

Sep 2 '60

ALLEGHENY COLLEGE LIBRARY

DEPARTMENT OF DEFENSE
Annual Report
of the
SECRETARY OF DEFENSE



and the
ANNUAL REPORTS
of the
SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE

July 1, 1958, to June 30, 1959



DL 1: 959

THE
JOURNAL
OF
JAMES
MILNE
1841-1842
VOLUME
I
PART
I
1841
1842

DEPARTMENT OF DEFENSE
Annual Report
of the
SECRETARY OF DEFENSE
and the
ANNUAL REPORTS
of the
SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE
July 1, 1958, to June 30, 1959

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1960

For Sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. — Price \$1.25

DEPARTMENT OF COMMERCE
Annual Report
1907
BUREAU OF COMMERCE
OFFICE OF THE SECRETARY
WASHINGTON, D. C.
1908

RECEIVED
JAN 10 1908
U. S. DEPT. OF COMMERCE
BUREAU OF COMMERCE
WASHINGTON, D. C.

Letter of Transmittal

THE SECRETARY OF DEFENSE
WASHINGTON

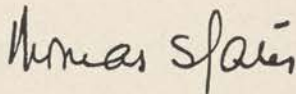
JUNE 16, 1960

DEAR MR. PRESIDENT:

This report of Secretary of Defense McElroy, together with those of the Secretaries of the Army, the Navy, and the Air Force, is submitted in compliance with Section 202(d) of the National Security Act of 1947, as amended.

It is the first report to be submitted as prescribed by the Department of Defense Reorganization Act of 1958 on an annual, rather than a semiannual, basis and covers fiscal year 1959.

With great respect, I am
Faithfully yours,



THOMAS S. GATES, JR.

THE PRESIDENT
THE WHITE HOUSE

Contents

ANNUAL REPORT OF THE SECRETARY OF DEFENSE

	Page
Chapter I. INTRODUCTION.....	1
II. THE ARMED FORCES.....	3
III. RESEARCH AND DEVELOPMENT.....	12
IV. THE DEFENSE BUDGET.....	28
V. MANAGEMENT.....	35
VI. MANPOWER.....	47
VII. WEAPONS, EQUIPMENT, AND FACILITIES.....	64
VIII. MUTUAL SECURITY.....	79
IX. CONCLUSION.....	95
ANNUAL REPORT OF THE RESERVE FORCES POLICY BOARD..	97

ANNUAL REPORT OF THE SECRETARY OF THE ARMY

Chapter I. INTRODUCTION.....	113
II. OPERATIONS AND TRAINING.....	115
III. LOGISTICS.....	133
IV. MANPOWER AND PERSONNEL MANAGEMENT.....	149
V. THE SEARCH FOR BETTER WEAPONS, EQUIPMENT, AND TECH- NIQUES.....	166
VI. CIVIL WORKS: WATER-RESOURCE DEVELOPMENT.....	185
VII. STRENGTHENING MANAGEMENT.....	191
VIII. BUDGET AND FUNDS.....	198
IX. CONCLUSION.....	203

ANNUAL REPORT OF THE SECRETARY OF THE NAVY

Chapter I. INTRODUCTION.....	207
II. NAVAL OPERATIONS.....	209
III. MARINE CORPS OPERATIONS.....	226
IV. NAVAL PERSONNEL.....	233
V. DESIGN AND CONSTRUCTION OF SHIPS.....	239
VI. DESIGN AND PROCUREMENT OF AIRCRAFT.....	246
VII. WEAPONS.....	249
VIII. MEDICAL AND DENTAL SERVICE.....	254
IX. SUPPLY.....	258
X. SHORE FACILITIES.....	261
XI. RESEARCH.....	265
XII. CIVILIAN PERSONNEL.....	274
XIII. BUSINESS MANAGEMENT.....	276
XIV. CONCLUSION.....	283

ANNUAL REPORT OF THE SECRETARY OF THE AIR FORCE

	Page
Chapter I. INTRODUCTION.....	287
II. COMBAT FORCES.....	290
III. MANPOWER.....	302
IV. MILITARY TRAINING.....	308
V. HEALTH AND WELFARE.....	317
VI. INSTALLATIONS.....	326
VII. RESEARCH AND DEVELOPMENT.....	332
VIII. PROCUREMENT AND PRODUCTION OF MATERIEL.....	341
IX. LOGISTICAL SERVICES.....	347
X. MANAGEMENT.....	352
XI. BUDGET.....	358
Appendix.....	363
Index.....	387

1. Introduction

The defense program is part of an integrated national effort to meet the Communist threat in whatever form it may appear—political, economic, scientific, psychological, or military. It is not created in isolation. The challenge is total and the response equally so.

Within the overall framework of national policy, the defense establishment contributes to meeting two major objectives:

First, to deter the outbreak of a major war by defending the home base and striking back decisively against any aggressor; and

Secondly, to prevent or contain local wars by being ready to come to the aid of threatened friendly nations, if necessary.

To carry out their assigned missions, the armed forces operate in a flexible military structure. The military departments provide the necessary ground, sea, and air units, and unified and specified commands are responsible for the operational direction of these units as a combined force in accordance with their particular assignments. Few of these forces are designed for a single purpose; most are multi-purpose forces having vital roles in a major as well as a limited war, in nuclear as well as nonnuclear warfare.

While maintaining a balance of forces for any contingency, defense programs must also strike a balance between current needs and future needs, avoiding an overinvestment of resources in either.

These basic principles controlled the development of our armed forces in fiscal year 1959, as in previous years. An effective deterrent to aggression was maintained and approved programs assure that this effectiveness will continue in future years.

Manned aircraft, armed with nuclear weapons, continue to provide the backbone of our retaliatory force, which was further modernized during the year and more widely dispersed for its protection. In addition, air defenses were strengthened and warning systems improved to lessen the chances of successful penetration by enemy aircraft. The first long-range ballistic missiles began to enter the defensive arsenals of the free world, and additional weapons systems of this type were rapidly brought closer to operational readiness.

General emergency forces were also strengthened with the delivery of modern weapons and equipment that increased the effectiveness and mobility of combat units. By their strategic deployment over-

seas and their readiness to respond to an emergency, these forces, together with those of our allies, remained a major factor in discouraging Communist aggression. During fiscal year 1959, they contributed to a peaceful solution of potentially dangerous situations, particularly in Lebanon and the Taiwan Strait.

To back the active forces whenever necessary, a well-trained, ready reserve establishment was maintained.

An essential part of the shield that allows non-Communist nations to plan their future in freedom is our worldwide system of bilateral and regional collective security agreements, which are given vitality through the Military Assistance Program. This program, carried out in cooperation with the Department of State, continued to pay large dividends.

In the management of its many activities, the Department of Defense sought to install more efficient and economical methods of operation. In the current era of scientific discoveries, the key factor in this effort has become the constant critical review of major programs, reevaluating their priority in the light of changing requirements brought about by technological advances. As a result of such reviews, a number of major research and development projects were canceled during the year and funds shifted to more promising activities.

An improved organization for the operational control of ground, sea, and air units in the field and for supervising research and development activities was established in accordance with the provisions of the Department of Defense Reorganization Act of 1958. New military personnel programs, enacted in recent years, helped to raise the quality of the armed forces in 1959 and reduced the number of new men to be recruited and trained. Further experience with the Single Manager concept and the Armed Forces Supply Support Center indicated the value of such organizations in the efficient management of common supplies and services for the armed forces. These and many additional measures taken throughout the defense establishment brought increased security for each dollar expended.

In an organization as vast as the Department of Defense—including 2,500,000 military personnel and 1,250,000 civilian employees and having assets valued at an acquisition cost of over \$150 billion—occasional human error will inevitably be encountered. The Department has established corrective procedures which should reduce such mistakes to a minimum. Good management, however, will continue to depend on the devotion to duty and common sense of every official. The caliber of military and civilian personnel in the defense establishment is high and the Nation has been well served.

II. The Armed Forces

The security of the United States is in the hands of a powerful military establishment—one capable of readily detecting a threatened attack, of countering the intruders, of retaliating devastatingly, and of coming quickly to the aid of beleaguered allies in any part of the world in the event of local aggression. Eight mutually supporting unified and specified commands control most of the operating forces responsible for these missions. (See fig. 1.)

During fiscal year 1959, as in preceding years, the major changes in the structure of the armed forces were related to the introduction and increased use of new and improved weapons systems. These changes were accompanied by a reduction of 97,000 in military personnel—from a total of 2,601,000 on June 30, 1958, to 2,504,000 at the end of fiscal year 1959.

No major changes were made in the deployment of our armed forces during the fiscal year. Over 40 percent—or about 1 million men on June 30, 1959—were stationed outside of the continental United States (CONUS) or assigned to naval activities afloat or mobile. This deployment involved 40 percent of the Army, 63 percent of the Navy, 24 percent of the Marine Corps, and 28 percent of the Air Force. Assignments to Alaska and Hawaii, included in this total, amounted to about 33,000 and 45,000 men, respectively.

The ratio of the operating forces to total personnel strength was 62.9 percent at the close of the fiscal year—an increase of 0.7 percent over the preceding year. This improvement was achieved primarily by a reduction in the training forces—from 17.4 to 16.6 percent—accompanied by a slight decrease in the military personnel in the transient and patients category—from 3.3 to 3.1 percent. The ratio of supporting forces increased from 17.1 to 17.4 percent.

Retaliatory Forces

The capability of the armed forces of the United States to launch a massive retaliatory strike against any aggressor continued to be effectively maintained during fiscal year 1959.

The bulk of this retaliatory force, assigned to the Strategic Air Command (SAC), consists of B-52 and B-47 bombers, supported by jet KC-135 and propeller-driven KC-97 tankers. The introduction of a more advanced B-52 model with longer range and the de-

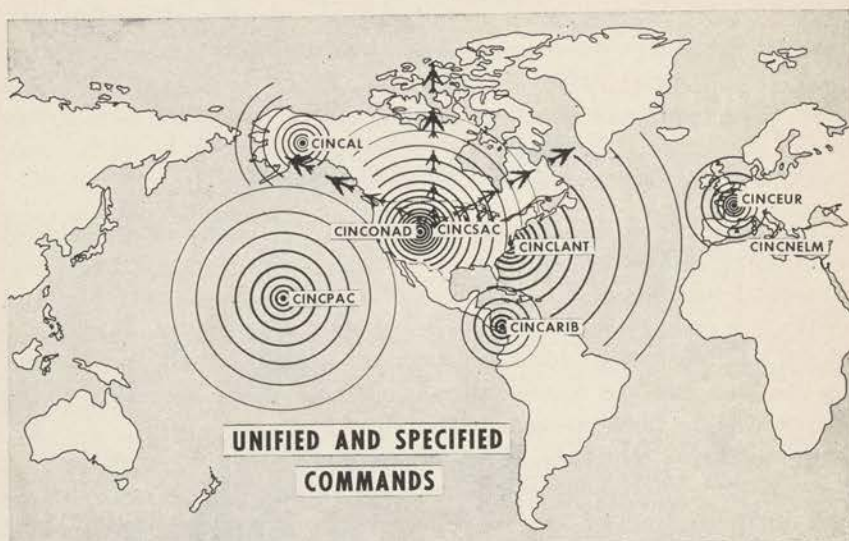


Figure 1

livery of additional jet tankers provided increased range capability and greater flexibility to this bomber force. The ability to penetrate enemy defenses was improved by the delivery of new electronic countermeasure equipment to jam enemy radars and air defense weapons. With bomber crews subject to constant evaluation of their navigation and bombing proficiency, maximum assurance was provided that assigned missions would be carried out with the highest degree of accuracy and effectiveness.

In accordance with current plans, the manned bomber force will continue to carry substantial responsibility for strategic deterrence even after the introduction of long-range ballistic missiles. Being subject to recall after takeoff, the manned bomber can remain under positive control for a considerable time after an alert warning, unlike missiles which are irrevocably on their way after launching. This capability is particularly valuable to a country subject to surprise attack and determined not to initiate any aggression.

By the close of the fiscal year, the first Intercontinental Ballistic Missile (ICBM), the ATLAS, was almost ready for operational deployment. Intermediate Range Ballistic Missiles (IRBM) had already been delivered to allied forces in the United Kingdom and agreements completed for further deployments in Italy. These launching sites will be manned by allied crews trained in the United States. While not an integral part of our retaliatory forces, these missiles will add significantly to the total deterrent capabilities of the free world.

Supplementing the striking power of SAC are tactical land-based and carrier-based air forces and missile units deployed in areas of potential trouble throughout the free world. Most of the Air Force and Navy tactical planes are equipped to carry nuclear weapons and can strike deep into enemy territory.

The versatility of our retaliatory forces complicates any enemy's plan to destroy them and, at the same time, increases their capability to accomplish their mission.

Continental Defense

Faced with the continuing possibility of surprise attack, further steps were taken during fiscal year 1959 to protect our strategic air forces through wider dispersal, a higher state of alert, and better warning and defense systems.

Already widely deployed in the Western Hemisphere and overseas, B-52 and B-47 wings were given additional bases to provide not only greater protection against attack but also a more immediate response capability. The Air Force's dispersal program has as its ultimate objective the location, with associated tankers, of no more than one B-52 squadron and one B-47 or B-58 wing at a single base.

An increased number of our bomber aircraft were placed on ground alert during fiscal year 1959, thus enabling them to be off and on the way within 15 minutes after initial warning.

Improvements in the warning system against enemy aircraft during the past year consisted primarily of extensions of the Distant Early Warning (DEW) line. Additional stations were built in the Aleutian Island chain and Pacific Ocean coverage to the south was provided by naval ships and aircraft. An eastward extension, to link up with the warning system of the North Atlantic Treaty Organization, was placed under construction. To back up the DEW line below the Arctic Circle, the Mid-Canada line along the 55th parallel and the Pine Tree line along the United States-Canadian border continued to be operated 24 hours a day. Radar picket ships, Texas Towers, and early warning aircraft extended detection and tracking capabilities over wide ocean areas. (See fig. 2.)

Construction of a Ballistic Missile Early Warning System (BMEWS), initiated in 1958, was continued as a matter of high priority. Considerable progress had been made by June 30, 1959, in the establishment of the Alaska and Greenland stations, while negotiations for the construction of the third station in the United Kingdom were nearly completed. BMEWS will provide a minimum of 15 minutes' warning of any mass attack on the United States by ballistic missiles.

Active defenses against bomber attacks include manned interceptors, guided missiles, and an electronic control network. All three

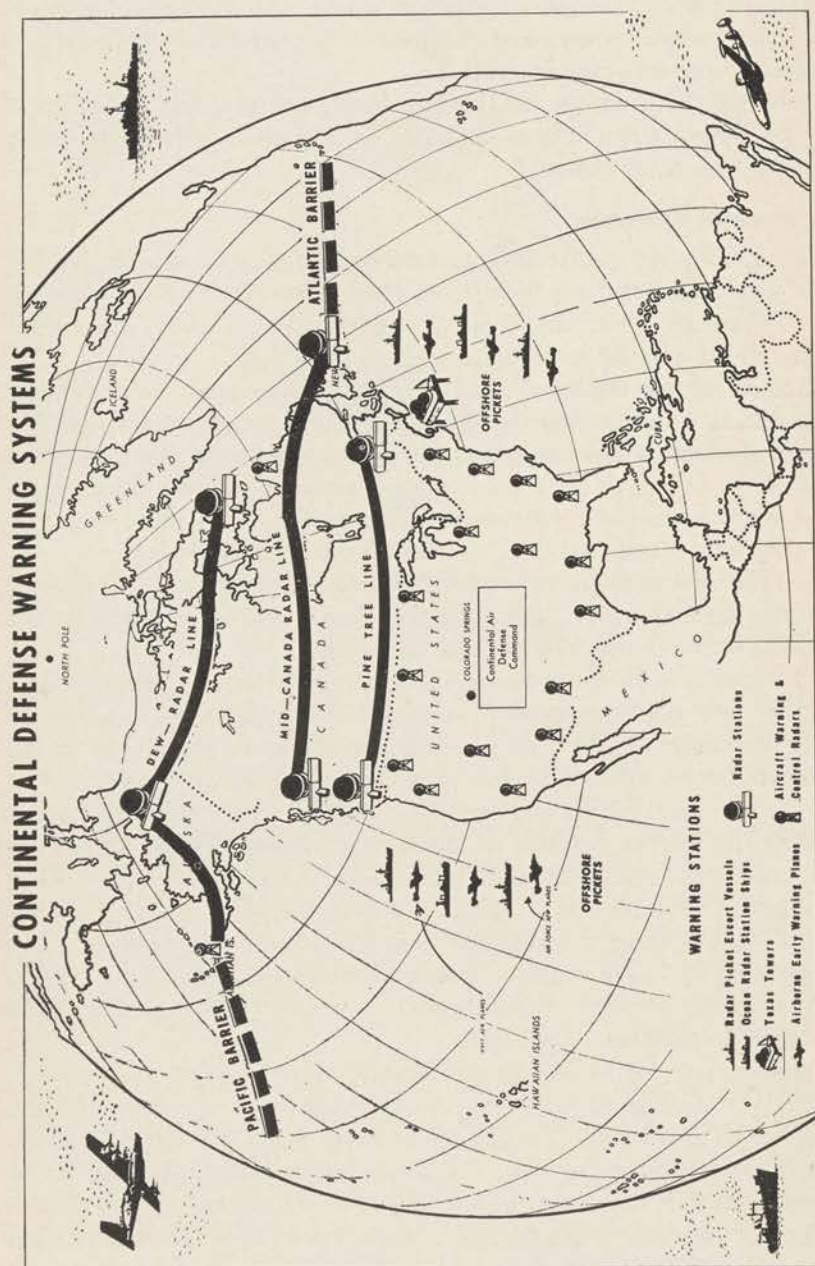


Figure 2

elements were improved during fiscal year 1959. Supersonic all-weather F-101B, F-102, F-104, and F-106 interceptors continued to replace the subsonic F-86's, F-89's, and F-94's, and their effectiveness was increased with the delivery of additional air-to-air missiles and the GENIE nuclear rocket. These "area" defenses will be supplemented next year by the BOMARC A, a missile with a 200-mile range; BOMARC B, with double this range, is under development. "Point" defenses were strengthened with the deployment of additional NIKE-HERCULES batteries, replacing nonnuclear, shorter range, and lower altitude NIKE-AJAX missiles.

Coordinated direction of the air defense battle is provided by the Semi-Automatic Ground Environment (SAGE) System, which gives the tactical commander the information needed for directing aircraft and missiles against enemy bombers. As four more sectors were completed during fiscal year 1959, the first SAGE division, including five sectors, became fully operational covering the northeastern area of the United States. The Army's MISSILE MASTER, for the control of NIKE missiles, was made technically compatible with SAGE and integrated into the overall network.

Air defense activities of the Army, Navy, and Air Force have been unified under the Continental Air Defense Command (CONAD), with headquarters at Colorado Springs, Colo. Close cooperation with the Royal Canadian Air Force is assured through the North American Air Defense Command (NORAD), which was established in 1957.

General Purpose Forces

Twice during fiscal year 1959, U.S. tactical forces demonstrated the rapidity with which they can come to the assistance of friendly countries threatened by aggression—in Lebanon in July 1958 and in Taiwan in September 1958. Some of the units deployed came from strategic reserves held in readiness at home, while others were drawn from forces already stationed overseas and trained for such emergencies.

The forces available for deterring local aggression and countering it, if necessary, constitute by far the largest portion of our operating forces. In addition to these missions, the "limited war" forces also have vital roles assigned to them in case of the outbreak of a major war, thus giving them a greater general purpose function than most other units.

These "general purpose" forces continued to gain in effectiveness during fiscal year 1959 with the introduction of more advanced weapons providing greater firepower and mobility. Similar improvements occurred in the capabilities of our allies, many of whom received modern equipment and training through the Military Assist-

ance Program. The combined strength of all these forces was a major factor throughout the past year in deterring local aggression.

U.S. ground forces contributing to this deterrent include both Army and Marine Corps units.

Of the Army's 15 divisions, 8 are deployed overseas—5 in Europe, 2 in Korea, and 1 in Hawaii. Many smaller combat units, such as REDSTONE groups and the Southern European Task Force (SETAF) in Italy, provide additional striking power to U.S. and allied forces. At home, the Strategic Army Corps (STRAC), composed of one infantry and two airborne divisions, is held in readiness for action wherever needed.

The three divisions and three aircraft wings of the Fleet Marine Forces are also combat ready. In the Pacific, most of one division and one aircraft wing is based in the Okinawa-Japan area with the remainder in Hawaii, while another division-wing team is located in southern California. The third division and aircraft wing was stationed on the east coast, with some of its ground and air units on continuous duty with naval forces in the Mediterranean.

