FINAL REPORT

ON

THE ARMY ACQUISITION WORKFORCE

AND

SCIENCE AND ENGINEERING

PEOPLE, PROGRAMS, POLICIES, AND PRACTICES

CONDUCTED BY

THE ARMY SCIENCE BOARD

OCTOBER 1991

STUDY OUTLINE

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I. Terms of Reference

I. TERMS OF REFERENCE

A. THE ACQUISITION WORKFORCE:

1. **NEW LAW:** Review Army approach to implementing Defense Acquisition Workforce Implementation Act.

2. **PRESIDENTIAL AND CONGRESSIONAL:** Review current issue of Presidential and Congressional Committees on Science and Engineering and/or the acquisition corps.

B. SCIENCE AND ENGINEERING:

1. **OTHER STUDIES:** Review past and present Government studies of science and engineering issues (NSF, DoD Lab demo and others).

2. **PEOPLE:** Review and evaluate scientists and engineers, both uniformed and civilian, across all disciplines in Army laboratories and centers; recommend training and educational requirements.

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I. TERMS OF REFERENCE

B. SCIENCE AND ENGINEERING (CONT.):

3. **PROGRAMS:** Review and evaluate Army laboratories and RD&E centers and recommend directions for improving the research and technology.

4. **POLICIES AND PRACTICES:** Review and evaluate current federal and Army personnel policies and management practices in light of future national science and engineering capabilities.

II. Study Membership

II. STUDY MEMBERSHIP

A. HEADQUARTERS ARMY:

1. **SPONSOR:** Mr. George T. Singley, III
   Deputy Assistant Secretary for Research and Technology
   OASA(RDA)

2. **COGNIZANT DEPUTY:** Dr. Daphne Kamely
   Director for Research and Laboratory Management
   OASA(RDA)

3. **STAFF ASSISTANT:** Ms. Janice M. Lynch
   Office of the Director for Research and Laboratory Management
   OASA(RDA)

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II. STUDY MEMBERSHIP

B. ARMY SCIENCE BOARD:

1. **STUDY CHAIR:** Dr. James A. Tegnelia
   Vice-President - Business Development
   Martin Marietta Electronics,
   Information and Missile Group

2. **VICE CHAIR:** Mr. John D. Johnston
   President, International Venture Group

3. **MEMBER:** Mr. Alfred Gessow
   Professor, Department of Aerospace
   Engineering, University of Maryland

4. **MEMBER:** Mr. Frederick E. Hartman
   Chief Operating Officer, Cypher
   Communications Technology, Inc.

III. Background

III. BACKGROUND

A. THE ACQUISITION WORKFORCE:

A new law establishing an acquisition corps has been passed by Congress. The Army has assumed the role as lead service for implementation. Army management wanted an independent assessment of its progress.

B. SCIENCE AND ENGINEERING:

The last Army Science Board study on this subject took place in 1982. There was interest in updating the understanding of the people, programs, policies, and practices for science and engineering in consideration of the consolidation of the labs and the forthcoming downsizing of the labs.

IV. Approach

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IV. APPROACH

A. THE ACQUISITION WORKFORCE:

1. **THE LAW:** Review the Defense Acquisition Workforce Improvement Act - its general authorities and responsibilities, positions, acquisition corps, education, training, and general management provisions.

   a. OSD PERSPECTIVE: Briefing by Mr. James D. McMichael, Director, Acquisition, Education, Training and Career Development Policy, USD(A).

   b. ARMY HQ PERSPECTIVE: Briefing by Col. Al Greenhouse, Deputy Director, Acquisition Career Management, HQ U.S. Army.

   c. AIR FORCE HQ PERSPECTIVE: Briefing by Glenda Atkinson.

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IV. APPROACH

A. THE ACQUISITION WORKFORCE (CONT.):

c. THE FIELD PERSPECTIVE: Held discussions with junior, middle management and senior scientific and engineering personnel at the following Army commands and laboratories:

- Picatinny Arsenal
- LABCOM
- TROSCOM
- Huntsville
- TACOM
- AVSCOM
- Fort Monmouth

Discussed the implementation process, reviewed published information available, received briefings and identified problem areas and concerns. In addition visited the G.M. Research Center in Warren, MI, and discused R&D management philosophy, measures of quality and output.

IV. APPROACH

A. THE ACQUISITION WORKFORCE (CONT.):

2. PRESIDENTIAL AND CONGRESSIONAL: Researched and identified pending legislation regarding science and engineerings and/or the acquisition workforce.

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IV. APPROACH

B. SCIENCE AND ENGINEERING:

1. **HISTORY:** Reviewed past studies and output.

2. **FIELD VISITS:** As our principal source of data, we visited the five above-mentioned Army laboratories and one private sector laboratory, the General Motors Research Center.

3. **DATA FILES:** As another source we used the personnel files of the Defense Manpower Data Center (DMDC), whose data on scientists and engineers originates in the laboratories and is submitted via Service reporting channels to DMDC.

IV. APPROACH

B. SCIENCE AND ENGINEERING (CONT.)

4. **ANALYSIS:** Our analysis is presented in chart form to show comparisons (then and now) for FY 1980, FY 1985 and FY 1990. Our analysis examines the civilian and military S&E workforce characteristics.

   a. Quantity

      - Growth
      - Accessions
      - Career Force

   b. Quality

      - Education
      - Performance Ratings
      - Average Grade

   c. Age

   d. Training

   e. Minorities

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IV. APPROACH

B. SCIENCE AND ENGINEERING (CONT.):

4. ANALYSIS (CONT.):

f. Field Visits: Our field visits permitted additional observations regarding:

- Attitude and quality of personnel
- Quality of R&D programs and products
- Organization structure
- Training programs
- Policies and practices
- Successes and problem areas
- Professional environment

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V. Executive Summary

V. EXECUTIVE SUMMARY

A. THE ACQUISITION WORKFORCE:

1. Implementation problems exist regarding the establishment of the Army acquisition workforce.

   a. No common policy structure exists at HQ Army to bring together key players from ASA (RD&A), representatives from functional areas, representatives from AMC, representatives from military and civilian personnel and representatives from TRADOC (training support) and USAISC (computer support).

   b. Inadequate functional community guidance.

   c. Inadequate personnel community support.

   d. Informational materials for acquisition corps are basically non-existent.

   e. Mobility statement for civilians are a problem because of poor guidance and mis-information resulting in apprehension, confusion and rejection.

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V. EXECUTIVE SUMMARY

B. SCIENCE AND ENGINEERING:

1. In general, the Army labs have been able to recruit and maintain the required quantity and quality of S&Es for the last decade (1980 to 1990).

2. Quality could be improved: Share of civilian S&E PhDs in Army is about 13% and in General Motors Research Center is about 35%. Air Force labs are aiming for a 30% share and have a new program, Palace Knight, to achieve this goal.

3. Attitude of new civilian S&E accessions, middle management and senior executives interviewed was found to be outstanding with good understanding, commitment and dedication to the labs mission.

V. EXECUTIVE SUMMARY

B. SCIENCE AND ENGINEERING (CONT):

4. The demographics for the past decade (1980 to 1990): Mean age and average grade remain about the same for civilian and military S&E new accessions and on board workforce; role of women for the civilian S&E workforce went from 4% to 10.5% of the workforce and for the military from 3% to 12%; minority representation about doubled going from 7% to 13% .

5. Programs reviewed were well focused and appeared relevant to Army objectives.

6. No common quantitative measurement of lab program quality exists either in Army or private sector (General Motors) labs. Customer satisfaction appears to be an effective surrogate.

7. Training programs were varied and differed from lab to lab and generally offered excellent advancement opportunities for S&Es. They need to be protected during downsizing.

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V. EXECUTIVE SUMMARY

B. SCIENCE AND ENGINEERING (CONT):

8. Lab downsizing, if not managed well, could be a serious problem for maintaining the best quality workforce. The best people can find alternate jobs and will leave if they believe their work environment and/or job is threatened.

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VI. Findings

VI. FINDINGS

A. THE ACQUISITION WORKFORCE:

1. THE NEW LAW - IMPLEMENTATION:

a. OSD PERSPECTIVE:

- Draft policy for acquisition corps completed, out to services for comment and October goal for publication.
- Good working relationship with the Hill and the Services.

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

1. THE NEW LAW - IMPLEMENTATION (CONT.):

b. HQ ARMY PERSPECTIVE:

- Army took lead.
- Followed Congressional guidance in establishing an "independent acquisition corps".
- Developed excellent briefing regarding plans to establish corps -- covers the organization and personnel requirement.
- Has a great working relationship with OSD.

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VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

1. THE NEW LAW - IMPLEMENTATION (CONT.):

b. HQ ARMY PERSPECTIVE (CONT.):

- Appears to be a one man program with limited resources.
- No policy structure exists to bring together key players from:
  - ASA (RD&A)
  - Commander AMC
  - Representatives from functional areas in acquisition workforce
  - Representatives from military and civilian personnel
  - Representatives from TRADOC and USAISC
- Inadequate functional community direction.

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

1. THE NEW LAW - IMPLEMENTATION (CONT.):

c. FIELD PERSPECTIVE:

- Chaos describes status in field for civilian personnel.
- Lack of organization appears to be a problem.
  - •• Civilian personnel field offices have not been substantially involved.
  - •• No one at installation level is capable of answering questions or assisting individuals with career planning.

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

1. THE NEW LAW - IMPLEMENTATION (CONT.):

c. FIELD PERSPECTIVE (CONT.):

- Informational materials for acquisition corps are basically non-existent.
- The requirement to sign a mobility statement of civilians without an explanation of what it means or likelihood of being enforced has resulted in a significant number of incumbents and candidates declining to join.
- New opportunities authorized by law are not widely understood in the field and/or implemented.

VI. FINDINGS

A. THE ACQUISITION CORPS (CONT.):

2. PRESIDENTIAL AND CONGRESSIONAL:

a. Senate Report 102-118, National Defense Authorization Act for Fiscal Years 1992 and 1993 has a section on page 250 entitled "Defense Acquisition Workforce Amendments."

- Committee expressed concern over slow pace of implementation and saw no attempt to take advantage of new benefits.

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

2. PRESIDENTIAL AND CONGRESSIONAL (CONT.):

- Benefits include:
  - Authority to provide special pay for individuals in critical positions
  - Use of student loan repayments as a recruitment incentive
  - Payment for training leading to educational degree
  - Waiver for the penalty against further government service
  - Establishment of intern and scholarship programs

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

2. PRESIDENTIAL AND CONGRESSIONAL (CONT.):

- Committee worried about morale of acquisition workforce during downsizing.
- Committee wants to transfer personnel responsibilities for acquisition workforce from Under Secretary of Defense for Acquisition to the Assistant Secretary (Force Management and Personnel). Under Secretary would still have coordinating responsibilities but would be relieved of the management responsibilities of the personnel issues.

VI. FINDINGS

A. THE ACQUISITION WORKFORCE (CONT.):

2. PRESIDENTIAL AND CONGRESSIONAL (CONT.):

- Committee would provide the Department with greater flexibility in tailoring qualifications requirements for acquisition positions without the rigid standards specified in last year's law.
- Committee authorizes the Secretary to postpone the effective date by one year if deemed necessary.

VI. FINDINGS

B. SCIENCE AND ENGINEERING:

1. PAST STUDIES:

a. Examined ten recent studies:

- DoD Laboratory Management Task Force (1982)
- ASB 1982 Summer Study (1982)
- RAND/NSF (1990)
- RAND/Ford Foundation (1990)
- RAND/NSF (1990)
- NSF Survey (1989)
- Secrist, Grant E. (1984)
- Committee on Education and Human Resources (1990)
- BAST Study (1983)
- ARDEC Study (1985)

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

1. PAST STUDIES (CONT.):

b. Last comprehensive Army Science Board study was completed in 1982.

c. Many key recommendations adopted; e.g.:

- Recruitment authority
- Pay reform
- OSD Lab Demonstration Program

d. Problems identified not new and still of concern today.

- Starting pay for new recruits
- Degree training
- Dual track for scientists and management

VI. FINDINGS

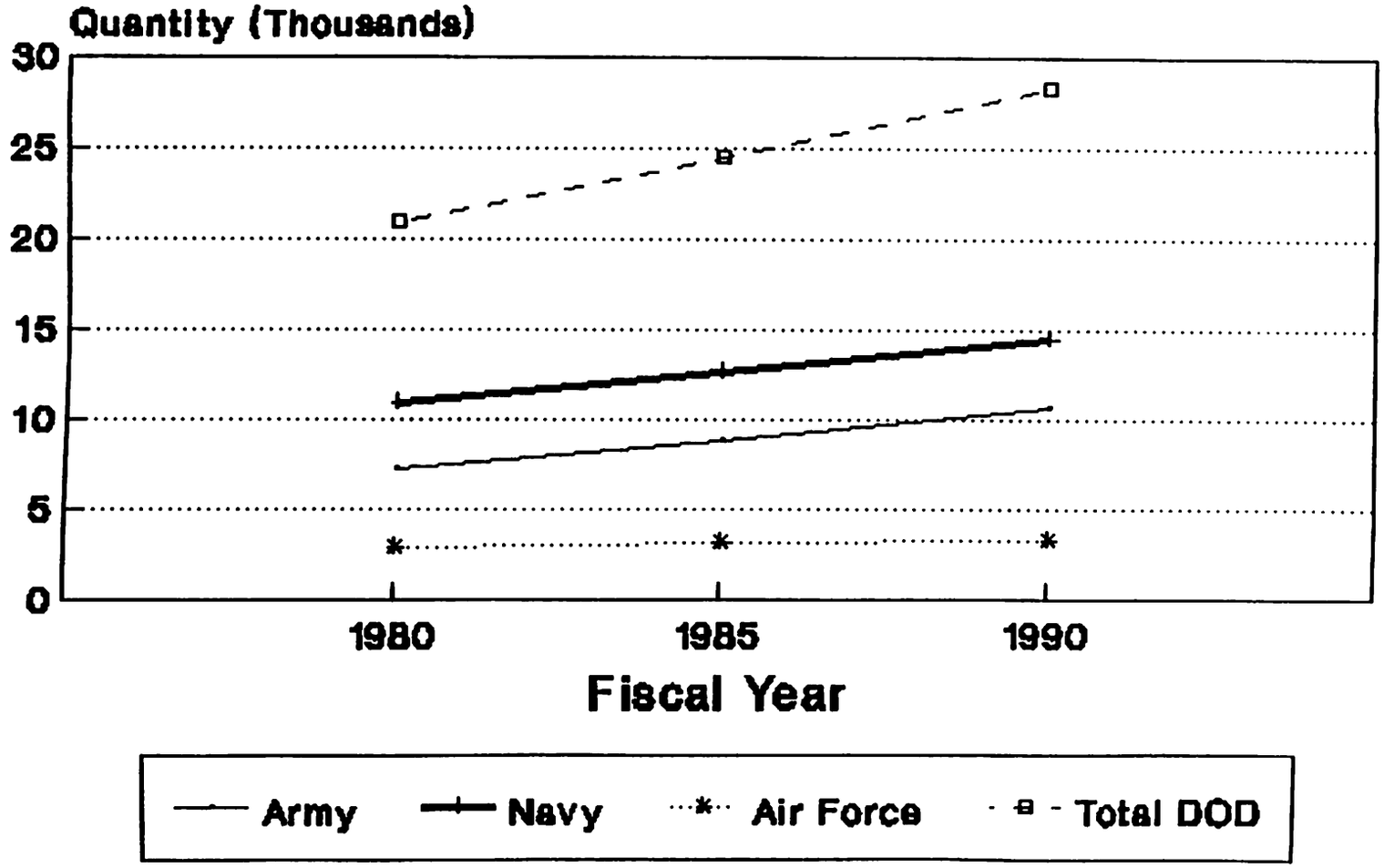
B. SCIENCE AND ENGINEERING (CONT.):

2. PEOPLE - QUANTITY:

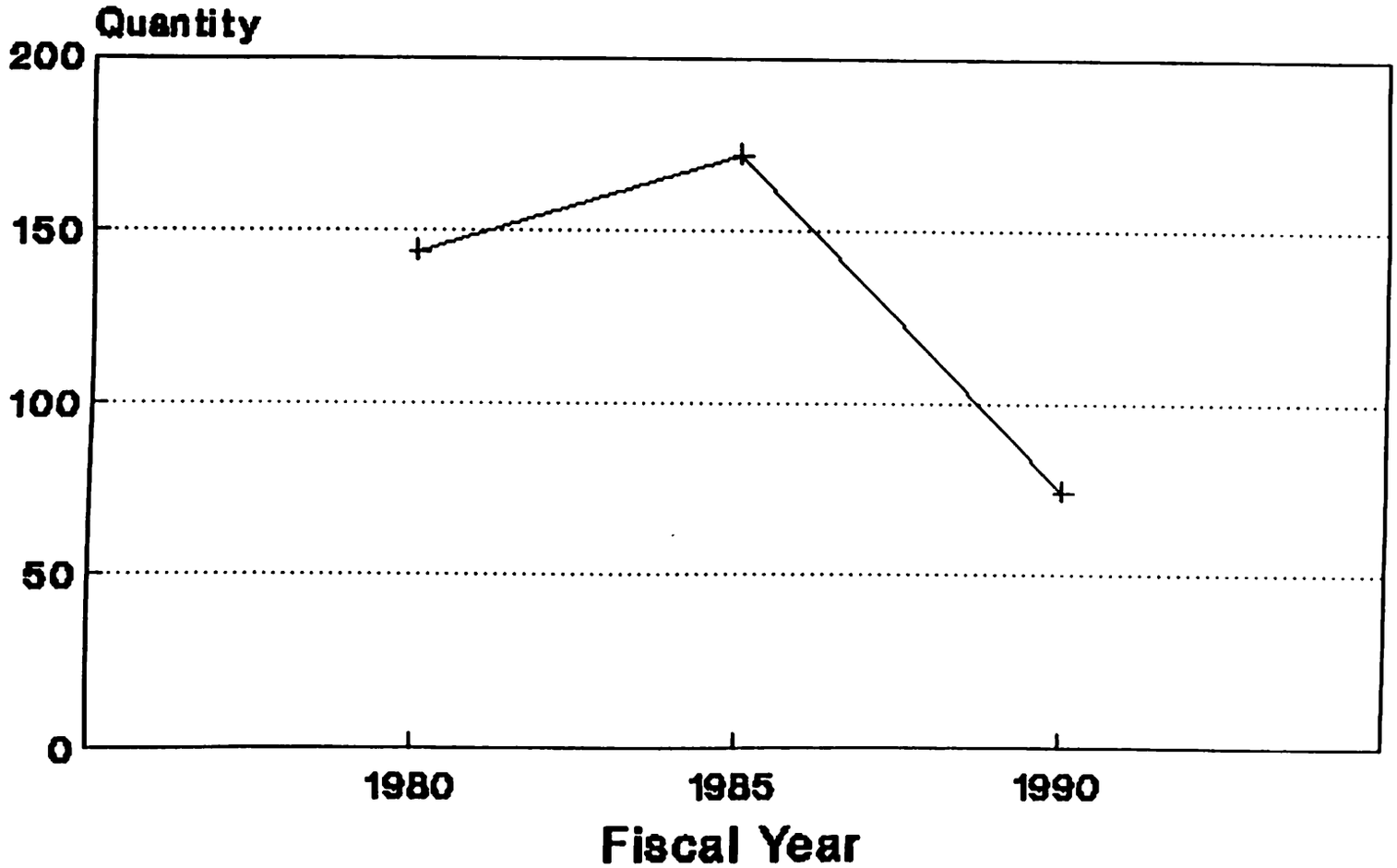
a. Growth: The civilian S&E workforce in the Army labs grew by 46% from September 1980 (7213) to September 1990 (10,558).

b. Decline: The military S&E workforce in the Army labs decreased by 52% from September 1980 (140) to September 1990 (74).

