC Counsels Civilian Base Employees

If you have not already made an appointment to visit the **R**egional **O**pportunity **C**enter (ROC) for counseling or retraining, now is the time to take that first step. The ROC offers workshops in Financial Management, Stress Management, the Labor Market, Resume/Interview Techniques, and Achieving Your Potential. Also offered are courses on going into business.

The GRIFFISS Journal

Published by:
Griffiss Local Development Corporation
153 Brooks Road
GAFB, New York 13441

(315)338-0393
(315)338-5694 Fax

Steven J. DiMeo - Executive Director
Mark W. Reynolds - Land Use Planner
Donna J. Skibitski - Community Development Planner
Lorna A. Perry - Office Manager

Check This Out!

Counselors at the ROC will administer general aptitude tests to determine a person's most marketable skills and then direct each client to the most appropriate retraining sessions.

Registration for seminars, workshops, and retraining sessions is underway. New classes begin on a rolling basis and are free of charge.

To date, over 600 civilian employees have been assisted through the efforts of the caring intake counselors at the Regional Opportunity Center. Make the transition to new employment after realignment easier on yourself by visiting the center as soon as possible to see just how they can help you.

Call **330-1829**, **330-1831**, or **334-9161** or stop in at either of their offices at 584 Phoenix Drive, GAFB, or Rome City Hall, Liberty Plaza.

linking the northern and southe
Core district, plus landscaped b

The open space plan envisions
that extend from the existing g
Creek area. With the exception
used as a hospitality center and
market develops, new housing s

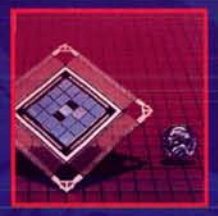
DFAS G

The Defense Finance and
(DFAS), located in Buil
finance operations on A
accounting and finance functions
Pennsylvania will be transferrec
housed at Griffiss (DFAS-Rc
reimbursement, contractual payr
Army sites being closed.

In June, functions from Carlisle
be relocated to Griffiss, and
Maryland will see their accoun
reassigned to the new Rome locat
October 1995, the future closure
announced, determining the time
Griffiss employees.

DFAS-Rome expects to hire the m
3 to 5 year period, the most exter
fiscal years 96-97, when the full c
reach 700-750 staff members. I
operations in April, the Griffiss
approximately 40 people, includ
complement.

Heading up the local DFAS n
Director Steve Bonta. Mr. Bonta
January from the Army's 5th Si



Rome Laboratory Success Stories

Where Visions Become Reality

Air Force
SCIENCE & TECHNOLOGY

Established in 1951 as Rome Air Development Center, Rome Laboratory became one of the Air Force's four "super" laboratories in December 1990. Laboratory personnel developed the technology which was incorporated into such systems as the Contingency Theater Air Control Automated Planning System (CTAPS), Computer Aided Tactical Information System (CATIS), DOD Intelligence Information System (DODIIS), Over-the-Horizon (OTH) Radar, Joint STARS, and the Airborne Warning and Control System (AWACS).

Rome Laboratory at Griffiss AFB NY is the Air Force Materiel Command center of excellence for Command, Control, Communications and Intelligence (C3I) research and development. C3I is the military process of managing US forces on a worldwide basis. The effective planning, directing, coordinating, and controlling of forces requires surveillance, communications, and information processing.

In all technical areas, Rome Laboratory is directly responsible to the Electronic Systems Center (ESC) at Hanscom AFB MA. Rome Laboratory operates three technical directorates at Griffiss AFB NY and one at Hanscom AFB MA. Occupying more than 18 acres of floor space, Rome Laboratory houses some of the finest research and development facilities in the country. These include areas for research in signal processing, microelectronics, antennas, and solid state devices and materials. The laboratory also operates off-base research sites at various locations in New York and Massachusetts, where research and engineering is conducted in functions such as surveillance, communications, antennas, and scattering.

Our goal is to establish a dialogue with you to better meet your technology needs. We welcome any feedback you might have. Should you see a Rome Laboratory "Success Story" you want to know more about, please call Capt Andrew P. Jeselson at (315) 330-2069, or write RL/XPS, 26 Electronic Parkway, Griffiss AFB, NY 13441-4514.

PAUL D. NIELSEN
Colonel, USAF
Commander, Rome Laboratory

1993-94 Rome Laboratory Success Stories

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INTRODUCTION

Our Air Force Science and Technology "Success Stories" are presented over the last two years. The individual stories most often represent the combined effort of several scientists and engineers working as a team. This basic and applied research, plus the follow-on technology development described in a "Success Story", are key elements of the continued success of the Rome Laboratory mission.

Our "Success Stories" were selected from one or more of the following categories:

TECHNOLOGY TRANSITION: Technology that has achieved application on a Department of Defense system in development or operation that has provided "quick-reaction" response to problems or needs of field organizations (see Table I).

TECHNICAL ACHIEVEMENT: Major innovative technological advancements that offer significant potential for existing and future Air Force systems (see Table II).

TECHNOLOGY TRANSFER: Technology that has transferred from the laboratory to the private sector, to include: industry, academia, and state and local governments (see Table III).

PEER RECOGNITION: External awards or recognitions by the scientific community at large, concerning technology advancements in the areas of Technology Transition, Technology Transfer or Technical Achievement (see Table IV).

To receive more information on the "Success Stories" contained in this document by the experts involved, or to learn about other activities at Rome Laboratory, please contact: Capt Andrew P. Jeselson, RL/XPS, 26 Electronic Parkway, Griffiss AFB, NY 13441-4514, Tel. (315) 330-2069.

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An Automated Targeting and Weaponeering Capability (Rapid Application of Air Power) Developed	21
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TABLE III. 1993-94 TECHNOLOGY TRANSFER SUCCESS STORIES

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Table IV. 1993-94 Peer Recognition Success Stories

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Advanced Planning System
Air Combat Command Fielding

Transition of Advanced Planning System to ACC

Payoff

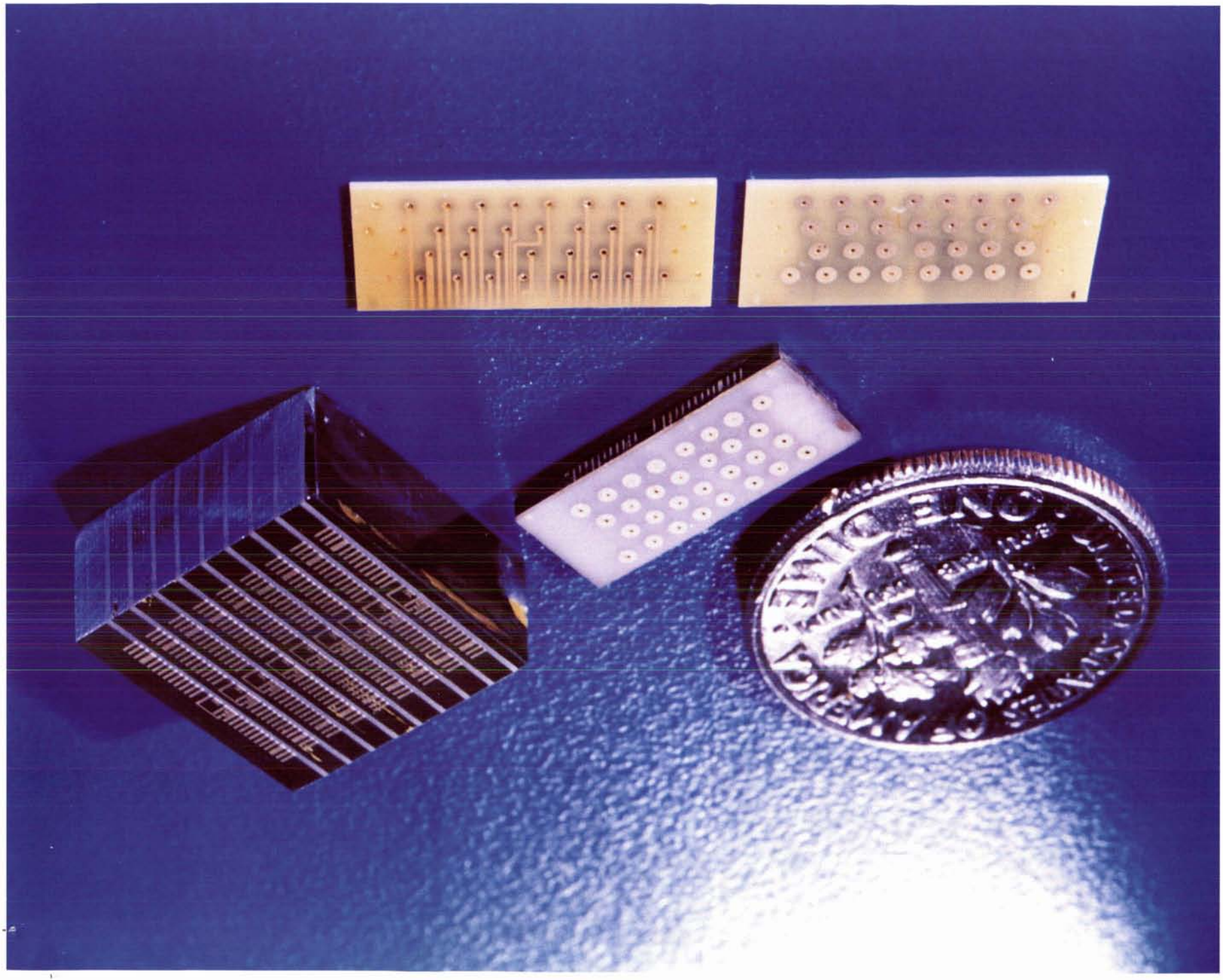
Rome Laboratory transitions Advanced Planning System (APS) to Air Combat Command (ACC). Proceeding clockwise from top left: The APS program running on standard AFCAC-308 workstations inside a deployable shelter; a Lt Col from ACC familiarizes himself with APS; Rome Laboratory personnel outside the deployable shelters containing APS; Rome Laboratory computer scientist 1Lt John Van Hove introduces ACC planners to APS. Rome Laboratory delivered the APS to ACC on 31 Aug 1992. Developed and tested by Rome Laboratory, the artificial intelligence based APS allows ten to fifteen operators to build an Air Tasking Order (ATO) in the same amount of time it previously took one hundred operators. The savings in time and effort is felt throughout the mission cycle, giving U.S. Air Forces a decided advantage in times of conflict.

Accomplishment

APS is an integrated air battle planning system that successfully satisfies the Tactical Air Force Theater's common requirements to generate, by automated means, Air Battle Plans and ATOs. APS provides the capabilities for force level: allocation of air resources; assessment of weapons system employment; pairing of targets and weapon systems; assignment of attack, support, or refueling tasks; scheduling of missions; and preparing ATOs.

Background

APS is a software only system operating on the Theater Air Forces standard workstation. APS is designed to pull data from the ORACLE database tables resident in the Contingency Theater Air Control Automated Planning System (CTAPS) architecture, generate an Air Battle Plan and then output a Standard Message Format Air Tasking Order. The generation of an ATO requires the coordination of a massive amount of information such as intelligence, target data, logistics data, force status, and aircraft capabilities critical to the combat plans decision makers. Rome Laboratory engineers constructed APS to import planning data either electronically or, if need be, via manual input. The ability for the operator to adjust the Air Battle Plan as the operators construct it is a fundamental precept in APS. ACC welcomed APS and signed on early in the development program. Rome Laboratory engineers placed great emphasis on involving the user. As a result, Rome Laboratory program designers received over one hundred and ninety user comments on how to improve APS during the developmental phase, many of which were incorporated into the system. APS performed during Desert Storm, even though it was still in its developmental stages, and helped Central Command achieve its unprecedented joint ATOs. Rome Laboratory engineers incorporated the lessons learned from Desert Storm into APS. This user involvement and testing under fire ensured APS met user requirements from the first day of operability. APS is currently stationed in Europe as part of CTAPS. ACC and Rome Laboratory personnel stationed in Germany are applying APS to the Bosnian situation.



Memory Chip Stacking Technology Transfer to Industry

Payoff

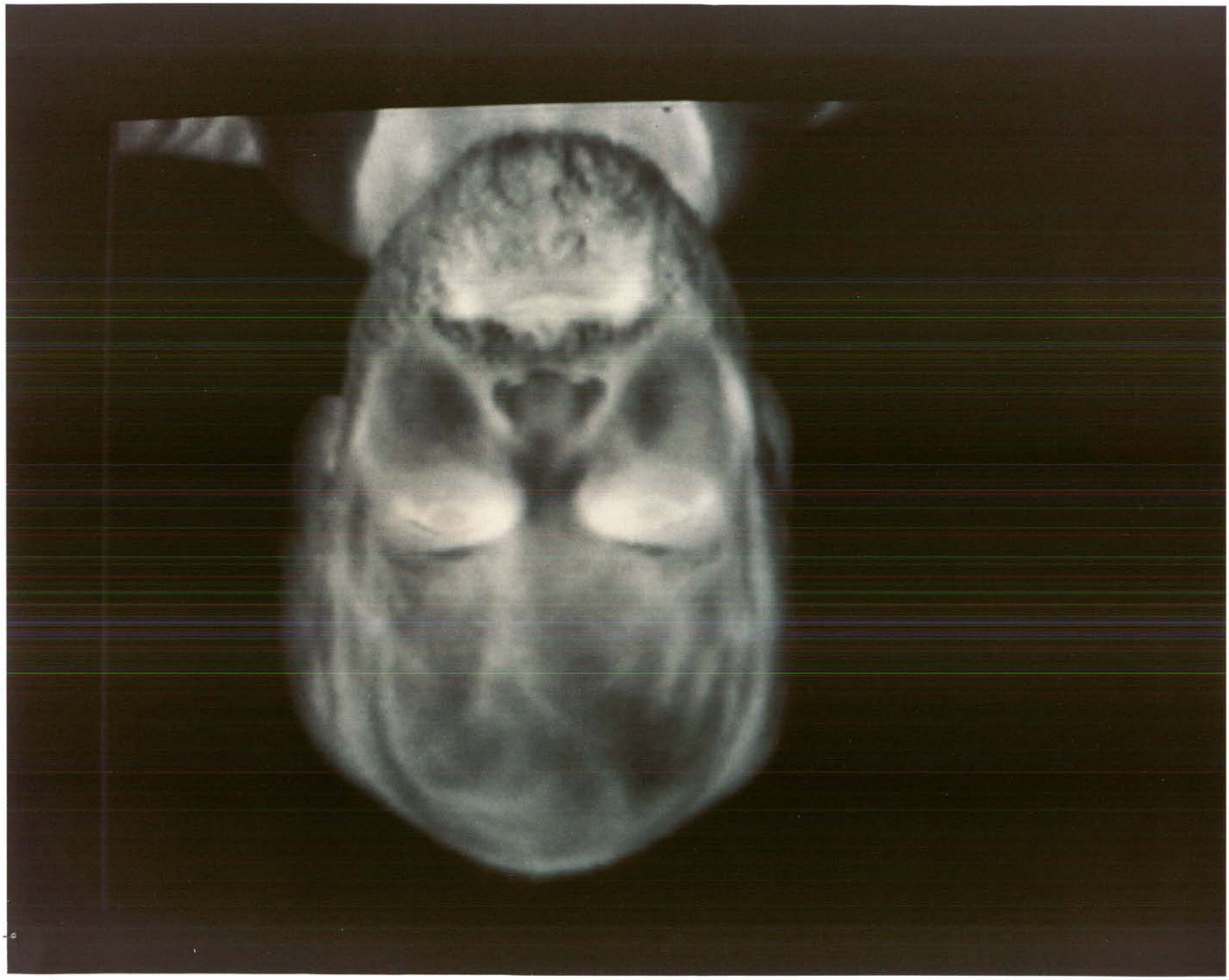
Memory "stacks" constructed by Rome Laboratory memory packaging technology. In the foreground are covers, which serve as connecting points for each stack, and a chip-like "short stack" which contains four memory die. The "sugar cube" architecture in the background consists of nine short stacks wired together. Note the thin wires on the side of each stack connecting the memory die. Current state-of-the-art for this technology uses 16 megabit Dynamic Random Access Memory (DRAM) die, leading to 64 megabit short stacks. The sugar cube architecture could contain 576 megabits of memory. The dime provides scale. Rome Laboratory engineers invented a novel technique for packaging computer memory circuits allowing manufacturers to stack them in 3-Dimensional (3-D), chip-like architectures. Rome Laboratory successfully transferred this technology to Irvine Sensors of Irvine, Ca which now sells 3-D memory stacks to industry.