U.S. naval striking forces are organized into four fleets. The First and Seventh Fleets, with eight aircraft carriers, are operating in the Pacific, with the Seventh Fleet providing a major deterrent to Communist aggression in Far Eastern waters. The Second Fleet in the Atlantic and the Sixth Fleet in the Mediterranean, including six aircraft carriers, guard the sea approaches to the east coast and protect U.S. and NATO interests in the Near East. Ships in these fleets are rotated on a regular schedule so that one-third of our naval combat forces is always in the Far East and Mediterranean and another third off our east and west coasts, while the remaining third is being overhauled or used for training purposes.

The Air Force's worldwide tactical air combat strength includes tactical bomber, fighter, missile, and reconnaissance units, supported by troop carriers. These are organized predominantly into three main commands. U.S. Air Forces, Europe, which operate under overall NATO control, includes the majority of these forces. The Pacific Air Forces, with units deployed in many Far Eastern allied countries, is a component command under the Commander in Chief, Pacific. At home, the remaining tactical air strength is controlled by the Tactical Air Command and includes a Composite Air Strike Force which is ready for quick oversea deployment in case of local emergencies.

The Military Services

While land, sea, and air units are assigned for operational purposes to unified and specified commands in whatever combination is required for the accomplishment of the missions assigned to these commands,

the military services carry full responsibility for organizing, training, equipping, and administering such units.

The Army

Adjustments in the formal organizational structure of the Army were few. While Army personnel strength dropped from 899,000 to 862,000 (with 870,000 authorized), the Army maintained its 15 divisions, organized into pentomic divisions with both nuclear and nonnuclear capabilities. The nondivisional units included, as in the preceding year, five armored cavalry regiments, one armored combat command, two infantry brigades, and four missile commands. The number of infantry battle groups was increased from 6 to 8 (by the redesignation of units) and the number of air defense battalions was decreased from 90 to 85.

These organizational adjustments fail to reflect the substantial modernization that was effected in fiscal year 1959. Additional REDSTONE and CORPORAL surface-to-surface missiles as well as HONEST JOHN rockets were delivered and the first LACROSSE missiles for short-range combat support became operational. Most of the troops handling these modern weapons were incorporated in larger divisional and regimental units rather than being maintained as separate organizations. While air defense battalions were reduced by five, air defense capabilities were substantially increased as NIKE-HERCULES batteries replaced antiaircraft gun and NIKE-AJAX batteries in substantial numbers. The first HAWK battalion was organized, to provide improved defenses against low-flying aircraft after completion of training. The Army's active aircraft inventory of helicopter and fixed-wing liaison aircraft was increased by 172—from 5,027 to 5,199.

The Navy and Marine Corps

Modernization in the Navy has been accompanied, as in the other military services, by slight reductions in personnel and combat units. Naval personnel declined by 15,000 during fiscal year 1959—from 641,000 on June 30, 1958, to 626,000 a year later (with 630,000 authorized), and the number of warships was reduced by 10 to a total of 386, and the number of other ships—mine warfare, patrol, amphibious warfare, and auxiliary vessels—by 21 to a total of 474. At the same time, construction of 20 new ships was completed and 1 additional warship was modernized under the Navy's systematic conversion program to prolong the useful life of older ships.

The Navy had 14 attack carriers at the close of the fiscal year—1 less than at the beginning of the year—but the year-end total included the fourth *Forrestal*-class carrier, the *Independence*, and a completely

modernized *Essex*-type carrier, the *Oriskany*. The elimination of 1 attack carrier was accompanied by the reduction of the carrier air groups from 17 to 16. The number of antisubmarine carriers remained at 9 during the year and that of carrier-based antisubmarine air squadrons at 22.

The Navy's cruiser program provides for a gradual conversion to guided-missile ships. During fiscal year 1959 a third guided-missile cruiser joined the fleet, while the number of regular cruisers was reduced by 4—from 13 to 9. The destroyer fleet of 237—8 less than at the end of the preceding fiscal year—included 5 new destroyers. The submarine fleet of 113—2 more than on June 30, 1958—included 3 new nuclear-powered attack submarines, 2 more REGULUS guided-missile submarines, and 1 new conventional submarine.

The Navy's active aircraft inventory, while decreasing from 10,533 to 9,649 aircraft during fiscal year 1959, continued to be modernized as substantial numbers of A4D jet attack aircraft and supersonic F8U fighters were delivered. The ratio of jet aircraft in the active inventory rose from 42 to 43 percent. The increased availability of SIDEWINDER and SPARROW III air-to-air missiles and the introduction of the first BULLPUP air-to-ground missiles greatly increased the combat effectiveness of naval air power.

Naval air defense capabilities were improved as more TERRIER missiles were deployed with the fleet, and the longer range TALOS, fired for the first time at sea in February 1959, became operational.

The number of Marines on active duty declined from 189,500 to 175,600 during fiscal year 1959, but the organizational structure of 3 divisions and 3 air wings was maintained. The decrease of 13,900 in personnel brought some reductions in combat and support units. At the same time, however, striking power was increased as additional HONEST JOHN rockets and land-based TERRIER air defense and SIDEWINDER air-to-air missiles became available.

The Air Force

On June 30, 1959, the Air Force was organized around 105 wings—43 strategic, 27 air defense, and 35 tactical (including 11 troop carrier). Organizationally, this represented a reduction of 1 strategic, 1 air defense, and 10 tactical wings, all of which had been equipped with older type aircraft. Military personnel strength stood at 840,000 (with 850,000 authorized), as compared to 871,000 a year earlier. While the active aircraft inventory of the Air Force fell from 22,578 planes to 20,890, jet aircraft increased from 62 to 66 percent.

The changes in the Air Force structure were the result of modernization taking place throughout the armed forces. The increased

guided-missile capabilities of the Army reduced the need for Air Force tactical as well as air defense support. At the same time, the Air Force continued its own rapid modernization as improved aircraft and missiles were deployed in larger numbers.

The delivery of B-52G models introduced longer range and new missile-launching capabilities into the strategic air forces. The last B-36 bombers were retired during the year and replaced by B-52's. With each of the B-52 wings scheduled to be equipped with 45 instead of the former 30 aircraft, the retaliatory power of these heavy bombardment wings will be greatly increased. Combat flexibility was also substantially improved by the delivery of additional KC-135 jet tankers. The B-47 modernization program continued to add to the attack capability of this versatile bomber.

As for air defense, interceptor squadrons continued their rapid conversion from F-86's, F-89's, and F-94's to the supersonic F-101 B's, F-102's, F-104's, and F-106's, with some of the aircraft equipped with GENIE nuclear rockets. At the same time, substantial numbers of FALCON and SIDEWINDER air-to-air missiles were delivered.

Tactical air support was improved as additional F-100's, F-101's, and F-104's were delivered and the first F-105 squadron became operational. Moreover, additional MATADOR/MACE squadrons were assigned to the tactical missile wing established in 1957. New medium C-130's and heavy C-133's replaced older troop carrier aircraft to maintain a substantial airlift capability.

III. Research and Development

Obligations for research, development, testing, and evaluation by the Department of Defense during fiscal year 1959 reached a total of \$5.4 billion—representing a \$1.1 billion, or 20 percent, increase over the preceding year. The 1959 total included \$3.5 billion obligated from research and development funds, an additional \$1.6 billion from procurement funds, and \$0.3 billion from military personnel and construction funds.

While public attention remained focused primarily on guided missiles, particularly ballistic missiles, the 2,000 active research and development projects of the Department of Defense covered practically all areas of military interest, ranging from clothing and food for the individual serviceman to earth satellites. Over 38 percent of programed obligations in fiscal year 1959 were devoted to guided missiles and related equipment, 12 percent to aircraft, 11 percent to military sciences, 9 percent to programs in space technology, 6 percent to ordnance equipment and combat vehicles, 5 percent to ships of all types, 19 percent to other equipment, including communications, navigation, and air defense items, and to program management.

These projects were kept under constant review to assure an integrated research program, to expedite the research and development most vital to our security, and to eliminate marginal projects, particularly those overtaken by technological progress. It is believed that these objectives were achieved in 1959.

Guided Missiles

On June 30, 1959, the armed forces had operational or under development a total of 37 guided missiles systems. Of these, 15 were operationally available, 7 were scheduled to become operational during fiscal year 1960, and the remaining 15 were in various stages of research and development. During the fiscal year, four new projects were initiated—SHILLELAGH, REDEYE, MAULER, and SKY-BOLT—and four were dropped because of the progress made with more advanced missiles or changes in operational concepts.

RASCAL, REGULUS II, GOOSE, and DART

Programed obligations for guided missiles systems, including not only the costs of bringing missile systems to operational status but also the cost of procuring missiles and related equipment for opera-

GUIDED MISSILES SYSTEMS - PROGRAMED OBLIGATIONS

Fiscal Years 1946-1959

Missile Programs - Millions of Dollars				
Fiscal Year	Grand Total	IRBM and ICBM	Other Surface-to-Surface	All Other
1946 and before	72	2	19	51
1947	58	-	20	38
1948	81	.3	36	45
1949	98	.1	45	53
1950	134	-	65	69
1951	784	.5	185	598
1952	1,058	.8	239	818
1953	1,166	3	403	760
1954	1,067	14	336	717
1955	1,468	159	398	911
1956	2,281	526	387	1,368
1957	4,506	1,401	603	2,502
1958	5,180	2,150	639	2,391
1959	6,900	2,946	685	3,269

NOTE: These figures include all research and development, construction, and procurement funds directly associated with missile programs, including those shipbuilding and aircraft costs directly related to providing a missile capability. Funds for military pay and for operation and maintenance of operational units and sites are not included.

Figure 3

tional purposes, increased by almost one-third during fiscal year 1959, reaching a total of \$6.9 billion as compared to \$5.2 billion during the preceding year. This year's programed obligations included \$2.9 billion for long-range ballistic missiles, \$0.7 billion for other surface-to-surface missiles, and \$3.3 billion for surface-to-air, air-to-air, and air-to-surface missiles. (See fig. 3.)

The guided-missiles effort of the Department of Defense has been focused on three major areas: (1) Strategic missiles for our retaliatory forces, (2) air defense missiles, and (3) tactical missiles in support of ground and naval forces. These categories are not mutually exclusive, since many missiles can be used for more than one purpose.

Strategic Missiles

Since 1955 the United States has assigned the highest national priority to the development of long-range ballistic missiles. As a result of this effort, two Intermediate Range Ballistic Missiles, the THOR and the JUPITER, became operationally available within 3 years and the first Intercontinental Ballistic Missile, the ATLAS, was scheduled to become operational shortly after the close of this fiscal year. The successful development of radical new weapons systems in such a short time is unprecedented.

The Department of Defense effort in the long-range ballistic missile field included, in addition to the above projects, the POLARIS fleet ballistic missile, to become operational in calendar year 1960; the TITAN, a followup missile to the ATLAS, scheduled for 1961; and a second-generation solid-propellant MINUTEMAN, to be operational in 1963.

The urgency for an operational capability in long-range ballistic missiles led to the establishment in 1955 of two IRBM projects with a range of 1,500 nautical miles—a distance that appeared obtainable at an earlier date than the 5,500 nautical miles of the ICBM. Despite encountering some difficulties, both the THOR and the JUPITER met their established schedules and were considered operationally available in December 1958. The operational deployment of these missiles overseas was delayed since additional time was needed to meet the construction, installation, checkout, and modification requirements of our allies.

The original ICBM program was based on two liquid-propellant missiles—the ATLAS, started in 1954, and the TITAN, placed under contract in 1955 to provide an alternative approach to solving the complex problems likely to be encountered in this pioneer ICBM effort. Difficulties in flight tests during the spring of 1959 retarded the ATLAS schedule and forced a postponement of the operational

STRATEGIC MISSILES

Type	JUNE 30, 1959			
	Developing Service	Operationally Available	In Late Development	In Early Development
1,500-MILE IRBM	ARMY AIR FORCE	JUPITER THOR		
FLEET BALLISTIC MISSILE	NAVY		POLARIS	
5,000-MILE AERODYNAMIC	AIR FORCE		SNARK	
5,500-MILE ICBM	AIR FORCE AIR FORCE		ATLAS TITAN	MINUTEMAN
AIR-TO-SURFACE	AIR FORCE		HOUND DOG	SKY BOLT
AIR-LAUNCHED DECOY	AIR FORCE		QUAIL	

Figure 4

availability date from June 1959 to the early fall of 1959. As the success of the ATLAS became assured, the TITAN program was reoriented toward more advanced objectives rather than continued as an insurance program. The 1961 operational date for the TITAN remained unchanged at the close of the fiscal year. A second-generation ICBM, the solid-propellant three-stage MINUTEMAN, was added to the program in February 1958, when substantial improvements in solid propellants opened up the possibility for a much lighter, less costly, and more mobile ICBM with a capability of instantaneous reaction. The progress made in this project by the end of the fiscal year indicated that all these objectives could be achieved well within the time allotted.

The POLARIS weapons system, authorized in December 1956, was originally scheduled to become operational in 1962, but the early successful resolution of scientific and technological problems made it possible to shorten the development period by 2 years. The solid-propellant, two-stage POLARIS, to be fired from submerged nuclear-powered submarines, will have an initial range of 1,200 nautical miles, subsequently to be increased to the 1,500-nautical-mile IRBM range. The mobility of its firing platform, however, will enable the POLARIS to carry out missions similar to those intended for the ICBM. The first POLARIS submarine, the *George Washington*, was launched on June 9, 1959. At the close of the fiscal year, five additional such submarines were being constructed and contracts for three more were ready for signature.

The rapid development of ballistic missiles has been mainly responsible for the cancellation of aerodynamic long-range missiles, such as NAVAHO, TRITON, and, in fiscal year 1959, REGULUS II. The only missile system of this type scheduled for use, but in much smaller numbers than originally contemplated, is the 5,000-nautical-mile, turbojet SNARK, which will become operational in calendar year 1960.

To increase the striking power of our strategic bombers, two air-to-surface missiles systems are under development—the HOUND DOG, which will travel over 500 miles at supersonic speed under inertial guidance, and the SKYBOLT, an air-launched 1,000-mile ballistic missile. Additional protection will be provided to strategic bombers by the QUAIL, which is being developed to provide an air-launched diversionary missile. (See fig. 4.)

Air Defense Missiles

The protection of U.S. cities and military installations against high-altitude attacks by enemy bombers has been considerably increased by the availability, since early 1954, of NIKE-AJAX and,

AIR DEFENSE MISSILES

JUNE 30, 1959				
Type	Developing Service	Operationally Available	In Late Development	In Early Development
FOR FRONT-LINE GROUND TROOPS	ARMY ARMY			REDEYE MAULER
DEFENSE AGAINST LOW-FLYING PLANES	ARMY		HAWK	
GROUND-TO-AIR, SHORT/MEDIUM RANGE	ARMY ARMY	NIKE-AJAX NIKE-HERCULES		
GROUND-TO-AIR, LONG RANGE	AIR FORCE		BOMARC	
FOR NAVAL VESSELS	NAVY NAVY	TERRIER TALOS	TARTAR	
AIR-TO-AIR, SHORT RANGE	NAVY AIR FORCE NAVY	SIDEWINDER FALCON SPARROW		
AIR-TO-AIR, LONG RANGE	NAVY			EAGLE
ANTI-BALLISTIC MISSILE	ARMY			NIKE-ZEUS

Figure 5

since 1958, of NIKE-HERCULES. To supplement these Army surface-to-air missiles with ranges of about 25 and 75 miles, respectively, the Air Force has under development the 200- to 400-mile BOMARC, which is intended to provide additional defense in depth for the North American continent. Protection by guided missiles against low-flying aircraft will become available early in the next fiscal year, when the Army's HAWK is scheduled to become operational.

To meet the special air defense problems of the fleet at sea, the Navy has been developing three surface-to-air missiles systems, two of which are operational. Since 1955 the TERRIER has provided close-in air defense for naval ships, and in January 1959 the TALOS, with an initial range of about 50 miles, became operational. The TARTAR, a smaller improved weapon intended particularly for destroyer use, is still in the development stage.

The Army initiated the development of two new surface-to-air missiles during fiscal year 1959—REDEYE, a bazooka-type air defense missile for individual soldiers, and MAULER, a mobile, all-weather missile to be used by forward elements in the field.

To increase the air-to-air combat capability of military aircraft, three families of supersonic guided missiles have been under development—SPARROW, FALCON, and SIDEWINDER. Different guidance, control, speed, warhead, and range characteristics distinguish these missile families from one another. While all three have been operational since 1955-56, a succession of improved models has been under development. SPARROW III became operational in August 1958.

Still in the early development stage is the Navy's EAGLE, a long-range supersonic air-to-air missile to be launched from relatively slow, patrol-type aircraft flying protective cover.

Defense against long-range ballistic missiles has presented scientists with probably the greatest challenge of the missile age—the destruction of weapons traveling more than 5,000 miles in less than 30 minutes with maximum speeds above 15,000 miles per hour. One possible answer to this problem might be provided by the Army's NIKE-ZEUS, which is being developed under highest priority; it will not, however, be placed into production until necessary tests have been satisfactorily completed. Other possible answers to this complex problem are being investigated under the supervision of the Advanced Research Projects Agency. (See fig. 5.)

Tactical Missiles

At the close of the fiscal year, tactical commanders had available for the support of ground combat units four surface-to-surface missiles systems with nuclear capability. Close tactical support was

TACTICAL MISSILES

JUNE 30, 1959				
Type	Developing Service	Operationally Available	In Late Development	In Early Development
CLOSE-IN SUPPORT OF GROUND TROOPS	ARMY			SHILLELAGH
ANTI-TANK	ARMY		SS-10, SS-11	
SURFACE-TO-SURFACE, SHORT RANGE	ARMY	LACROSSE		
SURFACE-TO-SURFACE, 75-MILE RANGE	ARMY	CORPORAL	SERGEANT	
SURFACE-TO-SURFACE, 200-MILE RANGE	ARMY	REDSTONE		PERSHING
SURFACE-TO-SURFACE, LONG RANGE	AIR FORCE	MATADOR	MACE	
SHIP-TO-SHORE, LONG RANGE	NAVY	REGULUS I		
AIR-TO-SURFACE, SHORT RANGE	NAVY	BULLPUP		
AIR-TO-SURFACE, MEDIUM RANGE	NAVY		CORVUS	
ANTI-SUBMARINE MISSILE	NAVY			SUBROC

Figure 6

being provided by LACROSSE, which became operational in June 1959. Targets within a distance of 75 and 200 miles came within the range of CORPORAL and REDSTONE, respectively; these first-generation, liquid-propellant ballistic missiles are scheduled to be replaced during the next 3 years by the second-generation, solid-propellant SERGEANT and PERSHING. Targets at even greater range were subject to destruction by the subsonic, jet-propelled MATADOR. The MACE, an improved version of the MATADOR, is scheduled to become operational early during the next fiscal year.

For close-in support two additional guided missiles systems were under development—SHILLELAGH, approved during fiscal year 1959, for use against armor, field fortifications, and troops, and SS-10, a wire-guided, French-produced, antitank missile, which was being procured abroad to take the place of DART, terminated in September 1958. The SS-11, a similar weapon with greater range, speed, and effectiveness, was being purchased for evaluation.

To increase the striking power of the fleet against shore installations, the Navy has had available since 1954 REGULUS I. At the close of the fiscal year, four cruisers and four submarines armed with this 500-mile missile were in commission. In addition, the versatile air defense TALOS could also be employed for ship and shore bombardment.

Since April 1959 naval aircraft have been equipped with BULLPUP, an air-to-surface missile for attacks against pillboxes, tanks, truck convoys, and similar targets. A much longer range, heavier missile, CORVUS, designed to penetrate heavily defended land areas and fleets, is still in the development stage.

Also under development is the antisubmarine missile SUBROC, designed to be fired by submerged submarines, rise above the water, and send its warhead back into the water to destroy its target. This missile system promises to extend greatly the attack range of submarines.

In addition, land and sea commanders will have available most of the air defense missiles mentioned above—surface to air as well as air to air. The Marine Corps has selected for its specialized tasks such guided missiles systems as the Army's HAWK and REDEYE and a land-based version of the Navy's TERRIER for air defense; the Navy's SIDEWINDER and SPARROW III for air-to-air combat; the Navy's BULLPUP for air attacks on ground targets; and is considering the use of the French SS-10 and SS-11 as antitank weapons. (See fig. 6.)

Rockets

Rockets, unlike artillery shells, are self-propelled and, unlike guided missiles, travel without guidance once they have been launched. Of

the various types of rockets employed by our armed forces or under development, three are designed for a nuclear capability.

Since 1954, medium- and long-range artillery firepower has been supplemented by HONEST JOHN batteries, which have a greater battlefield mobility than conventional artillery and in one round can deliver a demolition effect of many hundreds of artillery shells. A much lighter and still more mobile version, the LITTLE JOHN, was in the late development stage at the close of the fiscal year.

Interceptor aircraft obtained a nuclear capability against other aircraft in 1957 when the Air Force's GENIE rocket became operational.