Scientists and Engineers
Civilian Workforce by Service - Quantity



Scientists and Engineers
Army Military Workforce - Quantity



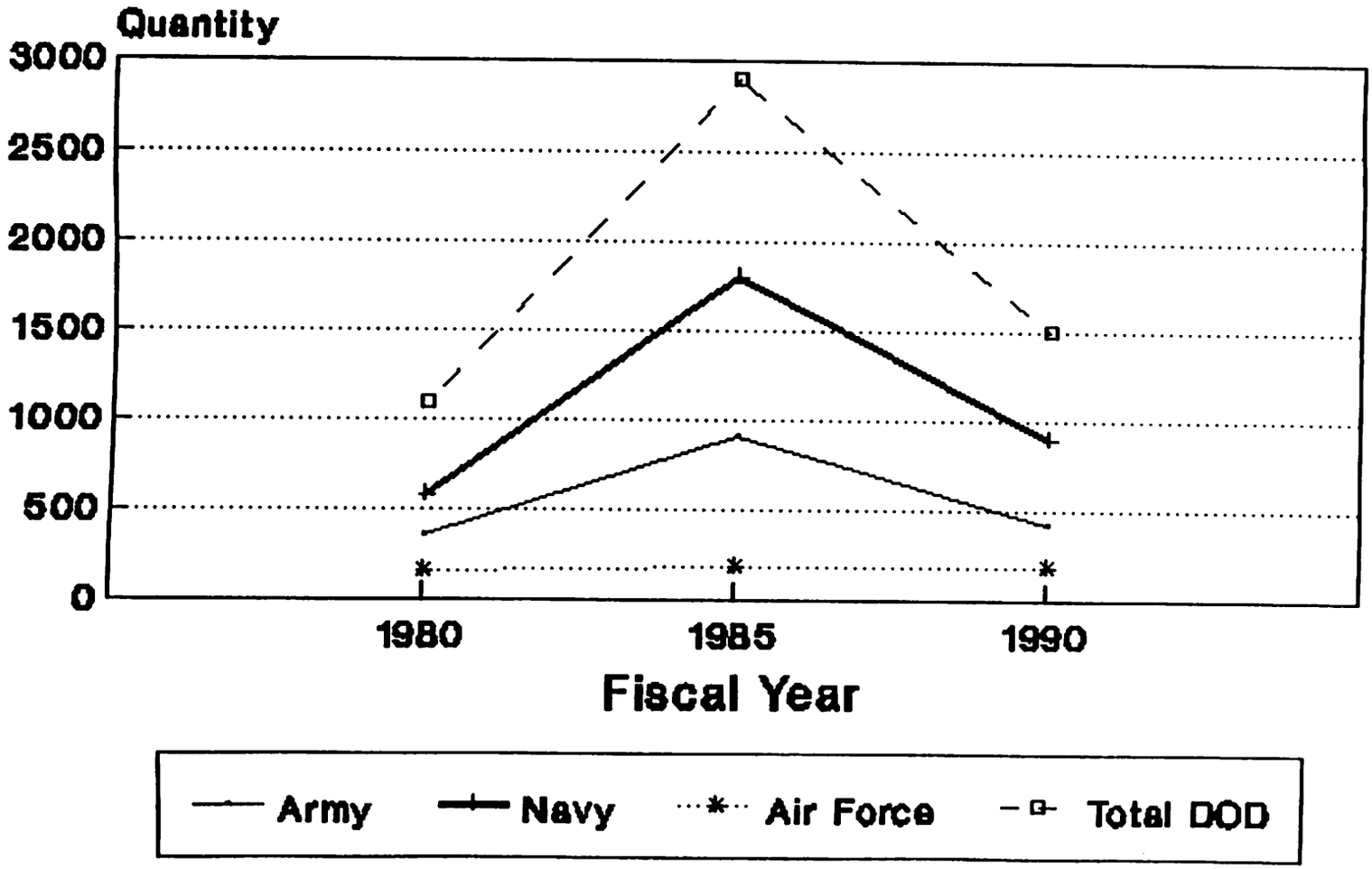
VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

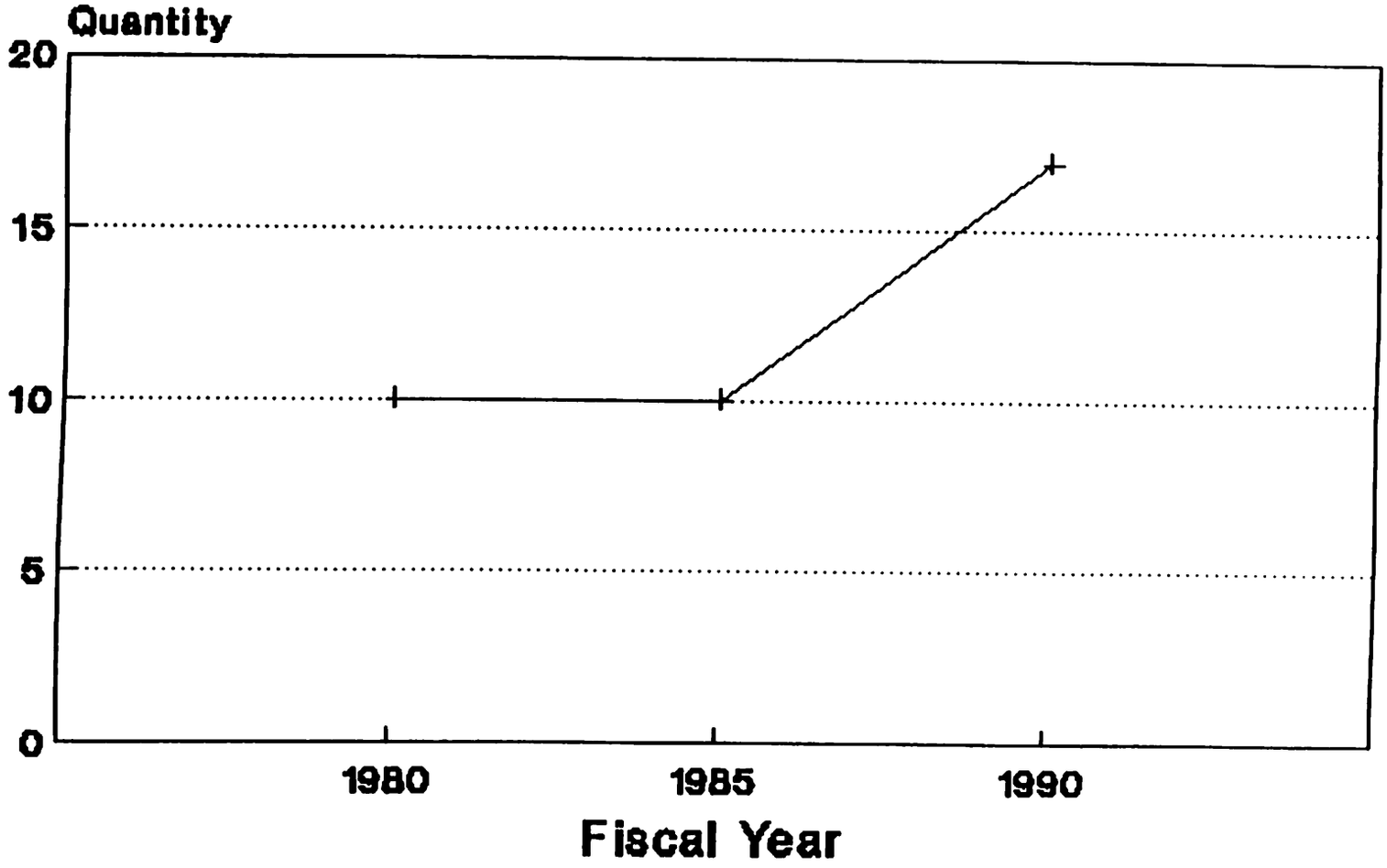
2. PEOPLE - QUANTITY (CONT.):

c. Accessions: The Army was able to meet its civilian S&E accession goals during the 1980, 1985, and 1990 period. For the military, it went from 10 accessions for 1980 and 1985 to 17 accessions in 1990.

Scientists and Engineers
Army Civilian Workforce - Accessions



Scientists and Engineers
Army Military Workforce - Accessions



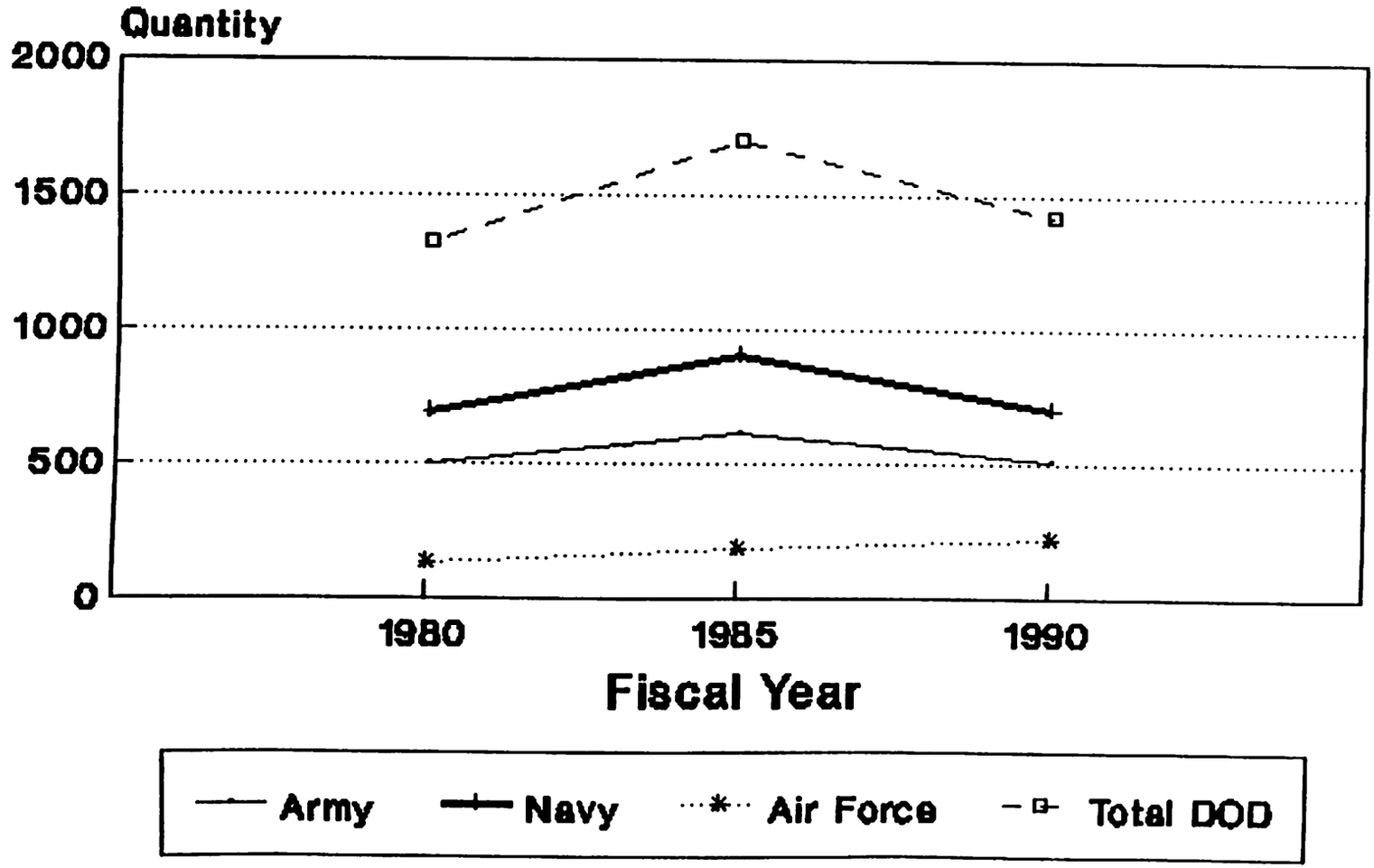
VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

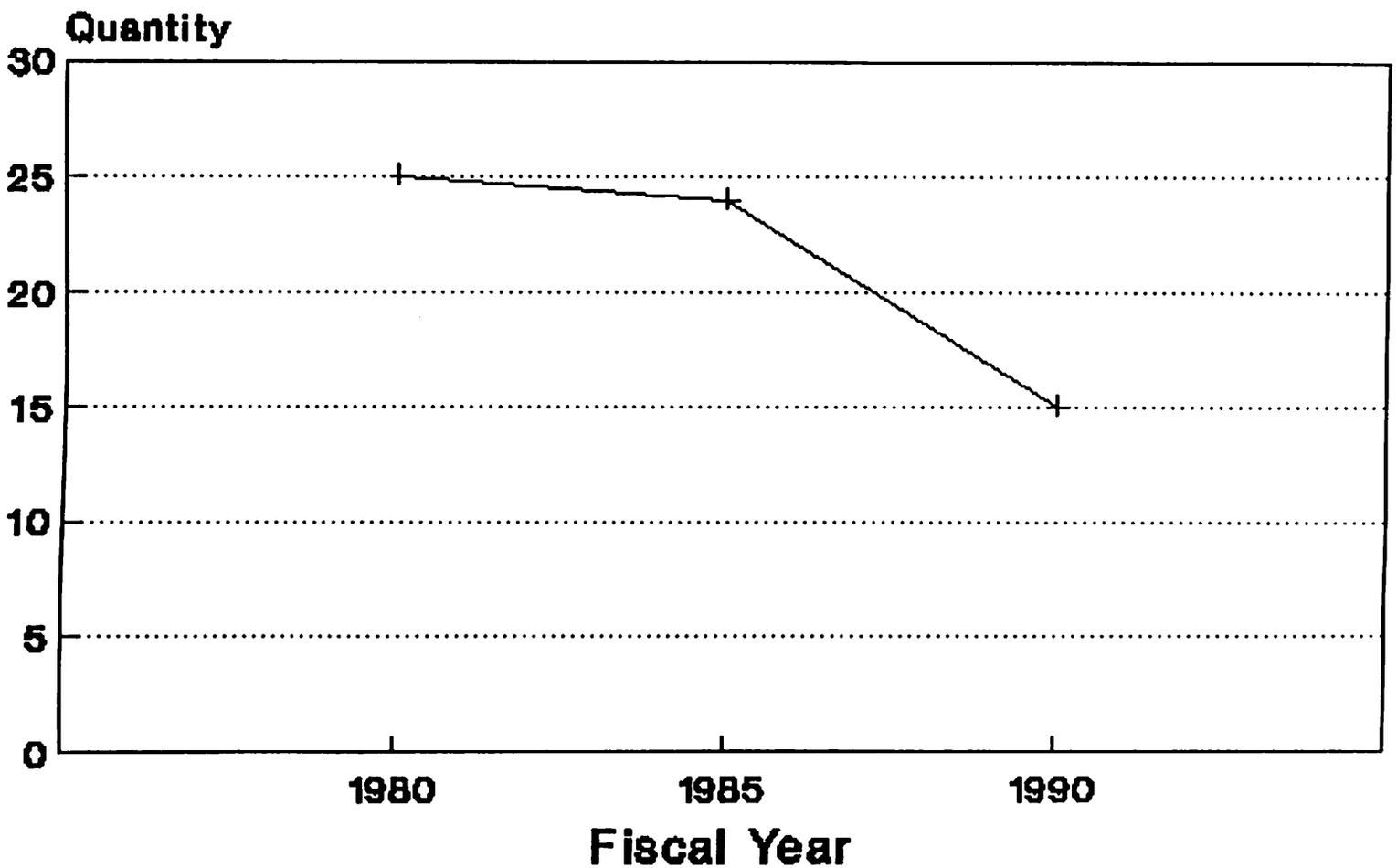
2. PEOPLE - QUANTITY (CONT.):

d. Career Force: The civilian S&E career force remained quite stable for the years 1980, 1985 and 1990. Separations went from 7.1% in 1980 to 5.3% in 1990. For the military, separations went from 25 in 1980 to 24 in 1985 to 15 in 1990.