Accomplishments

Chip-like, three dimensional memory stacks will greatly increase the memory capacity, without significantly increasing the size, of both commercial and military systems. The packaging concept, called Memory Densification by the Application of Z-Axis Lithography (MDAZL), takes multiple, unpackaged, memory die, thins the backs down, stacks four to sixteen die vertically, and then connects the edges to a cover. The cover serves as connection points for wire bonding or other connection purposes. The resulting package is about the same size and thickness as a single, unpackaged die, but with four to sixteen times the memory capacity. Rome Laboratory has filed a patent on this concept.

Background

Irvine Sensors, located in Irvine California, uses the MDAZL concept to construct Short Stacks, Irvine Sensors' trademarked name for the MDAZL packaging concept. The company manufactures Short Stacks for several DoD and SDIO contractors with several more considering their use. Irvine Sensors has also demonstrated this technology with a wide variety of commercial memory chip manufacturers including IBM, Micron, Texas Instruments, and Mosel. Irvine Sensors and IBM recently signed a cooperative agreement to fabricate 16 megabit DRAM chips and package them into 64 megabit packages using the MDAZL concept. This facility has a capacity of 100,000 units per month with production expected to begin this summer.



Dr. Jonathan Mooney Nominated for Alan T. Waterman Award

Payoff

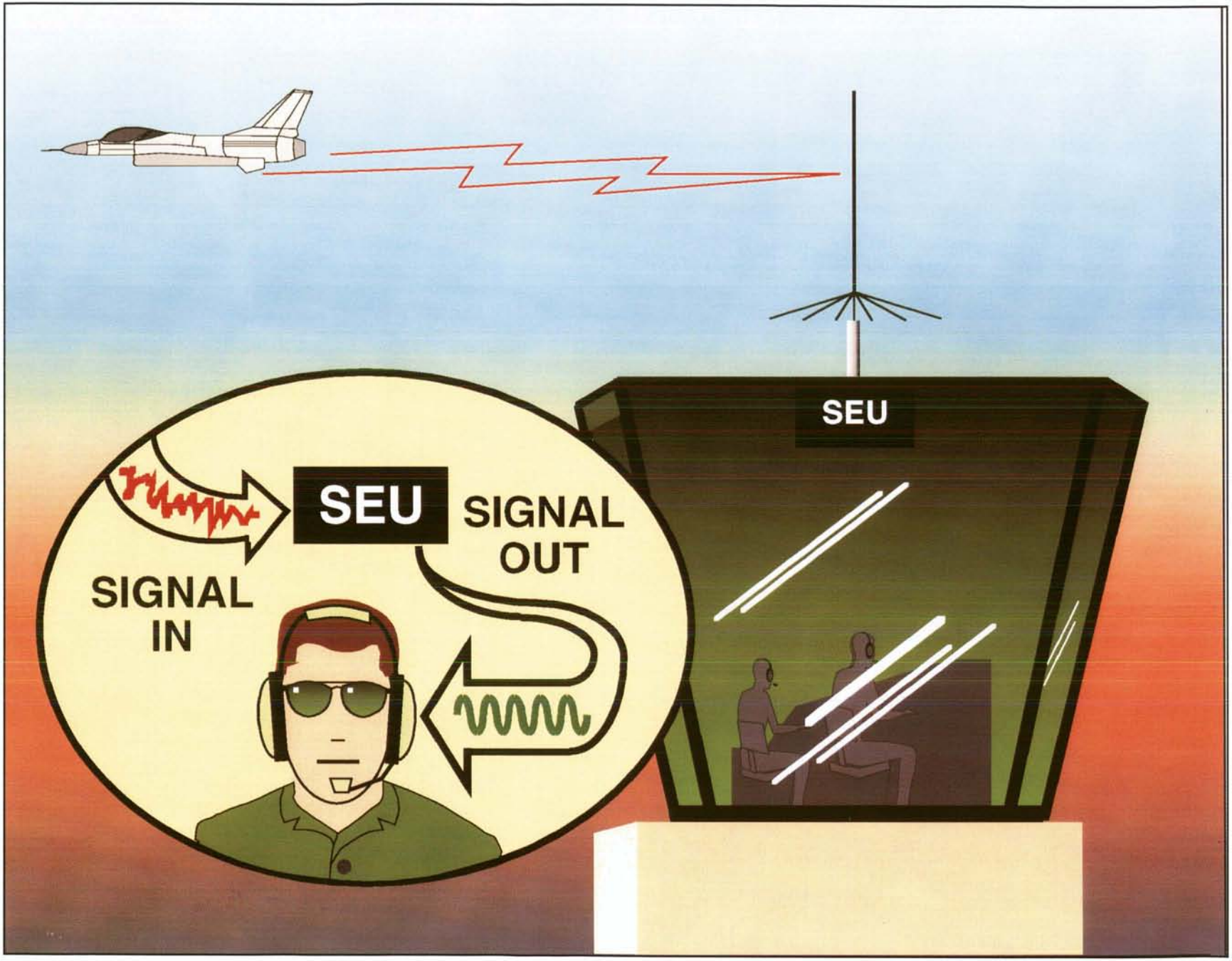
Dr Jonathan Mooney imaged in the infrared. Air Force Materiel Command's (AFMC's) predecessor, Air Force Systems Command (AFSC), honored Dr Mooney for his theoretical work in infrared imaging. AFMC's forerunner, AFSC, selected Rome Laboratory's Dr Jonathan Mooney as their candidate for the Alan T. Waterman Award for his outstanding contributions to the theory of infrared focal plane array response uniformity and its effect on infrared imager performance.

Accomplishment

Dr Mooney's work is the first major advance in our understanding of the theory of infrared imaging in more than thirty years. His efforts improved the performance of Rome Laboratory's staring infrared imagers ten fold.

Background

Infrared imaging is becoming more and more important in today's battlefield environment. It allows combatants to "see" in conditions not conducive to optical sight, such as in darkness or haze. Rome Laboratory is a leader in the infrared imaging field and pioneered the platinum silicide focal plane array infrared camera. These cameras use an array of cells, constructed from platinum silicide, which are sensitive to varying heat intensities. The response of these cells can be electronically measured and displayed on a screen to produce an image of a scene as seen in the infrared. The advantage of this is that infrared radiation is present at all times of the day and radiates through smoke, haze and other substances that reflect and diffuse light. The result is a clearer image of the surrounding area than might be possible using the visual spectrum. Many infrared systems are fielded in the Air Force. Infrared seekers guide our most accurate missiles. Desert Storm pilots used the infrared to locate and destroy targets. Rome Laboratory recently transitioned our platinum silicide infrared camera to the B-52 System Project Office, improving that aircraft's infrared capability. Work continues to improve the performance of infrared systems. Researchers like Dr Mooney are advancing infrared technology to the point where the resulting images convey more information than ever.


SEU
SEU
SIGNAL OUT
SIGNAL IN

Speech Enhancement Technology

Payoff

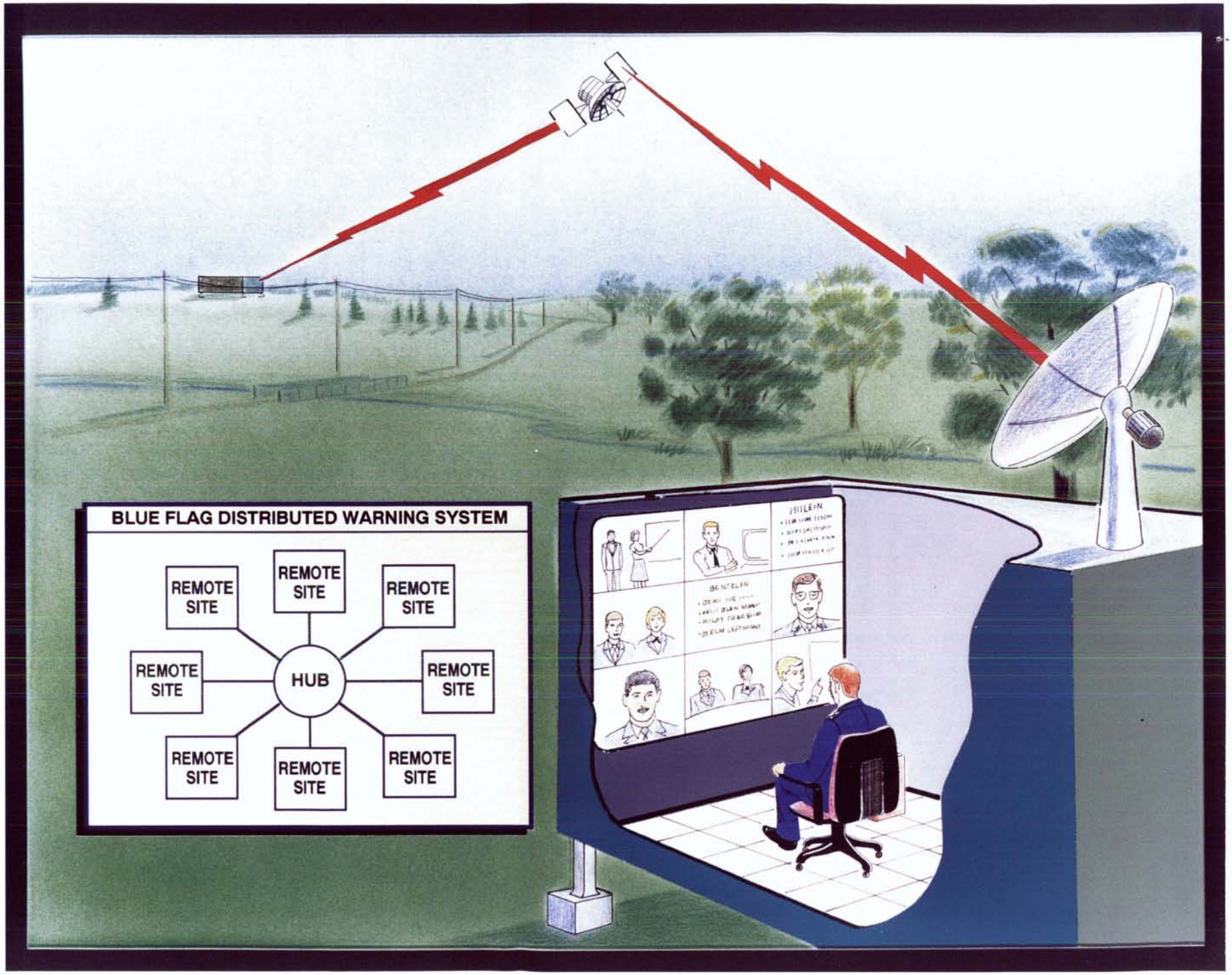
Rome Laboratory's Speech Enhancement Technology, embodied in the Speech Enhancement Unit (SEU), removes noise and boosts the clarity of audio communications by an average of 30 dB or 700 percent. Rome Laboratory's Speech Enhancement Technology improves, in real-time, the clarity of audio signals. Clearer communications reduce listener fatigue, an important consideration in air traffic operations, and Speech Enhancement Technology approximately doubles the effective communication range of speech signals.

Accomplishment

As a means to clearer communications, Rome Laboratory has developed Signal Enhancement Technology. This technology greatly increases the clarity and accuracy of both analog and digital audio communications by suppressing narrow band, wide band, and impulse noise by several orders of magnitude. Signal Enhancement Technology can improve audio signals throughout the full spectrum of airborne and ground communications.

Background

Rome Laboratory's Signal Enhancement Technology combines Very Large Scale Integrated (VLSI) circuit and Very High Speed Integrated Circuit (VHSIC) technology with a host of state-of-the-art speech processing algorithms. Rome Lab scientists call the resulting device the Speech Enhancement Unit. There are two Speech Enhancement Units available, one VLSI based and one VHSIC based. Rome Lab's VLSI base Speech Enhancement Unit has successfully completed field tests and evaluations at 21 locations for the Department of Defense and the National Security Agency. Over 200 of these units are currently in operation worldwide. The VHSIC based SEU is battle tested, demonstrating its capabilities during DESERT STORM, on modern airborne collection platforms. The Air Force is currently producing 235 of these units. Both the VLSI and VHSIC models decrease narrow band, wide band, and impulse noise by an average factor of 1000 for audio signals, and a factor of 10 for data signals. Currently, the FAA is considering Speech Enhancement Technology as a tool to improve air traffic control communications and safety at our nations airports. Several universities are interested in Speech Enhancement Technology for devices to help the hearing impaired. Finally, commercial radio manufactures are already implementing Rome Lab developed Speech Enhancement Technology into their radio receivers.