Military Space Technology

The establishment of civilian and military space programs under separate management highlighted the organizational development of the U.S. space effort during fiscal year 1959. The National Aeronautics and Space Administration (NASA), created by the act of July 29, 1958, started in October to assume management responsibility from the Department of Defense for projects of primarily civilian scientific interest.

On October 1, 1958, NASA took over the remainder of Project Vanguard for launching earth satellites; 3 scientific satellite projects involving 2 inflatable spheres and a cosmic ray experiment; 4 lunar probes scheduled for Project Pioneer; and a number of basic research programs for the development of nuclear rocket engines, fluorine engines, and a 1-million-pound-thrust, single-chamber engine. On December 3, 1958, the Army's Jet Propulsion Laboratory at Pasadena, Calif., was transferred to NASA, followed on April 13, 1959, by Project Tiros, a meteorological research satellite, and on June 30, 1959, by the Centaur launching vehicle, an ATLAS booster with a second-stage, liquid-hydrogen engine.

To provide top-level coordination between NASA and Department of Defense space activities, a Civilian-Military Liaison Committee was established. Duplication of facilities and effort was avoided by having the military departments act as executive agents for NASA for some of the major projects transferred.

Military space research remained throughout fiscal year 1959 under the management control and direction of the Advanced Research Projects Agency (ARPA), a separate agency reporting directly to the Secretary of Defense but operating under the technical supervision of the Director of Defense Research and Engineering. Specific research projects were assigned by ARPA either directly to one of the military departments or under contract to outside research organizations.

During fiscal year 1959, Department of Defense agencies were directly responsible for eight satellite launchings and one space

probe. These efforts included: (1) The firing, before NASA became operational, of one Vanguard and two Explorer satellites and one lunar probe; (2) Project Score, an orbiting communications relay system launched on December 18, 1958, and used for receiving and rebroadcasting messages; and (3) four Discoverer shots, designed to test components and propulsion and guidance systems as well as new techniques to be utilized in future space projects. Four of these nine launch attempts proved successful—one Explorer, Project Score, and the first two Discoverer shots.

Department of Defense agencies, acting as executive agents for NASA, were also responsible for five of the eight NASA launch attempts in fiscal year 1959. The Air Force handled the first two Pioneer space probes, while the Army fired Pioneer III and IV and the Beacon shot, intended to test atmospheric densities. The remaining three NASA shots, involving Vanguard vehicles, were under the complete control of the new civilian space agency. (See fig. 7.)

A special military experiment, designed to measure the effects of nuclear explosives high in outer space, Project Argus, was carried out in September 1958 with ARPA as executive agent.

Human space travel was investigated jointly by the military departments and NASA during fiscal year 1959. The Air Force started flight testing the X-15, designed to reach an altitude of 100 miles above the earth and speeds of 3,600 miles per hour. Substantial progress was also made in the development of DYNA-SOAR, capable of glide speeds of about 17,500 miles per hour. Additional physiological data were obtained when on May 28, 1959, an Army JUPITER carried two monkeys about 300 miles into outer space and the nose cone in which they traveled was recovered.

Still in the research and development stage at the close of the fiscal year were four military satellite programs—(1) Project Transit, a navigation satellite which is expected to provide a highly accurate method for exact position fixing by ships and possibly aircraft; (2) Project Midas, a missile defense alarm system employing infrared techniques to detect the launching of ballistic missiles; (3) Project Notus, utilizing satellites to provide long-range communication links; and (4) Project Sentry, directed toward the development of an effective reconnaissance satellite.

For the detection and identification of satellites and prediction of their orbits, the military departments started in February 1959 to operate the first sections of an active "minitrack" fence. When fully extended and equipped with the latest electronic instruments, the minitrack system should provide early, exact information on any object orbiting in space.

SATELLITES AND SPACE PROBES

Military Programs - Fiscal Year 1959			
Date	Name	Type	Test Results
Jul. 26, 1958	EXPLORER IV	Satellite	Placed in orbit; provided data on radiation belts and micrometeoritic impacts; in orbit on Jun. 30, 1959
Aug. 17, 1958	THOR-ABLE	Lunar Probe	Rocket exploded 77 seconds after take-off
Aug. 24, 1958	EXPLORER V	Satellite	Did not achieve orbit
Sep. 26, 1958	VANGUARD	Satellite	Did not achieve orbit
Dec. 18, 1958	Project SCORE	Communications Satellite	Placed in orbit; relayed messages to earth; down Jan. 21, 1959
Feb. 28, 1959	DISCOVERER I	Satellite	Placed in orbit but capsule not recovered; down early Mar. 1959
Apr. 13, 1959	DISCOVERER II	Satellite	Placed in orbit but capsule not recovered; down Apr. 26, 1959
Jun. 3, 1959	DISCOVERER III	Satellite	Did not achieve orbit
Jun. 25, 1959	DISCOVERER IV	Satellite	Did not achieve orbit

NASA Programs - Fiscal Year 1959			
Oct. 11, 1958	PIONEER I	Lunar Probe	Reached altitude of 71,300 miles; provided data on radiation belts and earth's magnetic field; executive agent: Air Force
Oct. 23, 1958	BEACON	Inflatable Satellite	Did not achieve orbit; executive agent: Army
Nov. 8, 1958	PIONEER II	Lunar Probe	Reached altitude of 963 miles; provided data on micrometeoritic density; executive agent: Air Force
Dec. 6, 1958	PIONEER III	Space Probe	Reached altitude of 63,600 miles; provided data on radiation and earth's magnetic field; executive agent: Army
Feb. 17, 1959	VANGUARD II	Satellite	Achieved orbit; expected life 10 years or more
Mar. 3, 1959	PIONEER IV	Planetoid	Passed about 37,000 miles from moon and went into solar orbit; executive agent: Army
Apr. 13, 1959	VANGUARD	Satellite & Inflatable Satellite	Did not achieve orbit
Jun. 22, 1959	VANGUARD	Satellite	Did not achieve orbit

Figure 7

ARPA has undertaken a number of long-range basic research projects investigating the feasibility of a nuclear-pulse-propelled space vehicle, the conversion of solar and nuclear energy to electrical energy in the space environment, and electrical propulsion methods.

Nuclear Weapons and Nuclear Reactors

Since the beginning of the atomic age in 1945, the superiority of the United States in applying atomic energy to defense needs has been a major factor in the deterrence of general war. Nuclear development and testing programs, carried out cooperatively by the Department of Defense and the Atomic Energy Commission during fiscal year 1959, tested the design of new and improved weapons, and greater use was made of nuclear energy as a source of power for ships and other military purposes.

Elements from the military services and the Defense Atomic Support Agency—formerly the Armed Forces Special Weapons Project—participated in two series of nuclear tests during the first part of the fiscal year: Operation HARDTACK and the Argus experiment. Beginning in April 1958 at Eniwetok and ending in October at the Nevada Test Site, Operation HARDTACK provided additional knowledge about the military effects of nuclear weapons. Of particular importance to the Department of Defense were two high-altitude detonations of megaton nuclear devices carried aloft by missiles—the first stratospheric tests by the United States. Other test shots in the HARDTACK series measured the effects of nuclear detonations in deep water and on the surface of the Pacific. Subsequently, the feasibility of subkiloton nuclear devices and their effects was tested in Nevada.

The Argus experiment in the South Atlantic Ocean during September 1958 involved the detonation of three nuclear warheads at very high altitudes. The decaying electrons from the fission products were then measured by the Explorer IV earth satellite, by sounding rockets, and by aircraft. These measurements indicated that radioactive particles were trapped in the earth's magnetic field, producing an artificial auroral glow in the vicinity of the Azores and interfering with local communications in some areas. These phenomena confirmed previous theories about the earth's natural belt of radiation and contributed to a reevaluation of the military implications and applications of nuclear devices detonated above the earth's atmosphere.

The further testing of nuclear weapons by the United States was suspended on November 1, 1958, pending negotiations with the Soviet Union for the establishment of effective international controls to permit permanent cessation of such testing. By the close of the fiscal year, agreement had not been reached on control measures essential for the effective policing of nuclear tests. Research and development

activities to improve the quality of nuclear weapons have been continued, with emphasis on smaller devices for tactical use.

In the application of nuclear energy as a source of power, continued progress was made during fiscal year 1959. The Navy commissioned three new nuclear-powered submarines, bringing to six the number of such vessels. A total of 27 other nuclear submarines were under construction or authorized, including 1 guided-missile and 9 POLARIS fleet ballistic missile craft—the first of which was launched in June 1959. In addition, the Navy had under construction three modern surface ships powered by nuclear reactors: The guided-missile cruiser *Long Beach*, which was launched shortly after the close of the fiscal year; the aircraft carrier *Enterprise*; and the guided-missile frigate *Bainbridge*. Development work continued on the Army's second stationary nuclear powerplant that will provide electricity and heat at Fort Greeley, Alaska. Contracts were also let for the design of an air-transportable nuclear powerplant to be installed in 1961 at the Sundance Air Force Station, Wyo. The Army completed 2 years of highly successful operating experience with its first stationary nuclear powerplant at Fort Belvoir, Va. Work continued on the direct and indirect cycle approaches for developing a nuclear propulsion system for military aircraft. The Department of Defense also cooperated with the Atomic Energy Commission in experimental work directed toward the use of nuclear energy as a power source for unmanned space vehicles.

Other Research Activities

While progress in the exciting new fields of rocketry, space technology, and nuclear energy obtained widest publicity, significant advances were also scored during the year in many other technical fields.

Work was continued on improving aircraft performance to meet military requirements for a flexible deterrent force composed of both guided missiles and manned aircraft. A new B-52 model, B-52H, powered by a turbofan engine, was developed to incorporate the latest technological advances. The B-58 supersonic medium bomber successfully passed its evaluation tests and will soon begin to supplement and replace the B-47 in the Strategic Air Command. Development work on the B-70 Valkyrie, a long-range bomber designed for speeds of about 2,000 miles per hour, was continued. To enhance the effectiveness of tactical air operations, the Navy sponsored the design of an all-weather, low-altitude attack aircraft, the A2F, while the Air Force continued its efforts to perfect a vertical launching system for fighter planes that will lessen dependence on large and vulnerable airfield complexes and permit greater dispersal.

A large portion of the Navy's research and development funds was used in a vigorous attack on the many problems of antisubmarine warfare, involving the initial detection of an enemy submarine and the pinpointing of its position, its identification, and finally its destruction. Major emphasis was placed on basic research directed toward new approaches for overcoming the tremendous difficulties involved in accurate identification of objects in vast ocean areas. In the meantime, current equipment is being improved. New, more sensitive sonar equipment for locating submerged enemy vessels increased the range and accuracy of detection, while improved homing torpedoes and nuclear depth charges were developed to lessen the chances of survival for enemy submarines. New combat techniques greatly increased the joint effectiveness of ships and aviation units in antisubmarine warfare.

The combat capabilities of land forces were increased by providing greater firepower, improved mobility and communications, and better surveillance of the battle area. Lightweight small arms, using the NATO-standard 7.62-mm. cartridge, started to replace World War II rifles and machineguns, while powerful new recoilless rifles increased the effectiveness of ground troops against tanks. An air-transportable personnel carrier, the M-113, and a new, much improved tank, the M-60, were put into production. Rugged, lightweight communications sets and electronic combat surveillance equipment were developed to assist commanders in controlling widely dispersed troops, particularly in case tactical nuclear weapons are employed. Greater battlefield mobility was obtained by the Army with the introduction of the Iroquois utility helicopter—soon to be followed by the Caribou 3-ton, fixed-wing transport—and the Army's reconnaissance capabilities will be increased when the new Mohawk observation plane, now under development, becomes available.

Department of Defense support of basic research again increased in fiscal year 1959 as obligations for this purpose reached a total of \$121 million, as compared to \$106 million for the preceding year. For 1959, the total included \$97 million for research in the physical sciences, \$20 million in the life sciences, and almost \$4 million in the social sciences. Over two-thirds of this research was undertaken by educational and other nonprofit research institutions, one-fourth by Government laboratories, and the remainder by profit-making organizations.

The Director of Defense Research and Engineering and the Joint Chiefs of Staff continued to receive valuable assistance from the Weapons Systems Evaluation Group (WSEG) in evaluating competing weapons systems, their relative cost effectiveness, and their influence upon strategy and tactics. WSEG, under a military director, is made up of (a) a full-time military component drawn from

the military services and representing operational experience in all the major commands of those services; and (b) a civilian technical group representing all the physical sciences as well as the humanities. This civilian group, headed by a Director of Research, is supported by the Institute for Defense Analyses (IDA), which is a nonprofit corporation formed by five universities in 1956 at the request of the Department of Defense. Obligations for WSEG, including contract services provided by IDA, totaled \$3.7 million during fiscal year 1959.

Entirely distinct from the WSEG effort, IDA also assisted the Advanced Research Projects Agency by recommending directions, priorities of attention, levels of attention, methods of approach for the solution of problems related to space flight, and the defense against ballistic missiles.

With scientific advances occurring at an ever-more rapid rate, the timely application of new inventions and technological improvements to military use has become a matter of national survival. This fact is fully recognized by the military services, which have established an effective partnership between scientists and the armed forces. During the past year, this partnership made major contributions to the Nation's security and established firm foundations for greater strength in the future.

IV. The Defense Budget

The financial plans of the Department of Defense have been designed with but one objective in mind—to provide adequate military strength for the deterrence of war. To this end, each year's budget has represented but one more increment to a steady, overall defense effort which this Nation must support, indefinitely if need be. These budgets have effectively maintained free world security despite the Communist concentration of vast human and material resources on military and scientific programs.

The need to retain an ample deterrent to aggression has kept defense costs at a high level. Steadily increasing amounts have been devoted to research—expenditures essential for future security but not giving greater current protection. Even larger sums have been allocated for the purchase of the latest operational weapons, but each new system proves to be two to three times more costly than its predecessor and rapid technological advances are forcing earlier replacements. In addition, the complexity of these modern arms is demanding increasingly higher standards of training, ability, and experience, thereby raising personnel costs. Moreover, the general upward trend in price and wage levels has also levied a toll on the defense budget.

This upward trend in defense costs has placed an even higher premium on the realistic assessment of national security requirements and the economical execution of military programs. Of primary importance in this task is the careful and orderly adjustment of our armed forces to new weapons systems and the continued maintenance of a properly balanced and flexible defense establishment. The rapidity of technological change is illustrated by the fact that fully three-fourths of the major items of military materiel ordered during fiscal year 1959 were not being mass produced only 4 years ago. The new weapons have brought major changes in the composition of forces as, for example, guided missile units replaced anti-aircraft battalions and fighter interceptors and permitted reductions in the number of tactical bombers.

The budgets for fiscal years 1959 and 1960 were determined after the most searching analyses of our requirements. They avoided undue reliance on any single weapons system at the expense of other vital needs while at the same time preventing fragmentation of effort.

The Fiscal Year 1959 Budget

In August 1958 the Congress approved \$41.0 billion for the military functions of the Department of Defense for fiscal year 1959—\$39.6 billion in the Department of Defense Appropriation Act and \$1.4 billion in the Military Construction Appropriation Act. An additional \$0.3 billion was appropriated in May 1959 to cover the unabsorbed cost of civilian salary increases enacted in June 1958 and unbudgeted expenses incidental to the crises in Lebanon and the Taiwan Strait.

Thus, cash appropriations for the military functions of the Department of Defense in fiscal year 1959 amounted, after rounding, to \$41.2 billion. If transfers from revolving funds and other special accounts are added, the new obligational availability for the fiscal year totaled \$41.7 billion. The amount available for expenditures came to \$73.2 billion, consisting of the unexpected balances from previous fiscal years carried over on June 30, 1958, and the new appropriation of \$41.2 billion.

Net expenditures for fiscal year 1959 amounted to \$41.2 billion—\$2.1 billion more than for the preceding year. This increase reflected primarily the progress made in ballistic missile programs, but higher military and civilian pay scales and increased expenditures for ships and research also contributed.

The allocation of these expenditures by budget category has not changed significantly in recent years. (See fig. 8.) About one-fourth of the fiscal year 1959 expenditures—26 percent, or \$10.5 billion—was used to cover military personnel costs. Another quarter—23 percent, or \$9.6 billion—supported the day-to-day operation and maintenance of the armed forces. Over one-third—36 percent, or \$14.9 billion—financed major procurement and production of weapons and equipment. The remainder of \$6.2 billion included expenditures of \$6.4 billion for military construction, research and development, reserve forces, and Department-wide activities and an \$0.2 billion excess of receipts over expenditures in the revolving funds of the Department.

Expenditures by the military departments in fiscal year 1959 totaled \$9.5 billion for the Army, \$11.7 billion for the Navy, \$19.1 billion for the Air Force, and \$0.9 billion for the Office of the Secretary of Defense, the Joint Chiefs of Staff, and interservice activities.

A reduction in the balance of unobligated funds brought forward from one fiscal year to the next was achieved again in 1959 in line with the Department's continuing effort to limit such carryovers to the minimum needed for the orderly management of the defense program. Unobligated balances on hand totaled \$7.9 billion at the beginning of the year and \$7.5 billion at the end. Unexpended bal-

DEPARTMENT OF DEFENSE EXPENDITURES FOR MILITARY FUNCTIONS

FISCAL YEARS 1951-1959

(BILLIONS OF DOLLARS)

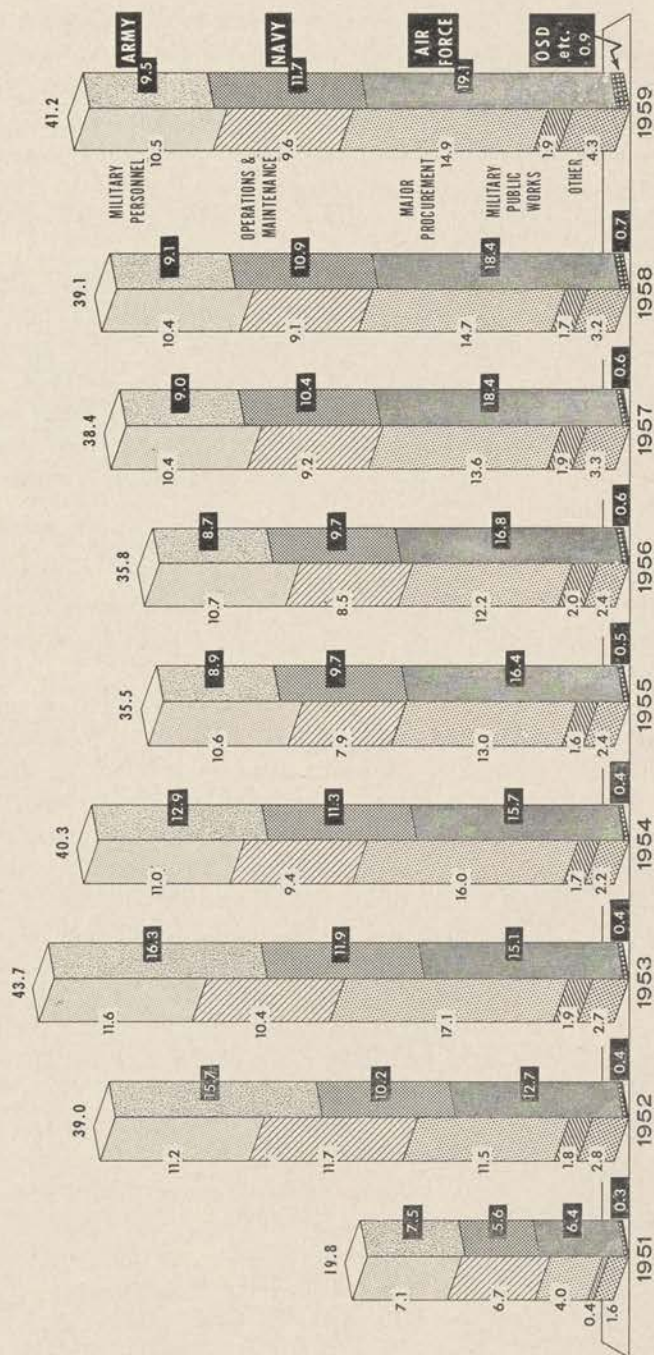


Figure 8

ances also declined during fiscal year 1959—from \$32.1 billion to \$31.6 billion.

The Fiscal Year 1960 Budget

The financial plans for fiscal year 1960 developed by the Department of Defense during the fall of 1958 continued to emphasize the rapid introduction of modern weapons systems into our forces.

The President's 1960 budget, submitted to the Congress on January 19, 1959, proposed a total of \$41.2 billion in new obligational availability for the Department of Defense—\$40.9 billion in new obligational authority and \$0.3 billion in transfers from the Department's revolving funds in lieu of new appropriations. The fiscal year 1960 request would have been higher but for the fact that \$0.7 billion, appropriated by the Congress in excess of the President's fiscal year 1959 budget request, was available to be applied to 1960 programs.