Scientists and Engineers
Army Civilian Workforce - Separations



Scientists and Engineers
Army Military Workforce - Separations



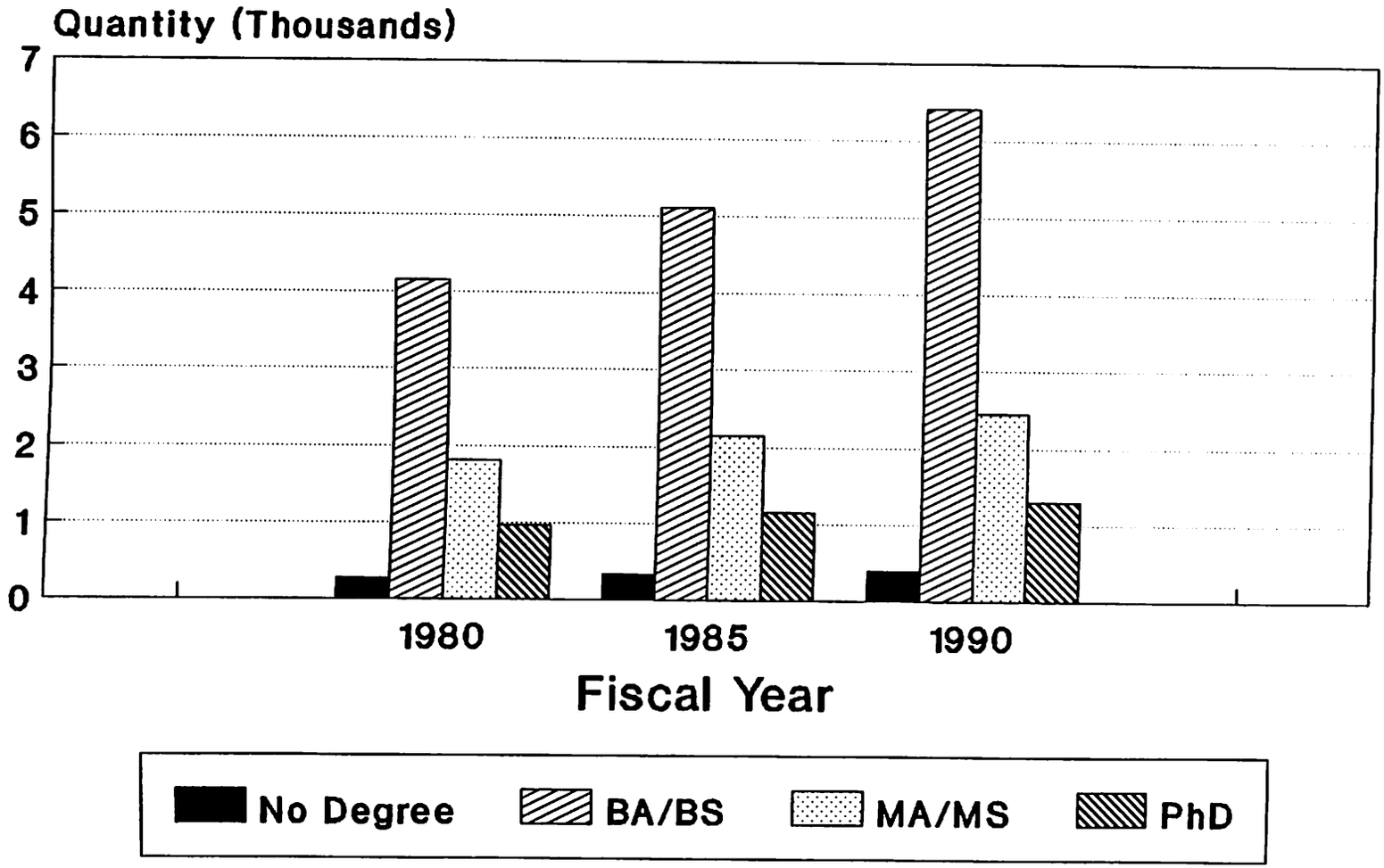
VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

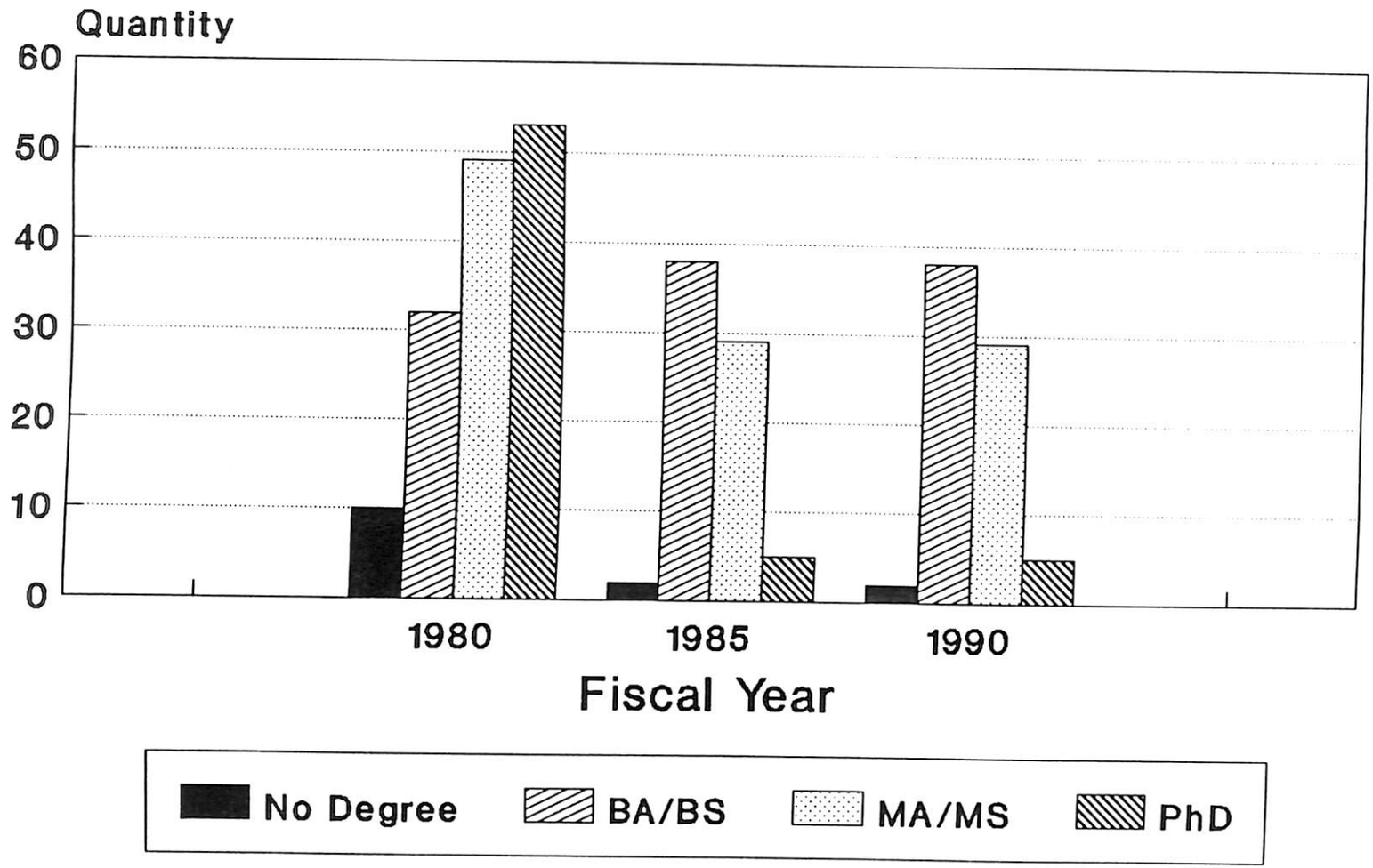
2. PEOPLE - QUALITY:

e. Education: The share of PhDs in the Army civilian S&E workforce has remained about the same for 1980, 1985 and 1990 - about 13% of the workforce. For the military S&E workforce, the share of PhDs dropped from 37% in 1980 to about 7% in 1990. In the private sector (General Motors), the share is 35% . The Air Force labs have 30% as a goal.

Scientists and Engineers
Army Civilian Workforce - Education



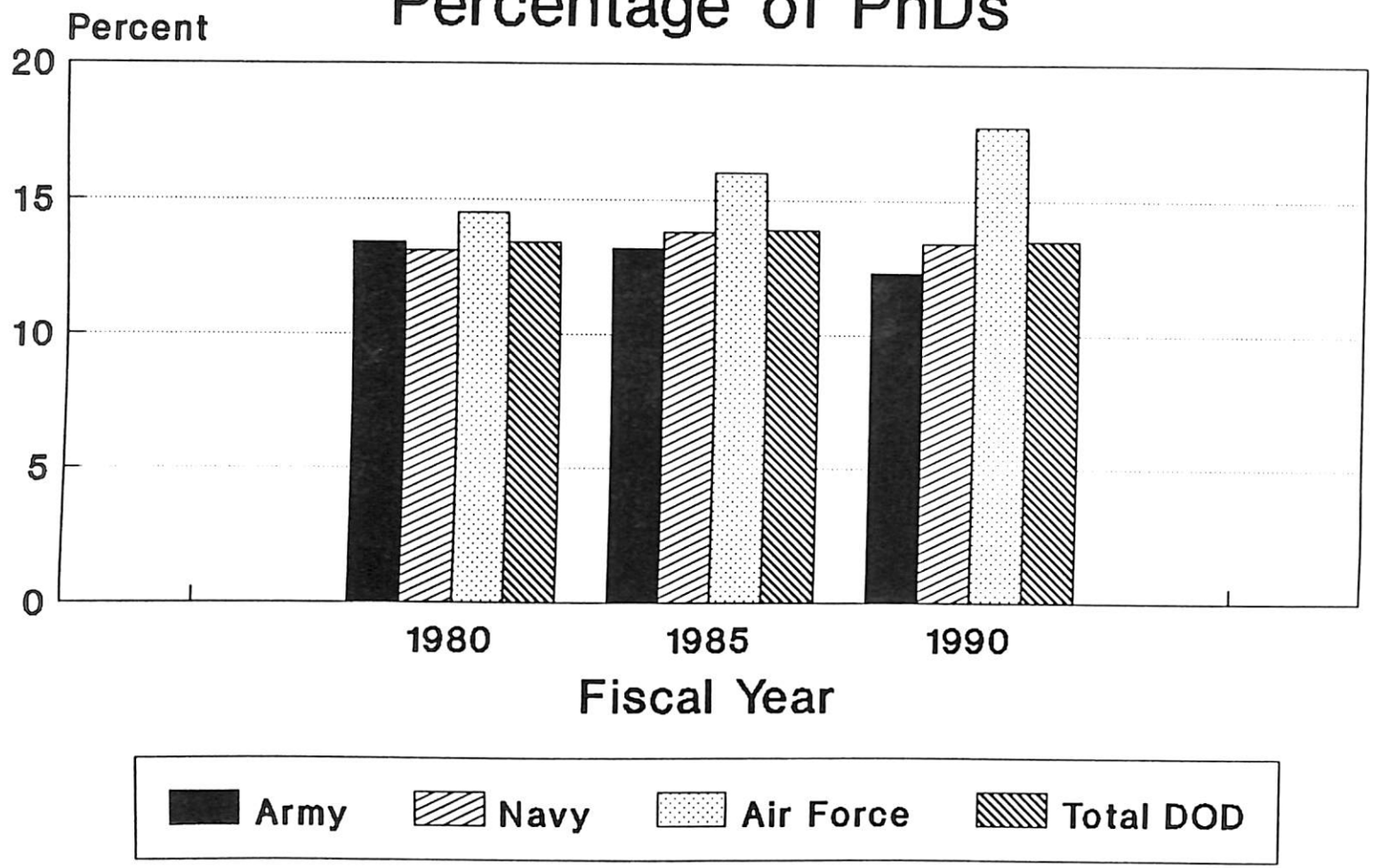
Scientists and Engineers
Army Military Workforce - Education



Scientists and Engineers

Civilian Workforce by Service

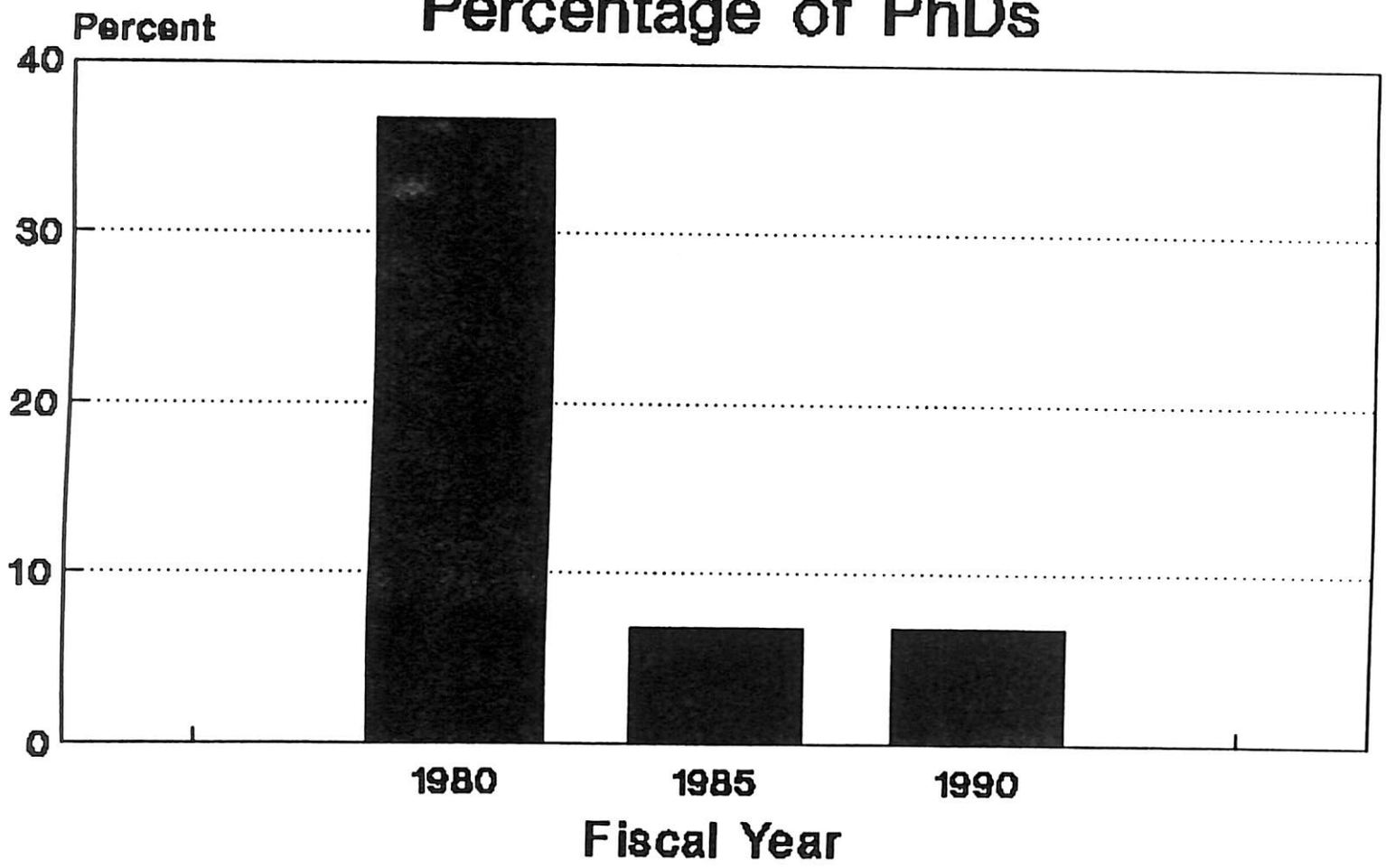
Percentage of PhDs



Scientists and Engineers

Army Military Workforce

Percentage of PhDs



VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

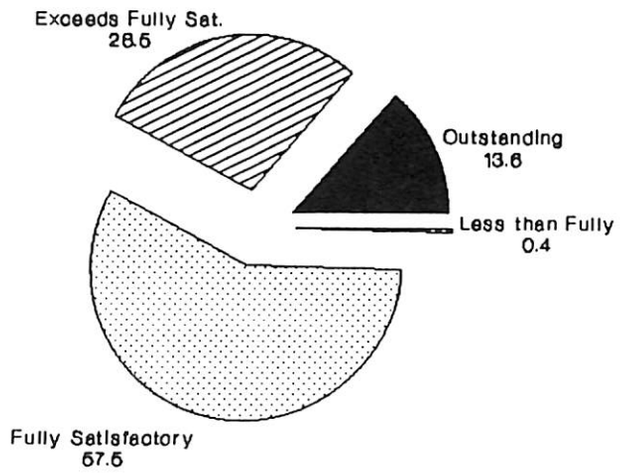
2. PEOPLE - QUALITY (CONT.):

f. Performance Ratings: Civilian S&E performance ratings for Army labs have significantly increased with outstanding ratings going from 14% in 1985 to 24% in 1990 and exceeds fully satisfactory going from 28.5% in 1985 to 42.5% in 1990.

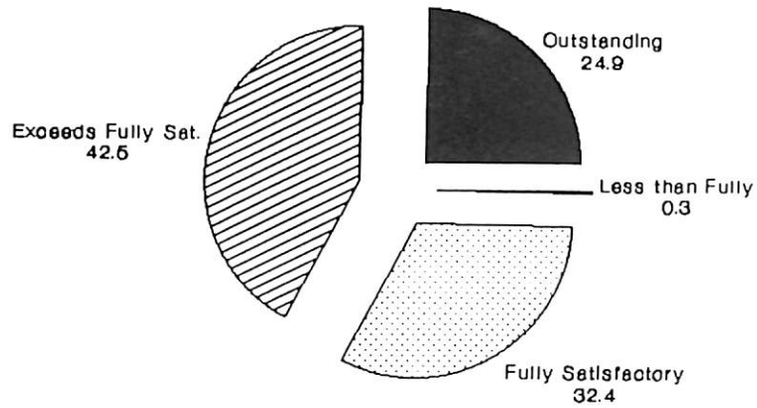
Scientists and Engineers

Army Civilian Workforce - Performance Ratings

FY 1985



FY 1990



VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

1. PEOPLE - QUALITY (CONT.):

g. Attitude: Based on interviews of new civilian S&E, accessions middle management, and senior executives, we found the overall attitude, understanding, and commitment to the lab mission and sense of dedication was good.