BLUE FLAG DISTRIBUTED WARNING SYSTEM
REMOTE SITE
REMOTE SITE
REMOTE SITE
REMOTE SITE
HUB
REMOTE SITE
REMOTE SITE
REMOTE SITE
REMOTE SITE
HILLEIN
BENTLEIN

A Distributed War-Gaming System for Blue Flag Developed

Payoff

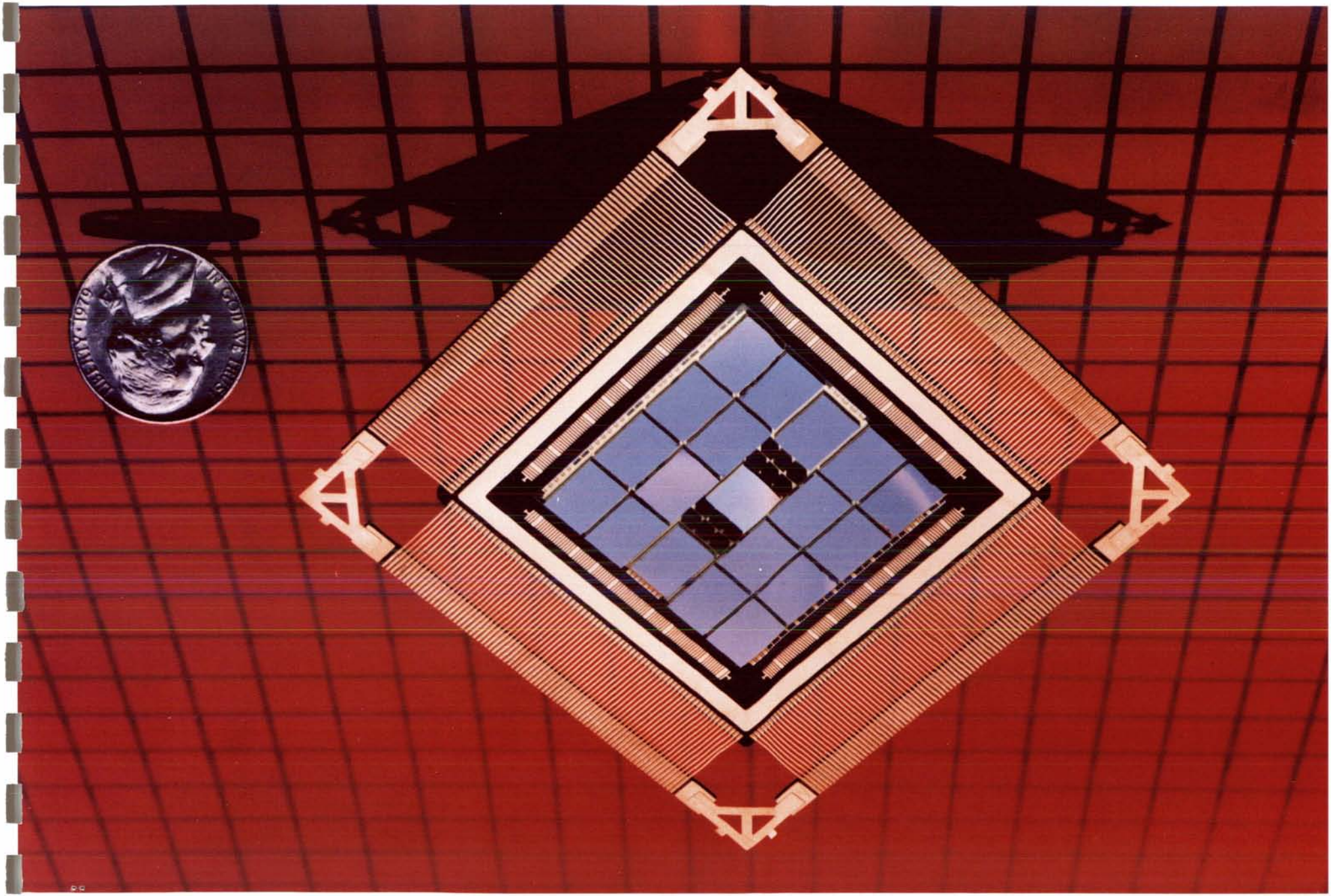
Rome Laboratory program managers developed a hub-and-spoke command and control network at the 41st Training Group, Hurlburt Field, Florida to support Blue Flag 92-1 and future exercises. The system lets the 41st Training Group take their exercises on the road, allowing units nationwide to participate without going TDY, and saving the Air Force money.

Accomplishment

ESC, responded to a request by Gen Charles Horner, then Commander of the 9th Air Force, tasked Rome Laboratory to develop a Distributed War-gaming System (DWS) for the 41st Training Group. Rome Laboratory program managers retained contractors to modify and improve plans of an existing system, and then oversaw the testing and installation of the new network. The entire elapsed time, from Gen Horner's request to operational network, was four months. The 41st currently uses this DWS for every Blue Flag exercise and plans to increase the system's role in the future.

Background

The Blue Flag DWS consists of a control hub networked with up to eight remote sites. The network provides point-to-point communication using satellite and terrestrial communication systems between the hub and sites. The network supports voice, video and data transmissions. Rome Lab supplied a variety of equipment under this program. The hub contains encryption long-haul interface equipment, data multiplexing equipment, and computer data network bridge and routing functions. The remote sites consist of a secure communication suite and a remote site video teleconferencing suite containing communication encryption, data multiplexing, telephone, computer data, cameras, monitors, video compressor/decompressor, speakers, and control units. The equipment fielded with the Blue Flag DWS is state-of-the-art, and the system as a whole pushes the state-of-the-art for distributed communications networks. Commercial spin-offs from this program could include multi-media conferencing capabilities, mobile television studios, and distributed training systems, the latter being a distinct advantage to the handicapped or others who cannot travel readily to attend training.


LIBERTY
IN GOD WE TRUST
1976

A TQM Approach for Qualifying Microcircuits Developed

Payoff

Rome Laboratory has developed a process-oriented Total Quality Management (TQM) approach for qualifying complex monolithic and hybrid microcircuits, as well as multichip modules. This approach is known as the Qualified Manufacturers List (QML) program. This program offers Department of Defense (DoD) system developers qualified sources of high-reliability microcircuits. These microcircuits play a key role in system performance and reliability.

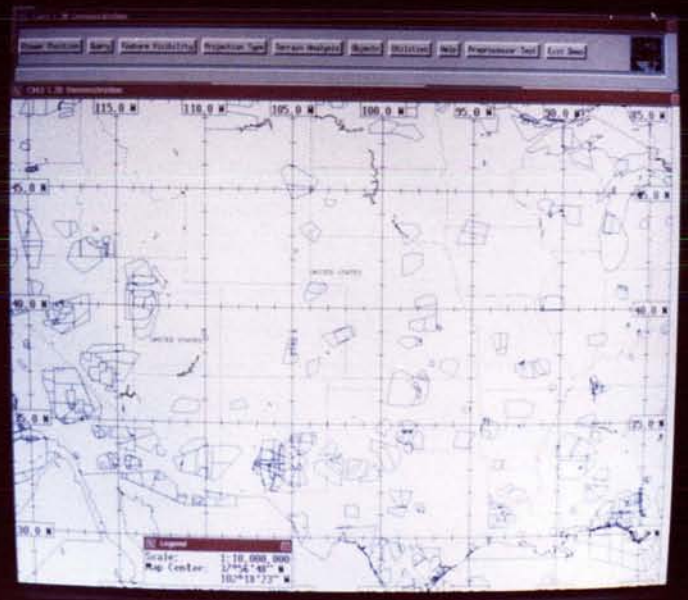
Accomplishment

The QML program provides qualified sources of integrated circuits by insuring a microcircuit company can demonstrate that all its manufacturing processes are capable and controlled to provide high-reliability devices for harsh military environments. The program was recently revised to include manufacturers and products from the Qualified Parts List (QPL) program, which has not been able to address newly developed technologies. Allowances have also recently been made in the QML program for overseas assembly and test of microcircuits. This ensures continued products for military programs, as well as allowing the DoD to benefit from advances in overseas commercial manufacturing processes.

Background

In the past, military microcircuits were acquired under the QPL Program. This program required extensive end-of-line testing to screen out defective microcircuits. With the increasing complexity of newer devices, this testing has become ineffective and prohibitively expensive. Rome Laboratory developed the QML program to address this problem. Companies qualified under the QML program use statistical process control to improve their manufacturing processes, and design quality into their products, rather than relying on testing to screen out defects. With the merger of QPL manufacturers into the QML program, the QML program has become the single system for qualifying military microcircuits.

VEGAS
BOMBING
AND
NEVADA
NEVADA PROVING GROUNDS


Scale:
Map Center:

Transition of Common Mapping Standard to ESC

Payoff

Rome Laboratory transitioned the Common Mapping Standard (CMS) to Electronics Systems Center (ESC) in September 1990. Developed and tested by Rome Laboratory, the CMS cartographic database format defines the single format acceptable for converting Defense Mapping Agency (DMA) data. All previously developed systems using DMA digital products converted the same databases into different formats for exploitation purposes. This uncontrolled reformatting has cost the Air Force millions of dollars in redundant work and stifled interoperability. By mandating use of the CMS format the savings in money and effort have been felt through the system development cycle and at the same time promoting increased system interoperability.

Accomplishment

CMS is a comprehensive cartographic data exploitation format that successfully satisfies the Air Force's requirements for standardizing digital mapping exploitation for Theater-, Force-, and Unit-level mission planning and intelligence operations. CMS provides a standard exploitation format for mapping data that allows multiple systems to share a common cartographic database.

Background

CMS is a database format for digital cartographic data that has been optimized for operational exploitation. CMS is a combination of vector, raster and gridded data formats that accommodate the variety of data formats available from the DMA. The DMA databases that are being used in the CMS format are Digital Terrain Elevation Data, Digital Feature Analysis Data, Arc Digital Raster Graphics, World Vector Shoreline, Digital Chart of the World, and Digital Aeronautical Flight Information File. Rome Laboratory engineers proposed the CMS in response to ESC's request for digital mapping support for the AF Mission Support System development. The design proposed by the engineers was robust enough to include all the Air Force's requirements for digital map exploitation. Rome Laboratory engineers insured that the CMS was able to be directly used by the variety of systems being developed to support the Air Force mission. Since that initial proposal ESC has gone on to promote CMS as the Air Force's standard for exploiting DMA digital products. To this end the DMA has accepted the role of being a producer of CMS data. The use of CMS data is now widespread throughout the Air Force in both operational and developmental systems. Systems such as the Air Force Mission Support System, Advanced Planning System, Rapid Application of Air Power, and the Computer Aided Tactical Information System all incorporate the CMS. The cost to the Air Force for exploiting DMA digital products has significantly been reduced and system interoperability has likewise increased.

ROME LABORATORY's F-16 EME TESTBED

Before

During

Program Objectives

- TO DEVELOP AN EME TESTBED TO PERFORM EXPERIMENTATIONS & EVALUATIONS OF EM EFFECTS ON ADVANCED ELECTRONIC SYSTEMS, EQUIPMENTS & COMPONENTS

Testbed Complete

Background

- TEST REQUIREMENTS FOR AN F-16 A/C
- OPERATIONAL A/C DIFFICULT TO OBTAIN
- DEVELOPED FROM CRASHED ASSETS
- TAIL # 84-1289 ASSIGNED TO ROME LAB

Capabilities

- EME GROUND TESTBED
- F-16C BLOCK 30 CONFIGURATION
- SIMULATES FLIGHT CONDITIONS

Applications

- LPM/HPM
- PHASED ARRAY SENSORS
- EM ID RELIABILITY
- LO
- EW

An F-16 Electromagnetic Effects Testbed Developed

Payoff

Rome Laboratory developed an F-16 Electromagnetic Effects (EME) Testbed from an F-16C crash damaged aircraft. With this testbed, Air Force Materiel Command (AFMC) laboratories are able to determine the effects of exposure to high intensity electromagnetic (EM) fields on advanced weapon and avionic systems used in fighter aircraft. This information can now be gathered without the need to expose operational aircraft to potentially damaging EM environments. Additional applications include cost effective evaluation of new diagnostic tools for improved supportability, evaluation of antenna and system level EM effects, and platform integration of multiple aircraft systems.

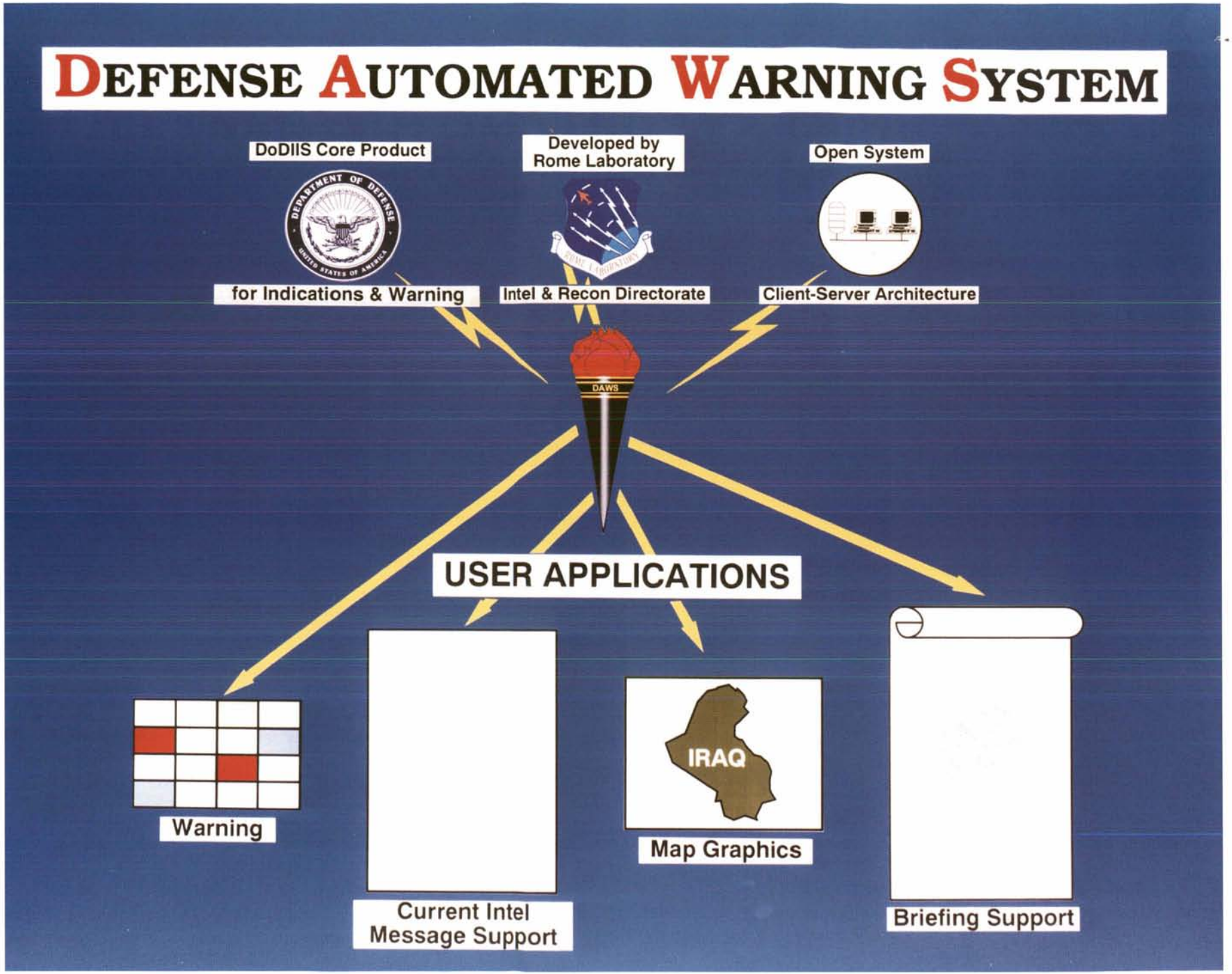
Accomplishment

The F-16 EME Testbed gives AFMC laboratories the ability to do detailed measurements on interactions of EM fields with tactical aircraft. It provides a non-flying F-16 aircraft that can be quickly and inexpensively modified to evaluate advanced weapon and avionic systems. Further, it helps us determine how the systems will work in actual operational EM environments. The F-16 EME Testbed can be used in place of an operational aircraft in many applications. In developing the F-16 EME Testbed, Rome Laboratory engineers capitalized on a pilot program at General Dynamics to refurbish crash damaged assets for use in non-flying applications. This resulted in a significant savings in cost. A $14 million F-16C aircraft was acquired for less than $1 million.