The 1960 budget placed increased emphasis on such programs as ATLAS, TITAN, MINUTEMAN, POLARIS, PERSHING, and NIKE-ZEUS, while some other programs were reduced or eliminated altogether as the result of a careful review of technological advances and changing military requirements. For example, the REGULUS II program for an aerodynamic missile was terminated, since the POLARIS program promised to produce a missile with far superior effectiveness for the same mission in almost the same time period. Similarly, production of the liquid-propellant REDSTONE was tapered off in favor of the solid-propellant PERSHING, and the air-to-ground RASCAL program was dropped and replaced by the more advanced HOUND DOG. A change in tactical concepts eliminated the GOOSE decoy missile, and the Army's antitank DART was terminated since this program failed to meet anticipated capabilities. The Navy chose to go ahead with the F4H-1 all-weather fighter rather than with the F8U-3.

These examples illustrate the need for constant, almost day-by-day reviews of defense programs in order to assure maximum security at minimum cost. The rapidity of technological advances has made it almost impossible to prepare firm financial plans 21 months ahead of the end of the fiscal year for which these plans are designed. A sudden breakthrough in one research area often affects the relative priorities of other programs and thus necessitates major changes in funding plans.

Final congressional action on the 1960 budget occurred after the close of fiscal year 1959. A total of \$41.0 billion was appropriated, including \$40.6 billion in new obligational authority and \$0.4 billion in transfers from the Department's revolving funds. The total amount was \$0.2 billion below the President's request in January 1959,

with practically all of the overall reduction having been made in the military construction appropriation.

Among the changes in the 1960 budget as originally proposed were the elimination of most of the funds for a new aircraft carrier, a revised and reduced program for air defense systems, and increased funds for the development of the NIKE-ZEUS missile, antisubmarine defenses, and Army modernization. The orderly implementation of the approved programs, kept under continuous review, should further strengthen the combat effectiveness of our Armed Forces in fiscal year 1960.

Financial Management

In the Department of Defense, as in private industry, a comprehensive system of budgeting, accounting, reporting, and auditing is an essential tool for the exercise of effective control as well as for the promotion of economy and efficiency. To achieve these objectives, the Department has, particularly since the enactment in 1949 of title IV of the National Security Act, developed and installed new financial management systems especially adapted to its needs. Further progress was made during fiscal year 1959 in refining existing procedures to provide greater incentives for economy and a clearer picture of the fiscal operations of the Department.

A major improvement in the Department's budget presentation to the Congress was incorporated in the fiscal year 1960 budget with the approval of the House and Senate Appropriations Committees. Instead of centering the presentation on the funds requested for organizational units—the Army, Navy, Air Force, and the Office of the Secretary of Defense—the 1960 budget stressed the major purposes of the appropriation—(1) military personnel; (2) operation and maintenance; (3) procurement; (4) research, development, test, and evaluation; and (5) military construction. The new budget arrangement facilitated a comprehensive presentation of the main functional activities of the whole defense establishment, but continued, as before, the separate appropriations for each of the major component agencies of the Department.

In addition, a better measurement of the Department's research and development effort was provided in the 1960 budget by shifting to these appropriations certain of the funds required for test and evaluation support that were formerly included in the procurement appropriations. Another improvement was the consolidation of 10 individual Navy appropriations for operation and maintenance into 2, 1 for the Navy and 1 for the Marine Corps. This consolidation will give the Department of the Navy greater flexibility in managing its funds—a flexibility that the Army and Air Force have had for several years.

New guidance for the financial management of operation and maintenance functions in the Department of Defense was provided in a directive issued in May 1959. In accordance with this directive, uniform plans are to be drawn up for the establishment of cost-based budgets to be used in supporting budget requests and supervising activities. Simplified account structures are to be developed for programming, budgeting, accounting, and reporting. Each operating unit in the field would be permitted to finance its operating activities from a single subdivision of operation and maintenance appropriations. Similar programs looking toward the improvement of accounting practices for military personnel, procurement, and research, development, test, and evaluation were under study during fiscal year 1959.

Substantial improvements were also made in many other phases of financial management. At the departmental level, action on over 94 percent of the planned apportionment program for fiscal year 1959 was completed within 30 days after the appropriations made by the Congress became available—a far greater percentage than in recent years. This achievement was made possible by the more timely availability of program data and by arrangements with the Bureau of the Budget permitting partial apportionment for programs not yet fully approved. At the field level, financial transactions were accomplished more expeditiously and with fewer personnel by further merging accounting and disbursement functions. The Air Force program for integrating its accounting and finance operations down to and including individual airbases was on schedule, with a target date for completion of July 1, 1960. The Army and Navy carried out similar programs in previous years.

The use of revolving funds in managing supplies (stock funds) and commercial- and industrial-type activities (industrial funds) was extended and refined during fiscal year 1959. Under this system, the cost of the supplies issued for use and of work or service performed by one activity for another is charged against funds appropriated to the user, with reimbursement to the revolving fund.

Inventories under stock funds were valued at \$8.2 billion on June 30, 1959, or about 18 percent of the total assets of the military supply systems. Preparations were completed for transferring to stock fund operations on July 1, 1959, an additional \$236 million in naval ordnance items. Nearly \$4.5 billion in excess cash balances has been recovered from the operation of these funds since 1953; these amounts were utilized in lieu of new appropriations, as authorized by the Congress, or were returned to the Treasury.

Four additional activities were placed under industrial funds during the year, bringing the total number of commercial- and industrial-type activities so financed to 59. The Army managed 25 of these, the Navy 31, and the Air Force 3. Sales by activities under industrial

fund charters totaled over \$2.4 billion during the year. Directives governing the operational and reporting procedures for industrial funds were revised during the year on the basis of experience gained in the management of these funds.

The improvement of internal and contract auditing procedures remained an important concern of the Department of Defense during fiscal year 1959. An integrated, worldwide audit of the military assistance program was completed, including the review of 86 separate activities. As a result of this extensive survey, specific management improvements were developed for each level of operation. In the field of contract auditing, new guidelines were established assigning responsibility to a single auditing agency for contractors producing materiel for more than one military department and making possible the audit of contracts on a company basis, rather than plant by plant. These changes should produce more uniform, effective, and efficient audits with less expenditure of effort. New contract cost principles were also developed for determining allowable costs under cost-reimbursement and fixed-price-type contracts.

With operations as extensive as those of the Department of Defense, the continued improvement of financial administration and control is a prerequisite for efficient management. By building upon the advances achieved during the past year, further progress in future years is assured.

V. Management

During fiscal year 1959, the Department of Defense Reorganization Act of 1958, approved on August 6, 1958, was put into effect.

This reorganization represents another step in the constant adjustment of the armed forces to the rapid changes in military technology. These changes have placed ever increasing importance on research engineering activities and made almost instantaneous reaction a prerequisite for effective military operations. In line with these requirements, the 1958 adjustments centered on shortening the chain of command to the operational forces, improving the management of research activities, and introducing increased flexibility into the central administration of the defense establishment.

Good organization facilitates the formulation of sound policy and its implementation, but it cannot automatically assure either efficiency or economy. The attainment of these goals remains a matter of individual action based on study, experience, and judgment.

Organizational Concepts

The new organizational framework of the Department of Defense was outlined in the revision of DOD Directive 5100.1, "Functions of the Department of Defense and Its Major Components," issued on December 31, 1958.

This directive provides for three groups of agencies operating under the direction, authority, and control of the Secretary of Defense, who acts as the principal assistant to the President in all matters relating to the Department of Defense. (See fig. 9.)

Immediate staff assistance to the Secretary of Defense is provided by the Office of the Secretary of Defense (OSD), including the Secretary's principal assistants in functional fields, and by the Joint Chiefs of Staff (JCS), who act as his principal military advisers and as military staff in the chain of operational command.

The three military departments of Army, Navy, and Air Force, including the military services within those departments, constitute the second group. Each military department is separately organized under its own Secretary, who is responsible to the Secretary of Defense for the operation as well as the efficiency of his department. Each department is responsible for the preparation of its forces for

the effective prosecution of war and for the expansion of the peacetime components of its forces to meet the needs of war.

The final group consists of the unified and specified commands. These commands are established by the President through the Secretary of Defense and are responsible to these officials for the accomplishment of the military missions assigned to them. The commanders of these commands exercise full operational command over the forces assigned, but the military departments are responsible for the administration and support of these forces.

Two command chains were established by the 1958 reorganization—one for operational direction running from the President to the Secretary of Defense and through the Joint Chiefs of Staff to the commanders of unified and specified commands; and the second running from the President to the Secretary of Defense to the Secretaries of the military departments for purposes not included in the operational direction.

Outside the major groups of component agencies are three organizations established for the administration and operation of technical programs requiring specialized handling. Their charters were revised in 1959 to bring them in line with the 1958 reorganization.

1. The National Security Agency (NSA), established by the President within the Department of Defense in December 1952, for special intelligence purposes.
2. The Advanced Research Projects Agency (ARPA), established by the Secretary of Defense in February 1958 for long-range basic research in various fields, including that of military space technology.
3. The Defense Atomic Support Agency (DASA) under the Joint Chiefs of Staff, approved by the Secretary of Defense on May 1, 1959, for the military application of atomic energy. This agency is the successor to the Armed Forces Special Weapons Project (AFSWP), which was responsible to the chief military officers of the three military departments. AFSWP was established on December 31, 1946, when the Manhattan Engineering District was dissolved.

The Office of the Secretary of Defense

The major changes in the Office of the Secretary of Defense brought about by the 1958 reorganization concerned research and engineering. The new position of Director of Defense Research and Engineering, created by the 1958 Reorganization Act, was filled on December 30, 1958.

The Director performs, by law, three major duties for the Secretary of Defense: (1) He acts as the principal adviser to the Secretary of

Defense on scientific and technical matters; (2) he supervises all research and engineering activities in the Department of Defense, including not only those in the military departments but also those in NSA, ARPA, and DASA; and (3) he directs and controls (including assignment and reassignment) the research and engineering activities that the Secretary of Defense deems to require centralized management. The 1958 act also made clear that, in the field of basic and applied research, the Secretary or his designee may engage in operations as well as policy formulation.

To carry out these increased responsibilities, the research and engineering staff in the Office of the Secretary of Defense was reorganized in the spring of 1959. Assistant Directors were appointed to evaluate plans and supervise programs in operational systems related to air defense, communications, tactical weapons, strategic weapons, undersea warfare, and special projects. Progress in technical fields continues to be supervised by special offices for Aeronautics; Atomic, Biological, and Chemical Warfare; Electronics; Fuels, Materials, and Ordnance; Guided Missiles; Maintenance Engineering; and Science. These offices also provide expert technical advice to the Assistant Directors dealing with operational systems. The new organization will help to assure a broader and more realistic evaluation as well as improved direction and coordination of all research and engineering activities in the Department of Defense.

In addition to the position of Director of Defense Research and Engineering, the 1958 Reorganization Act authorized seven Assistant Secretary positions—a reduction of two from the number previously authorized. (See fig. 10.) The law prescribes that one of these Assistant Secretary positions be assigned to the Comptroller; the remaining ones have been allocated by the Secretary of Defense to the fields of Health and Medical; International Security Affairs; Manpower, Personnel, and Reserve; Properties and Installations; Public Affairs; and Supply and Logistics.

The General Counsel, holding a statutory position established in 1953, acts as chief legal officer of the Department.

To meet special management needs, Assistants to the Secretary of Defense have been appointed for atomic energy, legislative affairs, and intelligence matters.

The charters of the major OSD officials were revised in the spring of 1959 to make them more uniform and bring them into agreement with the 1958 Reorganization Act. In general, these officials perform similar functions within their specific fields of responsibility:

1. They recommend policies and guidance governing Department of Defense planning and program development.

DEPARTMENT OF DEFENSE
OFFICE OF THE SECRETARY OF DEFENSE

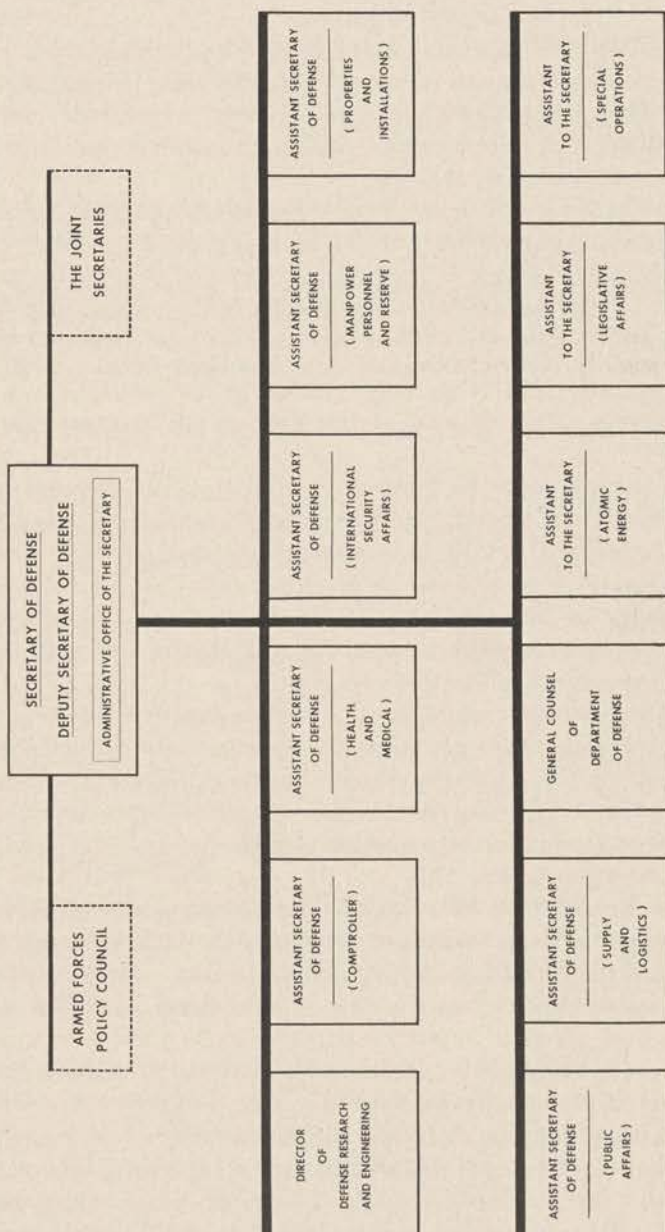


Figure 10

2. They develop systems and standards for the administration and management of approved plans and programs.
3. They review the programs of the military departments for carrying out approved policies.
4. They evaluate the administration and management by the military departments of approved policies and programs.
5. They recommend appropriate steps to provide more effective, efficient, and economical administration and operation within the Department of Defense.

The authority of these officials was described by the President in his reorganization message to the Congress on April 3, 1958:

I conceive of these Assistant Secretaries as having full staff functions; that is, they are empowered to give instructions appropriate to carrying out policies approved by the Secretary of Defense, subject at all times to the right of Service Secretaries to raise contested issues with the Secretary of Defense. This is the usual concept of the powers of principal staff assistants. It is essential to the work of the Assistant Secretaries of Defense.

In accordance with these views and the 1958 Reorganization Act, the chief OSD officials, in the course of exercising full staff functions, are authorized (1) to issue instructions and one-time direction-type memoranda appropriate to carrying out policies approved by the Secretary of Defense; and (2) to obtain from other Department of Defense agencies such reports and information as may be necessary for the performance of their functions.

To assure full coordination, all Department of Defense directives and instructions are placed on the agenda of the Armed Forces Policy Council or the Joint Secretaries before publication. Directives and instructions involving the military departments are issued through the Secretaries of those departments or their designees, as provided by the 1958 Reorganization Act.

The President in his reorganization message also called attention to the need for improvement in Department of Defense activities in the areas of public affairs and legislative liaison. Reviews of these areas were not completed at the close of the fiscal year, but preliminary steps were taken.

In the field of public affairs, a Defense Public Affairs Council, consisting of the Assistant Secretary and Deputy Assistant Secretary of Defense (Public Affairs) and the Chiefs of Information of the military services, was established at the beginning of fiscal year 1958 to assist in developing closer operating relationships between the various Department of Defense activities in this field. Other steps included: (1) The establishment of an Office of Plans and Programs with responsibility for the integrated planning and implementation of public affairs activities; (2) the consolidation of security review activ-

ities on September 19, 1958; and (3) the assumption by the Assistant Secretary of Defense (Public Affairs) of the responsibility for direction and guidance in public affairs matters concerning unified and specified commands. The last action was taken in November 1958 in connection with the discontinuance of the military departments as executive agencies for these commands.

In the field of legislative liaison, the review study was postponed to permit the new Assistant to the Secretary of Defense (Legislative Affairs) to become familiar with the operation of his office.

As part of the effort to improve operating methods in OSD, a Statistical Services Center was established on July 15, 1958, to serve the statistical and reporting needs of all OSD offices. While reporting requirements have been under continuing review by officials of the Office of the Secretary of Defense and the military departments, the fiscal year 1959 review resulted in a net reduction of 27 periodic reports.

To accelerate the decision-making progress, the Department of Defense committee structure was reviewed during the summer of 1958. Instructions on the proper use of committees and the establishment of effective staff relationships were issued. Moreover, nearly 200 out of a total of 300 joint Department of Defense committees were abolished.

Despite the increase in functions and responsibilities, employment in OSD did not expand during fiscal year 1959. OSD personnel at the beginning of the fiscal year totaled 1,712—including 1,287 full-time civilians, 382 military, and 43 part-time civilians. On June 30, 1959, the total was 1,707—including 1,262 full-time civilians, 393 military, and 52 part-time civilians. (See fig. 11 and appendix, table 11.)

The Joint Chiefs of Staff

By statute, the Joint Chiefs of Staff are the principal military advisers to the Secretary of Defense as well as to the President and the National Security Council. Their major duties are defined by law. Their members, except for the Chairman, are also the chief military officers in their respective departments.

The effect of the 1958 reorganization on the Joint Chiefs of Staff was primarily the addition to their established responsibilities as military advisers and strategic planners of the function of assisting the Secretary of Defense in the operational direction of unified and specified commands. To enable the Joint Chiefs of Staff to carry out their enlarged duties, the number of officers permitted on the Joint Staff was increased by the new act from 210 to 400. Simultaneously, the committee structure in the Joint Staff was replaced by a unified staff system organized around seven Directorates.

OFFICE OF THE SECRETARY OF DEFENSE - JOINT CHIEFS OF STAFF PERSONNEL STRENGTHS

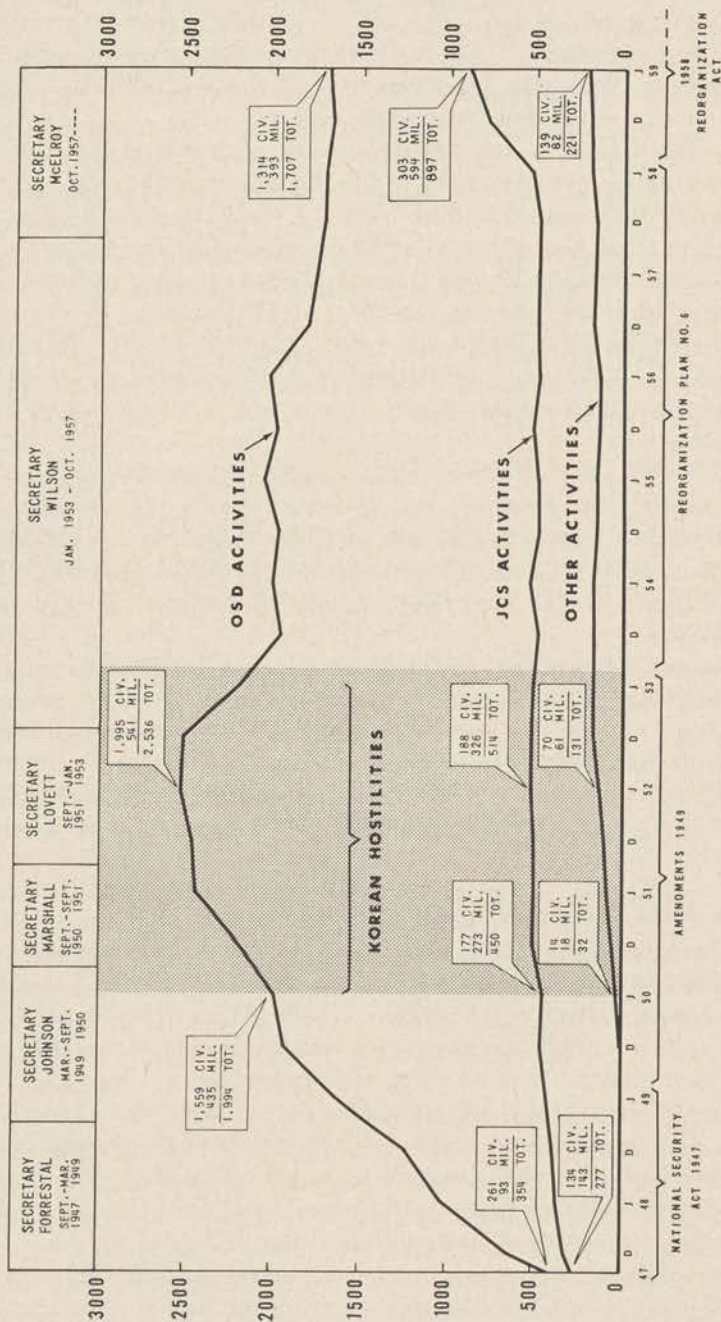


Figure 11

The reorganization of the Joint Staff aligns this group more closely to that of the staffs of the military departments and of the unified and specified commands. The seven Directorates are J-1, or personnel; J-2, intelligence; J-3, operations; J-4, logistics; J-5, plans and policies; J-6, communications-electronics; and a Directorate for military assistance. (See fig. 12.)