VI. FINDINGS

B. SCIENCE AND ENGINEERINGS (CONT.):

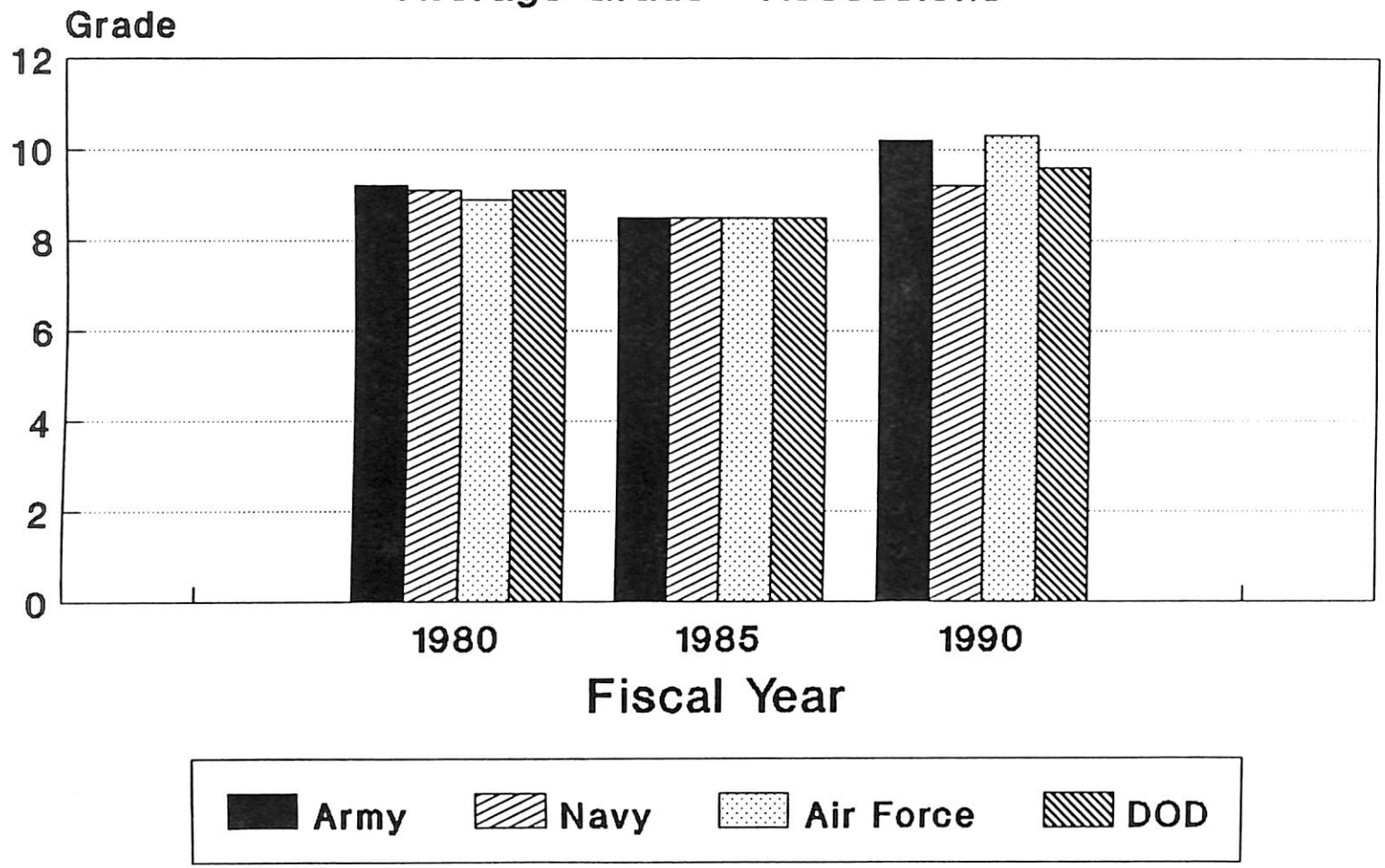
2. PEOPLE - QUALITY (CONT.):

h. Average Grade: The average grade for Army Laboratory civilian and military S&E accessions, career force, and separations has changed little from FY 1980 to FY 1990 and is in line with the other Service's data.