Background

Rome Laboratory's Newport Antenna Measurement Facility has a number of Air Force aircraft that are used in making antenna isolation and antenna pattern measurements for experimental and advanced development systems. The aircraft used are empty airframes. Most systems that are evaluated at the facility do not require electrical or data connections to an operational aircraft. For these measurements, empty airframes are best. Some systems require interaction with the aircraft. Also, there are some measurements (i.e. electromagnetic coupling, shielding, etc.) that can only be done on fully equipped aircraft. Use of operational aircraft for these measurements would require extensive, expensive modifications to the operational aircraft due to safety of flight requirements. The experimental nature of some tests would also require use of the aircraft for extended periods of time. The F-16 EME Testbed aircraft provides all of the capabilities of an operational F-16C block 30 aircraft but, since it is a non-flying aircraft, there are no limitations on modifications or measurement point access.

DEFENSE AUTOMATED WARNING SYSTEM



Transition of Defense Automated Warning System to DIA

Payoff

Rome Laboratory delivered the first Department of Defense (DoD) Intelligence Information System (DoDIIS) automated Indication and Warning (I&W) system to Defense Intelligence Agency (DIA) in the Fall of 1992, and to United States Central Command in the Spring of 1993. Developed and tested by Rome Laboratory, the Defense Automated Warning System (DAWS) provides I&W analysts the tools necessary to determine if enemy-initiated hostilities may be imminent. Hostilities include terrorism, diplomatic tensions, on through to full nuclear exchange. The data necessary for this notification may be received from minutes to hours, to days, or longer, prior to the initiation of hostilities. Because of the potential for very short notice, it is imperative that an analyst have an automated tool such as DAWS to assist them in existing or potential threats.

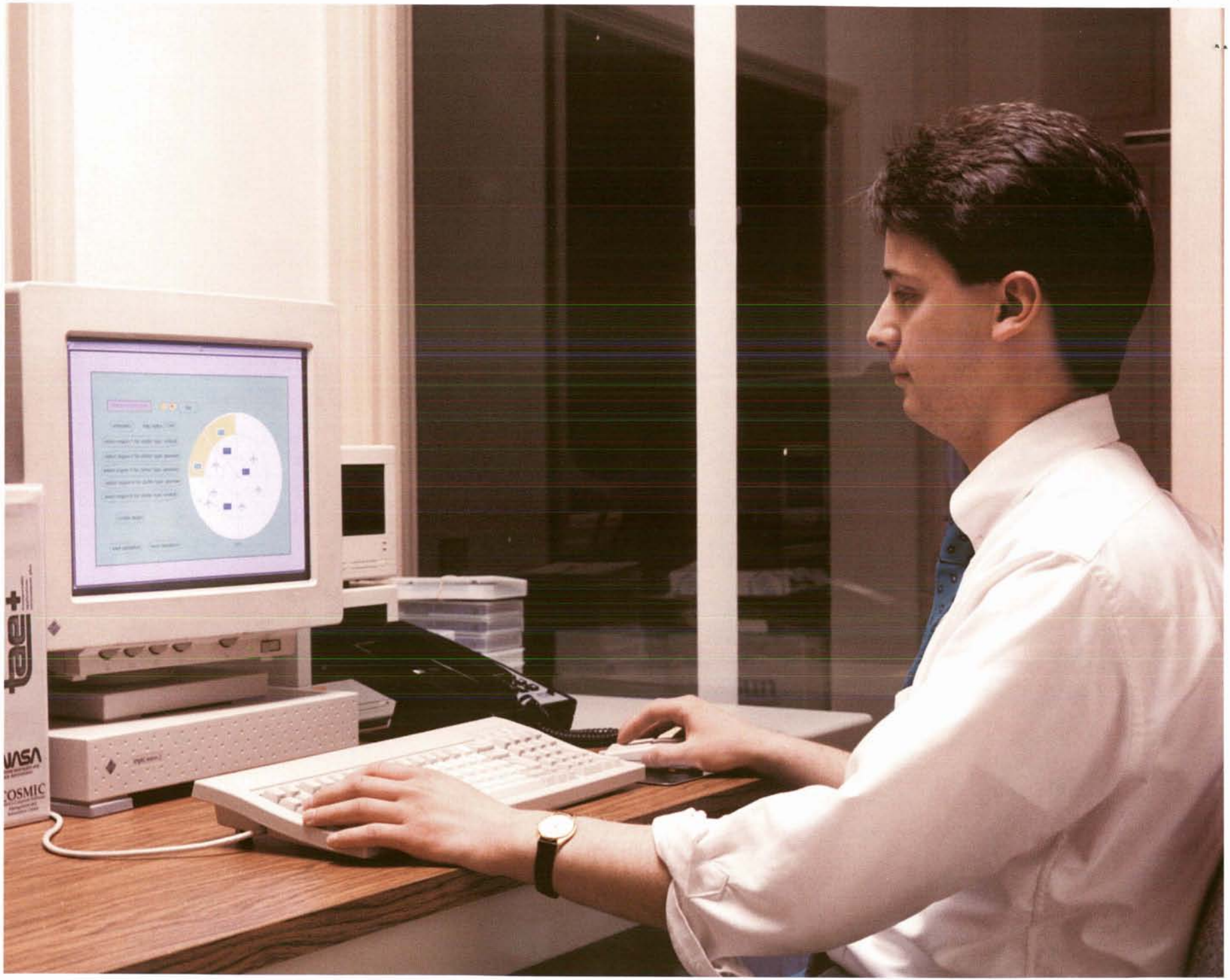
Accomplishment

DAWS is a sophisticated intelligence data handling system which provides the I&W community analysts with a highly effective applications suite to expedite analysis of all-source intelligence. All Unified and Specified commands make daily decisions on the appropriate posture of their forces, based upon the current threat. The force posture options include changes in alert status to improve response times, relocation of assets to increase warning time, and launch under positive control. These decisions are based upon the best assessment of enemy capabilities and demand sophisticated and timely intelligence.

DAWS is the system that meets these critical I&W requirements, and provides tailored support to specific operational planning, force employment, and crisis action tasks. DAWS is designed in the spirit of the Intelligence Data Handling System open architecture and operates across multiple UNIX based platforms under multiple workstation configurations.

Background

Rome Laboratory developed DAWS with full user group participation, to serve as the DoDIIS core product for I&W. DAWS is open system compliant, therefore, it easily integrates into already existing computer environments based upon the client-server, open systems architecture. The system has been developed primarily for the I&W mission, however, current intelligence missions can utilize DAWS effectively. DAWS consists of government owned software and commercial off-the-shelf (COTS) software running on COTS hardware.


tae+
NASA
COSMIC

Expert System Constant False Alarm Rate Processor Developed

Payoff

Rome Laboratory developed and tested the Expert System Constant False Alarm Rate (ES-CFAR) Processor in the spring of 1993. Using E-3 Airborne Warning and Control System (AWACS) aircraft data, the ES-CFAR Processor demonstrated a tripling of detection performance and an order of magnitude reduction of false alarm probability compared to a conventional Cell Averaging CFAR algorithm. This dramatic performance improvement can provide the E-3 AWACS aircraft with improved false alarm control while more reliably reporting detections of small, low observable targets.

Accomplishment

The ES-CFAR Processor is a prototype demonstrating the feasibility and performance gains made possible by integrating artificial intelligence technology into radar signal processing. By applying artificial intelligence, a radar signal processor can classify the interference environment and apply the most appropriate CFAR algorithm(s) for detection processing. Many CFAR algorithms have been developed to perform in a variety of clutter environments, but no single algorithm is able to perform adequately in all interference environments. By intelligently selecting the most appropriate CFAR algorithm, one can overcome the limitations dictated by a single CFAR algorithm processor typical of fielded systems.

Background

Rome Laboratory engineers conceived the ES-CFAR Processor to provide a low-cost, easily implementable approach to improving the performance of modern long-range surveillance radars via advances in signal processing, as opposed to costly transmitter or antenna upgrades. The ES-CFAR Processor may be incorporated into an existing radar as part of a signal processor upgrade or may be utilized in the development of a next generation radar signal processor.

The ES-CFAR Processor includes a library of CFAR algorithms which may be dynamically selected to provide a robust, adaptive CFAR Processor for improved performance in the presence of non-Gaussian backgrounds, clutter edges and multiple interfering targets. An inferencing structure is used to assess the environment and determine the most appropriate CFAR algorithm to be used for detection processing.

Sun
ON
OFF
DRIVE 1
DataShuttle

An Automated Targeting and Weaponeering Capability (rapid application of air power) Developed

Payoff

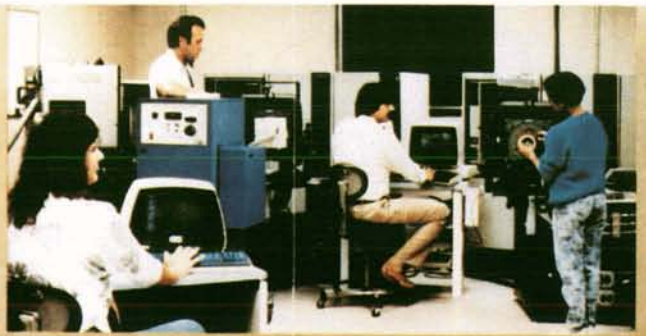
Rapid Application of Air Power (RAAP) is the Air Force's automated targeting software application. It is designated to support air commanders at the theater/force levels in integrating near real time intelligence with operations (plans and current operations), and effectively targeting fixed positions or a fast moving enemy in a dynamically changing environment. Developed and tested by Rome Laboratory, RAAP accesses selected intelligence and operational data bases to provide situationally-prioritized and weaponeered target nomination lists to Air Force planning systems. The savings in time and effort provided by RAAP is felt throughout the mission cycle giving the US Air Force a decided advantage in times of conflict.

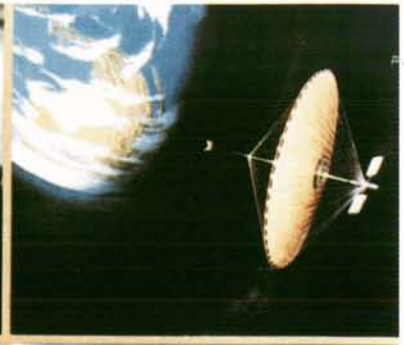
Accomplishment

RAAP is an integrated, force level support system for use in the Air Operations Center to develop, weaponeer and nominate situationally relevant targets for attack by air assets, achieving the objectives of the theater commanders overall strategy. Presently, it is capable of providing a developed and weaponeered (based on Joint Munitions Effectiveness Manual standards) Target Nomination List for output to, and fully compatible with, the Advanced Planning System for incorporation into the Air Tasking Order (ATO). It has the capability to manipulate imagery for target development/aimpoint selection and Bomb Damage Assessment data correlation.

Background

RAAP was developed, with full user group oversight, to serve as the US Air Force's standard targeting system. Most recently, the baseline version was integrated into the Contingency Tactical Automated Planning System. The system has been developed primarily to support ATO generation. Geographic information systems support comes from the Air Force's Common Mapping Program Tool Kit. RAAP is Government owned software and is Department of Defense Intelligence Information System compliant. The hardware is commercial off-the-shelf. Since the RAAP system is intended for operational use within the support facilities of the Joint Forces Air Component Commander, the system has come to the attention of the Navy and Army intelligence and operations personnel. RAAP meets the integration and evolutionary development challenge for an automated targeting application. Preliminary field reports indicate high user satisfaction with the system and its functionality.





Design

Electrical Test

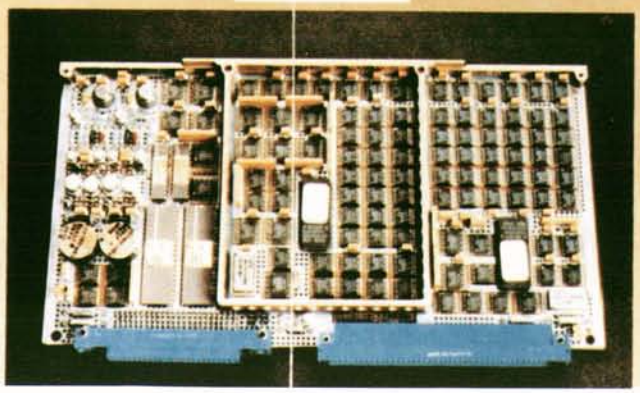
Development

Tester Independent Support Software System

Fabrication

System Insertion

Maintenance and Support



Test Support Automation - Reduces Costs

Payoff

Faster verification and more rapid insertion of technology advances into defense systems is made possible by the Tester Independent Support Software System (TISSS). The TISSS will reduce the time required for electrical product and test specification generation, reduce cost and time for test program development, and reduce the efforts required for test program retargeting to different Automated Test Equipment (ATE). Maintenance of permanent product model and device/module descriptions for life-cycle support is another major benefit made possible by the TISSS. The TISSS database will support design/module verification, testing, reprocurement and re-engineering for obsolete electronics.

Accomplishment

The TISSS will provide the Department of Defense (DoD) with an automation capability to generate and maintain electrical product and test specifications and test programs for digital microelectronics. The TISSS is an archival database system that can store device or module design and test data information independent of any supplied Computer Aided Design (CAD) or ATE data formats. TISSS users will have the ability to import product and test product specifications, along with design and test data, from any design environment supporting the TISSS product formats. The TISSS can then automatically generate ATE specific test programs from its internal CAD and tester independent database with the use of the TISSS generic postprocessor.

Background

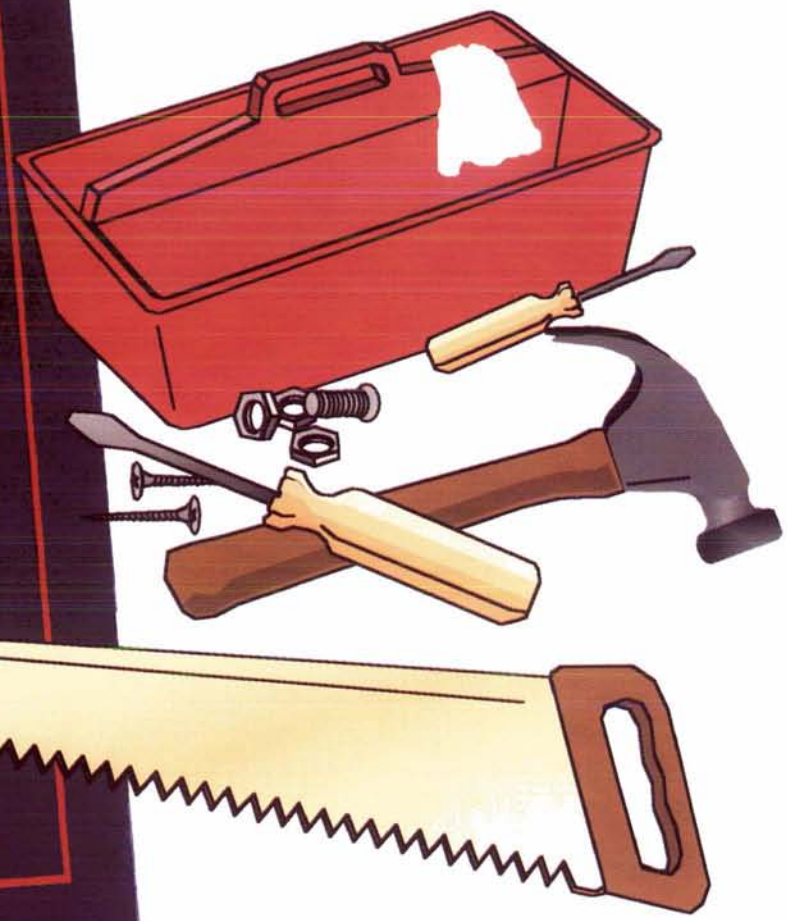
As the complexity of digital electronic technology increases, test program generation times and costs will increase significantly. Also, because of very limited test program interchangeability, the DoD often pays for several test programs for the same digital electronic unit. The TISSS was developed to solve this problem. With the TISSS's automation capability, the TISSS will allow the DoD to develop and maintain electrical product and test specifications and programs, thus, reducing the time and cost of test program generation. Initially developed and demonstrated for digital microcircuits, the TISSS was enhanced to encompass digital Line Replaceable Modules. It is also currently undergoing extensions to provide the same capabilities in support of analog and mixed signal components and boards.