The functions of the Joint Chiefs of Staff as military advisers, as strategic planners, and as a military staff in the chain of operational command to the unified and specified commands were outlined in the revised DOD Directive 5100.1, dated December 31, 1958. At the same time, a companion directive, 5158.1, dealing with the "Organization of the Joint Chiefs of Staff and Relationships With the Office of the Secretary of Defense," was also reissued. This directive stresses the overriding importance of the duties of the chiefs of the military services as members of the Joint Chiefs of Staff, outlines the authority and responsibilities of the Chairman of the Joint Chiefs of Staff, and prescribes close cooperation between the staffs of the JCS organization and OSD.

The "executive agency" responsibility of the military departments for unified and specified commands was gradually terminated in late 1958, and the new chain of command from the President and the Secretary of Defense through the Joint Chiefs of Staff became fully effective on January 1, 1959. The revision of the basic manual for

DEPARTMENT OF DEFENSE

ORGANIZATION OF THE JOINT CHIEFS OF STAFF

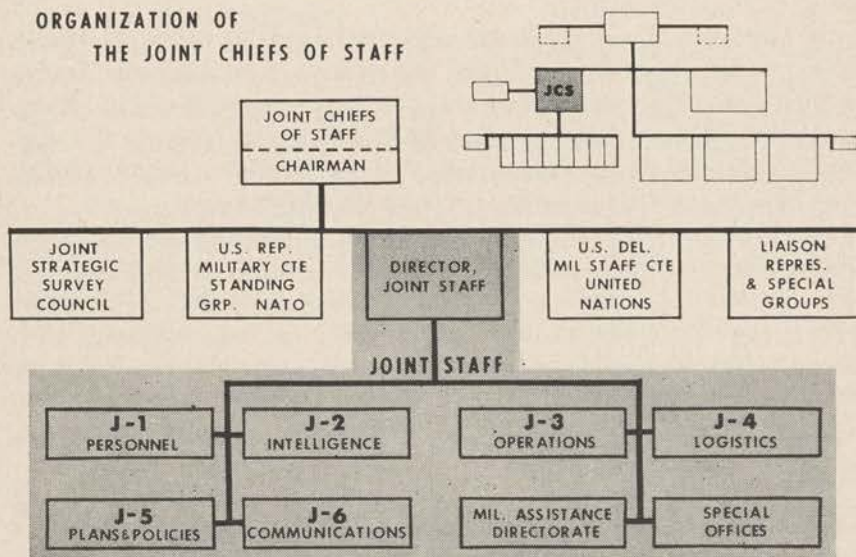


Figure 12

"unified actions" by the armed forces was nearly completed by the close of the fiscal year.

The approved personnel expansion, made gradually throughout the fiscal year, brought the total personnel in the JCS organization, including the Joint Staff, from 529 at the beginning of the fiscal year to 897 on June 30, 1959.

Unified and Specified Commands

Combatant commands with a Defense-wide mission are organized as unified commands when they include forces from more than one military department and as specified commands when their forces come predominantly from a single military department.

Six unified and two specified commands are currently in existence—the unified commands are the Alaskan, Atlantic, Caribbean, Continental Air Defense, European, and Pacific Commands; the specified commands are the Eastern Atlantic and Mediterranean and the Strategic Air Commands. Their missions and force structures were reviewed and approved by the President and the Secretary of Defense in September 1958.

"Full operational command" by the commanders of these commands, as prescribed by the 1958 Reorganization Act, was defined in February 1959 as including "those functions of command over assigned forces involving the composition of subordinate forces, the assignment of tasks, the designation of objectives, the overall control of assigned resources, and the full authoritative direction necessary to accomplish the mission."

While specified commands are organized similarly to the combatant field commands of the military department providing the forces, unified commands include a central headquarters, composed of officers from each of the military services having forces assigned to the command, and service component headquarters, through which the unified commander normally exercises his operational command.

Administrative and logistic support of unified and specified command headquarters is assigned to one of the military departments by the Secretary of Defense. In accordance with DOD Directive 5100.3, dated September 12, 1958, the Army is responsible for such support for the Caribbean and European Commands; the Navy for the Atlantic, Pacific, and Eastern Atlantic and Mediterranean Commands; and the Air Force for the Alaskan, Continental Air Defense, and Strategic Air Commands.

All the component forces assigned to these commands, including the component headquarters, are administered and supported by the military department that provides the forces.

In accordance with the new chain of command, communications by and to the commanders of unified and specified commands con-

cerning matters of joint interest are transmitted through the Joint Chiefs of Staff. While these commanders have not been assigned a detailed budget function, their estimates of requirements are transmitted directly to the Joint Chiefs of Staff, and provision has been made to assure that the submissions of the component commanders to their respective military departments are in agreement with the plans and programs of the unified commanders concerned.

The new relationships of the unified and specified commanders to the Secretary of Defense, the Joint Chiefs of Staff, and the military departments were developed gradually throughout the fiscal year in order to permit an orderly transition without any break in military effectiveness. These relationships continue to be under constant review to assure that our combatant forces remain in the highest possible state of readiness.

The Military Departments

The 1958 reorganization reemphasized the primary responsibility of the military departments for the effective management of the vast administrative, training, and logistic functions of the armed forces while relieving them of direct responsibility for military operations conducted by unified and specified commands.

Each of the Secretaries of the military departments, heading an organization much larger than any executive department except the Department of Defense itself, was authorized by the 1958 Reorganization Act one Under Secretary and three Assistant Secretaries as his principal civilian assistants.

The elimination of one Assistant Secretary position by the 1958 Reorganization Act forced revisions in the organization of the civilian secretariats of all three departments. These adjustments were made to meet the special needs of each military department rather than to achieve arbitrary uniformity throughout the Department of Defense. Thus, the established relationship of the Secretaries to their military staffs varies from department to department and reflects the type of relationship found by experience to be most suitable for the effective management of a particular organization.

To prevent possible conflict with the new chain of operational command, the command authority of the chief military officers in the Departments of the Navy and Air Force was changed to supervisory authority. The Chief of Staff, U.S. Army, already exercised supervision rather than command over the members and organizations of the Army.

The top civilian and military officials of the military departments have been charged with a vital role in the overall management of the Department of Defense in addition to their functions within their own departments. As members of the statutory Armed Forces Policy

Council, they assist the Secretary of Defense at the weekly meeting of this group in the final development of broad policies relating to the armed forces. The civilian chiefs are also members of the Joint Secretaries, a group established by the Secretary of Defense for the consideration of matters concerning the general management of the Department. The military chiefs provide military advice through the Joint Chiefs of Staff.

By procedures such as these and through daily contact, the advice of the "operating managers" of the Department of Defense—the Secretaries of the military departments—and of the chief military officers is brought to bear directly on the formulation of Defense plans, policies, and programs.

* * * * *

It is believed that the current Department of Defense organization adequately meets current management needs. As our technology advances, additional adjustments are likely to become necessary. It is important, however, that such adjustments are evolutionary rather than revolutionary in character, for radical changes upset the operational effectiveness of any organization for a considerable time. In view of the existing threats to our security, the Nation cannot afford such a loss in operational effectiveness.

VI. Manpower

Personnel policies of the Department of Defense proved increasingly effective during fiscal year 1959 in raising the quality of personnel in the military services, the reserve establishment, and the civilian working force.

With the rapid development of advanced weapons systems, requirements for highly qualified personnel have continued to increase in recent years. This emphasis on quality has been accompanied by appropriate adjustments in personnel programs. Measures designed primarily to fill earlier needs for large numbers of men have given way to those for attracting and retaining the technicians and specialists capable of servicing, operating, and supporting modern weapons.

Improved incentives for career service in the regular forces and greater selectivity in the standards for induction and reenlistment have raised the levels of training and experience in the active forces. Reserve programs have been strengthened by requiring reservists to complete basic training and by annual personnel screenings. Increased emphasis has been placed on attracting and retaining highly competent civilian employees.

These measures have helped to provide the Nation with an effective military establishment, supported by a competent civilian force. The requirements for highly qualified personnel, however, will continue to rise in future years in step with technological progress. To meet these expanding needs, manpower policies of the Department must remain focused on improving the quality of our forces and their supporting elements, and on making the best possible utilization of available skills.

The Active Forces

Personnel levels of the armed forces continued to be adjusted during fiscal year 1959 to reflect the increasing availability of modern weapons systems. These adjustments brought a reduction of 4 percent in the size of the military services, which totaled 2,504,000 on June 30, 1959, as compared to 2,601,000 a year earlier. An additional small reduction of less than 1 percent is planned for fiscal year 1960.

Programs for raising the quality and experience levels in the armed forces—recommended by the Cordiner Committee 2 years ago and approved in large measure by the Congress last year—became more fully

effective. Additional legislation to complete the Cordiner Committee recommendations pertaining to officer personnel was pending in the Congress at the close of the fiscal year. Adoption of these proposals, coupled with the measures enacted earlier to modernize the military personnel system, should assist the armed forces materially in filling future requirements for skilled career personnel.

Enlisted Personnel

Further progress was made by the military services in fiscal year 1959 in attracting and retaining technicians and specialists. The new military compensation system adopted in 1958 was undoubtedly a major factor contributing to this more favorable situation. The armed forces succeeded in filling a larger proportion of their manpower requirements through voluntary enlistments than at any time since the Korean conflict. Larger numbers of technically qualified personnel reenlisted. Fewer men in the lowest mental group were accepted for induction and disciplinary problems were reduced accordingly.

In addition to raising the pay rates of all personnel who have served on active duty for more than 2 years, the 1958 legislation established two new senior grades for enlisted men and authorized the award of proficiency payments to specialists in critical occupational fields. The first promotions and awards under the new legislation were made in fiscal year 1959, and programs were established for a gradual and orderly implementation of the new policies during the next 4 years.

Promotions to the highest new pay grade, E-9, totaled 1,361 during 1959, and to the new E-8 grade, 10,629. In 1963, when the promotion schedules will be fully effective, 1 percent of enlisted strength—about 22,000 at current force levels—will be eligible for E-9, and 2 percent—or 44,000—for E-8. The new grades, by giving more adequate recognition to the highest levels of responsibility and by providing additional incentives for men of outstanding ability, appear to be filling effectively a gap of many years' standing in the enlisted personnel structure.

The proficiency pay system has provided the military services with additional means to meet the competition from private industry for scarce technical personnel. The first proficiency payments were awarded in November 1958. By June 1959 approximately 47,000 men, most of them at pay grade E-4 and above, were receiving the new P-1 awards, which carry an additional \$30 per month. Over 64 percent of these 47,000 awards were made to electronics technicians; 20 percent to mechanics, repairmen, and other technicians; 10 percent to ground combat leaders; and the remaining 6 percent to other personnel performing important duties in an outstanding manner. About 100,000 additional personnel will be advanced to the P-1 rating next year, and plans are being developed for awarding the higher P-2

rating of \$60 per month to personnel in selected highly critical specialties.

Increased numbers of long-term enlistments during the fiscal year also contributed to qualitative improvement. In the Army, voluntary enlistments by non-prior-service personnel increased by almost 45 percent. The better recruiting situation allowed not only the Army but also the Navy and Marine Corps to take a larger proportion of men willing to serve for longer than the minimum term. Over 49 percent of the new men entering the Army during the year signed up for 3 years, as compared to only 35 percent during the preceding year. About 46 percent of new naval enlistments and 79 percent of those in the Marine Corps were for 4 years or more—as compared to 44 and 41 percent, respectively, in 1958. In both fiscal years, almost all enlistments in the Air Force were for a 4-year term.

The proportion of men reenlisting after their first tour of duty rose from 27.6 percent in fiscal year 1958 to 30.0 percent in fiscal year 1959. Gains were scored in the percentages of reenlistments by first-term regulars in critical occupational groups, such as electronics specialists (from 24.8 percent in fiscal year 1958 to 26.8 percent in 1959) and other technicians (from 23.2 percent to 27.2 percent). These percentages, however, are still below the desired levels but may continue to improve as the proficiency payment system becomes more fully effective.

The experience level of personnel in the armed forces also increased, partly as a result of improved retention. The percentage of enlisted men with 4 or more years of service rose from 41 to 46 percent during fiscal year 1959. Simultaneously, the mental quality of the armed forces rose significantly as a result of the higher standards adopted for initial enlistment, induction, and reenlistment and through the large-scale early release of low-potential personnel. Following the 1958 action by the Congress permitting deferment of potential inductees in the lowest acceptable mental group, the percentage of inductees in the top three mental groups rose from 60 percent in 1958 to nearly 70 percent in 1959. The benefits of greater selectivity in accepting personnel were illustrated by sharp reductions in absences without leave, courts-martial, and the numbers of military prisoners.

Although voluntary recruitment programs were increasingly popular during the year, draft calls had to be issued for 109,000 men—the lowest number to be called since the beginning of the Korean war. Action by the Congress in the spring of 1959 extending the Universal Military Training and Service Act for 4 more years assured that military personnel requirements in the immediate future would be met, particularly since this legislation also is a potent stimulus in encouraging voluntary enlistments.

Officer Personnel

During fiscal year 1959, the ability of the military services to retain qualified officers showed substantial improvement. The number of officers who resigned, retired voluntarily, or requested relief from active duty was lower during this year than in any recent period. Enactment of the modernized military compensation system late in fiscal year 1958 contributed to this favorable trend.

Three additional measures to improve the career management programs for officers were under consideration by the Congress at the close of the fiscal year. One of these was passed shortly thereafter, while the other two are expected to receive final approval in the next congressional session.

The legislation approved in August 1959 was designed to assist the Navy and Marine Corps in correcting the imbalanced grade distribution of their officers. About one-fourth of the total naval and Marine Corps officer strength is composed of personnel originally commissioned during World War II, with most of them in the ranks of lieutenant commander and commander or major and lieutenant colonel. The lack of promotion opportunity for these officers seriously impeded their advancement and also affected adversely the promotion of those junior to them. Without remedial action, about two-thirds of these World War II officers would have had to be retired at their present ranks. The new law will spread the forced attrition to the group of officers originally commissioned before World War II by permitting the Navy to retire officers with more than 20 years' service who have twice failed of promotion.

Still under consideration at the close of the fiscal year was a bill establishing a new system of retention contracts for reserve officers to encourage them to remain on extended active duty. Under this proposal the military services would be required to enter into an agreement with every Reserve officer who wishes to serve longer than his term of obligated duty. The contracts would guarantee a lump-sum payment of 2 months' pay for each year of service at the expiration date of the contract or when the officer was released from active duty. If the officer were released involuntarily before completion of the agreed term, he would receive an additional 1 month's pay for each unexpired year of the contract. Enactment of this legislation should substantially reduce the turnover among junior officers. Some 40,000 of these conclude their tour of obligated duty each year, and only about 10,000 remain on active duty, while the retention of 15,000 is desired. By inducing more reservists to request extended service, the armed forces expect to achieve a notable rise in experience levels and considerable savings in training costs.

Legislation was also proposed to permit the convening of special boards for considering the mandatory retirement of officers with more than 20 years' service who had twice failed of promotion and to provide permanent authority for more flexible promotion criteria adopted administratively by the military services in recent years. Under this permanent authority, promotions to the ranks of major and lieutenant colonel (lieutenant commander and commander in the Navy) could continue to be on a "best qualified" basis rather than by mere seniority, and up to 5 percent of the officers selected could come from groups junior to the primary promotion zone.

Despite some problems in the management of officer careers, which these legislative measures were designed to correct, quality and experience levels among officer personnel rose during the fiscal year. The proportion of regulars to total officer strength increased to 43 percent on June 30, 1959, as a result of programs to raise the input of regular officers. The largest increase occurred in the Air Force, which gained about 5,200 new regular officers, primarily through procedures authorized by the Officers Augmentation Act of 1956. At the close of the fiscal year, regulars composed 38 percent of total officer strength in the Air Force, 39 percent in the Army, and about 50 percent in the Navy and Marine Corps.

Women in the Military Services

The number of women on active duty in the armed forces totaled 31,900 on June 30, 1959, an increase of 700 during the fiscal year. This total was composed of 11,000 officers—8,700 of whom were nurses and medical specialists—and of 20,900 enlisted women. At the close of the fiscal year about 12,000 women were serving in the Army, almost 9,600 in the Navy and Marine Corps, and 10,100 in the Air Force.

The Defense Advisory Committee on Women in the Services continued to provide valuable assistance in planning the most effective use of the capabilities of these women and in promoting wider public understanding of their important role. This 50-member group of distinguished women leaders concerned itself particularly with improvements in the housing, training, and general welfare of service-women. The Committee's activities have greatly helped in attracting well-qualified women to serve in a wide variety of line, staff, and medical assignments in the armed forces.

Information and Education Programs

A wide range of educational and vocational training has been made available by the U.S. Armed Forces Institute (USAFI) of Madison, Wis., for use by servicemen in improving their military qualifications

and in preparing themselves for greater responsibilities upon return to civilian life. Individual and group study enrollments in USAFI courses reached a total of 227,400 on June 30, 1959—3,700 more than at the beginning of the year despite a reduction in the size of the armed forces. To supplement these offerings, 11 telecourses in basic subjects were available, suitable for use with 16-mm. movie projectors or over armed forces television outlets. Active enrollments in individual correspondence courses provided by 44 colleges and universities under contract with USAFI totaled 11,400 at the end of the year, approximately the same as on June 30, 1958.

Arrangements were also completed for providing more up-to-date material on world, national, and local affairs for use in the troop information program. National magazines cooperated in the widespread distribution of articles reprinted from their current issues, and the Office of Armed Forces Information and Education issued master paper plates of specially prepared fact sheets which were flown to field commands for local reproduction, thereby increasing materially the timeliness of the information. Over 3 million reprints of articles, 3 million pamphlets, and 2,000 plates for fact sheets were distributed during the fiscal year. Armed forces television outlets were increased from 30 to 34 and radio outlets from 181 to 197. Television stations were provided with 50 hours of kinescopes each week, and 33 motion pictures were distributed for troop information and education activities.

Dependents' Medical Care

Traditionally, dependents of military personnel have received essential medical care at military installations when such treatment could be provided without impinging on other, higher priority medical programs for active duty personnel. To assure equitable treatment of such dependents, the Department initiated in 1956 a special program for medical care at civilian facilities, with the armed forces bearing a major portion of the expenses. The program was modified in fiscal year 1959 to insure fuller utilization of existing military medical facilities and to keep expenditures within the amounts made available by the Congress. Dependents residing with service personnel are now required to obtain a "medicare permit" from a military medical center before seeking treatment from civilian sources, and limitations were placed on the types and extent of care authorized under the program—restricting outpatient services and excluding treatment of emotional disorders and elective surgical and medical procedures.

Following adoption of these new standards, the number of admissions of military dependents to civilian hospitals declined and there

was a corresponding increase in the number of admissions to military treatment facilities. Accordingly, the number and amount of the claims paid by the armed forces for treatment of dependents by civilian physicians and hospitals were lower this year than last. A total of 306,000 claims from civilian hospitals—amounting to \$38.6 million—were paid during the year, as compared to 370,000 claims for \$42.7 million the preceding year. Claims from physicians numbered 497,000 and amounted to \$41.1 million, as compared to 601,000 claims for \$46.5 million during fiscal year 1958. About two-fifths of these claims continued to represent treatment for dependents whose service sponsor was overseas or otherwise separated from his family—individuals who had found it difficult to obtain treatment at military installations prior to the institution of the 1956 program.

Family Housing

A key factor in retaining experienced personnel in the armed forces is the availability of adequate housing. Notable progress in meeting this requirement has been made. The substantial additions in recent years to the number of quarters under Government and private control have greatly contributed to improved morale. (See fig. 13.)