Scientists and Engineers

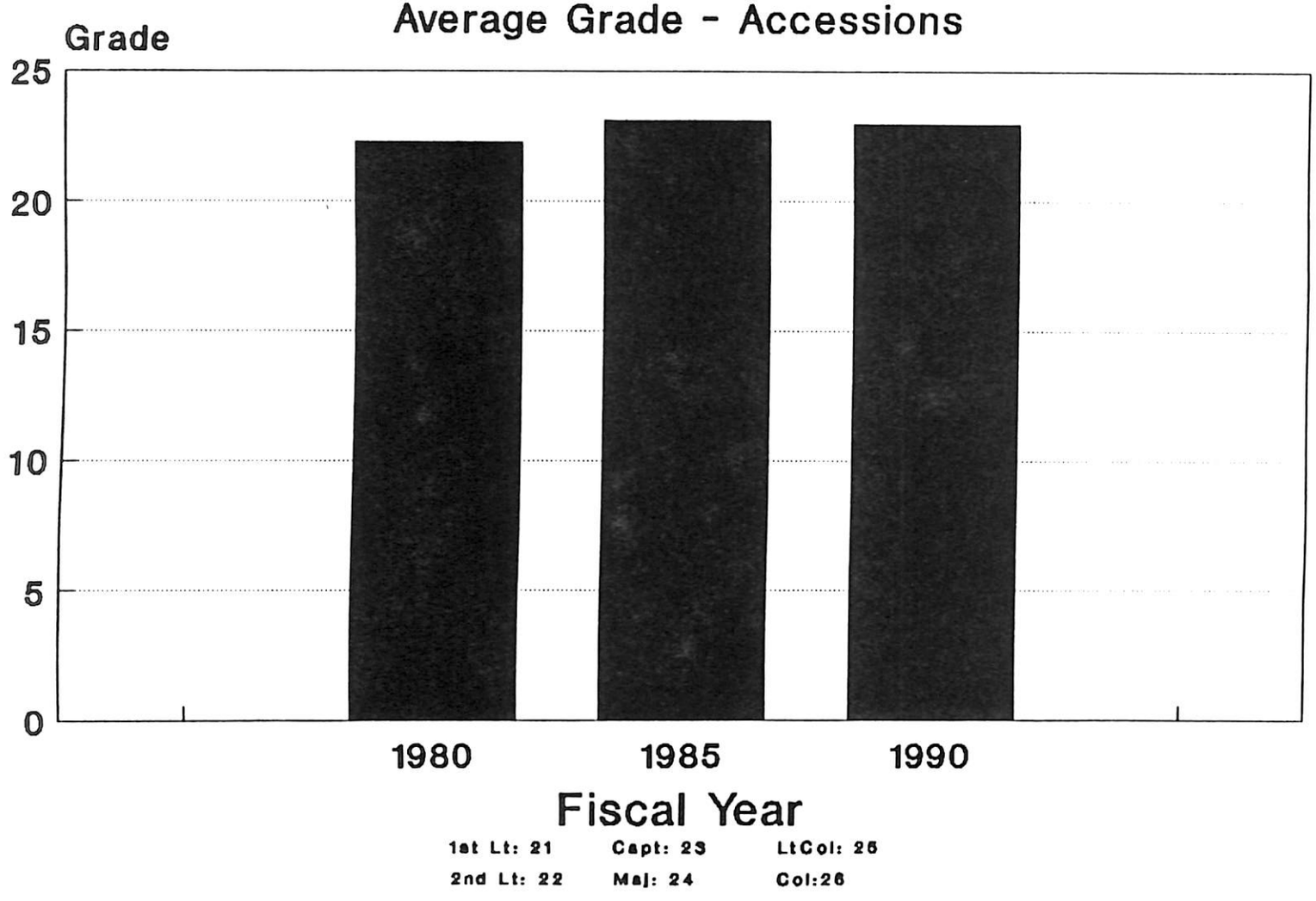
Civilian Workforce by Service

Average Grade - Accessions



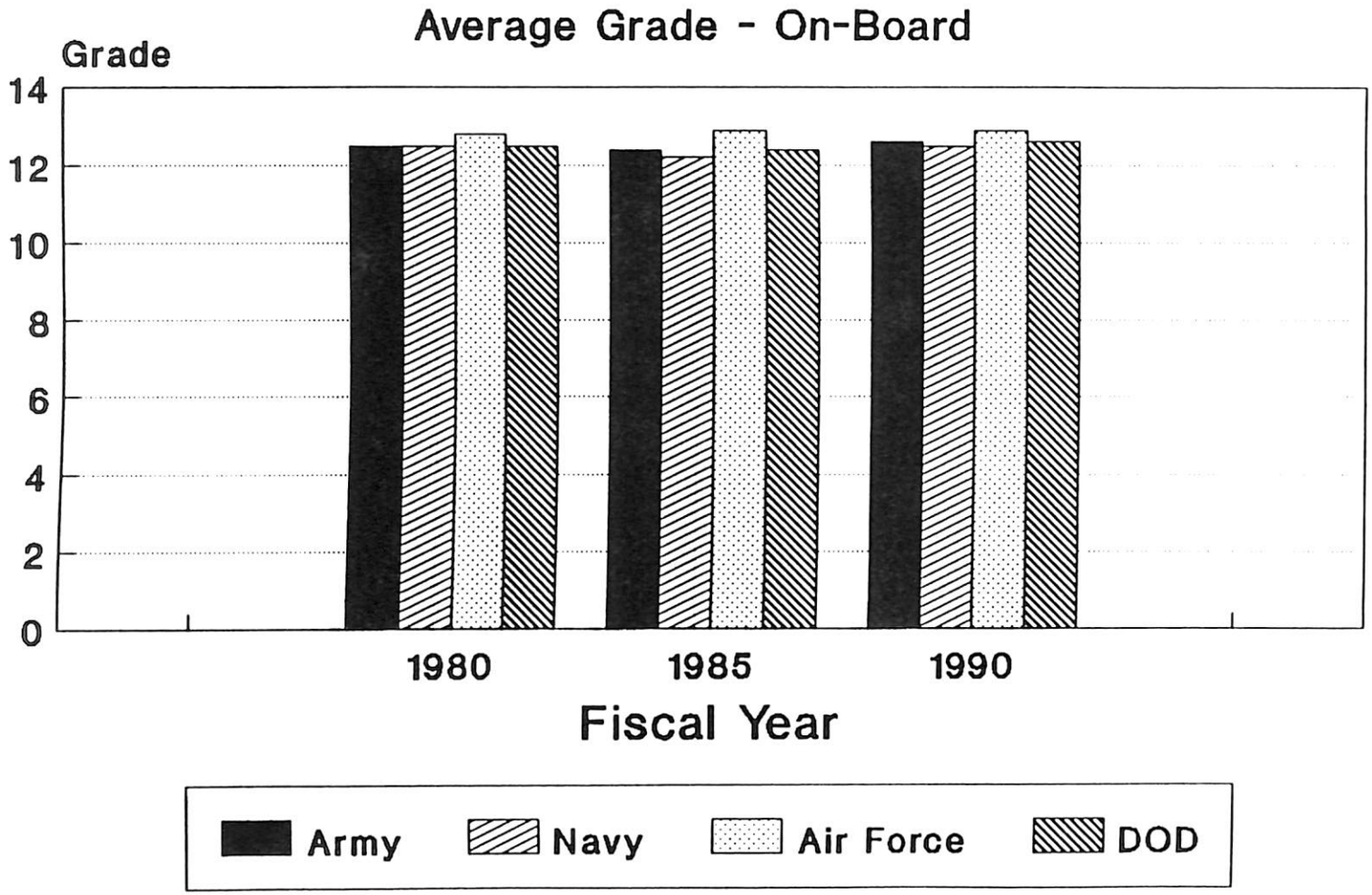
Scientists and Engineers

Army Military Workforce



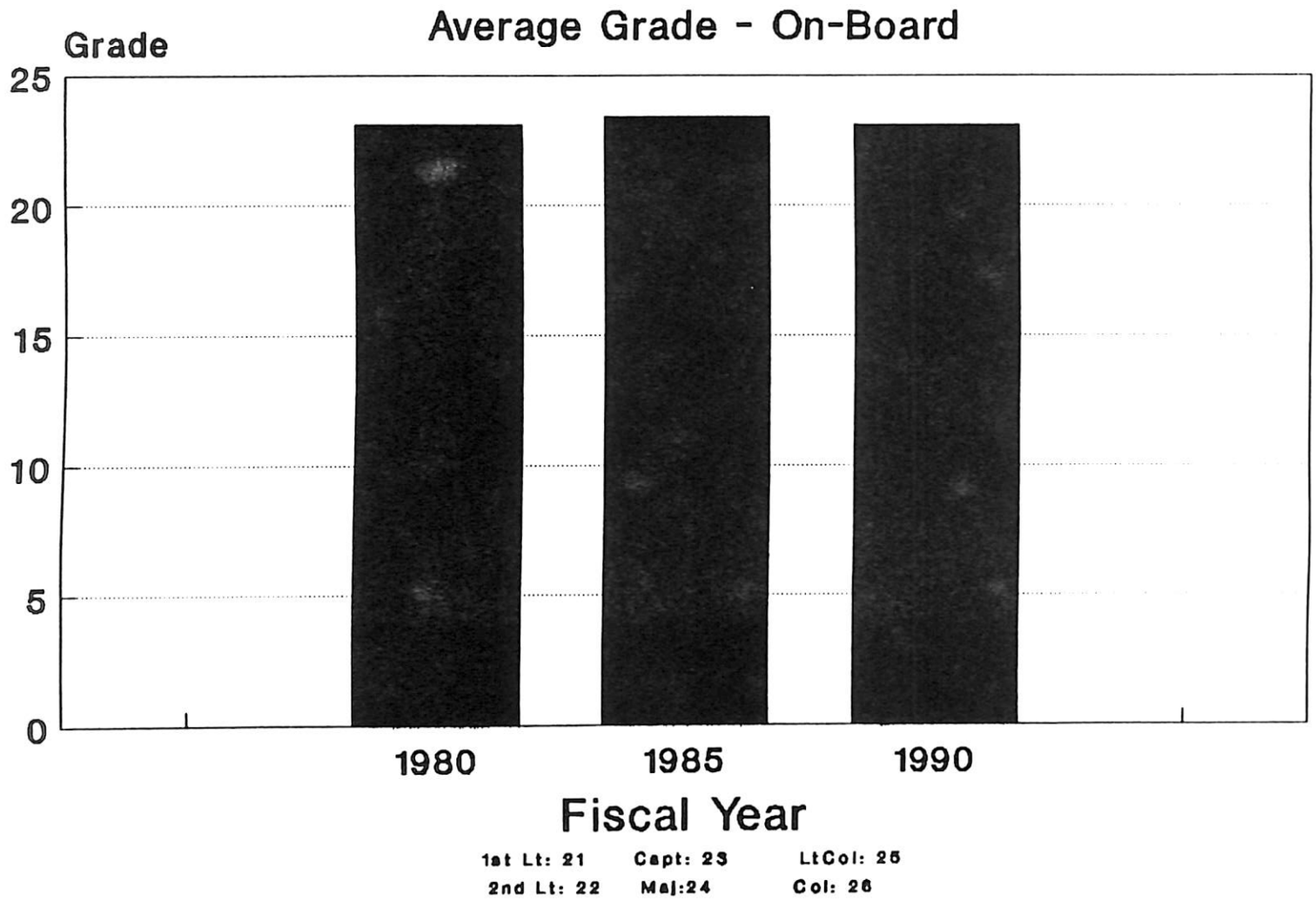
Scientists and Engineers

Civilian Workforce by Service



Scientists and Engineers

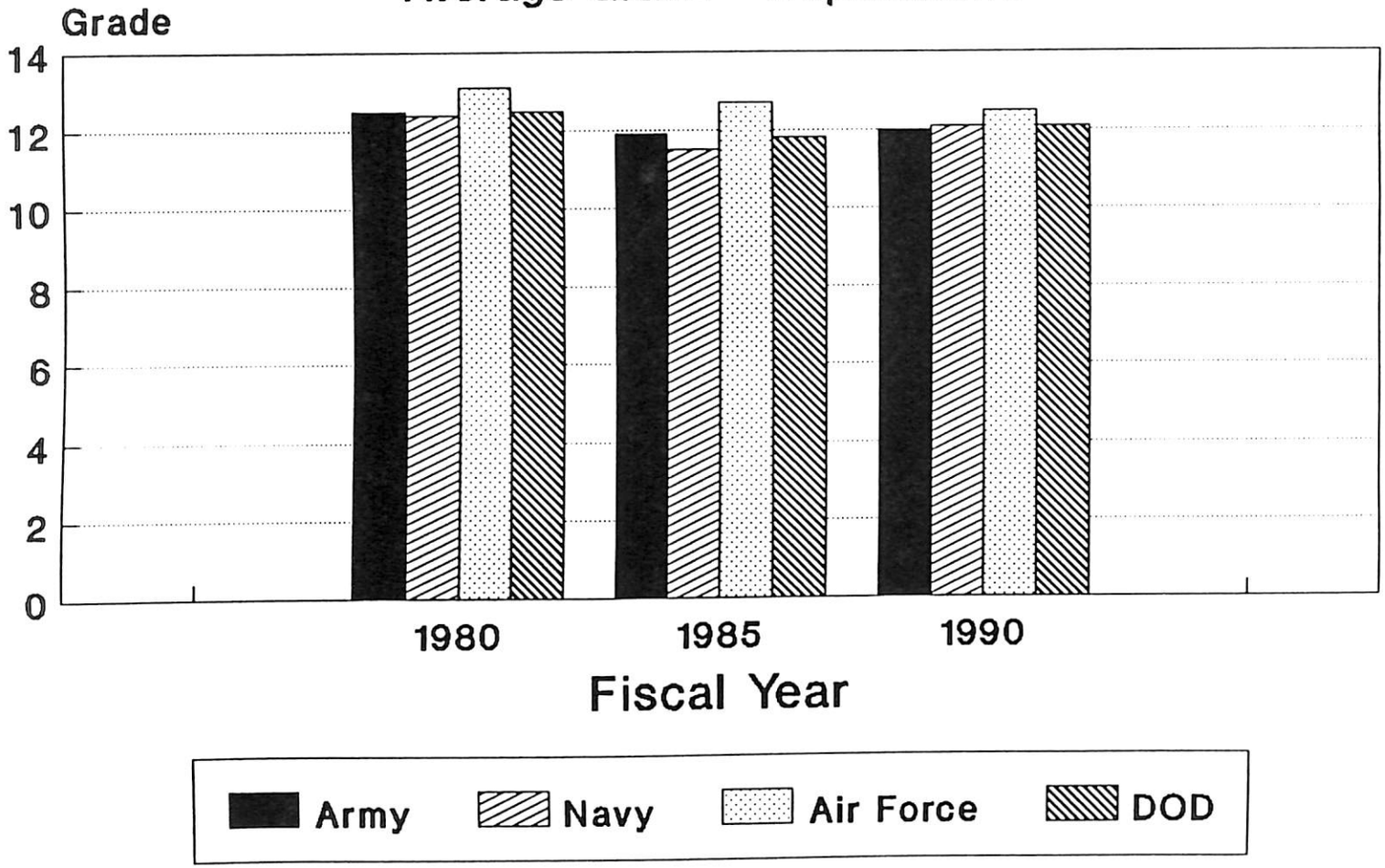
Army Military Workforce



Scientists and Engineers

Civilian Workforce by Service

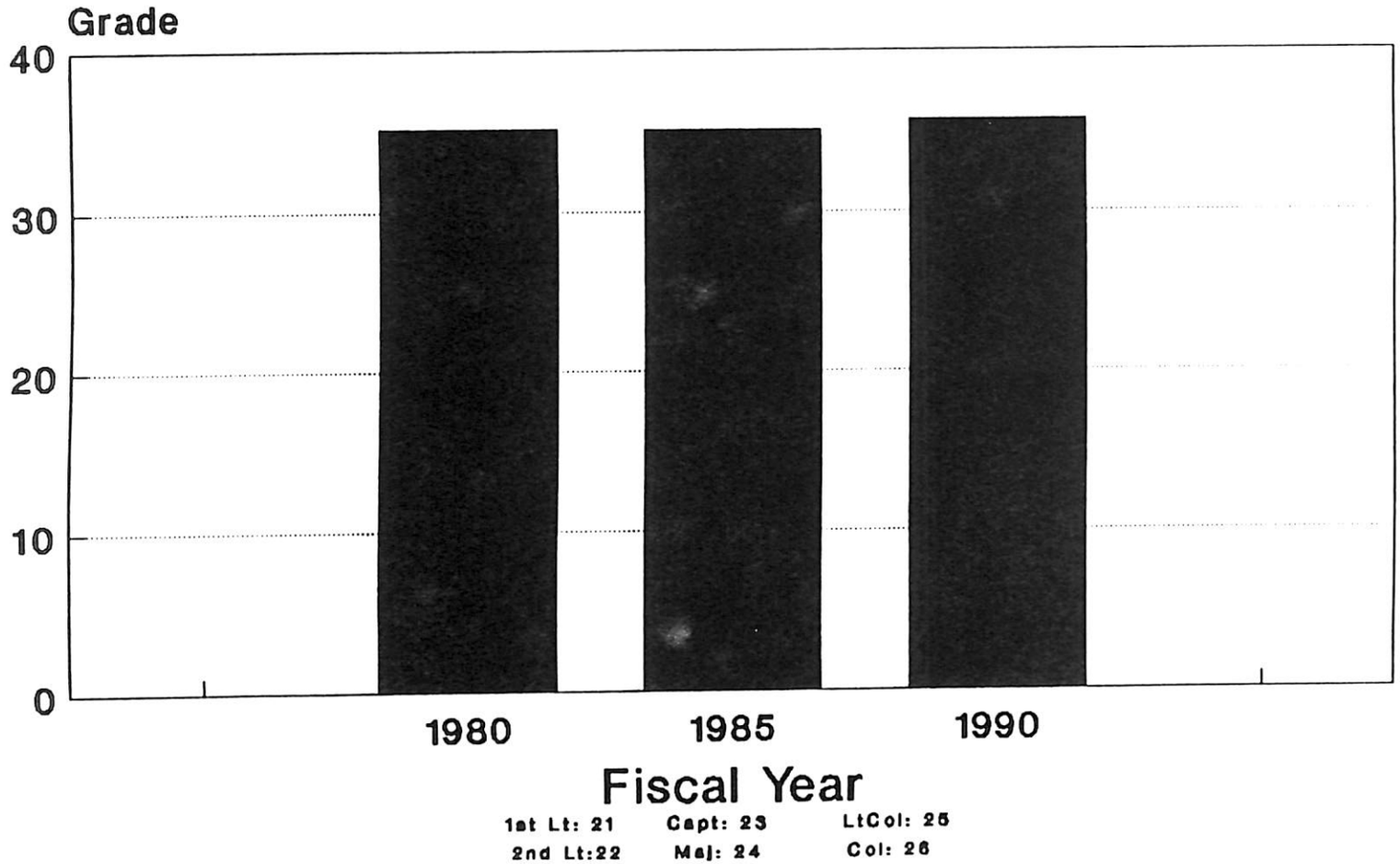
Average Grade - Separations



Scientists and Engineers

Army Military Workforce

Average Grade - Separations



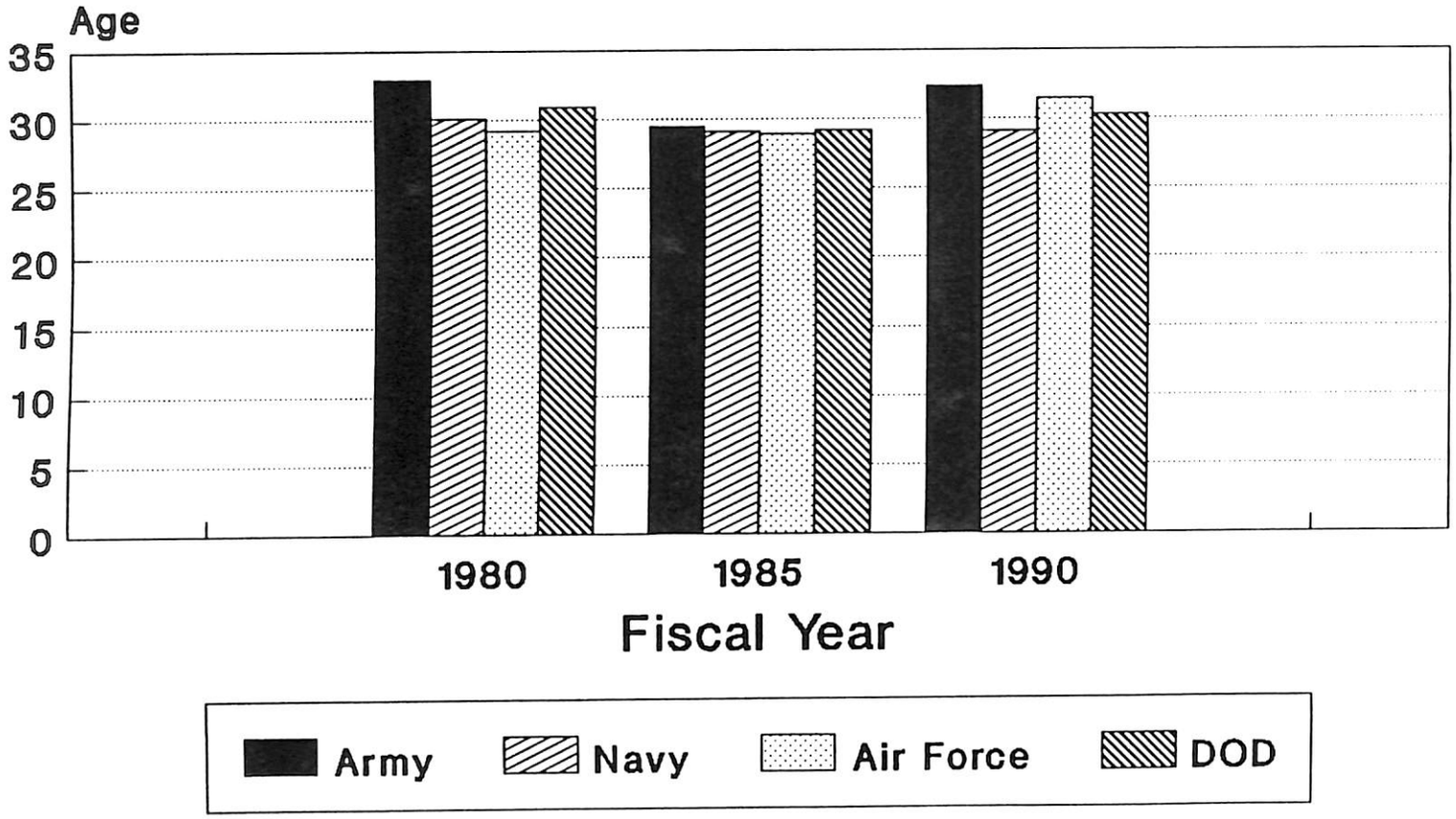
VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

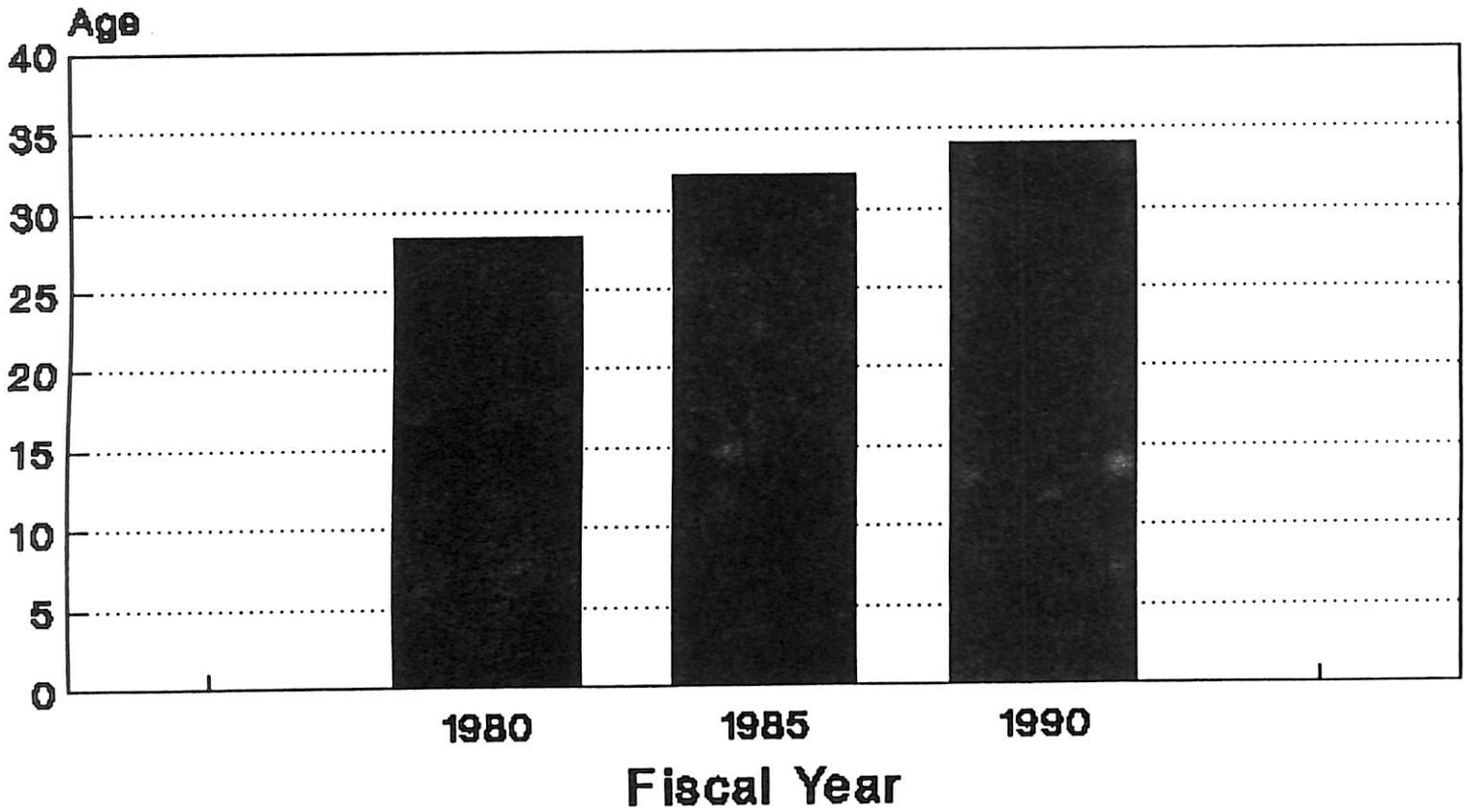
2. PEOPLE - AGE:

1. The mean age of the civilian and military S&E workforce has not changed very much during the 1980 to 1990 timeframe for accessions, career force (on board personnel) and separations.

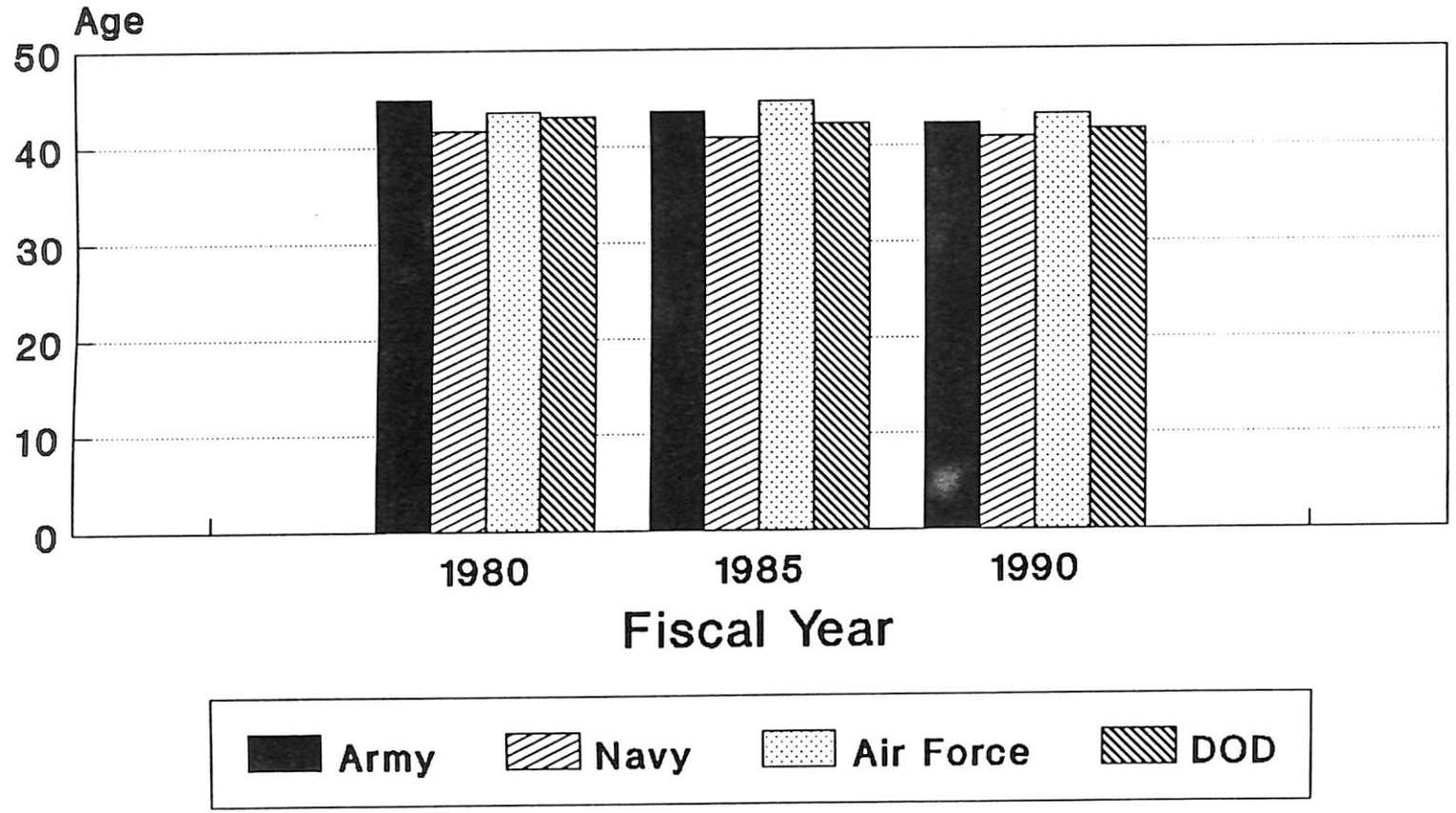
Scientists and Engineers
Civilian Workforce by Service
Mean Age - Accessions