ROME LABORATORY

The Rome Laboratory

Reliability Engineer's Toolkit

April 1993



Updated Reliability Toolkit (Handbook) for Industry and Government

Payoff

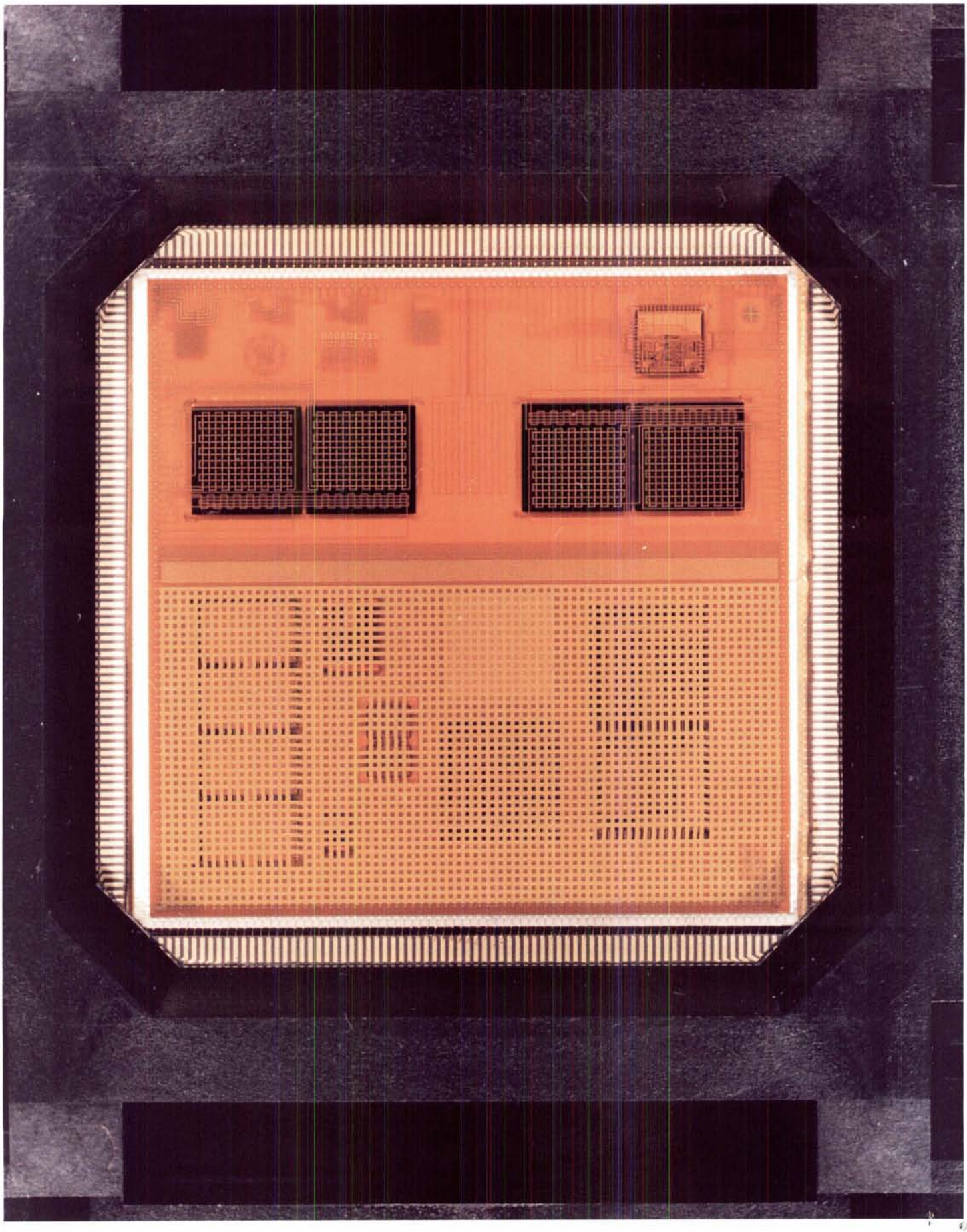
The Rome Laboratory Reliability Engineer's Toolkit is a compendium of the most useful techniques needed to design Reliability and Maintainability (R&M) into new electronic systems. It provides a quick and easy reference for reliability engineers by summarizing information in table, checklist and figure format, as opposed to paragraphs of text. The "Toolkit" represents a means of leveraging off the experience of Rome Laboratory R&M experts to improve the reliability of Air Force and Department of Defense products. It is written in an easy to use concise format that can be used as a training and/or reference guide.

Accomplishment

The "Toolkit" fills the need for a compact, comprehensive, yet thorough, technical source document designed for easy use with quick reference indices tied to questions that need to be answered by design and reliability engineers. The main sections of the document follow the flow of a normal system development program from determination of requirements to testing. Examples of subjects addressed are: R&M Task Priorities, Redundancy Equations, Parts Stress Derating, R&M Demonstration Plans, Design Review Questions, Warranty Guidelines, Critical Item Checklists, R&M Data Sources, Reliability Prediction Methods, and R&M Education Sources. The toolkit also addresses timely issues of current interest to Air Force development programs by providing guidance such as commercial versus military hardware reliability, impact of operational environments on system reliability and properly tailoring our R&M programs when commercial off-the-shelf subsystems will be used.

Background

In the mid-1980's the System Reliability Division at Rome Air Development Center (RADC) saw the need for a quick and easy to use R&M reference guide. Based on over 30 years experience in developing and applying new R&M techniques, a group of RADC R&M engineers set out to summarize the most useful and practical information into a single easy to use handbook. The original RADC (now Rome Laboratory) Reliability Engineer's Toolkit, July 1988, proved to be a best seller among military, industry and academic reliability practitioners. Over 10,000 copies were distributed and the Toolkit and its authors received the 1989 Federal Laboratory Consortium Special Award for Excellence in Technology Transfer. This updated version (April 1993), completed in-house at the Rome Lab Systems Reliability Division, revises most sections and adds new topics on accelerated testing, thermal analysis, surface-mount technology, design of experiments, hardware/software reliability, component failure modes/mechanisms, dormancy, and sneak analysis.



INTELLIGENT MULTICHIP MODULE ANALYZER

Payoff

Because of the great improvement in the size, weight, and speed associated with the use of Multi-Chip Modules (MCMs), the Air Force is placing a growing importance on their use in programs such as the F-22 Advanced Tactical Fighter and advanced radar projects using Monolithic Microwave and Millimeter Wave Integrated Circuit (MMIC) technology. This has led to a corresponding need for thermal and reliability analyzes of these modules during their design phase. Although these analyzes are currently being accomplished using general purpose finite element analysis tools, they take an extensive amount of time and their accuracy is often in question. Rome Laboratory's (RL's) Intelligent MCM Analyzer (IMCMA) will eliminate these shortcomings and provide the Air Force with the capability to assure the thermal reliability of future MCM designs by performing intelligent analyzes during the design process.

Accomplishment

RL's IMCMA greatly reduces the time necessary to perform a thermal reliability analysis of an MCM. Research has indicated that approximately 55% of the manpower expended on a reliability analysis of a MCM is used on the modeling of the device. For a typical MCM, this modeling would take about 200 hours for an experienced engineer. This assumes that multiple models have to be made to obtain accurate results. RL's IMCMA would reduce the modeling time to approximately 20 minutes. The embedding of expert knowledge into the process enables engineers that lack thermal analysis training to properly evaluate the reliability of new MCM designs. The simultaneous interaction of various areas of expertise in the IMCMA optimizes the contribution of each knowledge source in a manner that reduces the overall amount of computation required for the reliability assessment.

Background

RL's IMCMA is a software tool that is an outgrowth of the experience gained by using conventional reliability analysis methods. The iterative refinement of the accuracy of the analysis and the recursive selection, modeling and analysis of portions of the MCM indicated that the entire process could be automated. This idea was additionally influenced by other work in the area of using expert systems for the thermal analysis of printed circuit boards. That use of expert systems allowed the user to concentrate on higher level reasoning decisions and allowed the software to do the detailed analytical work. Reliability engineers expanded this approach to include the use of an object-oriented based data representation and reasoning approach. This expanded approach would allow for simultaneous and asynchronous application of various areas of expertise to the process and the use of an automatic error assessment algorithm. This code is a computerized process which allows the user to enter primary data about the MCM while the software determines the type of analysis, mesh density, and type of reliability prediction. Then, the software automatically performs the subsequent thermal reliability analysis. Temperature contours and the reliability of the various components of the MCM are results of this automatic process.

Strategic/Tactical
Optical Disk System
ROME LABORATORY
POWER
EJECT
TEST
READY
LOAD

12 Gigabyte Data Recorder Proven in Flight Tests

Payoff

The Strategic/Tactical Optical Disk System (S/TODS) is an optical disk system which has been ruggedly designed for sustained, reliable operation under severe flying conditions. This system stores 12 gigabytes of data on a single, 14-inch diameter, removable erasable optical disk. A multiple laser beam recording technique provides a data throughput rate of over 3 Mbytes/sec sustained, and 7 MBytes/sec burst. A powerful error detection and correction algorithm and direct Read-After-Write provides a very low Bit Error Rate (less than one error for every 10 E-12 bits). This disk system, by providing increased reliable, long term data storage with shorter data retrieval times, will dramatically decrease sensor exploitation time, thus, providing timely intelligence information to our warfighters.

Accomplishment

S/TODS demonstrated flight readiness by operating successfully during flight tests under a wide range of operational conditions. The flight tests were performed on RC-135 aircraft over three days during December 1993. Testing included mid-air refueling, tactical descents, 60 degree bank turns, touch-and-go's, turns up to 2G's in force, and heavy vibration. No data was ever corrupted or lost, and there were no bit error rates or hardware failures throughout the flight test. The S/TODS has met the needs of large-scale government intelligence information processing organizations and simplified their storage and retrieval operations.

Background

Rome Laboratory engineers developed a new generation of rewritable optical disk systems for high performance applications such as the following:

- mass data storage
- mass data processing
- wideband sensor data collection
- surveillance and reconnaissance

The mass storage requirements for Department of Defense collection platforms have dramatically increased due to the deployment of advanced sensor technology - resulting in growing need for both rapid access and reliable data storage. Current data storage systems (such as magnetic tape) have: (a) very slow access time which increases sensor exploitation time; (b) data loss over long periods of storage time (not considered archival media); and (c) not provided adequate performance under severe airborne conditions. Systems such as the S/TODS can provide the highly reliable performance needs of the Air Force now and in the future.

Aircraft Ground Attack Simulation Transitioned

Payoff

Rome Laboratory developed the Ground Attack Fighter Model (GAFM) in response to requirements from the National Air Intelligence Center (NAIC). The GAFM is an Air-Ground Attack Fighter-Bomber software simulation and modeling program.

Rome Lab engineers delivered and installed the GAFM at NAIC, USAF/X00C Washington D.C. and Air Combat Command/XP-JSG. This model is the only software simulation model available in the Air Force for Air-Ground Attack missions.

Accomplishment

Rome Laboratory developed an integrated software simulation program to help analysts simulate Air-Ground Attack missions. The GAFM simulates the following theater and campaign missions:

- Offensive Air-Ground Attack
- Defensive Air-Ground Attack
- Offensive Tactical Penetration of Air Defense Environments

It integrates Air Tasking Orders (ATOs), analysis of friendly (blue) and unfriendly (red) forces, and analysis of either one-on-one or few-on-few attack missions.

GAFM is a joint and comprehensive simulation tool because it encompasses multiple Air Force functions such as:

- conducting engagements
- running attacks against defensive targets and providing statistics
- planning air attacks
- allocating air assets
- planning routes and assigning targets

In addition to Air Force functions, Army functions are available for:

- planning air defensive maneuvers
- selection of air defense sites
- maneuvering through/around air defense radars and missile sites

Background

SENSOR TECHNOLOGY EVALUATION & PERFORMANCE FACILITY

RADAR EMULATOR FOR T/R MODULES

LONG TERM PERFORMANCE TEST

PULSED STABILITY MEASUREMENTS

ON WAFER COMPONENT EVALUATION

TRADITIONAL MICROWAVE ANALYSIS

RECEIVER NOISE PERFORMANCE MEASUREMENTS

TEST CIRCUIT BREAD BOARDING

CAD DESIGN & EVALUATION

Facility Emulates Unbuilt Surveillance Systems - Reduces Risk

Payoff

Rome Laboratory engineers have developed the Sensor Technology Evaluation & Performance (STEP) facility. This testbed facility evaluates the performance characteristics of advanced hardware for surveillance sensors. It provides a flexible, low cost alternative for early evaluation of new technology. Department of Defense components and commercial contractors can exploit this capability to reduce technical and cost risk on emerging system developments. DoD programs that have benefited from the STEP facility include the Air Force F-22 Advanced Tactical Fighter and Army Ground Based Radar. Current programs scheduled to use the STEP facility include the Navy Cooperative Engagement Capability Airborne Array and Federal Aviation Administration Multi-Purpose Airport Radar Development.