FAMILY HOUSING

QUARTERS CONTROLLED BY MILITARY DEPARTMENTS

(THOUSANDS OF UNITS)

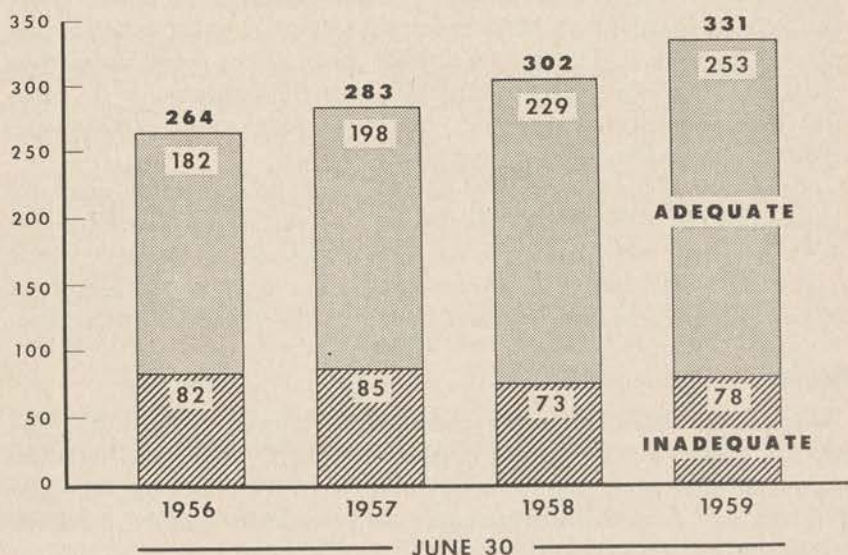


Figure 13

By far the largest portion of new family housing constructed this year was in Capehart projects—units built by private contractors under federally insured mortgages for operation as public quarters by the military services. Under the Capehart program, established by an amendment to the National Housing Act in August 1955, over 108,700 Capehart units were approved for construction at the end of the fiscal year. Of this total, 35,700 had been completed on June 30, 1959—almost 24,400 during this fiscal year—and an additional 44,400 were under construction.

During the fiscal year, the military services acquired title to about 14,300 housing units built under the 1949 Wherry amendment to the National Housing Act, which authorized federally insured mortgages for housing projects built by private contractors for private operation and rental to families of military personnel. With these acquisitions, made under authority enacted in 1956, the military services owned about 59,000 Wherry units and were operating them as public quarters.

Overseas, almost 2,200 housing units were completed during fiscal year 1959 with funds made available through the sale of surplus agricultural commodities for foreign currency, supplemented by appropriated funds for overhead expenses and for items not locally available. During the past 4 years more than 8,000 units were placed under contract or completed under this program in Europe and the Far East. An additional 3,444 units were authorized shortly after the close of the fiscal year with the enactment of the Military Construction Authorization Act for 1960.

The construction of public quarters with appropriated funds has been limited largely to small and isolated installations where it has been infeasible or impossible to construct Capehart units or use surplus commodity funds. During fiscal year 1959, about 1,400 units were constructed and 200 substandard quarters rehabilitated with funds made available by the Congress. About 600 more units, costing \$17.8 million, were programed for the next fiscal year.

The review of the adequacy of housing units used as public quarters, initiated by the military services during the year, covered 73,000 units; 54,000 of these were found to be fully adequate, while 19,000 were considered to fall below minimum standards. The disposition of the 19,000 inadequate units was under review at the close of the fiscal year.

Health

The highest standards of medical care continued to prevail throughout the armed forces during fiscal year 1959. Adequate numbers of professional personnel were recruited for duty in military medical activities and further improvements were made in hospital facilities and in the medical supply systems of the military services.

Fewer men were hospitalized during the year than in 1958, when an epidemic of upper respiratory infections sent large numbers of service personnel to treatment facilities for short stays. Hospital admission rates averaged 288 per 1,000 this fiscal year, compared to 387 per 1,000 the preceding year, and the percentage of the armed forces in hospitals declined from 1.06 percent last year to 0.94 percent in 1959. The noneffectiveness rate was lowered accordingly and averaged 11.45 per 1,000 this year, 1.55 per 1,000 below the preceding year's rate.

Medical Personnel

Since the approval of the Medical and Dental Officers Career Incentive Act on April 30, 1956, the number of physicians and dentists serving on active duty as regular officers has steadily increased, reversing the heavy losses of regular medical personnel that occurred in 1953, 1954, and 1955. During fiscal year 1959, the regular medical corps achieved a net gain of almost 300 physicians and totaled 4,640 at the close of the year. On the same date there were 2,034 dentists in the regular dental corps, a net increase of over 100 during the year. These trends are encouraging, but with 10,092 physicians and 5,143 dentists in the armed forces on June 30, 1959, further additions to the regular medical and dental corps are required in the years ahead.

The special program to encourage young physicians and dentists to volunteer for military service continued to be effective in meeting military requirements for medical personnel. Under this program, medical school graduates are offered reserve commissions and given the option of either applying for 2 years of active duty immediately upon completion of their internships or of being deferred to complete additional residency training in medical specialties needed by the armed forces. About 2,500 physicians were in a deferred status on June 30, 1959, for 1 or more years of such training and will enter active duty at a rate of about 800 each year. From the entire program, a total of 1,832 physicians entered the military services as reservists this fiscal year, either as specialists or as general practitioners.

Medical and dental students in their senior years have been eligible to apply for commissions as second lieutenants or ensigns and finish their studies in an active duty status. These students agree to accept either regular or reserve commissions upon the completion of training and to serve an additional 3 years of active duty. A total of 368 senior medical students and 125 senior dental students were commissioned under this program during fiscal year 1959.

Medical Facilities and Supply

Thirteen new permanent hospitals were placed in service during the fiscal year—11 in the United States and 2 overseas.

The percentage of patients treated in hospitals operated by a service different from their own rose again in 1959; about 10.1 percent of all military personnel and 18.7 percent of the dependents of military personnel who were admitted to hospitals in the United States were sponsored by a military service other than the one maintaining the facility. The 1958 rates were 9.4 and 17.7 percent, respectively.

During this fiscal year the Military Medical Supply Agency took additional steps to insure that its inventories remained in usable condition and adequate for a war emergency. All mobilization stocks of medical items were inspected and nonserviceable equipment repaired or scrapped. A catalog of the 700 items most essential for emergency conditions was compiled, and lists of the potential suppliers of these items furnished to each medical depot. Further progress was made in developing the drugs and equipment needed to fill special emergency needs. For example, a new dehydrated smallpox vaccine was perfected which has twice the shelf life of the present glycerated vaccine and does not require refrigeration in storage or transit. Attention was also given to developing lighter, more mobile equipment and items, such as plastic instruments, the production of which would conserve materials and labor skills likely to be in short supply during wartime. The procurement of special emergency medical packs for use by the armed forces in the event of nuclear attack was started.

Revised instructions for computing mobilization requirements for whole blood derivative products were also issued during the year. Peacetime blood programs were reviewed and arrangements made to fractionate the remaining wholesale stocks of blood plasma into serum albumin and reprocess outdated serum albumin.

The Reserve Forces

To assure that reinforcements will be readily available when needed, the armed services have steadily improved the quality of their reserve programs in recent years. As a result, the reserve components at the close of fiscal year 1959 were better organized, better trained, and better equipped to support the active forces than ever before.

Organization

The realignment of the Ready Reserve of all the military services to modern defense concepts made substantial progress during the year and will be largely completed by June 30, 1960.

Army National Guard divisions and supporting units began conversion during the year to the pentomic organizational concepts placed

in effect by Regular Army forces during the preceding 2 fiscal years. Pentomic divisions are numerically smaller, but possess greater mobility and firepower than the traditional triangular divisions that they superseded.

The Army National Guard will continue to maintain 21 infantry and 6 armored divisions, but the total number of subdivisonal and nondivisional units will be reduced by almost 25 percent. Each of the 21 pentomic infantry divisions will have 27 fewer companies, and the 11 separate National Guard regimental combat teams, each composed of 26 company-size units, will be converted to battle groups consisting of 7 companies each. Army National Guard units in the First Army area (New England) completed their reorganization in May 1959, and units in other parts of the country are scheduled to adopt the new tables of organization during the coming fiscal year.

The Army Reserve also began converting its divisional and supporting units to the pentomic concept. Under the new plan, the Army Reserve will consist of 10 pentomic infantry divisions, 13 training divisions, 2 maneuver-area commands, and several hundred supporting companies. When this reorganization is completed, about 270,000 Ready Reservists on drill-pay status will man about 4,300, instead of 5,400, company-size units. To strengthen the command and supervision of its Reserve training, the Army consolidated 46 military districts into 13 U.S. Army Corps (Reserve) Headquarters and plans to convert the remaining 3 military districts into 1 additional corps headquarters during fiscal year 1960.

The Navy greatly expanded during fiscal year 1959 its Selected Reserve program, initiated in February 1958. A total of 45 destroyers and destroyer escorts, based at Atlantic and Pacific ports, had been assigned on June 30, 1959, for use by the Selected Reserve. Each of these ships will have a full crew of reservists, trained to take the ship into action with the fleet in the event of war. An additional six destroyer-type vessels were scheduled to be added to this program in the near future. Naval air squadrons of the Selected Reserve were being trained and equipped primarily for antisubmarine warfare. Some 36 of the 41 squadrons in the program had been activated for antisubmarine missions by June 30, 1959. Other members of the Selected Reserve received training in units for immediate service in bringing ships of the active fleet and the Shore Establishment up to wartime manning levels. Selected reservists were issued "vest pocket" duty orders that will become effective immediately in case of war. Additional Marine Corps Reserve attack and helicopter aviation squadrons were also activated this year to provide a better balance of reserve forces for support of the active establishment in an emergency.

In 1959, the Air Force completed the reorganization of its Reserve and Air National Guard flying units to conform to the 39-wing structure announced during the preceding year. The Air Force Reserve organized its squadrons into 15 troop carrier wings, 5 air rescue squadrons, and 40 supporting units manned by reservists on drill-pay status. The Air National Guard on June 30, 1959, was composed of 24 wings—4 tactical reconnaissance, 12 fighter-interceptor, and 8 tactical fighter. These last eight were converted from fighter-interceptor wings to their new mission as tactical fighters during the year, but remain available to augment the Air Defense Command in the opening phases of an emergency. The new 39-wing structure greatly improves the readiness of the reserve units most urgently needed in an emergency.

Personnel and Training

With more than 95 percent of the Ready Reservists having had basic training, Reserve units were able to concentrate their efforts almost exclusively on advanced training programs. This high percentage was the result of provisions in the Universal Military Training and Service Act and the Reserve Forces Act of 1955, which established reserve obligations of varying length for men entering the Armed Forces. The extension in 1959 of these legislative provisions for 4 more years gave assurance that the reserve establishment will be able to maintain its current high standards of readiness in the future.

The special 6-month training program, which prescribes 8 years of Reserve duty for participants, has become an important additional source of trained individuals for reserve units. Some 318,000 enlisted men began tours of active duty and 255,000 completed such tours since the program was first offered in August 1955. During fiscal year 1959, 96,000 men entered training under this program, and 93,000 completed their active duty and were assigned to reserve units in their local communities.

The strength ceiling for the Ready Reserve, excluding reservists on extended active duty, has been established by the Department of Defense at 2,500,000. Through annual screening of the records of reservists, a properly balanced Ready Reserve has been maintained, composed of individuals readily available in an emergency. On June 30, 1959, the Ready Reserve totaled 2,456,000. Of these, 1,062,000 received pay for regular participation in drills or for training tours of active duty. An additional 247,000 reservists were serving on extended active duty with the regular forces. A year earlier, 2,429,000 men had been in the Ready Reserve, 1,025,000 on pay status, and 313,000 on extended active duty.

The Standby Reserve increased during the year by 292,000—from 1,478,000 to 1,770,000—while the Retired Reserve registered a net gain of 13,000, totaling 128,000 on June 30, 1959. (See fig. 14.)

Effective training of reserve units has been greatly facilitated by the continued modernization of weapons and equipment. During fiscal year 1959, for example, 32 additional Army National Guard air defense battalions began training with the NIKE-AJAX missile and a third Air National Guard squadron was provided with F-100 aircraft.

In addition to training their members for emergency service, Ready Reserve units are playing an increasingly important role in assisting the active forces to carry out their missions. During fiscal year 1959 the first two Army National Guard NIKE-AJAX missile battalions to become operational assumed responsibility for a portion of the ground-to-air defenses in their areas. In addition, 2 more Air National Guard fighter-interceptor squadrons were added to the active air alert programs, making a total of 22 such squadrons assigned to augment the Air Defense Command. Air Reserve troop carrier units also provided support for the active forces in special maneuvers, such as the Army-Air Force Exercise DARK CLOUD in the spring of 1959.

Financial Support and Construction

Expenditures for the reserve establishment during fiscal year 1959 totaled \$1.2 billion, slightly more than the amount expended for this purpose during the preceding year. Of this total, \$0.7 billion was allocated to the Army Reserve and the Army National Guard, \$0.2 billion to the Navy and Marine Corps Reserve, and \$0.3 billion to the Air Force Reserve and the Air National Guard.

Included in these amounts was \$86 million for the construction of new reserve training facilities and the expansion and modernization of existing ones. Over half of these funds—\$45 million—was expended for Army Reserve and Army National Guard armories and training centers. The Army placed 72 complete armories, 86 Army Reserve Centers, and numerous smaller reserve projects under contract during the year after a thorough review of the requirements created by the conversion of reserve units to the pentomic concept. The Navy and Marine Corps allocated \$13 million for reserve construction during the year, most of it for the expansion, alteration, or replacement of inadequate facilities. Expenditures by the Air Force for reserve training construction totaled \$28 million during fiscal year 1959, largely for the improvement of flying facilities for the Air National Guard and the Air Force Reserve.

RESERVE FORCES PERSONNEL STRENGTH

1955 - 1959

(IN MILLIONS)

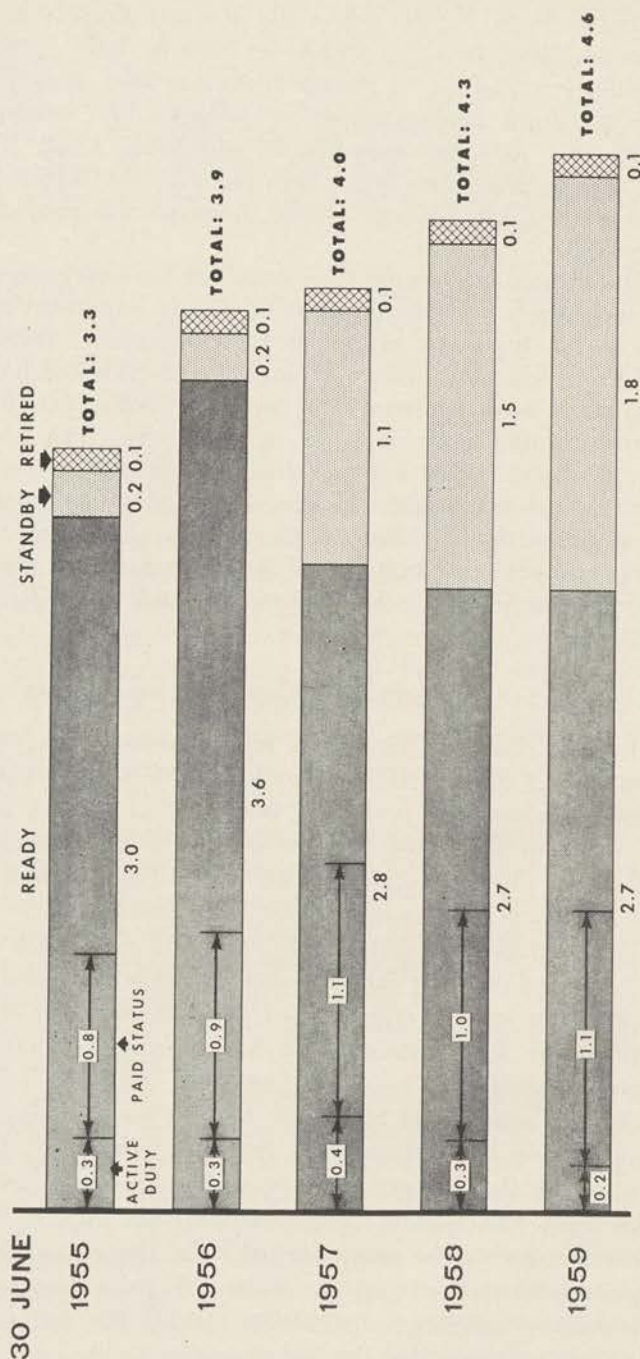


Figure 14

The money and effort expended in recent years for reserve programs have produced an establishment which is better trained and equipped and more immediately available to back up the active forces than ever before. Current programs assure that the high levels of mobilization potential currently prevailing will be maintained.

Civilian Personnel

On June 30, 1959, the civilian personnel force of the Department of Defense was comprised of 1,078,000 direct-hire personnel and 188,000 foreign nationals employed through contractual arrangements with friendly governments. About 53 percent of the direct-hire employees, or 570,000, were paid according to local hourly rates determined by wage boards, while the remaining 508,000 were salaried employees paid under the Classification Act of 1959, as amended.

The established policies for holding civilian employment to austere levels compatible with efficient operations permitted the Department to employ 47,000 fewer personnel at the end of the fiscal year than at the beginning. About 28,000 of these were foreign nationals, most of whom had been working in the Far East. Their services were terminated following the withdrawal from Japan of some major U.S. military units and activities. The reduction of 19,000 direct-hire employees included 4,000 salaried and 15,000 wage-board personnel.

While total requirements for civilian personnel have become less in recent years, the needs for specially qualified employees have steadily risen. To meet these rising needs, the Department of Defense has given increased attention to the problem of attracting and retaining skilled civilians in support positions.

As a partial solution to this problem, greater emphasis has been placed on programs for the career development and training of employees. New instructions were issued during the year to encourage employee on-the-job and off-duty training, as authorized by the Government Employees Training Act of 1958. In keeping with this legislation and earlier authority in annual appropriation acts, the military departments strengthened their civilian training programs. Within the Department of the Army, career incentive programs were established on an Army-wide basis for 12 career fields, while army commands set up training courses for 59 career groups. Over 20 percent of the Army's direct-hire employees fall into occupational areas covered by these programs. The Department of the Navy continued in fiscal year 1959 to make effective use of student-trainees and of civilian career planning programs. In addition, an employee development board was established. New instructions were issued

by the Air Force intensifying civilian career development activities at all levels of command.

Steps were also taken during the year to improve the attractiveness of Government service to top-level scientists, engineers, and technicians. Participation in professional and scientific meetings has been encouraged to enable these employees to keep abreast of technical developments in their specialties and to inform their colleagues of scientific advances made in Government research. As recommended by the Cordiner Committee, working conditions were improved at research and development installations and scientists were relieved of routine administrative duties whenever possible to permit them to concentrate their attention fully on research.

The ability of the Department to attract and retain professional and scientific personnel was increased shortly after the close of the fiscal year by congressional action authorizing additional top-level Civil Service positions. The number of special positions for scientists and engineers, with salaries up to \$19,000, allocated to the Department of Defense was raised from 292 to 450—an increase of 158. The Department's allocation of "supergrades," with annual salaries ranging between \$14,190 and \$17,500, was raised from 301 to 372—an increase of 71. The new positions will become available over a 3-year period—one-third each year. Only professional and managerial employees having great responsibility will be advanced to these higher pay grades.

The method of setting pay rates for wage-board employees in Army and Air Force industrial-type and maintenance activities was revised this year to improve the alignment of job ratings, assist in the assignment of jobs to appropriate pay grades, and facilitate administration. The number of grades was reduced from 28 to 15 and the number of seniority steps within grades from 4 to 3. Conversion to the new pay structure began in October 1958 and is scheduled to be completed before the close of fiscal year 1960. It will bring Army-Air Force grade schedules in line with those used by most other Federal agencies.

Substantial improvements were also made shortly after the close of the fiscal year in the administrative procedures applicable to teachers in elementary and secondary schools operated overseas by the armed forces for the children of servicemen. The Overseas Teachers Pay and Personnel Practices Act, approved on July 17, 1959, authorized the military schools to use procedures comparable to those in effect in many local jurisdictions in the United States. Formerly, oversea teachers had been subject to Civil Service regulations designed to cover 12-month, rather than 9-month, employees. These rules, by their lack of flexibility, worked a hardship on teachers.

The new legislation will greatly facilitate the staffing and administration of the 213 elementary and 21 secondary schools maintained abroad by the armed forces.

Civilian training programs, designed to provide greater opportunities for advancement, have also contributed to opening more positions to Negro employees for the first time. This trend is in accordance with the Department's policy to effect the fullest use of available manpower resources regardless of race. Negro employees participated in these programs in greater numbers during the past year and have a greater variety of jobs open to them in the Department of Defense than in the general economy. Moreover, the Department employed a larger number and a larger percentage of Negroes than any other Federal agency.

Another effort to improve departmental operations is represented by the Employees' Incentive Awards Program. During fiscal year 1959, 255,000 inventions and suggestions for improved procedures were submitted, as compared to 242,000 the preceding year. Over 68,000 of these proposals were accepted, 3,000 more than in 1958, and their adoption should save the Government over \$60.7 million in 1 year's time. Cash awards totaling \$2.2 million were paid to the employees submitting these ideas. In addition, 41,000 employees who discharged their duties at a sustained superior level of performance were granted \$6.6 million this year for having contributed to greater efficiency of operations and to tangible first-year savings of \$31.6 million.