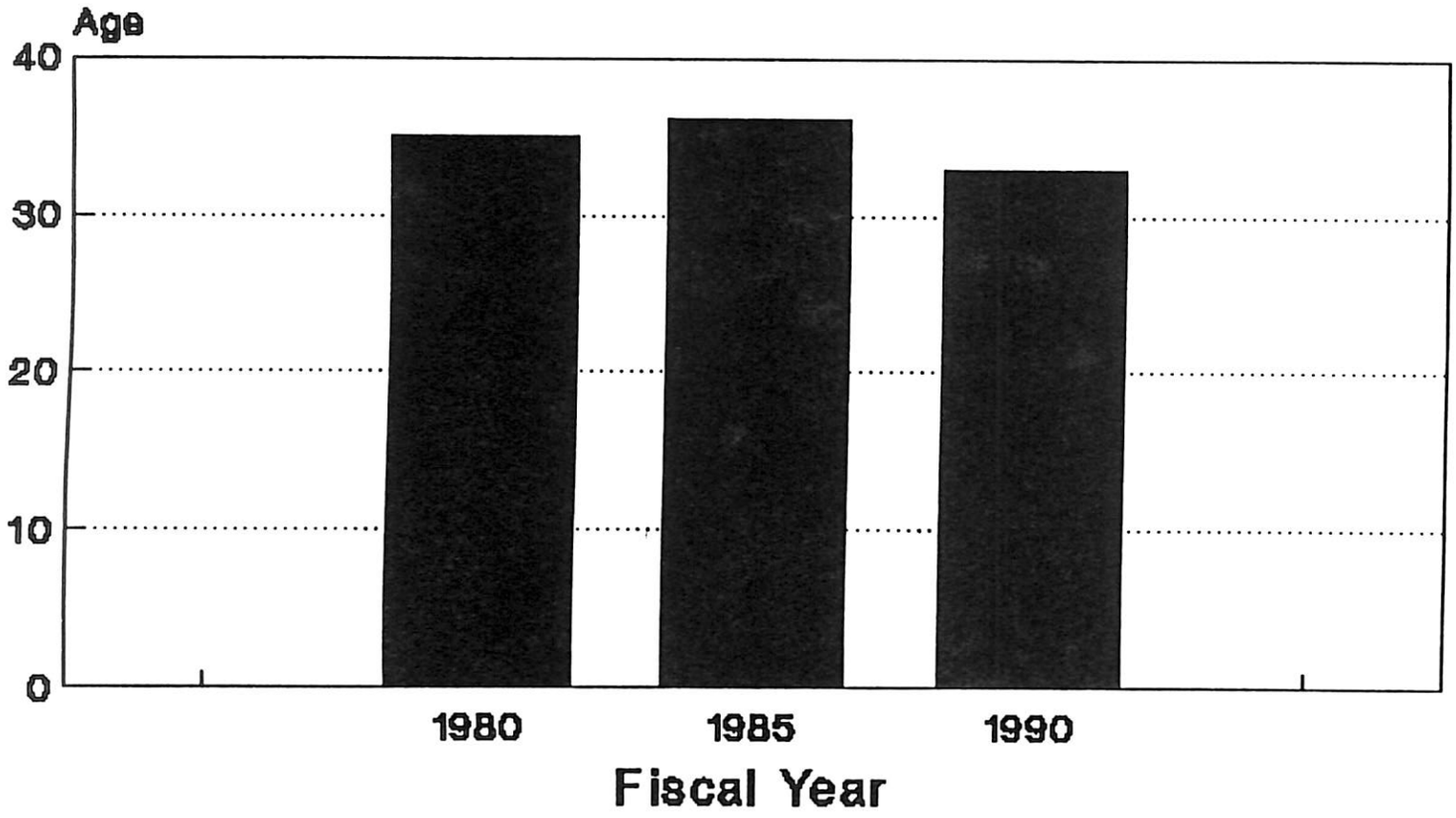
Scientists and Engineers
Army Military Workforce
Mean Age - Accessions



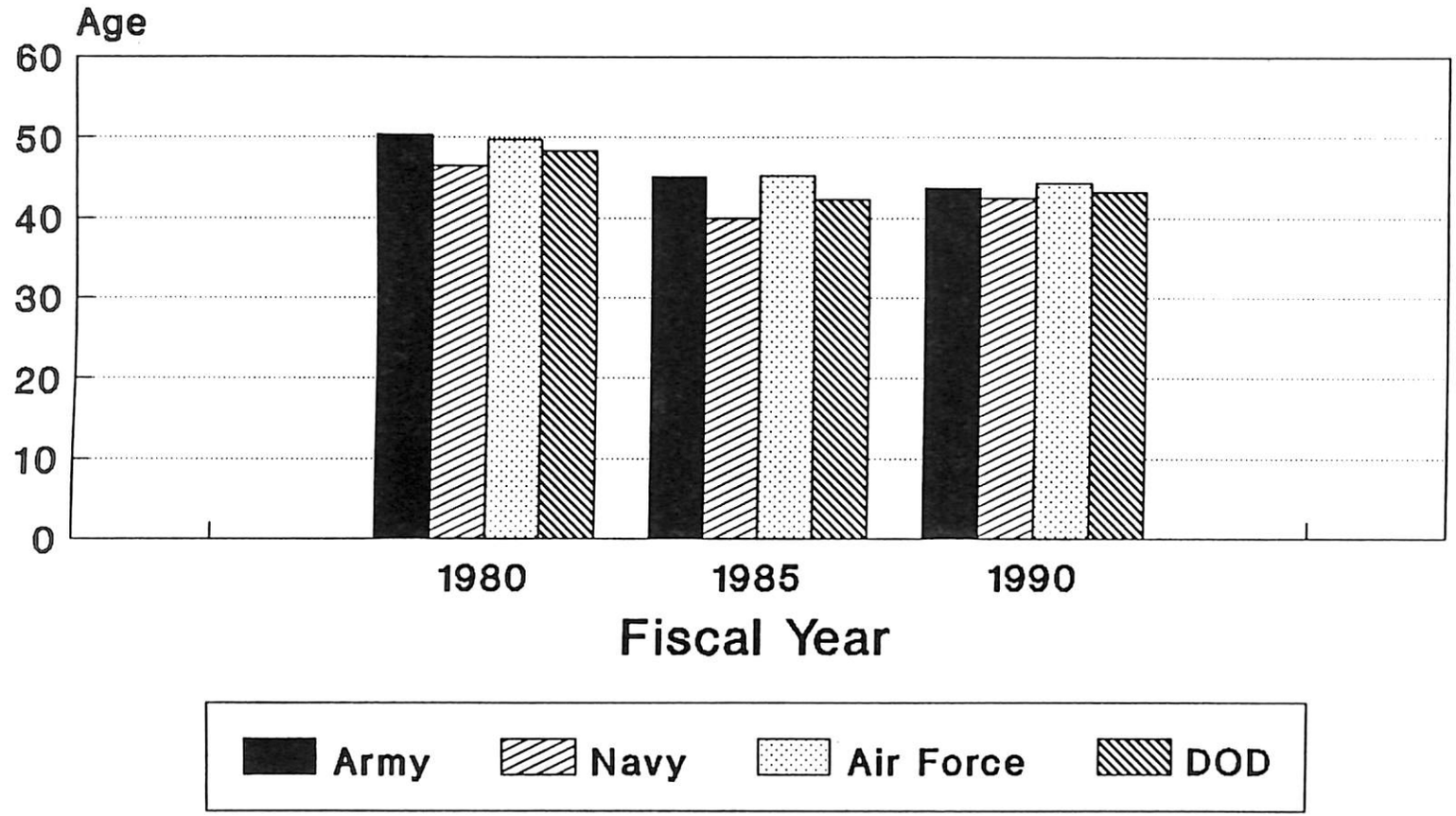
Scientists and Engineers
Civilian Workforce by Service
Mean Age - On-Board



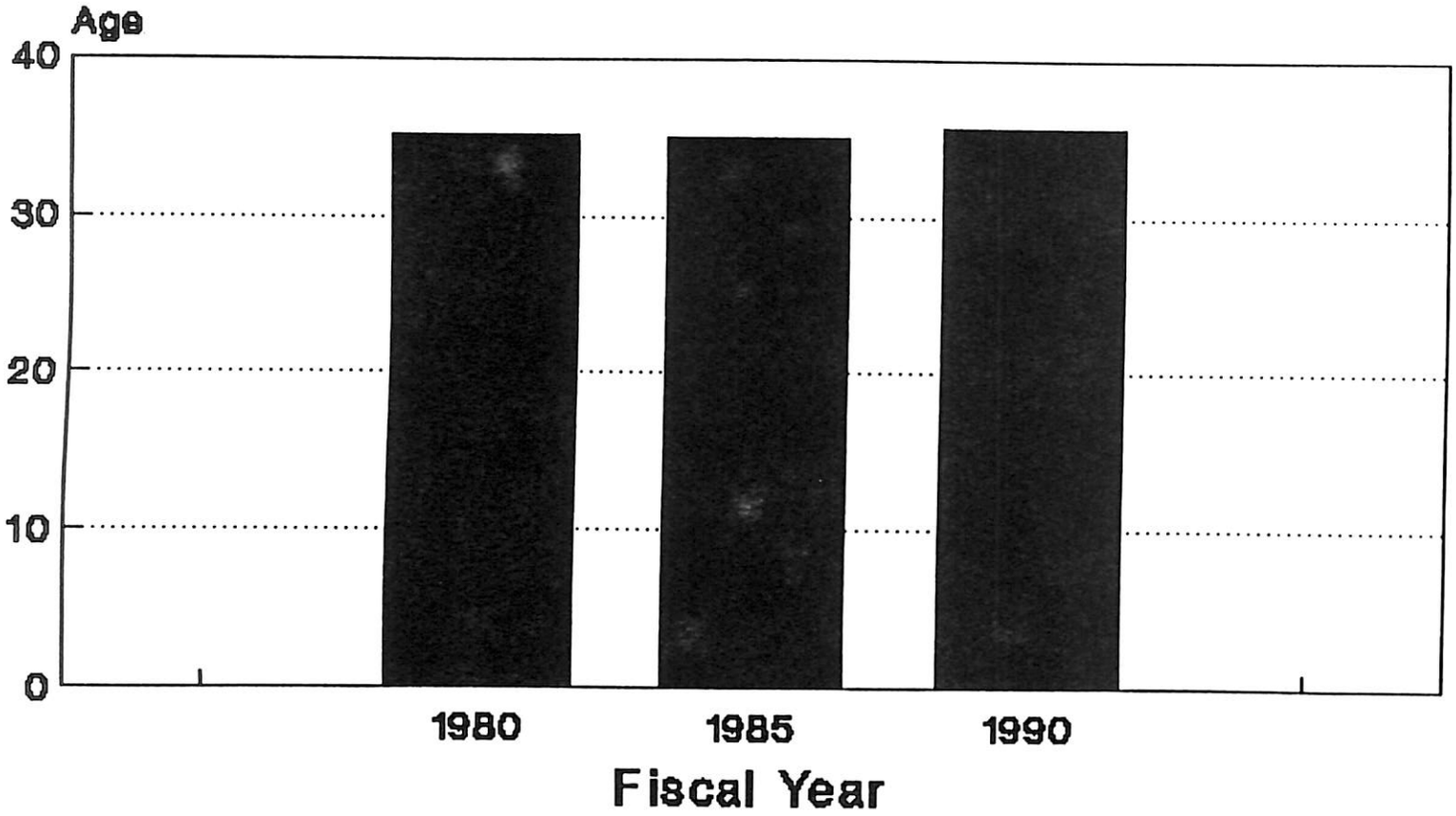
Scientists and Engineers
Army Military Workforce
Mean Age - On-Board



Scientists and Engineers
Civilian Workforce by Service
Mean Age - Separations



Scientists and Engineers
Army Military Workforce
Mean Age - Separations



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VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

2. PEOPLE - TRAINING:

j. Training programs were varied and differed from lab to lab but all offered career advancement opportunities for scientists, engineers, and administrators. Training was important to personnel interviewed and satisfaction was expressed for the ongoing programs.

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

2. PEOPLE - WOMEN:

k. Female accessions for the civilian S&E workforce increased from about 16% (57) in 1980 to 28% (124) in 1990. Role of women in Army labs has improved going from 4% (209) in 1980 to 10.5% (1104) in 1990. For the military S&E workforce, the percentage of women on-board went from 3% (4) in 1980 to about 12% (9) in 1990.

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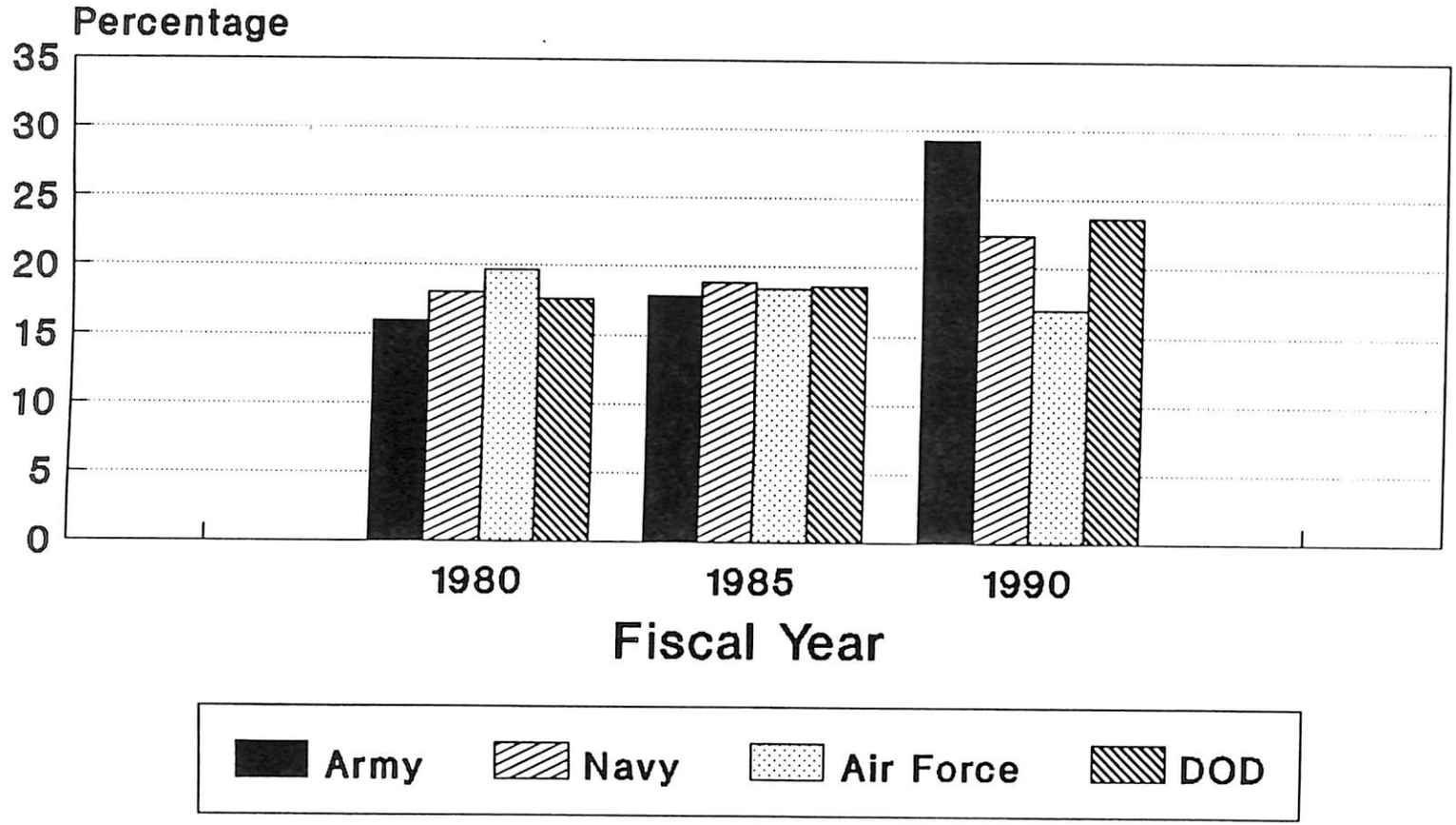
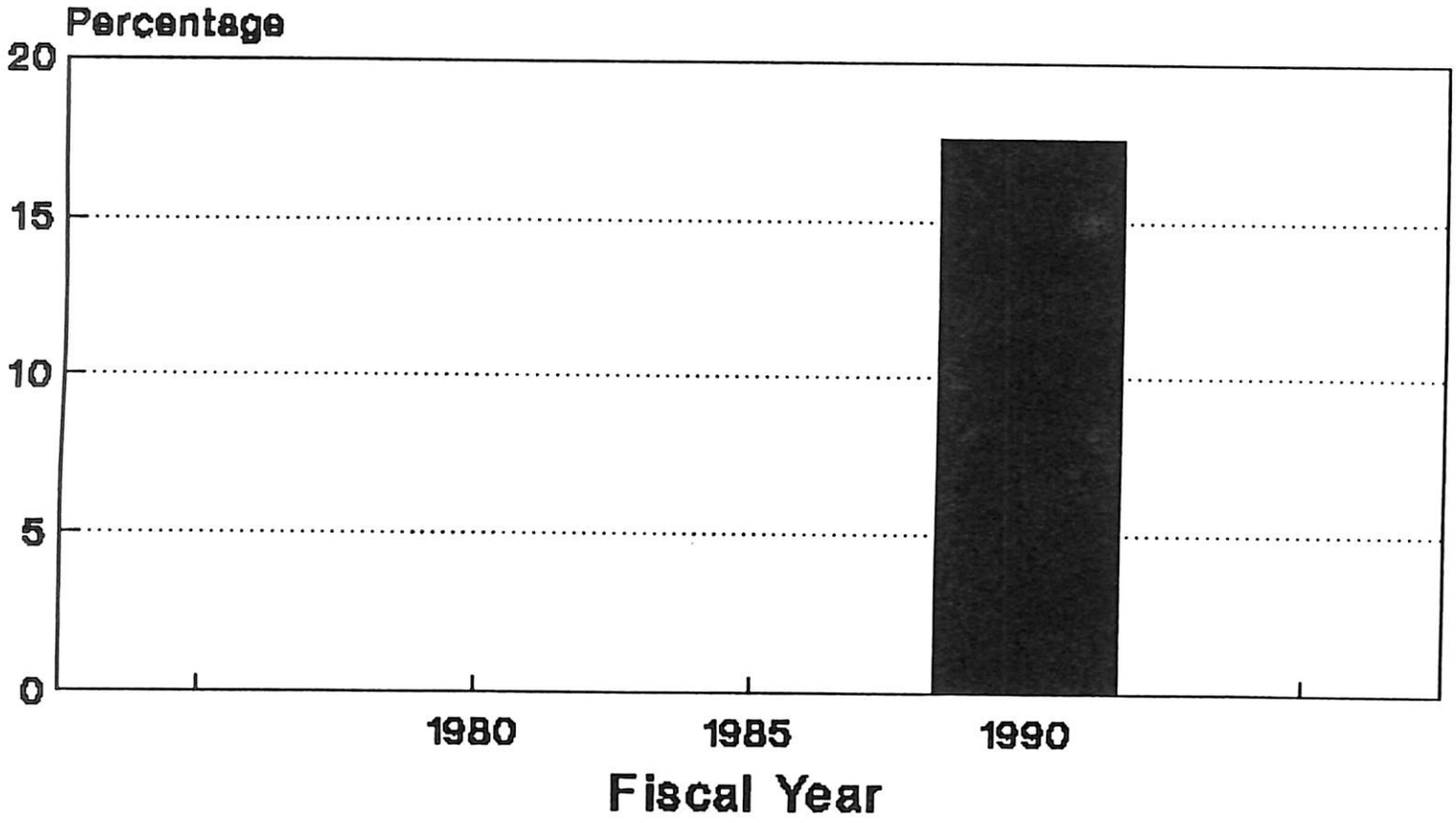
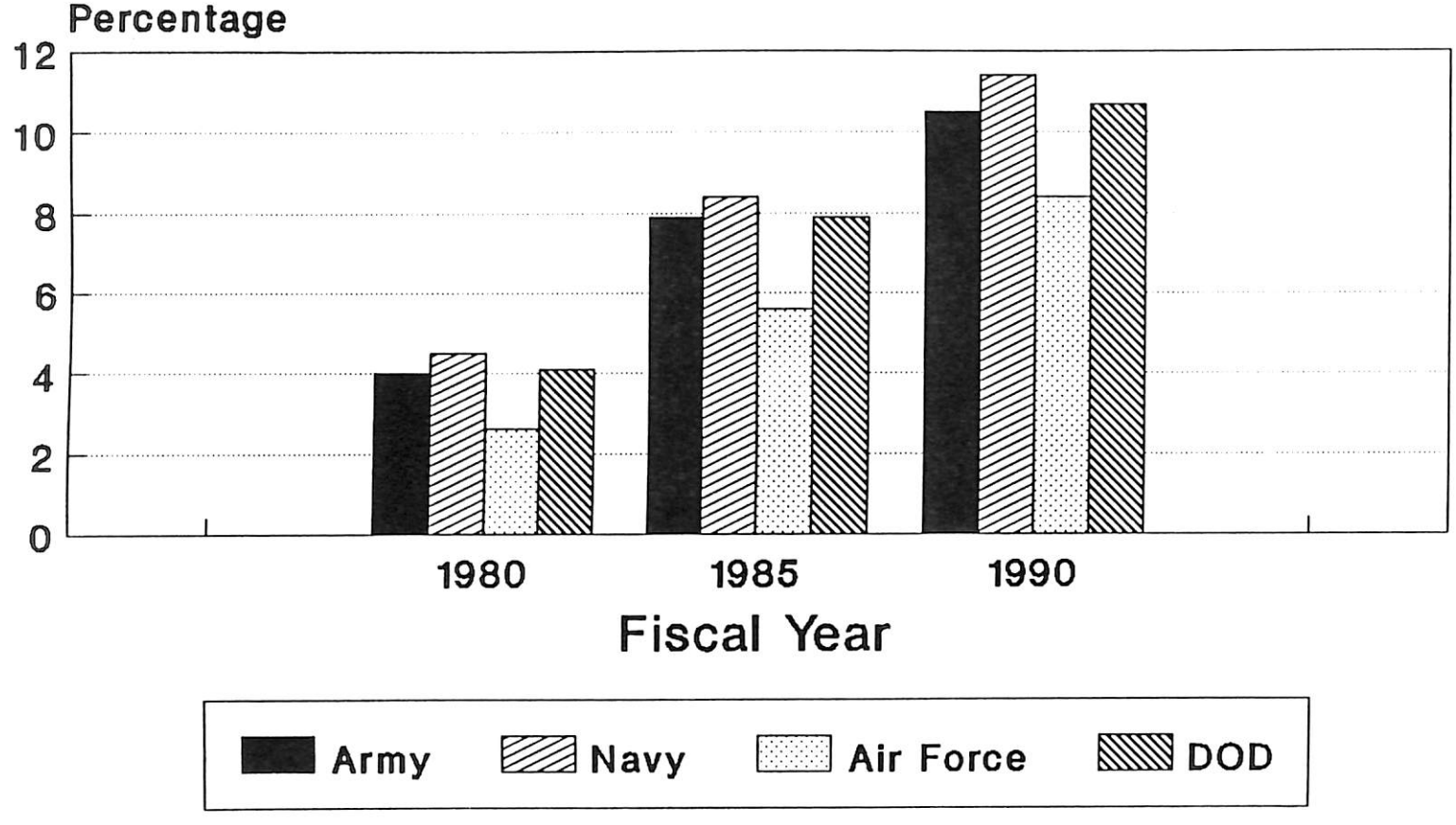
Scientists and Engineers
Civilian Workforce by Service
Percentage of Female Accessions