Accomplishment

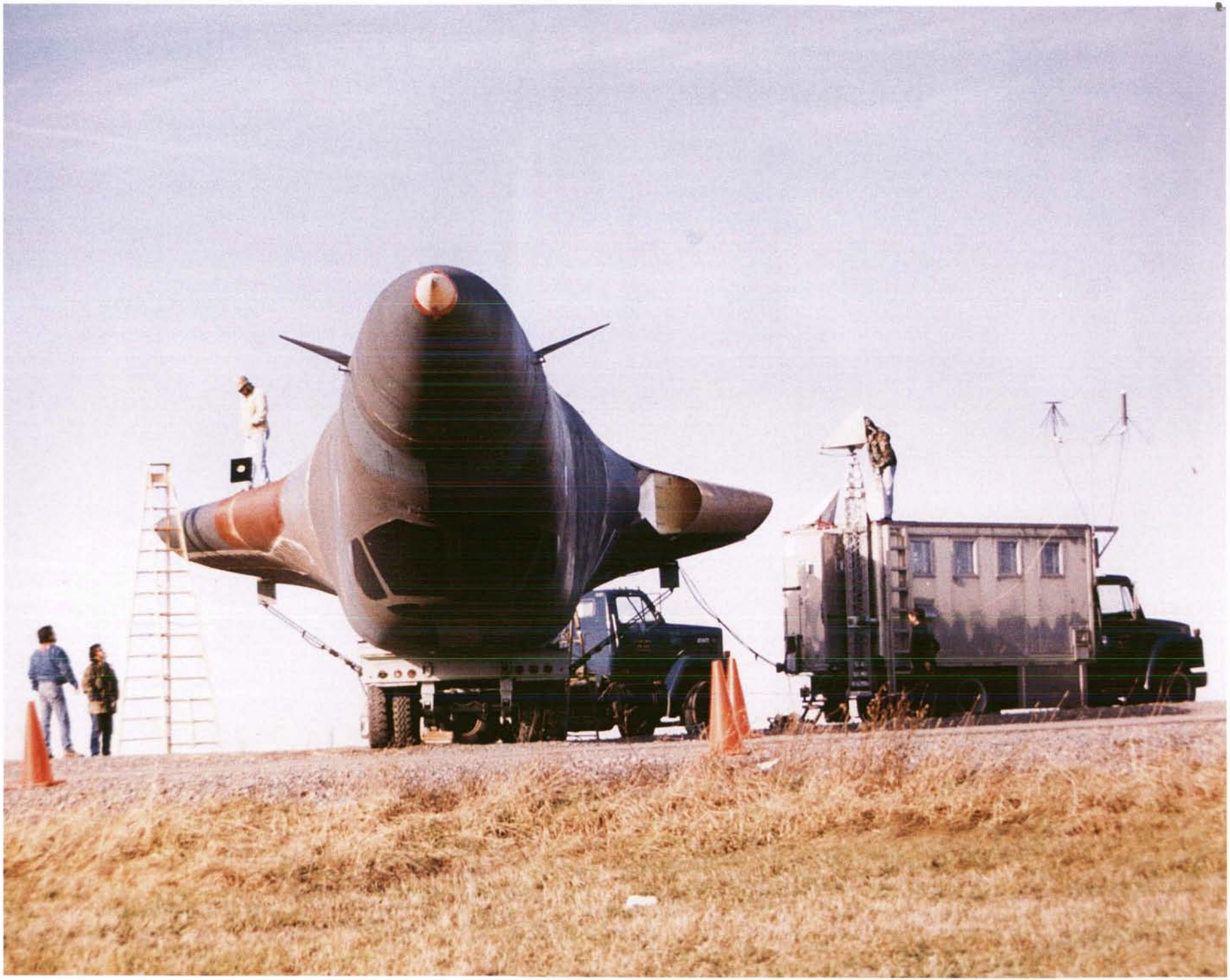
The Sensor Technology Evaluation & Performance Facility performs characterizations on single and multiple transmit and receiver devices and subsystems under various environmental and electromagnetic conditions. This facility can emulate the conditions that the electronics would experience in an operational system. For example, engineers can test a device within the facility's radar emulator to determine how operational conditions might affect an otherwise good transmit & receive function:

- power supply fluctuations
- antenna to antenna mutual-coupling
- varying baseplate temperature
- complex Radio Frequency (RF) waveform and drive levels

Another unique test that the facility can perform determines the pulse-to-pulse stability of a device to levels not achievable with off-the-shelf test systems. Finally, the facility can perform a comprehensive accelerated Direct Current and RF life test. These tests involve continuously monitoring multiple performance indicators such as RF gain, power supply voltages, and currents and base plate temperatures.

Background

The Air Force identified a method of fully characterizing Transmit/Receive (T/R) modules as a technology need in order to avoid the catastrophic T/R module failure rate that Pave Paws experienced during its initial turn-on period. This included developing a pulsed power measurement system. Also, with the advent of low observable targets, the difficulty of target detection has increased. To improve target detection, T/R modules must transmit and receive more stable waveformsx, and thus, the need for evaluating a T/R module's stability increased significantly beyond state-of-the-art test capabilities. Rome Lab developed the STEP facility to provide these capabilities.



Rome Laboratory Assets Also Unique to Industry

Payoff

On 18 Nov 93, Rome Laboratory demonstrated a pilot program to allow industry to directly use some unique Rome Laboratory facilities. Rome Laboratory's unique B-1 test bed located at the Newport Research Facility and the Precision FPS-16 tracking radar located at the Verona Research Facility were used to evaluate an industry sponsored improvement to the B-1B strategic bomber program. In addition to being reimbursed by industry (at a lower cost to them than would have been possible at a major test center), the funding received by Rome Laboratory helps support its funding base and sustains its facilities' operation costs, which are used to support the Laboratory's primary research and development role in the Air Force.

Accomplishment

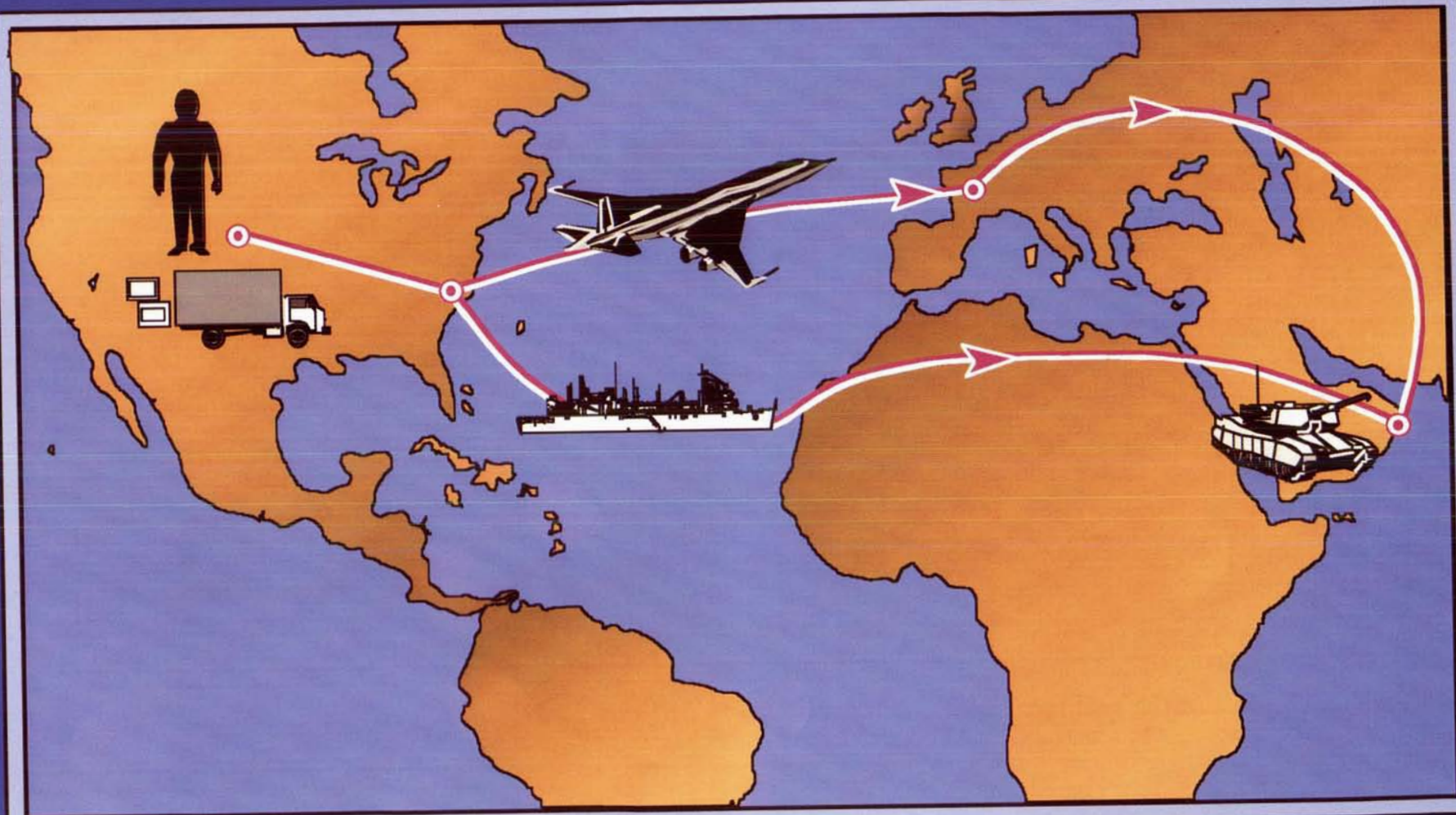
The Air Force has long known of the test capabilities of Rome Laboratory. Although its facilities are primarily geared for research and development, they are also valuable scaled-down test and evaluation assets. They are not as extensive as the major test centers, but they do fill a specialty niche in the field. Industry for the first time is now utilizing these unique Rome Laboratory facilities to evaluate concepts that may, at a later time, be proposed as future systems to be developed not only for the government, but also within industry. In addition, this gives the Air Force in-sight into the technologies that will be becoming available in the future. The first test of this nature at Rome Laboratory was planned in two weeks and successfully conducted in a one-day flight test. The expertise and professionalism of the people involved were the key to success.

Background

Facilities which are unique to the Air Force, are also unique to industry. Rome Laboratory's Newport and Verona facilities have long been known as unique facilities to the Department of Defense (DoD) and to industry, but up to this time only DoD had utilized them. It is not cost-effective for a contractor to develop and maintain aircraft test beds once final production has been initiated. The Air Force, however, is constantly looking at ways to improve on what it already has in the inventory. Thus, the Air Force has a need to maintain a test bed as long as the aircraft remains in the inventory. However, a contractor selected for an upgrade is not always the original manufacturer. In this case, a contractor which had previously supported an Air Force test program at Rome Laboratory facilities, was aware of the existence of these facilities. This experience with Rome Laboratory gave the contractor the confidence that any program undertaken by Rome Laboratory had a high factor of being successful. While defining its concept for the B-1 conventional mission upgrade program, it approached Rome Laboratory to discuss utilizing the facilities it had seen in refining its own in-house project. The facilities it required were the Verona Radar Tracking Facility and the Newport B-1 Test Bed. A system would be installed on Rome Laboratory's test bed and its response to an airborne threat would be evaluated.

The Verona Facility would be used to determine the precise location of the airborne threat. The small scale, easily scheduled, quick response nature of these facilities allowed Rome Laboratory to fill the contractor's needs at a cost effective benefit to both the Government and the contractor.

DART
The Dynamic Analysis Replanning Tool



Dynamic Analysis and Replanning Tool Transitioned to WAM Program

Payoff

Rome Laboratory's (RL's) Dynamic Analysis and Replanning Tool (DART) has transitioned into the World Wide Military Command and Control System Automated Data Processing (ADP) Modernization program. Under this program, DART will now be supported over the long term and fielded to approximately 30 sites. DART is a user-interactive information system which assists military planners in developing and analyzing war plans for deploying large numbers of troops and equipment. Planners can run strategic transportation models in a period of minutes rather than the hours or days that it had previously taken.

Accomplishment

RL's DART is an integrated set of ADP tools and a data base management system that provides planners the ability to rapidly edit and analyze "Time Phased Force Deployment Data" for transportation feasibility. The DART makes it possible for planners to consider more alternative courses of action in response to crises than previously, and to produce, in less time, a potential feasible course of action.

Background

RL's DART program started as an intense ten week rapid prototype effort to support US Transportation Command (USTRANSCOM) in response to Desert Shield/Storm under the RL/Advanced Research Projects Agency (ARPA) Knowledge-Based Planning and Scheduling Initiative. The RL/ARPA team worked in close proximity to USTRANSCOM planners building the initial prototype system that, at the end of eight weeks, was sufficiently mature to move it to the European Command. As a transitioned technology, DART could be characterized as a sequence of seven major software releases or builds made over a twenty-three month period. At every point in the program RL and ARPA put emphasis on maximizing user involvement, minimizing the time between software releases, and maximizing the functional content of each software release.

UNCLEARED PERSONNEL
UNSECURED DOOR

Extended Integrated Data Base Transitioned To ACC

Payoff

Rome Laboratory (RL) delivered the first Extended Integrated Data Base (XIDB) system to Air Combat Command in December 1993. The XIDB system provides Air Force Major Commands (AF MAJCOM) with General Military Intelligence (GMI) data via an Air Force implementation of the Military Intelligence Integrated Data System (MIIDS) IDB database. Because of the vast amount of intelligence data currently existing, it is imperative that Air Force decision makers have automated tools such as XIDB to assist them in retrieving and updating specific information which relates to a current problem area, in near-real-time fashion.

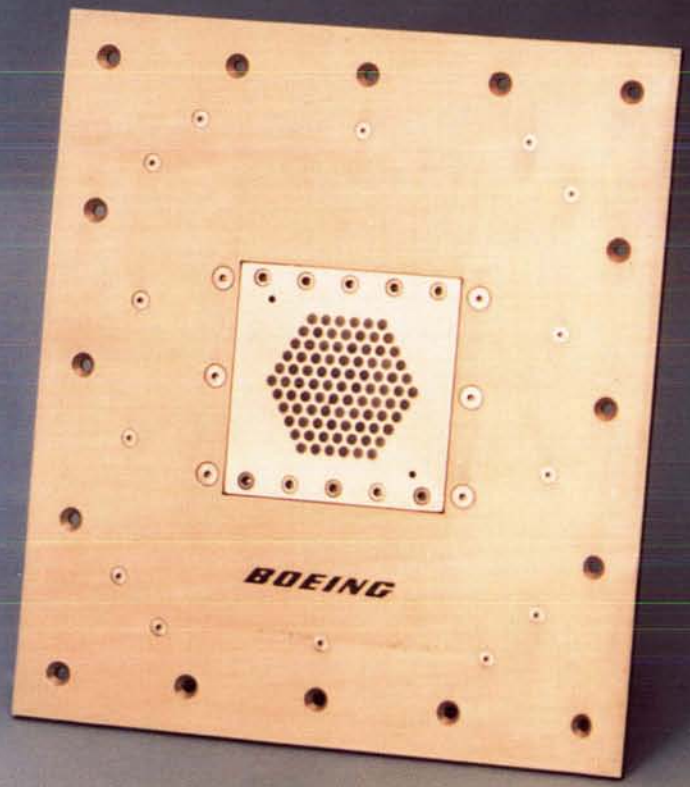
Accomplishment

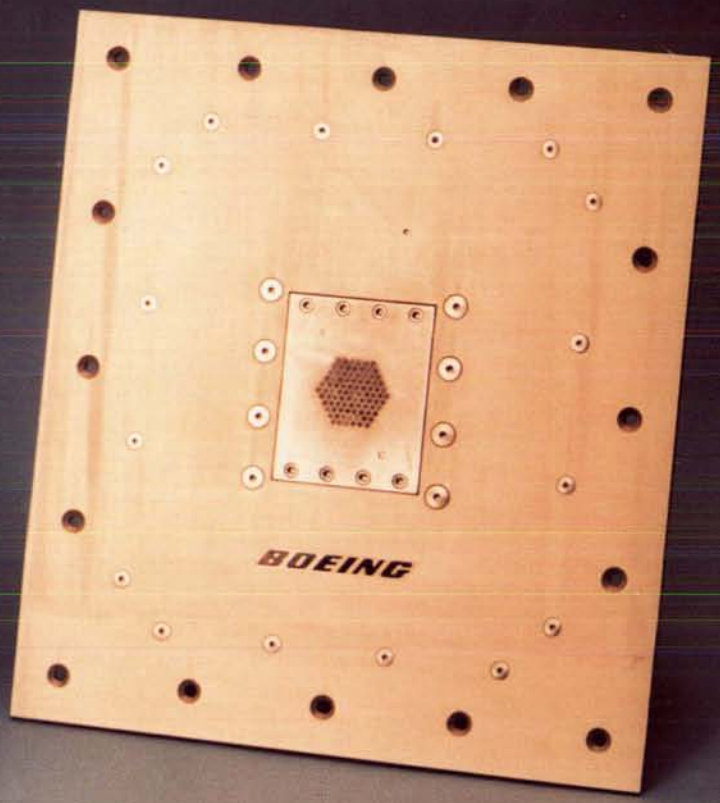
XIDB is a sophisticated IDB system which provides AF MAJCOM analysts with a highly effective applications suite to expedite intelligence information retrieval and updates. XIDB ensures data accuracy by providing the vehicle to disseminate updated GMI data in near-real-time to the appropriate Air Force and National level systems, such as Sentinal Byte, Computer-Aided Tactical Information System, IDB-II, and MIIDS/IDB. Additionally, by providing an Air Force wide, standard IDB system, XIDB minimizes training requirements and Life-Cycle costs.