VII. Weapons, Equipment, and Facilities

The rapid technological progress of recent years has produced major changes in logistic support as in all other activities of the armed forces. Guided missiles and new electronic control and warning devices have become available at an increasing rate, supplanting older weapons and equipment and creating requirements for new construction. Achieving a smooth evolution from the older to the new weapons systems has been one of the primary management objectives of the Department of Defense.

In discharging its responsibilities, the Department has developed improved coordinating organizations, updated its administrative procedures, and promoted constantly closer integration of the support activities of the military services. Continued review of supply systems and real property holdings provided more effective support to the armed forces and facilitated the changeover to new weapons systems. At the same time, logistic support was furnished more economically by increased joint use of available supply inventories and real property.

Supply Management

The magnitude of the Department of Defense supply system has made the efficient administration of these activities one of the greatest single management tasks anywhere today.

Contracts for new materiel, construction, and services totaled more than \$25 billion during fiscal year 1959. The Department's management responsibility included materiel assets valued at \$117.7 billion on June 30, 1959. This total comprised \$63.6 billion invested in the arms and equipment issued to the Armed Forces; more than \$9.6 billion in production machinery, industrial fund accounts, and undisposed obsolescent property; and \$44.5 billion in inventories held for later use—as compared to approximately \$85 billion in inventories owned by all industrial firms in the United States. The extent of the Department's responsibilities is illustrated by the fact that military stocks include almost 3,500,000 different items as compared to approximately 100,000 entries in the catalog of the largest mail-order house in the United States.

The volume of transactions and the size of the assets of the Department require the employment of special management techniques to

achieve efficient operations. Further experience was gained during the fiscal year with the Single Manager system, which continued to provide increased benefits through the centralized procurement, distribution, and management of common-use supplies and services. The Armed Forces Supply Support Center, established in June 1958 to supervise cataloging, standardization, and materiel utilization programs, effectively promoted greater interservice cooperation in logistics. Improved methods were developed for disposing of surplus stocks. Continuing attention throughout the Department of Defense to the many logistical problems confronting the armed forces has reduced expenditures and, more importantly, has contributed to more effective military strength.

The Single Managers

In slightly less than 3 years of actual operating experience, the Single Manager system for supply and service activities common to more than one military department has eliminated unnecessary duplication of effort and substantially improved the effectiveness of logistical support activities.

This system was applied to four categories of supplies—subsistence, clothing and textiles, petroleum, and medical items. The first two of these commodity groups have been managed by the Secretary of the Army and the latter two by the Secretary of the Navy. In addition, the Secretary of the Army has been serving as Single Manager for domestic traffic operations, the Secretary of the Navy for ocean transportation, and the Secretary of the Air Force for airlift services. (See fig. 15.) At the close of the fiscal year, studies were well under way for extending the Single Manager system to two other classes of materiel—industrial items and “general” supplies (administrative and housekeeping items).

Special operating agencies were established to carry out the responsibilities of the Single Managers in the four commodity areas. These agencies determine the net requirements of all the services; procure and inspect materiel; control the storage and wholesale distribution of stocks, with some exceptions in the case of petroleum products; promote standardization; and dispose of surplus items. In their operations the agencies fully utilize the facilities, resources, and skills available in all three military departments. Savings directly attributable to the new management system were more than \$13 million in fiscal year 1959. The consolidation of procurement, inspection, and distribution activities has made possible a reduction of over 700 personnel spaces, the elimination of 73 storage sites, and the release of 4,400,000 square feet of storage space for other purposes. In addition, wholesale supply inventories have been decreased by more than \$235 million.

SINGLE MANAGERS

FISCAL YEAR 1959

FOR SUPPLY			
Activities	Subsistence Supplies	Clothing and Textiles	Medical Supplies
Line Items Assigned	1,427	33,593	8,591
Requisitions Handled	993,900	1,287,000	1,755,000
Short Tons Shipped	937,000	182,000	37,000
Sales	\$699 million	\$324 million	\$76 million
Inventory	\$126 million	\$1,826 million	\$301 million

Activities	Petroleum Supplies
Line Items Assigned	1,247
Contract Awards	\$1,938 million

FOR TRANSPORTATION			
Activities	Air Transport	Sea Transport	Domestic Traffic Management
Passengers: Number	1,098,000	556,600	4,342,100
Passenger-Miles	3.8 billion	2.1 billion	2.3 billion
Dry Cargo: Tons Carried	185,000 ^{b/}	12,395,000 ^{c/}	22,816,000 ^{d/}
(Freight) ^{a/} Ton-Miles	0.5 billion	48.7 billion	11.2 billion
Petroleum: Tons Carried		16,670,000 ^{b/}	
Ton-Miles		52.8 billion	
Commercial Transp. Procured	\$70 million	\$246 million	\$564 million
Total Income	\$288 million	\$423 million	

^{a/}Freight for Domestic Traffic Management includes both dry and liquid cargo
^{b/}Long Tons ^{c/}Measurement Tons ^{d/}Short Tons

Figure 15

In the Military Subsistence Supply Agency, savings have been achieved by reducing personnel and storage requirements and introducing more economical procurement procedures. The Agency has been able to purchase food products in larger quantities—usually in carload lots—by consolidating orders from all the military services. Transportation expenses have been cut by arranging for mixed carload lot shipments of items, whereas formerly less than carload quantities were delivered directly to the using installation. Greater use has been made of the food inspection services of the Department of Agriculture to reduce the number of inspections. Savings also have resulted from designating the Cheatham Annex Cold Storage facility in Virginia as the center for supplying perishables to Army, Navy, and Air Force activities in Europe.

The Military Clothing and Textile Supply Agency during the past fiscal year reduced the number of distribution depots under its control from 58 to 13. The Navy clothing and textile office was moved from New York City to Philadelphia, where it can operate more efficiently in close proximity with the Agency headquarters and the Army, Air Force, and Marine Corps clothing control points. Wholesale inventories were substantially reduced, and the number of separate items in stock cut from 43,910 to 33,593 by standardization. At the same time, the number of items used by more than one service has almost doubled since single management was instituted. More uniform and equitable procurement procedures have been adopted, benefiting both the Government and suppliers.

In the summer of 1958 the Military Petroleum Supply Agency met expeditiously the additional demands for petroleum products created by the Middle Eastern and Taiwanese crises, thus demonstrating the adaptability of the Single Manager system to emergency conditions. In filling these sudden needs, the Agency contracted rapidly for additional supplies, diverted tankers in mid-voyage to new destinations, and rescheduled subsequent delivery programs. The Agency also continued to improve its procurement procedures, to reduce the number of different petroleum products in stock, to facilitate the exchange of excess products, and to arrange more economical distribution patterns. Unlike the other commodity Single Managers, the Military Petroleum Supply Agency does not own wholesale inventory stocks because of high consumption rates and the importance to the military services of controlling adequate reserve fuel supplies for emergency operations.

During the fiscal year the Military Medical Supply Agency closed 2 additional storage points, thus reducing within 2 years the number of installations at which medical supplies are stocked from 19 to 12. Of these 12 depots, 3 carry a full line of supplies, 7 handle only items with high turnover, and the remaining 2 store bulk backup

stocks and mobilization reserves. The Agency's distribution system has eliminated unnecessary crosshauling and backhauling of supplies. Consolidation of activities has made possible the elimination of 428 positions and released 798,000 square feet of storage space for other purposes. The number of different items in stock has been decreased by 25 percent—from 11,585 to 8,591—since the Agency was activated.

Impressive as have been the economies introduced by the commodity Single Managers, of even greater significance is the fact that the operating forces have been provided with more effective logistic support. Using agencies have uniformly testified to their satisfaction with the Single Manager system both in normal operations and in such special emergency situations as occurred in the Middle and Far East.

The three Single Manager agencies for transportation—the Military Traffic Management Agency (MTMA), the Military Sea Transportation Service (MSTS), and the Military Air Transport Service (MATS)—also continued to make significant contributions to logistical effectiveness during the past year.

MTMA, established to control the use of commercial transportation in the United States by Department of Defense agencies, operates with a staff 30 percent smaller than when each service was responsible for its own traffic management. During fiscal year 1959, the Agency realized savings of \$30.0 million (as compared to \$23.9 million during the preceding year) through negotiation of rate reductions, adjustment of freight classifications, and better utilization of en route stopoff privileges for materiel in transit. The Agency moved 34 percent more freight in fiscal year 1959 than in 1958 at a cost only 3 percent higher.

MSTS provides ocean transportation for all military services. It operates Government-owned vessels, constituting the nucleus of our wartime logistic support fleet, and contracts with commercial carriers for the bulk of peacetime sealift requirements. During fiscal year 1959, about 77 percent of the Agency's operating expenses represented payments for services rendered by private firms. Total expenses—\$414 million—were about \$20.0 million less than during the preceding year despite a 21-percent increase in the tonnage of petroleum moved overseas. The additional petroleum shipments were more than offset by a 9-percent reduction in both passenger and dry cargo requirements. Lower sealift needs permitted a reduction in the number of active ships from 179 to 151. Continuing operational improvements yielded a gross operating profit during the year of \$9.0 million, which was passed on to the military services in the form of rate reductions.

MATS completed on June 30, 1959, its first year of operations under industrial fund financing as the Single Manager agency for oversea airlift services. This function is carried out as an essential part of MATS' responsibility for assuring that the transport and troop carrier aircraft, service forces, and en route bases required in an emergency are available and manned by experienced personnel. Commercial aircraft in the Civil Reserve Air Fleet (CRAF) are scheduled to provide a substantial part of the aircraft requirement. A new standard contract for such standby service by airlines was drafted during the year. Increased use was made during fiscal year 1959 of commercial carriers to provide the necessary airlift. Payments to such firms amounted to \$70.4 million, or \$13.7 million more than during the preceding year, and accounted for almost 26 percent of the total operating expenses for airlift services of \$274.4 million. Continued close cooperation between MATS and the airline industry will help to assure the existence of capacity adequate for meeting emergency conditions as well as economical peacetime airlift services.

Cataloging and Standardization

The cataloging program of the Department of Defense continued to make major contributions to more efficient supply operations. The conversion of the military supply systems to the new catalog numbers was achieved on schedule on December 31, 1958, thus giving each of the 3,500,000 different items used by the armed forces a single name, a single commodity group classification, and a single identifying number.

About 459,000 new items of equipment, including component parts, were cataloged in fiscal year 1959, while some 441,000 superseded item identifications were dropped, for a net increase of 18,000 listings. At the close of the fiscal year, the number of active items in the catalog totaled 3,499,000. Processing time for making changes was decreased by about 40 percent after rapid data-transmitting equipment between the central catalog office and 24 field installations was placed in service in March 1959. Another 12 field installations were scheduled to join this network during the summer of 1959.

Cataloging is the essential first step in eliminating unnecessary sizes, types, and kinds of equipment and components from military supply systems. The weeding out of these superfluous supplies is accomplished through the Accelerated Item Reduction (AIR) Program and the Standardization Program.

Under the AIR Program, the military services have started to review the continuing need for over 1 million commercial items in wide general use throughout the armed forces. During the past year, 24 categories of administrative and housekeeping supplies were

surveyed, and almost 10,000 of 14,500 items, or 70 percent, were declared "nonstandard," thereby precluding future purchases.

Under the Standardization Program the military services evaluate the more technical supply items to select equipment that best meets common operating needs and redesign items to permit more general use. Detailed standardization plans have been approved for 308 of the 431 supply categories to be reviewed. The new and revised military standards published during fiscal year 1959 will prevent further procurement of some 181,000 sizes, kinds, and types of generally similar items. With these actions, a total of 937,000 items have been designated for elimination under the Standardization Program. In addition, about 1,750 military and Federal specifications have been replaced by 681 specifications to reduce overlapping and duplication.

Procurement

In continuing the modernization of the armed forces during fiscal year 1959, the Department of Defense contracted for the purchase of weapons, supplies, services, and construction with a net value of \$25.3 billion—\$1.1 billion more than during the preceding year. About 90 percent of this procurement was placed with business firms for work in the United States—more than \$19.4 billion for weapons and supplies, \$1.9 billion for services, and \$1.4 billion for construction. In addition, awards for work outside the United States totaled \$1.4 billion, and procurement transactions with Government agencies and nonprofit institutions amounted to \$1.2 billion. (See fig. 16.)

Of the approximately \$19.4 billion in procurement actions for weapons and supplies to be produced by firms in the United States, \$15.4 billion, or 79 percent, was allocated to major weapons and equipment. The remaining \$4.0 billion was committed for purchases of food, fuel, textiles, miscellaneous hard goods, and thousands of small transactions, each less than \$10,000, not reported by category.

The steadily increasing importance of guided missiles systems in warfare is illustrated by the award during fiscal year 1959 of missile contracts totaling \$4.5 billion—or 60 percent more than \$2.8 billion awarded for these systems during the preceding fiscal year. The value of contracts for communications and electronics equipment and for ships was also considerably higher this year than last. Conversely, the value of aircraft contracts declined from \$7.4 billion in fiscal year 1958 to \$6.5 billion in fiscal year 1959.

The great variety of goods, services, and construction required by the Department of Defense has made reliance on a single procurement procedure impossible and has forced the use of procurement methods most appropriate for particular items. Since firm specifications cannot be drafted in advance for many of our major new weapons sys-

PROCUREMENT ACTIONS BY PROGRAM

FISCAL YEAR 1959

(BILLIONS OF DOLLARS)

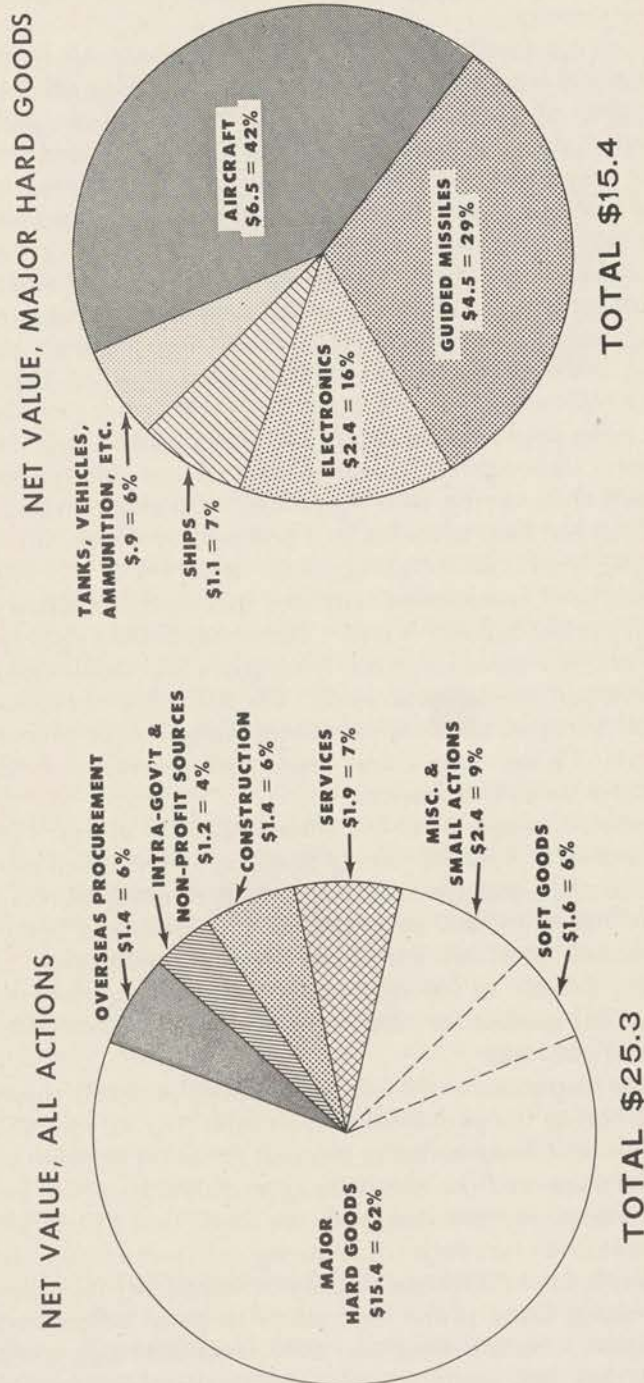


Figure 16

tems, formal advertising and sealed bids are unsuited for this type of procurement.

During fiscal year 1959, the Department of Defense completed 6,699,000 separate procurement actions totaling \$25.3 billion. About 847,000 of these actions were accomplished through intragovernmental arrangements, while 24,000 represented modifications of existing contracts. Of the remaining 5,828,000 actions, with a value of \$16.2 billion, 4,830,000, valued at \$0.8 billion, were small purchases, averaging \$160 each and negotiated locally under simplified methods to reduce administrative expense. Formal advertising and sealed bids accounted for 286,000 procurement actions involving purchases totaling \$3.4 billion. Direct competition between suppliers, but without formal bidding procedures, characterized another 48,000 awards for \$2.4 billion, placed by contracting officers after negotiating with two or more producers to obtain the best possible price for the Government. Although 35,000 procurement actions, totaling \$8.2 billion, were reported as having been negotiated with single firms, many of these actions had been preceded by a preliminary design or technical contest among several potential suppliers. A survey of \$6.6 billions' worth of this type of procurement indicated that such preliminary contests were used for \$5.3 billions' worth. These negotiated awards were primarily for major weapons systems, spare parts for complex equipment, or research and development work. The final 629,000 actions, with a value of \$1.4 billion, involved negotiated contracts for procurement outside of the United States and negotiated contracts of which the competitive status is unknown.

Small business firms bid successfully for military prime contracts valued at \$3.8 billion during fiscal year 1959, about the same amount as the preceding year. These awards represented 63.1 percent of the \$6.0 billion in new procurement that had been determined to fall within the productive capacity of smaller companies. As in previous years, failure to bid or failure to submit the lowest bid were the principal reasons for small business firms not receiving all their potential contracts.

The Department of Defense continued to devote considerable attention during the past fiscal year to achieving an equitable distribution of the procurement dollar to small firms. The joint program of the Department and the Small Business Administration for this purpose was vigorously executed, with the result that \$1.1 billion in contracts was set aside for competition among such companies. In addition, the Department of Defense steadily strengthened its procedures for encouraging large prime contractors to place subcontracts with small business. During fiscal year 1959, some 295 large producers reported that they had made payments to small subcontractors that totaled

\$3.3 billion. These reports, together with the awards of \$3.8 billion in prime contracts to smaller companies, indicate that the share of small business in defense contracting totals at least \$7.0 billion a year.

Contracts awarded by the Department of Defense during the fiscal year played a significant role in combating unemployment in areas and industries with a surplus of labor. Procurement with a net value of \$9.3 billion was placed with firms in 310 labor-surplus areas this fiscal year, as compared to awards of \$3.8 billion in 285 such areas the preceding year. Included in this year's totals was \$96 million in contracts awarded through set-asides or tie-bid preferences, about \$59 million more than during fiscal year 1958. This program of preferences has been carried out to assist in maintaining a strong industrial mobilization base in case of war.

Inventory Control, Storage, Distribution, and Disposal

Particular attention was given during fiscal year 1959 to establishing inventory levels based on more realistic future requirements and to redistributing excess stocks among the military services. The Department began the development of uniform inventory control factors, applicable to all the services, to govern the quantities of noncombat items to be stored. New instructions were issued for the transfer of items in long supply from one military supply system to another without reimbursement, thus saving appropriated funds for the purchase of new items.

The supervision of the transfer of assets among the military services is the responsibility of the Armed Forces Supply Support Center, established at the close of fiscal year 1958. During the first year of administering the Defense Materiel Utilization System, the Center provided for the interchange of long-supply materiel valued at almost \$1.3 billion, as compared to \$0.7 billion during the preceding year. About one-half of the 1959 total was transferred to other Federal agencies, the national stockpile of strategic materials, and the Military Assistance Program. The other half was interchanged within the military supply systems—over \$0.2 billion through excess property screening procedures and over \$0.4 billion through the 33 interservice commodity coordination groups, the 6 area coordination groups in the United States, and the oversea unified commands. These coordinating agencies arranged for the transfer of 25 percent more materials this year than last.

The better utilization of inventories and the reduction in stock levels has permitted the armed forces to cut back their requirements for storage facilities. An additional factor contributing to these cuts has been the increased interservice use of depots and cooperating warehousing arrangements between the Department of Defense and other

Government agencies. At the close of the fiscal year, 2,400,000 square feet of storage space was assigned to joint use by the military departments between themselves and another 3,900,000 square feet to joint use by the Department of Defense and other Federal agencies. Since June 1954, over 27,700,000 square feet has been converted to other uses or disposed of—4,200,000 square feet in fiscal year 1959—and another 19,800,000 square feet is scheduled to be phased out by June 30, 1962. Additional studies were undertaken during the year looking toward the consolidation of ocean terminal facilities at San Francisco, Honolulu, and Hampton Roads.