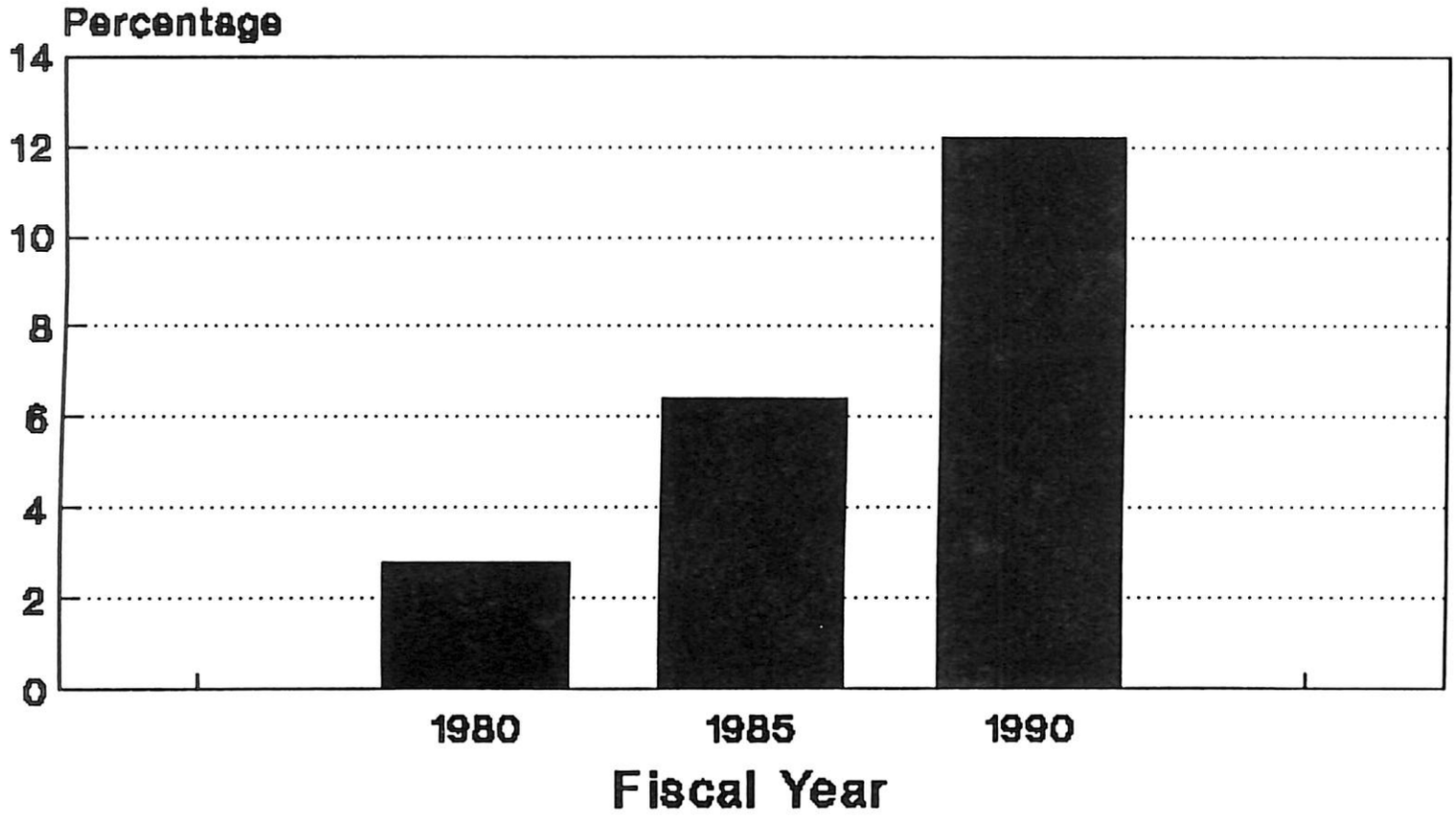
Scientists and Engineers
Army Military Workforce
Percentage of Female Accessions



Scientists and Engineers
Civilian Workforce by Service
Percentage of Female On-Board



Scientists and Engineers
Army Military Workforce
Percentage of Female On-Board



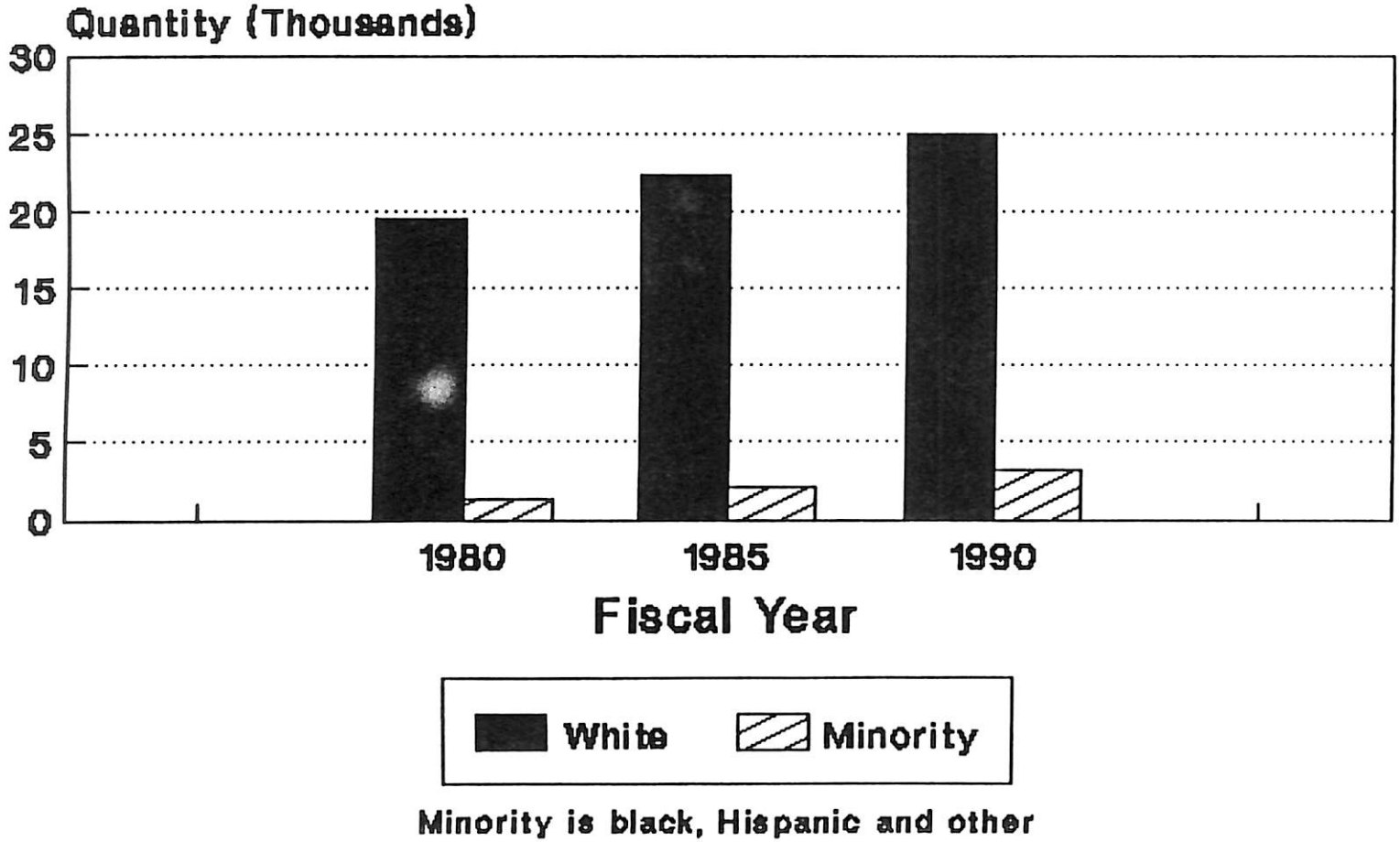
VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

2. PEOPLE - MINORITIES:

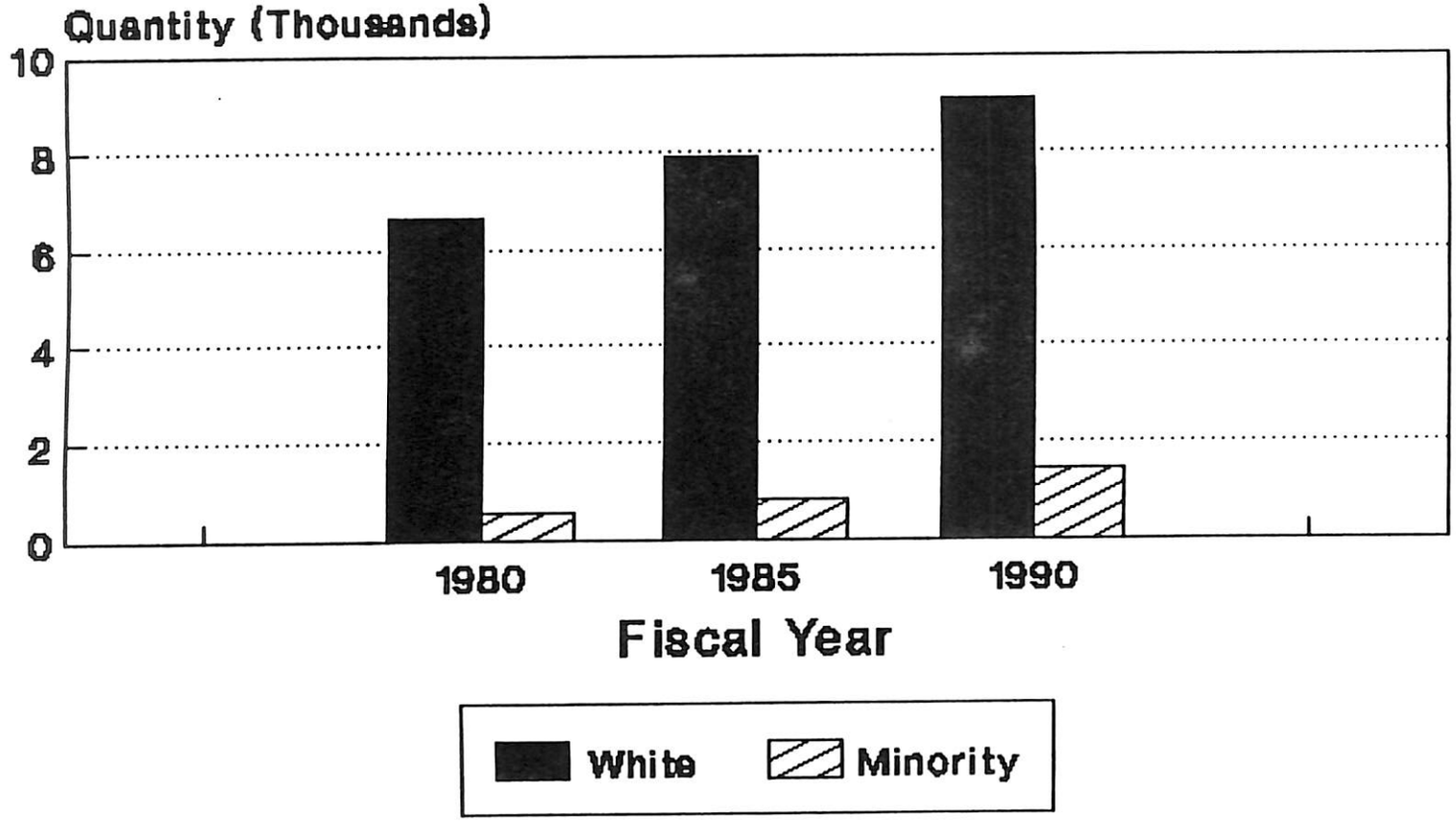
1. The civilian S&E workforce minority representation (black, Hispanic, and others) has about doubled for the Army civilian S&E workforce from 1980 to 1990, going from 7% (529) to 13% (1432). For the Army military S&E workforce, the share has gone from 9% (13) in 1980 to about 12% (14) in 1990.