Background

RL's Intelligence and Reconnaissance Directorate developed XIDB to serve as the standard product for Air Force IDB and the Distributed Production Program responsibilities. XIDB is open system compliant, therefore, it easily integrates into already existing computer environments based upon the client-server, open systems architecture. Data currency with national level IDB systems is maintained via IDB Transaction Format messages.

ACTIVE PHASED ARRAY ANTENNAS





FIRST EHF PHASED ARRAYS

Payoff

At present, both ground and airborne platforms use reflector dish antennas for Extremely High Frequency (EHF) satellite communications. These require large installation apertures and protruding radomes, are reasonably slow scanning, and are not suitable for high performance aircraft or ground communications-on-the-move. In the future a one inch thick conformal phased array antenna capable of agile electronic beamsteering will be highly attractive for Department of Defense (DoD) Satellite Communications (SATCOM) and many commercial communications applications.

Accomplishment

Rome Laboratory (RL) and the Electronic Systems Center MILSATCOM Terminal Program Office have taken the first important steps towards electronic phased array antennas for SATCOM systems. Using modular architectures, both Boeing and Martin Marietta, under a RL contract, have successfully developed the first working phased array antennas for SATCOM at Transmit and Receive frequencies of 44 and 20 Gigahertz, respectively. RL's Antenna Technology Branch is currently measuring antenna parameters at RL's EHF Antenna Test Range. The purpose is to determine performance capabilities and make recommendations for next generation improvements.

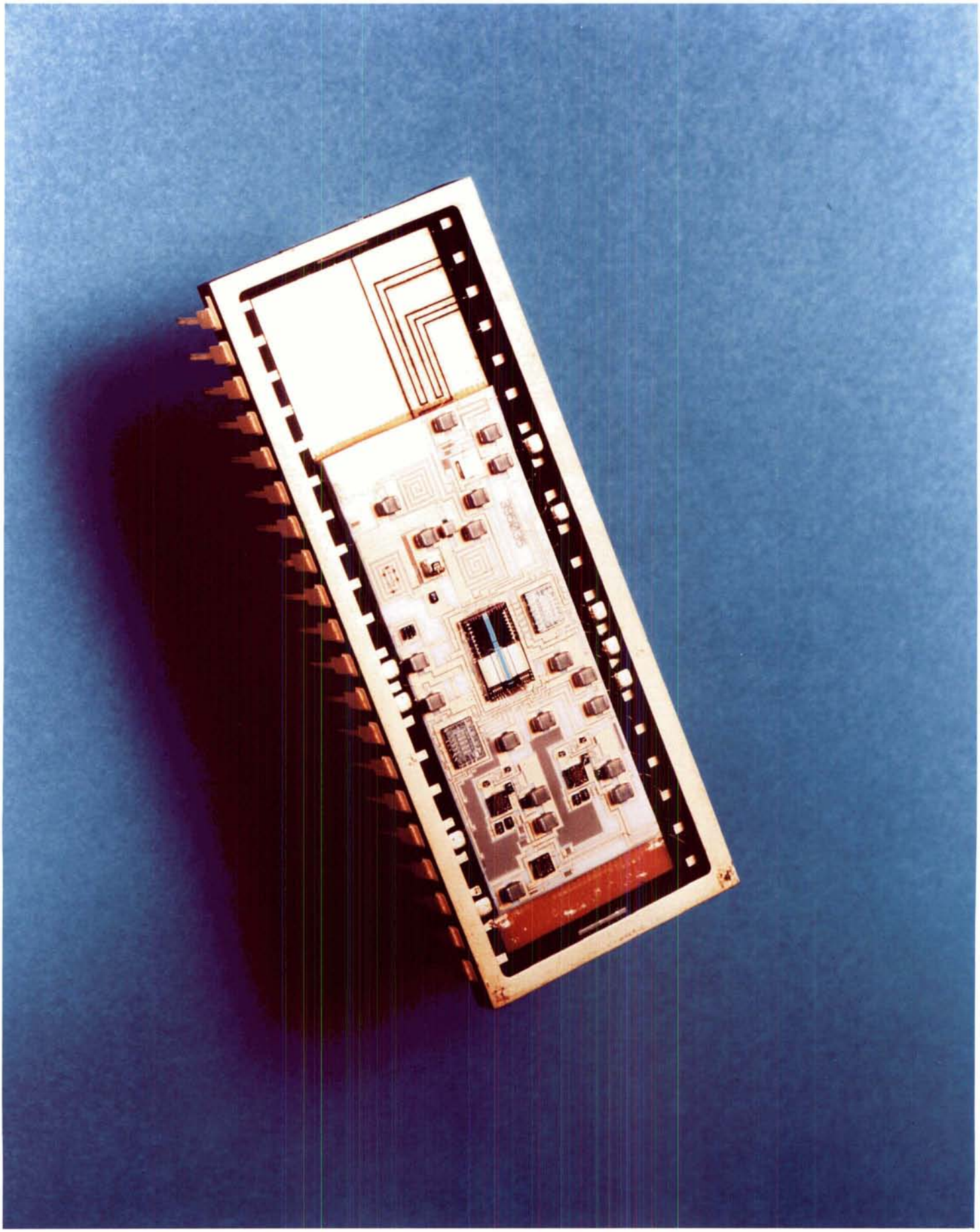
In conjunction with the National Aeronautics and Space Administration (NASA) Lewis Research Center, the phased array antennas developed on the RL program have been mounted in a NASA aircraft. During flight demonstrations, the RL antennas have been used in a SATCOM system to establish phone links between the NASA aircraft and various ground locations relayed via the NASA Advanced Communication Technology Satellite (ACTS). One such phone call was made from the NASA aircraft to the RL Commander at Griffiss AFB. The phased arrays will also be used in an Army HMMWV (Humvee) to demonstrate SATCOM from ground vehicles on-the-move.

The phased array antennas developed on this successful RL program have achieved two important objectives. First, RL test engineers have been able to evaluate early prototypes of a new technology. And Second, SATCOM demonstrations have shown both DoD and commercial users that the phased array antenna is critical to the implementation of advanced mobile communication systems.

Background

Desert Storm demonstrated the critical importance of communications with rapidly moving tactical units deployed in the air, on the ground, or at sea. Satellites are playing an increasingly important role in relaying communications over long distances. The ACTS is currently being used to demonstrate EHF SATCOM for commercial uses, and in the near future EHF DoD SATCOM will be made possible by the MILSTAR satellites. However, until a low profile antenna with no moving parts is developed, SATCOM-on-the-move is at a stand-still.

Since the mid 1980's RL has worked with the MILSATCOM Terminal Program Office to develop EHF antenna technology. There is great interest in compact phased array antennas for advanced airborne terminals; however, the truly monolithic array is still a technical challenge requiring several more years of development. The modular receive and transmit phased arrays are a technology first for test and evaluation. Although these antennas are small, they can be used to demonstrate that phased arrays are real and are important to develop for future SATCOM systems.



High Volume Manufacture of Acoustic Charge Transport

Payoff

Rome Laboratory's (RL's) Acoustic Charge Transport (ACT) effort, funded by the Advanced Research Projects Agency (ARPA), provides low cost, high performance ACT devices for a variety of both military and commercial systems. ACT is a new technology that allows digital control of wideband analog signals. ACT devices are compact microelectronic signal processing devices fabricated on Gallium Arsenide Integrated Circuits. These devices achieve very high processing rates — 46 billion operations per second — on a single chip. These processing rates are several orders of magnitude higher than what Very High Speed Integrated Circuit digital processors can provide. This will lead to better, smaller, and "cheaper" electronics products.

Accomplishment

Military applications of ACT devices include: Low Probability of Detection (LPD) communications, co-site interference filters, intercept receivers and adaptive interference cancelers. ACT's low cost, small size, low power consumption, and wide bandwidth make it useful in LPD communications. It's low cost, small size, low power consumption, high processing power and processing speed make it ideal for use in intercept receivers and interference cancelers. ACT devices are used as adaptive interference cancelers to take advantage of their digitally programmable controls, fast loading speeds and high processing power.

The ability to broadcast compact-disc quality sound over existing AM and FM radio channels is an important advancement for the commercial radio industry. ACT signal processors have been used to demonstrate a Digital Audio Broadcast system that is fully in-band and in-allocation with the present radio channels. This system utilizes the programmability and high speed of the ACT signal processor to permit the transmission and reception of digital information simultaneously with standard AM and FM signals within existing frequency allocations.

Background

In 1985, ACT technology first started as a University experiment. This led to an on-going ARPA/RL sponsored program. Electronic Decisions Corporation from Urbana, IL, under a RL contract, set up an ACT device fabrication line and begun high volume manufacture of these devices, thus, significantly reducing the cost-per-chip.

CSP
Communications Support Processor
RA60
RA60

Intelligence Community's Communications Support Processor Upgraded by Rome Lab

Payoff

The Rome Laboratory delivered a five fold increase in AUTODIN message processing by re-developing the assembly language coded Communications Support Processor (CSP) in Ada. This effort not only increased the performance of the hardware and software baseline of the CSP but also provided increased system security, eliminated existing and potential system bottlenecks, improved software transportability, reduced cost of software enhancements and maintenance, and increased reliability and maintainability.

Accomplishment

The new CSP system can process over 40,000 messages a day - a 500 percent increase over the earlier CSP PDP computer based system. The upgraded CSP is now operational at nine sites: CINCPACFLT, USSTRATCOM, Air Mobility Command (AMC), Defense Intelligence Agency (DIA), Yokota Air Base, Molesworth, and Cheyenne Mountain. Other site CSP replacements are planned at a rate of 10-15 per year over the FY93-97 timeframe.

Background

The Rome Laboratory supports the CSP contract which is currently operational at 64 worldwide sites. The CSP can operate as a stand alone AUTODIN tributary for consolidated base level secure communication centers or as a front-end processor providing AUTODIN access for intelligence analyst support systems. CSP is the DIA/Defense Information Systems Agency approved standard front-end message handler for various backside intelligence systems such as the Modular Architecture for the exchange of Intelligence and the Computer Aided Tactical Information System.

The Rome Laboratory developed the initial CSP technology during the early 1970's. They first fielded the CSP at HQ Strategic Air Command (SAC) in 1978. In February of 1980 the Department of Defense (DoD) adopted the CSP as a DOD standard. Rome Lab developed the CSP to run of the PDP 11/84 computer with MACRO-11 Assembly language. Under the CSP Performance Upgrade Program, Rome Lab developed a partial Ada version of CSP to prove the concept of using Ada and provide early relief for message saturated sites. They installed this version and reached Initial Operational Capability at HQ SAC in March 1991. The full Ada version resides on Digital Equipment Corporation VMS computer processors. This version went through extensive testing and was security accredited on 29 January 1993 at HQ AMC.

IR FLARE PERFORMANCE MODEL PROGRAM

OBJECTIVE: FLARE PERFORMANCE

IR Flare Performance Model Transitioned to NAIC

Payoff

Rome Laboatory's (RL's) Infrared (IR) Flare Performance Model is operational at the National Air Intelligence Center (NAIC), Wright-Patterson AFB, OH. The IR Flare Performance Model is an integration of five existing Government Furnished Software (GFS) programs resulting in a highly flexible, user friendly, software tool which can be used by several intelligence agencies. This software tool is used for the study and evaluation of missiles and aircraft.

Accomplishment

The IR Flare Performance Model uses software already in the Air Force inventory and is well-known by several Air Force users. In addition, users with related, yet different intelligence tasking, can evaluate missile and aircraft performance with similar yardsticks.

Background

This software integrates five GFS programs into one user friendly program. Performance models such as Aircraft and Missile Kinematics, 3-Dimensional Display and Visualization, Flare Kinematics and Signature, Atmospheric Transmission, and Seeker Tracking Models are all embedded into the software. Most of the programs embedded into the IR Flare Performance Model were provided by at least two Air Force Intelligence Agencies. Because of limitations of previous performance models, RL and NAIC jointly conceived the IR Flare Performance Model to improve performance modeling for missiles and aircraft.

Knowledge-Based Software Assistant Interactive Development System

Payoff

The knowledge-based, formal method of software development provides not only superior quality of software, but also achieves unprecedented code efficiency. Kestrel Institute's Kestrel Interactive Development System (KIDS) is a program transformation system for deriving correct and highly efficient code by automating the sequential application of meaning-preserving transformations to an initial specification. The US Transportation Command, using the KIDS system, scheduled transportation resources much faster than any other known scheduler. Rome Laboratory's (RL's) Knowledge-Based Software Assistant (KBSA) program contributed significantly to the development of KIDS through sponsoring knowledge-based algorithm performance optimization research.

Accomplishment

Knowledge-based systems technology has been demonstrated to be capable of providing automation in the application of formal software development methods to non-trivial, real-world problems. KIDS demonstrated the ability to synthesize extremely efficient code and implemented algorithms previously unknown to the software community.

Background

In 1983 RL (then Rome Air Development Center (RADC)) undertook the KBSA program. This program was considered to be a high risk, revolutionary departure from conventional software engineering research (according to IEEE Computer, November 1983). The promised benefits were, however, just as revolutionary — with the predictions of orders of magnitude improvement in productivity and quality. The Kestrel Institute, developer of KIDS, was one of the members of the small community of researchers with sufficient foresight and courage to pursue a formal, knowledge-based approach to software development. Kestrel also contributed significantly to RL's KBSA program research and development strategy as one of the authors of the original RADC "Report on a Knowledge-Based Software Assistant." RL's KBSA program contributed significantly to the development of KIDS through sponsoring research. This research consisted of applying knowledge-based techniques to algorithm performance optimization through RL's KBSA Performance Assistant program and code development through RL's KBSA Development Assistant program. Research directed toward making KIDS technology more accessible to software developers continues under RL's KBSA program. A few examples include exploration of a graphical software visualization capability and implementation of an inexpensive, shrink-wrapped, PC-based KIDS version suitable for use in college courses and other training organizations.

JVC
ON
RESET
LAMP TEST
OFF
POWER
FAULT

NATURAL LANGUAGE UNDERSTANDING SHELL

Payoff

Rome Laboratory's (RL'S) Natural Language Understanding (NLU) Shell development effort will provide a capability to perform textual data extraction automatically from news wire articles and open source documents of multiple languages. While the initial goal of this project was primarily to build tools to allow the rapid development of NLU applications for Air Force Intelligence Domains, RL recently obtained a requirement from the US Department of Treasury to apply the NLU Shell tools to textual data of interest to the Treasury Department. RL's Intelligence and Reconnaissance Technology Development Branch is currently developing these tools and the NLU software which provides an excellent example of the dual use applicability of NLU technology in general.

Accomplishment

On 27 July 1994, RL's Intelligence and Reconnaissance Technology Development Branch, using the NLU Shell, successfully demonstrated the extraction of names and organizations from English and Spanish news articles and documents to members of the US Department of Treasury and the Internal Revenue Service (IRS). Both the Treasury Department and IRS have expressed a great deal of interest in the Shell's ability to locate and extract specific information. RL's Intelligence and Reconnaissance Technology Development Branch plans to test and install the NLU Shell application at the Treasury Department in December 1994. The use of this diverse software application provides an excellent demonstration of the portability, ease of use, and dual use applicability of the NLU Shell. Future enhancements include the extraction of account numbers, places, nationalities and gender; ability to handle German, French, and Italian; and a port to the Macintosh environment.

Background

Intelligence analysts are overwhelmed by the volumes of textual information they review daily. This situation has worsened due to the influx of open source information. The analyst must sort through the information and extract that which is pertinent to their mission. RL's NLU Shell development effort will provide a capability to perform the text extraction automatically, thus, freeing the analyst to do their analysis.

INC.

Peer Recognition: Dr. Warren Debany Receives IEEE Award

Payoff

Dr. Warren H. Debany, Jr., from Rome Laboratory's (RL's) Electromagnetic and Reliability (ER) Directorate, received the 1994 Institute of Electrical and Electronic Engineers (IEEE) Region 1 Award for Engineering Professionalism at the June 1994 IEEE Dual Use Conference. The award recognizes Dr. Debany for his contributions to the theory and practice of digital testability techniques as applied to microcircuit designs.

Accomplishment

Dr. Warren Debany's work in digital testing and testability advanced both theory and practice in this field. His publications, especially those of a tutorial nature, notably increased the awareness and acceptance of design-for-testability, built-in-test, and quantitative evaluation methods in the fault-tolerant computing industrial community. Due to his renowned expertise in microcircuit testability design and evaluation techniques, Dr. Debany's peers called upon him time and time again to accurately assess approaches chosen by the manufacturers of high performance microcircuits. Dr. Debany was instrumental in standardizing the procedure which provided a common baseline for evaluating digital microcircuit fault coverage using any commercially available fault simulator. The microcircuit industry heralded his approach as a major step in the practical implementation of digital microcircuit testability.

Background

RL's ER Directorate performs research in methods for digital testability measures, testability measurement techniques, design-for-testability, and built-in-test. Digital microcircuits are critical components of the Department of Defense's electronic systems. It is important to detect manufacturing defects in electronic components before they are placed in systems and to be able to rapidly detect, isolate, and repair failures in the field. RL's research program combines in-house research with contractual efforts to provide a unique capability to determine the most cost-effective methods for specifying testability in contractual requirements and to develop techniques for measuring the degree of testability. RL's program also exploits testability at the microcircuit level by propagating it to the system level. The program tester develops and documents low-cost built-in-self-test and built-in-self-check techniques that are necessary for the implementation of fault-tolerant command and control systems. As part of RL's research team, Dr. Debany received IEEE recognition for his contributions to the theory and practice of digital microcircuit testability techniques.

SAFE
TARGET

Prototype Secondary Information Dissemination System Transitioned to ACC

Payoff

Rome Laboratory's Prototype Secondary Information Dissemination System (PSIDS) effort rapidly moved technology from the laboratory to the field for user demonstration and evaluation. It used actual combat scenarios from Air Combat Command (ACC) to provide an operational flavor to the demonstration. ACC's 480th IG acted as the fixed facility target materials production center. Digital intelligence information was electronically pulled from the 480th by Sentinel Byte and Intelligence Counter-Measures users at the 9th Air Intelligence Squadron at Shaw AFB, South Carolina and the 366th Operations Support Squadron at Mountain Home, Idaho. This digital flow of information enhanced the Request For Information process and Air Tasking Order support.

Accomplishment

RL's Intelligence Data Handling Division utilized rapid prototyping techniques and software integration to field a PSIDS proof-of-concept technology demonstration within 6 months. The purpose of the PSIDS effort was to explore a proof-of-concept for enhanced digital intelligence request, dissemination, and management. The PSIDS operated from a fixed facility target materials production center for support to Force and Unit level intelligence users. This effort demonstrated the use of a Unix based, digital imagery server at an intelligence production center and the ability for remote users to pull timely, digital intelligence products from that server.

Background

This effort leveraged the technology developed at HQ Pacific Air Forces/INY as a starting point for digital image product server. This provided the capability to access a variety of image sources. In-house resources were used to integrate a multimedia database and desktop publishing package for "all-source" intelligence production. RL's Intelligence Data Handling Division has taken advantage of existing off-the-shelf technology, in-house resources and rapid prototyping to quickly move technology from the laboratory to the operational user. While the intent of the effort was never to leave a prototype system in the field, the valuable information and user feedback collected from the demonstration will be used to enhance future development of RL's Image Produce Archive.

MICROTESTER 22

Reliability of Advanced Packaging for Military/Civilian Applications

Payoff

Rome Laboratory (RL) in conjunction with the National Aeronautical Space Administration (NASA), Naval Surface Warfare Center (NSWC) and Army Research Laboratory (ARL) have established an alliance for assessing the reliability of advanced Multi-Chip Module (MCM) packaging concepts for military and civilian applications. This effort provides an independent, unbiased assessment of the reliability of respective manufacturers MCM technologies. This assessment includes recommended corrective actions or cost-effective screening requirements to assure the shipment of good quality and reliable MCM products. Results from this program, entitled "Reliability to Achieve Insertion of Advanced Packaging (RELTECH)" will assure customer satisfaction in the commercial market place and low life cycle costs in military applications.

Accomplishment

The RELTECH program, cited above, is actively working with eight (8) industry suppliers of MCMs to determine the quality and reliability of their products in meeting application requirements in diverse environments from air conditioned offices to outer space. This program uses the unique capabilities and resources from the various participating laboratories to assess the respective manufacturer's MCM technologies that were either unavailable or cost prohibitive to their company. The RELTECH program has already resulted in the identification of unique failure mechanisms for MCM technologies, proposed manufacturing process corrective actions, development of a national dual-use specification for MCM technologies and the establishment of an industry accessible reliability database.

Background

MCM packaging/interconnect technologies are seeing increased emphasis from both the civilian and military communities as a means of increasing capability and performance while providing a vehicle for reducing cost, power and weight of the end item electronic application. Application, cost, producibility and reliability are the drivers that will determine which MCM technology will best fit a respective need or requirement. With all the benefits cited, it can be expected that the use of MCMs would be extensive in both military and commercial applications. Unfortunately, a significant roadblock exists to implementation of MCMs — the absence of the necessary reliability and qualification testing. Therefore, RL in conjunction with NASA, NSWC, and ARL have developed a comprehensive proactive program with industry to identify the failure mechanisms that are possible in MCM structures and then use the information to address standardization issues. This is accomplished through development of cost effective qualification and appropriate screening criteria for inclusion into a national dual-use specification for military and commercial applications.

415

Transition of ProSLCSE to Ogden ALC

Payoff

Rome Laboratory transitioned the Process-oriented Software Life Cycle Support Environment (ProSLCSE) to the F-16 Heads-Up Display (HUD) software development team at Ogden Air Logistics Center (OO-ALC/TIS), Hill Air Force Base, Utah. The ProSLCSE product line provides automated support for software development teams. This support allows these teams to achieve and even surpass the Software Engineering Institute (SEI) Capability Maturity Model (CMM) software process maturity rating of 3 (the maturity rating of 5 is the highest). According to SAF/AQK policy on the Software Maturity Assessment Program, dated 23 Sep 91, all Air Force software organizations must achieve at least a software process maturity rating of 3 by 1998. This maturity rating requires a fully documented, institutionalized software development process. ProSLCSE includes a graphical Visual Process Modeling Language editor (called "ProEDITOR") that captures, documents and baselines the processes. ProSLCSE will help increase developer productivity and software product quality while decreasing the cost of software development. The F-16 HUD team is using ProSLCSE's process editor to capture the entire F-16 Operational Flight Program (OFP) software development process.

Accomplishment

ProSLCSE leverages state-of-the-art Computer Aided Software Engineering technology to provide a seamless Software Engineering Environment (SEE) framework that includes process definition and enactment capabilities. It provides a computer-based framework that is used to initiate SEEs that are tailored to accommodate the specific needs (in terms of process, users, data, and tools) of any software development/support project. A ProSLCSE SEE supports a total life cycle concept where an integrated toolset is applied to the software activities within the system life cycle development phases (i.e., concept exploration, demonstration and validation, and engineering and manufacturing development) and is later transitioned, along with an associated repository containing all accumulated information, to the Operations & Support (O&S) phase. The intent of this concept is not only to increase productivity and product quality during the development phases, but also to improve the supportability of the product by making all development data and the O&S toolset available to software support activities.

Background

ProSLCSE provides the guidance necessary to ensure that users perform task assignments that do not violate a project's process definition. Specifying the entire set of tasks, products, data flows & dependencies between tasks/products, roles associated with tasks, and tools associated with products using ProEDITOR provides a definition of the process to be followed for a project in which users can play one or more roles. Definition of the F-16 OFP process, using ProEDITOR, will enable O&S software development teams at the ALC to achieve their goal of surpassing the SEI CMM level 3 rating of software process maturity.

Waveform & Vector Exchange Specification

Payoff

Rome Laboratory (RL) in conjunction with the Institute of Electrical and Electronic Engineers (IEEE) developed a standard that provides a powerful and expressive language for representing test stimulus and response information in a non-proprietary format that is readily transported among multiple simulation and test platforms for both military and commercial use. This standard is known as The Waveform and Vector Exchange Specification (WAVES). WAVES is capable of representing waveforms and vectors for all levels of digital electronic systems. WAVES can be used with the industry standard Very High Speed Integrated Circuit Hardware Description Language (VHDL) for simulation and design verification prior to hardware build. Qualification of multiple sources at the device or module level is possible by requiring the vendors to supply information using the WAVES standard format. Interoperability can be verified from simulation through fabrication to insertion by applying one vendor's VHDL description to another vendor's WAVES data. Use of this joint military and commercially developed standard by the Air Force will provide significant cost savings throughout the life cycle of any electronic system.

Accomplishment

The WAVES standard development applied a new approach to developing a standard for military use. The new approach employed in the development of WAVES was to create a standard that would have universal appeal and be accepted commercially as well as for military use. Therefore, RL decided to develop the standard through the IEEE. The benefits of doing this are threefold. First, participation by the design and test community in development of the standard would lead to quicker acceptance in the commercial community. Second, the WAVES format standard would be managed and maintained by the IEEE, thus, freeing the Department of Defense (DoD) of this responsibility. Thirdly, software tools to use this standard would be developed by the commercial community, thus, saving the DoD from having to develop and support them.

Background

The WAVES development and transition started in May 1989 and concluded in September 1991. WAVES is now a Standard within the IEEE. Numerous commercial vendors are planning to, or already have, begun development of tools to support the use of WAVES. The WAVES team, working in conjunction with the F-22 System Project Office, developed the appropriate Statement of Work requirements for WAVES insertion into the F-22 support requirements.

Acronym List

Acronym	Definition
3-D	Three Dimensional
A/D	Analog to Digital
ACC	Air Combat Command
ACT	Acoustic Charge Transport
ADI	Air Defense Initiative
ADP	Automated Data Processing
AF	Air Force
AFMC	Air Force Material Command
AFSC	Air Force Systems Command
AI	Artificial Intelligence
AOC	Air Operations Center
AOSP	Analog Optical Signal Processing
APS	Advanced Planning System
ARL	Army Research Laboratory
ARPA	Advanced Research Project Agency
ASC	Aeronautical Systems Center
ATE	Automated Test Equipment
ATO	Air Tasking Order
AWACS	Airborne Warning and Control System
BDA	Bomb Damage Assessment
BER	Bit Error Rate
BIT	Built-In-Test
C3	Command, Control, and Communications
C3I	Command, Control, Communications and Intelligence
CAD	Computer Aided Design
CEC	Cooperative Engagement Capability
CFAR	Constant False Alarm Rate
CMP	Common Mapping Program
CMS	Common Mapping System
CMV	Common Mapping Version
COMINT	Communications Intelligence
CONUS	Continental United States
COTS	Commercial Off The Shelf
CPU	Central Processing Unit
CTAPS	Contingency Theater Air Control Automated Planning System
DAB	Digital Audio Broadcast
DART	Dynamic Analysis and Replanning Tool
DAWS	Defense Automated Warning System
DC	Direct Current
DEC	Digital Equipment Corporation
DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency
DMA	Defense Mapping Agency
DoD	Department of Defense
DODIIS	DoD Intelligence Information System

Acronym List

Acronym	Definition
DWS	Distributed War-gaming System
EADSIM	Extended Air Defense Simulation
ELINT	Electronic Intelligence
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EME	Electromagnetic Effects
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
ER	Electromagnetic and Reliability
ESC	Electronic Systems Center
ES-CFAR	Expert System Constant False Alarm Rate
EW	Electronic Warfare
FAA	Federal Aviation Administration
FLAPS	Force Level Automated Planning System
GaAs	Gallium Arsenide
GAFM	Ground Attack Fighter Model
GBR	Ground Based Radar
I&W	Indications and Warning
ICs	Integrated Circuits
ID	Identification
IDHS	Intelligence Data Handling Systems
IEEE	Institute of Electrical and Electronic Engineers
IMCMA	Intelligent Multi-Chip Module Analyzer

Acronym	Definition
IR	Infrared
JFACC	Joint Force Air Component Commander
JMEM	Joint Munitions Effectiveness Manual
LPD	Low Probability of Detection
LRM	Line Replaceable Module
MCM	Multi-Chip Module
MDAZL	Memory Densification by the Application of Z-Axis Lithography
MMIC	Monolithic Microwave and Millimeter Wave Integrated Circuit
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NAIC	National Air Intelligence Center
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAWC	Navel Surface Warfare
PCB	Printed Circuit Board
QML	Qualified Manufacturers List
QPL	Qualified Parts List
R&D	Research and Development
R&M	Reliability and Maintainability
RAAP	Rapid Application of Air Power

Acronym List

Acronym	Definition
RADC	Rome Air Development Center
RAIDS	Rapid Air Defense Evaluation System
RELTECH	Reliability to Achieve Insertion of Advanced Packaging
RF	Radio Frequency
RFI	Radio Frequency Interference
RL	Rome Laboratory
S&T	Science and Technology
SATCOM	Satellite Communications
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Office
SEU	Speech Enhancement Unit
SIGINT	Signals Intelligence
SPC	Statistical Process Control
SPO	System Program Office
STEP	Sensor Technology Evaluation Performance

Acronym	Definition
T/R	Transmit/Receive
TBM	Theater Battle Management
TISSS	Tester Independent Support Software System
TPFDD	Time Phased Force Deployment Data
TQM	Total Quality Management
US	United States
USAFE	United States Air Force in Europe
USCENTCOM	US Central Command
USTRANSCOM	US Transportation Command
VHDL	VHSIC Hardware Descriptive Language
VHSIC	Very High Speed Integrated Circuit
VLSI	Very Large Scale Integration
WAVES	Waveform and Vector Exchange Specification
WWMCCS	World Wide Military Command and Control System

Rome Laboratory Success Stories

AFMC