Scientists and Engineers
Civilian Workforce All Services
Minority Representation



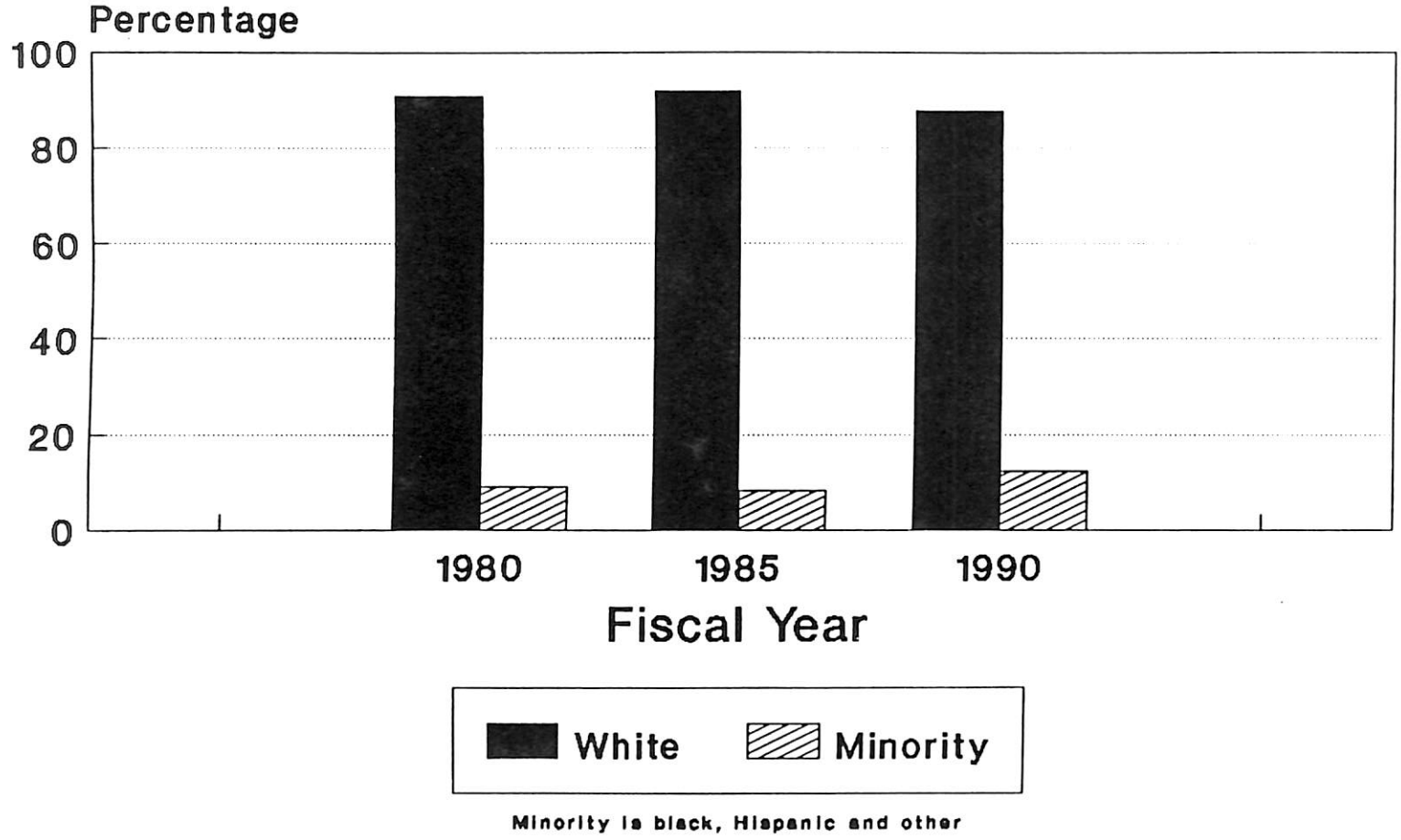
Minority is black, Hispanic and other

Scientists and Engineers
Army Civilian Workforce
Minority Representation



Minority is black, Hispanic and other

Scientists and Engineers
Army Military Workforce
Percent of Minority Representation



VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS:

a. The equipment and facilities at the Army labs visited were state-of-the-art technology, well maintained, and appeared to have rate of utilization to support Army programs.

b. The programs reviewed were well focused and relevant to Army objectives and needs but the dramatic changes in world politics present new challenges.

c. Quality Measurement: There is no common quantitative measurement of program quality. In lieu of quantitative measures, customer satisfaction appears to be an effective surrogate.

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS (CONT.):

d. Vision 2000 has caused much uncertainty and discussion at the local lab level and, in the long run, has the potential of impacting program quality and the career work force stability

e. Lab programs briefed during field trips were of high quality in substance and customer satisfaction. Further, many programs received high marks in the Desert Shield and Desert Storm operations

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS (CONT.):

f. The Field Assistance in Science and Technology (FAST) program has worked well and deserves more operational support.

g. Library services which are responsive and efficient are important to S&Es.

h. The procurement system is cumbersome and slow.

i. Information management systems useful to researchers are not widely available.

j. Physical services (telephones, communications, lighting, janitorial services, etc.) are often not responsive to the needs of S&Es.

k. Space and equipment needs often lag requirements.

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

4. POLICY AND PRACTICES:

a. DoD Laboratory Demonstration Program, which attempts to streamline small procurement practices (credit card), expedite hiring practises, etc., was well received and increased employee morale and effectiveness.

b. Low entrance salaries for civilian S&E personnel result in a policy of assured rapid promotion independent of demonstrated performance.

c. Laboratory directors have insufficient authority over support functions (e.g., personnel, procurements, facilities, etc.).

VI. FINDINGS

B. SCIENCE AND ENGINEERING (CONT.):

4. POLICY AND PRACTICES (CONT.):

d. The S&E career path for the pure scientist may have inadequate spaces to meet lab needs and career desires.

e. Junior S&E personnel indicate that they have inadequate hands-on experience prior to being moved into contract management. For example, one junior S&E believed that as an acquisition officer he might know what the contractor was doing wrong, but he did not have enough bench experience to tell the contractor how to do it correctly.

VII. Observations and Recommendations

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE:

1. HQ STRUCTURE:

a. Recommend acquisition professional development council be formed at HQ Army with the following key member participation:

- ASA (RDA) - Chairman.
- Commander, AMC.
- Representatives from functional areas in acquisition workforce.
- Representatives from military and civilian personnel.
- Representatives from TRADOC and USAISC.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

1. HQ STRUCTURE (CONT.):

b. Recommend an SES Civilian S&E be assigned full time to work Army acquisition workforce issues in SARDA. The SES civilian would assist in handling and coordinating field laboratory concerns, questions and/or problems with the implementation, development and maintenance of the acquisition workforce.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

2. FIELD SUPPORT:

a. Recommend military and civilian personnel offices be tasked to support the acquisition workforce at Headquarters and field level. This should be one of the key vehicles for providing consistent career guidance information on the acquisition workforce to personnel in the field.

b. Communications: Recommend an Army manual on the acquisition corps be developed and be provided to the field ASAP. Also recommend a short Q&A pamphlet be provided which deals with the top 25 questions/concerns.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

3. MOBILITY ISSUE:

a. Signing a mobility statement by civilians without a clear explanation of what it means or likelihood of occurring has caused unnecessary concern to S&E's and their families. Recommend that only Program Executive Officers (PEO's) and Program Managers (PM's) be required to sign mobility statements.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

4. TRAINING:

a. Recommend the new training opportunities authorized in the law be taken advantage of:

- Student loan repayment for recruits.
- Payment for degree training.
- Establishment of intern and scholarship programs.

b. Recommend that the acquisition workforce education requirements be packaged so that the local universities/colleges be accredited to offer the various curricula in order to meet the near term requirements.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

5. COMPENSATION:

a. Recommend the law's authorization of special pay for individuals in critical positions be reviewed and implemented.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

6. ASSIGNMENT CRITERIA:

a. Current selection criteria for assignment to the corps requires 8 or 9 years experience plus a 6-month training course at DSMC For PM's. This precludes participation by senior and highly qualified operational and technical personnel with near-term experience. For example, we believe that aviators, tankers, accomplished engineers and scientists, etc., should be allowed to participate in the program. Assignment rules should be modified.

VII. OBSERVATIONS AND RECOMMENDATIONS

A. THE ACQUISITION WORKFORCE (CONT.):

7. INDEPENDENT MONITOR:

a. The acquisition process may not be as broken as many once believed, based on the experience of Desert Shield/Storm. Further, the new law and the Army's implementation contains some overly restrictive provisions relative to selection, training and mobility. In light of these considerations, we recommend that a standing committee track the implementation of the law, monitor changes being made to the process and analyze impact (pro and/or con) on the acquisition process.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING:

1. PEOPLE:

a. No major problems appear to exist regarding the Army lab community's ability to recruit and retain a quality S&E workforce.

b. Recommend S&Es have an opportunity to participate in both tech base and engineering type work early in career:

- Achieve insight into differences
- Establish personnel goals
- Establish communication links

This is especially important for fast track individuals ("would be" lab and tech directors).

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

1. PEOPLE (CONT.):

c. The effectiveness of current personnel programs used in the management of downsizing need to be evaluated. In particular:

- Protection of interns.
- The defining of competitive levels to reduce bumping and retreat rights.
- The management of misinformation to avoid unnecessary job jumping by the best qualified.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

1. PEOPLE (CONT.):

d. DoD labs should exchange information on critical S&E candidates available for employment.

e. Recommend the share of PhD's be increased to 30%.

f. Support innovative local educational, quality of life, work environment, and hiring initiatives.

g. Allow pay banding.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

1. PEOPLE (CONT.):

h. Delegate step level approval authority for new hires.

i. Delegate direct hire authority for GS-13 or above S&Es.

j. Provide medical benefits for Temps.

k. Count Term Appointments as Temps for personnel accounting purposes.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

2. TRAINING:

a. Army lab training programs are working well and we recommend these programs should be maintained and protected during the downsizing period.

b. Retain central funding for long term training.

c. Allow local approval of locally funded long term training programs greater than six months.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS (CONT.):

a. Recommend the Army continue to seek a common quantitative measurement of program quality.

b. Recommend a thorough review of programs at the end of consolidation and downsizing to insure that the current levels of focus and relevance are maintained.

c. Recommend lab and RDEC streamlining implementation be carefully monitored to insure program quality is maintained and the career workforce remains stable.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS (CONT.):

d. Recommend participation in 1) the Field Assistance in Science and Technology, Junior, (FAST, Jr.) program and 2) the Design Engineers Field Experience With Soldiers (DEFEWS) program be expanded. They deserve both operation cooperation and support by research management.

e. Recommend a responsive and efficient library services system.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

3. PROGRAMS (CONT.):

f. Recommend an increase in the responsiveness of the procurement system.

g. Recommend the establishment of an information management system useful to researchers.

h. Recommend improved responsiveness of physical services.

i. Recommend update planning for space and equipment.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

4. POLICIES AND PRACTICES:

a. Recommend that DoD Laboratory Demonstration Programs be expanded.

b. Recommend that the management of support functions (e.g., personnel, procurement and facilities) be under the authority of the laboratory director.

c. Recommend there be adequate spaces for the S&E pure scientist to meet lab needs and career desires.

VII. OBSERVATIONS AND RECOMMENDATIONS

B. SCIENCE AND ENGINEERING (CONT.):

4. POLICIES AND PRACTICES (CONT.):

d. Restore centrally funded capital equipment investment programs without any associated budget decrements.

e. Encourage creativity by providing Tech Director some discretionary reprogramming authority.

f. Allow Technical Director to implement and operate under DA Manage to Budget policy.

VII. OBSERVATIONS AND RECOMMENDATIONS

C. SCIENTISTS AND ENGINEERS - NEEDS:

1. Challenging assignments.
2. Peer recognition.
3. Senior S&E monitoring and guidance.
4. Promotion opportunities.
5. Cutting edge technology.
6. State-of-the-art equipment.
7. Training opportunities.
8. Administrivia minimization.

Note: We are grateful to Dr. Robert W. Lewis, Technical Director, U.S. Army Natick Research for providing this chart

VIII. APPENDICES

VIII. Appendices

A. Review of Past Studies

B. Civilian S&E workforce data provided by Defense Manpower Data Center, Monterey, California

C. Military S&E workforce data provided by Defense Manpower Data Center, Monterey, California

D. Congressional Proposed Legislation, 1992 and 1993

Appendix A

Review of Past Studies

APPENDIX A
REVIEW OF PAST STUDIES

Eight studies were identified and reviewed. An overview of each one follows:

A. DoD Laboratory Management Task Force, "Study of Scientists and Engineers in DoD Laboratories," November 1981 - April 1982.

1. Services and Laboratory communities should develop integrated program which includes:

   a. Means for forecasting S&E personnel needs.

   b. Common database for identifying S&E candidates.

   c. Well conceptualized and interrelated recruitment recruitment and retention program

   d. Concerted effort to improve image of Federal service and to reduce bureaucratic constraints hampering lab productivity.

APPENDIX A
REVIEW OF PAST STUDIES

2. Services and laboratory communities should be encouraged to emphasize some elements more than others depending on the unique needs and resources of each service and to share experiences/ successes/failures with each other.

3. OSD should facilitate Services' efforts by:

   a. Supporting areas where Congressional, OSTP, OMB or OPM intercession is required.

   b. Reducing bureaucratic constraints under OSD control.

   c. Coordinating and supporting programs of NSF which contribute to S&E needs of DoD laboratories.

APPENDIX A
REVIEW OF PAST STUDIES

B. ASB 1982 Summer Study, "Report of Panel on Scientific and Engineering Personnel," Nov 82

1. Officer recommendations:

   a. Make major changes in officer professional development.

   b. Establish a competitive category (or equivalent) for RDA at 2 years service.

   c. Fence additional number of ROTC scholarships to S&E fields.

   d. Immediately screen officers now completing 2-3 years of service to select attendees for graduate school.

   e. Immediately identify technical experience billets for 2-10 year period in RDA activities.

APPENDIX A
REVIEW OF PAST STUDIES

f. Limit further entries into RDA area to those officers with at least a B.S. in S&E.

g. Assure equal opportunity for promotion to all grades for those officers in RDA.

2. Civilian recommendations:

a. Support legislation to establish a performance-based personnel system.

b. Develop and implement advanced degree programs.

c. Develop quality assessment procedures for Army R&D organizations.

d. Request OPM update S&E recruitment practices.

e. Initiate and expand S&E productivity improvement programs.

APPENDIX A
REVIEW OF PAST STUDIES

f. Mount national publicity campaign to promote working as civilian S&E for Army.

3. University/industry recommendations:

a. Improve systems acquisition process.

b. Strengthen ties among Army, Defense contractors and universities.

c. Support -- via ARO -- additional centers of excellence.

APPENDIX A
REVIEW OF PAST STUDIES

4. National Technological "literacy":

   a. Institute organized effort to assist in improving mathematics and science education in local communities by:

      - Release time teaching.
      - Equipment and laboratory facility loans.
      - Enrichment programs for students.
      - Support existing commissions.

APPENDIX A
REVIEW OF PAST STUDIES

C. RAND/NSF Study, "Lost Talent: The Underparticipation of Women, Minorities and Disabled Persons in Science," Feb 90.

1. Alter way science and mathematics are taught.
2. Provide additional, positive science and math experiences both in and out of school.
3. Provide career information and contact with role models.

APPENDIX A
REVIEW OF PAST STUDIES

D. RAND/Ford Foundation Study, "Trends in the Post-secondary Enrollment of Minorities," Aug 90

1. Undertake diverse efforts to upgrade the content and intellectual level of elementary and secondary education offered to minority students.

E. RAND/NSF Study, "Multiplying Inequalities: The Effects of Race, Social Class and Tracking on Opportunities to Learn Mathematics and Science," Jul 90

1. Make problem a focus of national concern.
2. Seek new funding, creative use of existing funding, and new alliances with private sector.

APPENDIX A
REVIEW OF PAST STUDIES

F. NSF Survey, "Academic Science and Engineering: Graduate Enrollment and Support," Fall 89

1. Of Federal Agencies, only DoD provided primary support to fewer students in 1989 than in 1988.

G. Secrist, Grant E. "Enlightened Management of Military Research and Development: A Design for Excellence," Dec 84

1. Eliminate prolific management redundancy.

   a. Signing out letters.

   b. Approving material, computer/analytical support, supplies, equipment, personnel actions.

   c. Approval of TDY.

   d. Release of scientific reports/papers.

APPENDIX A
REVIEW OF PAST STUDIES

2. Reduce/eliminate administrative paperwork/ excesses.

3. Revise and realign inefficient PPBS to coincide with inherent rhythm of R&D process.

   a. Convince Congress of need for 3-5 year funding.

   b. Provide portion of funding (e.g., 5-10%) as "seed money" to lower level management to exploit unanticipated breakthroughs or opportunities.

   c. Develop effective, automated product and resource-tracking systems.

4. Create and effective personnel selection, placement, promotion and mobility system.

APPENDIX A
REVIEW OF PAST STUDIES

H. Committee on Education and Human Resources of the Federal Coordinating Council for Science, Engineering and Technology Report, "By the Year 2000: First in the World."

1. Support the 6 National goals for improving education, particularly #4, by year 2000, U.S. students will be first in world in science and mathematics achievement.

2. Increase budget for FY 1992 over FY 1991 for mathematics and science education programs.

APPENDIX A
REVIEW OF PAST STUDIES

J. ARDEC Study, "Scientific and Engineering System Initiatives," 10 April 1985.

1. Summarized significant findings, common across studies done from 1980 through 1983.

   a. Reduce bureaucratic overburden.

   b. Emphasize comprehensive continuing education.

   c. Support expansion of Navy demonstration legislation.

   d. Improve image of federal S&Es.

   e. Promote closer ties with academia.

   f. Access quality and encourage professionalism.

   g. Stabilize/eliminate lab personnel ceilings.

APPENDIX B

CIVILIAN S&E WORKFORCE DATA PROVIDED BY THE DEFENSE MANPOWER DATA CENTER, MONTERERY, CALIFORNIA

September 1980, 1985 and 1990

Data Overview for The Army Laboratory's Civilian S&E Workforce

U.S. ARMY R&D LABORATORIES
CIVILIAN SCIENTIST/ENGINEER MANPOWER STATISTICS

	(N=7213) SEPT 80 %	(N=8746) SEPT 85 %	(N=10558) SEPT 90 %
OCCUPATION AREA			
Science	34.5	29.8	24.1
Math	6.8	6.8	6.3
Engineering	58.7	63.4	69.6
EDUCATION			
No Degree	3.8	3.8	3.7
BA/BS	57.7	58.4	60.7
MA/MS	25.1	24.5	23.3
PhD	13.4	13.2	12.3
AGE			
<25	1.0	3.6	2.1
25-34	17.6	22.3	32.3
35-44	30.0	25.2	21.9
45-54	31.4	28.4	25.5
55+	20.0	20.5	18.1
(Avg Age)	(45.0)	(43.6)	(42.3)