Steady advances in technology—hastening the obsolescence of older weapons systems—have required the military services to give high priority to their programs for disposing of arms and equipment no longer needed for current use or for mobilization reserves. Plans were approved during the fiscal year for the establishment of a central Surplus Sales Information Office, which will maintain a consolidated bidders' list to encourage competitive bidding and thus increase the return from the disposal of unneeded materiel. In addition, the number of regional sales offices will be reduced by January 1961 from 315 to about 35 to facilitate the more efficient handling of surplus materiel.

Increased emphasis on inventory management during the year resulted in an increase of disposals to a total of \$8.9 billion. Of the \$8.9 billion reutilized, donated, or sold, \$8.5 billion—or \$2.2 billion more than in the preceding year—was disposed of after specific determination as "excess." The balance of \$0.4 billion represented materiel transferred for reutilization by other military users without having been designated as "excess," although this materiel would have acquired "excess" status at some later date. These totals did not represent the "appraised disposal value" but the acquisition cost of the materiel processed.

The \$8.9 billion of materiel reutilized or disposed of (including donations) was the largest in the history of the Department of Defense. Of this total, \$1.3 billion, or 15 percent, was utilized by the Department of Defense, the Military Assistance Program, and other Federal agencies. The remaining \$7.6 billion was processed for donation or disposal by surplus sale—\$4.5 billion was converted to scrap, \$0.3 billion was donated to States, educational institutions, and other nonprofit organizations, and \$2.8 billion was sold as specific items of materiel in conditions which varied from salvage to usable. From the \$2.8 billion sold, the Department of Defense realized \$140 million or 5 percent of the original cost. Scrap sales returned an additional \$72 million, making a total return of \$212 million from all sales. Taking into account cash receipts, reutilizations, and donations credited at book value, and savings from reduced costs of storage and accounting, the effective management of this \$8.9 billion of disposable inventory yielded an estimated return of 21 percent.

Mobilization Planning

The Department of Defense, operating under general policies prescribed by the Office of Civil and Defense Mobilization, continued during fiscal year 1959 to take the actions the Department required for the maintenance of an adequate industrial mobilization base. The emphasis in industrial mobilization planning was shifted during the past year from developing new sources of supply in case of an emergency to greater reliance on factories already working on military contracts.

Two types of assistance were available to private firms to expand their military production facilities—rapid tax amortization privileges and guaranteed loans. Under present law, only research, development, and testing facilities and productive capacity for new or specialized defense equipment can be certified for accelerated amortization. During fiscal year 1959, the Department of Defense considered 395 requests for such certification, and the Office of Civil and Defense Mobilization issued 130 certificates in the amount of \$94.7 million, as compared to \$107.7 million during the preceding year. In addition, the Department acted on 40 applications for federally guaranteed loans, of which 35 were authorized, totaling \$137.6 million—\$24.8 million less than during fiscal year 1958.

Inquiries from Federal agencies and from industry about whether proposed new facilities met requirements for adequate dispersion of productive capacity were substantially more numerous this year than last—504 as compared to 264. About 76 percent—382—of the proposed sites met established standards.

An essential nucleus for war production is provided by the National Industrial Plant Reserve (NIPR) and the plant reserves of the military departments. The number of plants in the NIPR was reduced from 83 to 24 during fiscal year 1959, with 21 of these owned by private firms but subject to recapture in an emergency and 3 operated under lease or contract. Some plants were removed from the reserve because of changing requirements in weapons systems and others because of the changing military concept concerning the time available in an emergency to put industrial facilities into production. The plant reserves of the military departments on June 30, 1959, included 394 facilities, valued at an acquisition cost of \$6.0 billion, as compared to 387 plants valued at \$5.7 billion at the end of the preceding fiscal year. Of this year's total, 223 were operated by contractors and 66 by the Government; 89 were in standby status; and 16 had been declared excess but had not yet been transferred to the General Services Administration for disposal.

In accordance with the revised planning concepts, the amount of production machinery held in the National Industrial Equipment Reserve (NIER) and by the military departments was also reduced during the fiscal year. On June 30, 1959, there were about 4,000 items of production equipment in the NIER, as compared to 4,900 a year earlier. The inventory of production equipment controlled by the military departments on June 30, 1959, included 494,000 items with an acquisition value of \$5.3 billion. This total was lower by 26,000 items and \$0.2 billion less than the one at the close of the preceding year. During the year about 6,400 items, costing \$73.1 million, were shipped for use by military contractors and by military construction facilities. The inactive inventory included approximately 86,127 pieces of production equipment on June 30, 1959.

New guidance was developed to govern cooperative planning between the military departments and essential industries for wartime production. Issued shortly after the close of the year, the new instructions abolished the Production Allocation Program instituted in 1950 and authorized the services to adopt planning systems specially tailored to the category of items for which preparatory actions are considered necessary. The greater flexibility of these new methods will provide more realistic plans.

The National Priorities and Allocation System, in which the Department of Defense participates, is used to keep current military production, construction, and research and development programs on schedule and to prepare for wartime expansion. The Department handled over 1,800 requests from contractors for special assistance in obtaining materials, components, end items, and production equipment in the past year.

Properties and Installations

During fiscal year 1959, the existing base structure was kept under continuous review to assure maximum utilization of available assets. New construction was authorized only for the most essential projects. Wherever feasible, facilities for new weapons were provided by modifying older bases, thus holding to a minimum the acquisition of additional real estate. Probable future weapons development, force levels, and military plans were given careful consideration in developing the long-range property requirements of the armed forces.

During fiscal year 1959, most military construction was for facilities supporting our key defensive and retaliatory weapons systems. Highest priority was given to strategic missile launching and support bases. On June 30, 1959, work on the first ATLAS ICBM complex in California neared completion, while construction for five ATLAS squadrons and the first TITAN squadron was being rushed to meet

the established schedules. Supporting facilities for the Navy's POLARIS fleet ballistic missile system were also placed under contract during the year.

Further progress was made in the construction of facilities to permit the wider dispersal of strategic bombers and their refueling tankers. To shorten the time required for responding to an enemy attack, additional pavements and crew readiness facilities were being provided. Air defenses were strengthened by construction of more surface-to-air guided missile firing sites and ground control centers and of the first stations in the Ballistic Missile Early Warning System.

For these installations and other military public works the Congress appropriated \$1.4 billion in fiscal year 1959. The Department of Defense obligated \$1.7 billion for military construction during the year—as compared to \$1.6 billion during the preceding year—and spent \$1.9 billion, as compared to \$1.7 billion in 1958. The unexpended balance on hand at the close of the fiscal year was reduced to \$2.4 billion—\$0.5 billion less than at the beginning of the year.

Efforts were intensified during the year to transfer facilities from one military department to another in order to meet the requirements created by new weapons systems. Transfers involving nearly 111,900 acres were approved and more than 12,000 acres were reallocated. For example, the cession of Parks Air Force Base, Calif., to the Army permitted the Army to dispose of Camp Stoneman, Calif., while the transfer of Vincent Air Force Base, Ariz., to the Navy eliminated the necessity for building a new Marine Corps auxiliary airbase. The Navy transferred an industrial reserve plant in New York to the Army, thereby obviating the need for a new 1,400-man reserve armory. The Army provided land at Fort Custer, Mich., on which the Air Force will construct a Capehart housing project.

The orderly disposal of real property not suitable to the current requirements of any service was given continued emphasis. A net reduction of 1,200,000 acres, much originally part of the public domain of the United States, was made in the holdings of the Department of Defense during fiscal year 1959. After these disposals, the Department controlled on June 30, 1959, a total of 31,300,000 acres throughout the world, valued with buildings and improvements at an acquisition cost of \$29.7 billion. Almost 81 percent of this acreage—25,300,000 acres valued at \$22.6 billion—was located in the continental United States, while 11 percent—3,500,000 acres valued at \$3.3 billion—was in Alaska, Hawaii, and U.S. territories and possessions. The remaining 8 percent—2,500,000 acres valued at \$3.8 billion—was situated in foreign countries. About 55 percent of the holdings had been withdrawn from the public domain or other pub-

lic lands; 23 percent was owned by the Department of Defense; 14 percent was controlled through leases, temporary use arrangements, or easements; and 8 percent represented foreign base rights. The Department of the Air Force controlled 15,700,000 acres, slightly more than one-half the total; the Department of the Army one-third, or 10,300,000 acres; and the Department of the Navy the remaining 5,300,000 acres.

In February 1959 the Department of Defense requested the Congress to authorize new construction totaling \$1.4 billion. About 31 percent of this program was for ballistic missile installations, 20 percent for air defense construction, 17 percent for the support of research and development, 9 percent for improving the capabilities of the Strategic Air Command, and the remaining 23 percent for other modernization of Active and Reserve forces facilities. The Department's appropriation request for fiscal year 1960, submitted in March 1959, totaled \$1.6 billion in military public works funds. Shortly after the close of fiscal year 1959, the Congress authorized new projects totaling \$1.2 billion in value and appropriated \$1.4 billion in new funds.

The rapid evolution of weapons technology will continue to create substantial requirements in future years for new construction. These requirements can be met economically and effectively if the policies and procedures developed in recent years are fully applied.

VIII. *Mutual Security*

The United States does not stand alone in the defense of freedom. Through collective security arrangements we are allied with 42 nations throughout the world. (See fig. 17.) This pooling of resources has immeasurably strengthened both our defenses and those of our friends, and the increased realization of interdependence has fostered a spirit of cooperation and mutual confidence that constitutes the real foundation of the free world community. In support of this common effort, in close cooperation with the Department of State, the Department of Defense has carried the responsibility for strengthening the worldwide protective shield that guards the security of all free and peaceful nations.

During fiscal year 1959, the value of collective security was demonstrated once more in the successful defense of Quemoy by the forces of the Republic of China. The rapid assistance available to nations determined to protect their freedom was made clearly evident during the Lebanon crisis. In reply to the Soviet pressure for changes in the status of West Berlin, the Western powers established a common position based on the free consent of sovereign nations. Increased emphasis in the continuing effort to strengthen defensive forces was placed on the modernization of ground, sea, and air units.

The Military Assistance Program, as a part of our overall mutual security policy, remains the keystone of the free world alliance. Without it, the military capabilities of our friends to resist aggression and combat subversion would be seriously weakened, and the threat of U.S. isolation in a hostile world would be increased manyfold. In the present world situation, military assistance expenditures provide per dollar a greater return in security than if these funds were added to our defense expenditures.

Military Assistance

The objective of the U.S. Military Assistance Program is to help friendly nations to participate in collective self-defense. In support of this objective, the United States furnishes modern arms and equipment and training in the use and maintenance of this materiel, and assists in the construction of military bases, the development of advanced weapons, and the building of industrial facilities for arms production. Both the form and the amount of assistance is de-

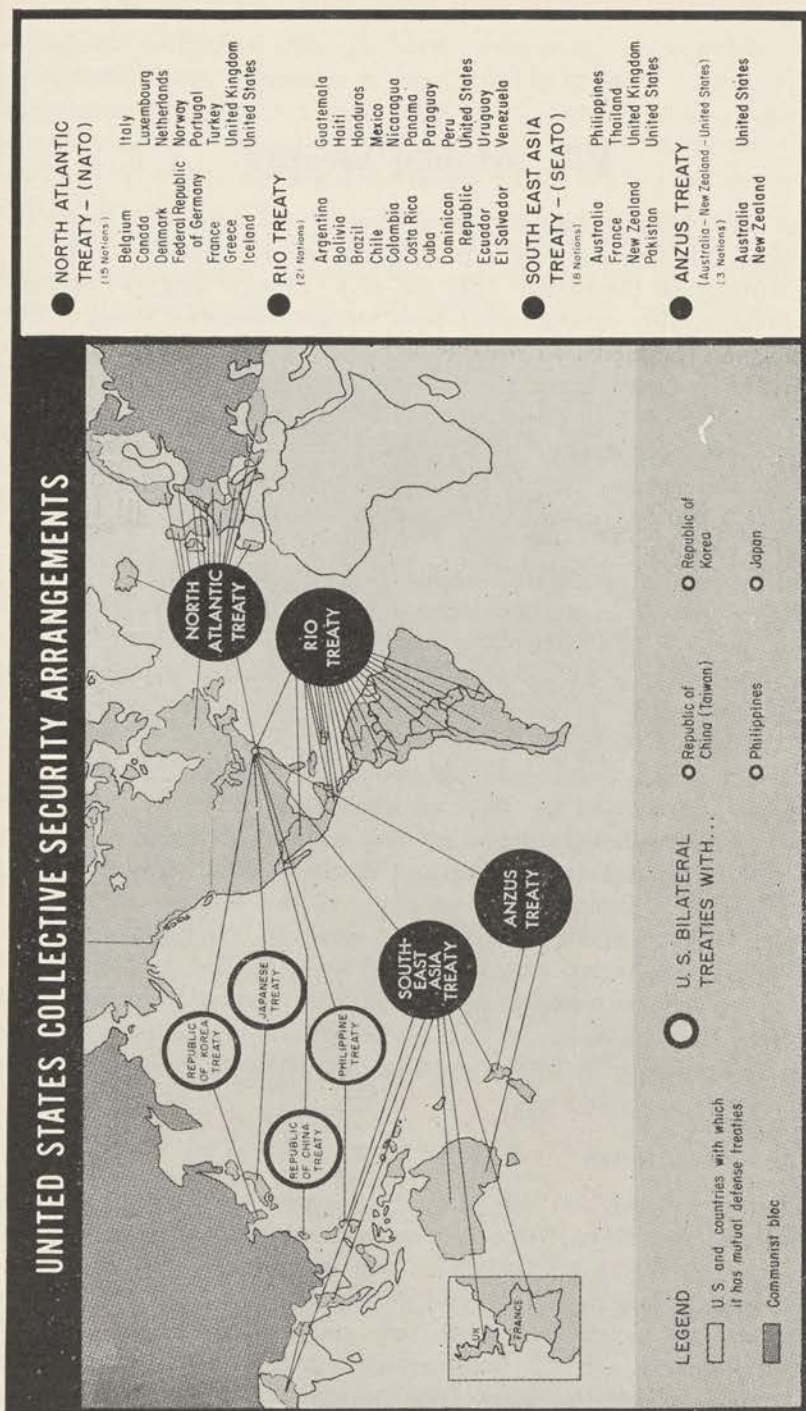


Figure 17

terminated by the United States in the light of its own security and foreign policy requirements.

For these purposes the Congress appropriated \$26.9 billion since 1950. Of the funds appropriated through fiscal year 1959, \$25.4 billion become available for obligation, after net adjustments of \$1.5 billion for transfers, lapsed accounts, and reimbursements. On June 30, 1959, \$25.3 billion had been obligated or reserved for obligation, including \$1.5 billion during fiscal year 1959.

Expenditures for military assistance amounted to \$2.4 billion during the fiscal year, bringing total expenditures since 1950 to \$22.8 billion. This year's program further reduced the unexpended balances on hand at the close of the fiscal year; these balances totaled \$2.6 billion, as compared to \$3.4 billion a year ago and \$8.5 billion at the end of fiscal year 1953. Over half of the unexpended funds had been obligated for materiel requiring extensive time for manufacture, such as aircraft, missiles, ships, and related communications and electronic equipment. The remaining unexpended funds are committed to shorter leadtime items in the military assistance supply pipeline. A further reduction in unexpended balances is anticipated during the next fiscal year.

The procurement of weapons, ammunition, equipment, and supplies accounted for over four-fifths of the expenditures by the United States for military assistance—\$18.7 billion of the \$22.8 expended. An additional \$1.2 billion covered the costs of packing, crating, handling, and transporting materiel. In addition, the military services made available to the Military Assistance Program substantial amounts of equipment excess to current needs. This materiel was originally acquired at a cost of \$1.4 billion, but only repairing and rehabilitating costs were charged against military assistance funds.

Including the acquisition cost of this excess materiel, deliveries to recipient nations reached a total value of \$23.3 billion by the end of fiscal year 1959. About 55 percent of these shipments went to European countries; 23 percent to the Far East; over 14 percent to the Near East, South Asia, and Africa; and the remainder to Latin America and nonregional projects. (See fig. 18.)

Since the beginning of the program by far the greatest portion of the funds made available was spent in the United States. In fiscal year 1959, this portion amounted to nearly 90 percent, and the amount spent abroad was more than offset by foreign expenditures for military equipment in the United States.

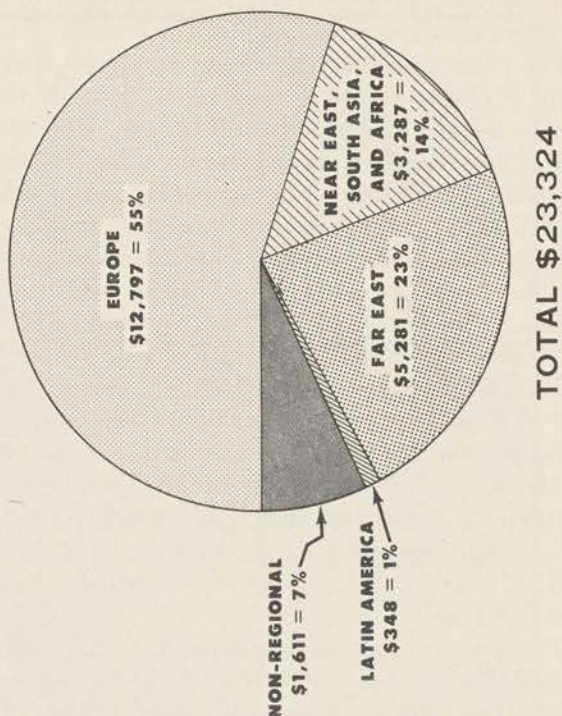
The training of allied military personnel in the operation and maintenance of U.S. equipment has helped to raise substantially the combat capabilities of friendly forces. In addition, it greatly contributed to interallied cooperation by fostering better understanding and the

MILITARY ASSISTANCE PROGRAM

— DELIVERIES —

(MILLIONS OF DOLLARS)

FISCAL YEARS 1950-1959



FISCAL YEAR 1959

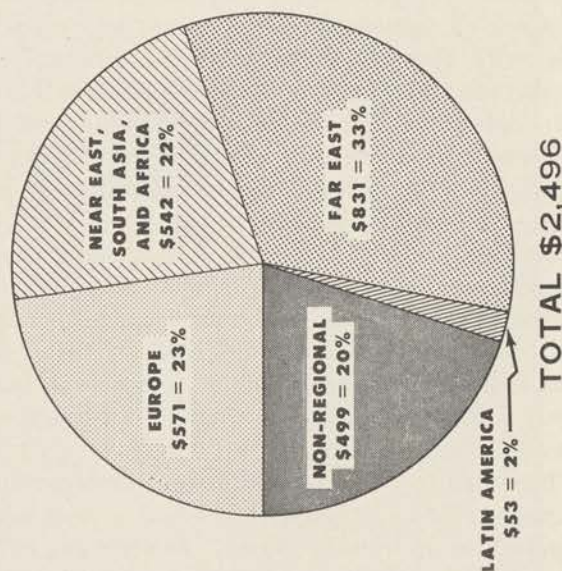


Figure 18

exchange of ideas between soldiers, sailors, and airmen of many nations. During fiscal year 1959, foreign military personnel successfully finished 19,100 courses of instruction in the United States and 3,300 courses offered overseas. Including the 1959 program, a total of 124,000 courses here and 32,000 abroad were completed by allied military personnel since 1950. About \$510 million has been expended from military assistance funds for this training, including \$75 million this year.

The costs of constructing and operating joint military bases supporting international military headquarters are shared by free world nations in accordance with special agreements. U.S. contributions to these mutual undertakings amounted to \$132 million during fiscal year 1959, bringing total expenditures for this purpose to \$729 million since 1950. By far the largest proportion of these funds were utilized for the construction of military public works projects included in the North Atlantic Treaty Organization infrastructure program, to which the United States contributed about one-third of the total cost.

Another important accomplishment of the Military Assistance Program has been the expansion of allied industrial capacity for arms production, thus decreasing peacetime and emergency reliance on U.S. sources. To carry out this objective, the United States placed orders for materiel with foreign concerns and made funds available to build new manufacturing facilities abroad under cost-sharing agreements with allied governments. Since 1950 about \$2.6 billion, or 14 percent, of the \$18.7 billion expended for the procurement of weapons and equipment has been allocated to oversea contractors. In addition, the United States has spent about \$55 million, including \$18 million in fiscal year 1959, as its share—approximately 25 percent—of the cost of enlarging allied military productive capacity through the Weapons Production Program and its predecessors.

Cost-sharing arrangements have also been followed in assisting friendly countries to complete the research and development of promising advanced weapons, particularly those well adapted to the special needs of oversea allies. About \$111 million has been expended for this purpose, \$39 million of it this year. These funds were allocated to over 170 research projects, and the results have been available both to the United States and to the countries that initiated the research. Some projects were sponsored by a group of allies acting in concert for mutual benefit.

Direct purchases of modern arms and equipment from the United States have served friendly nations as an additional means of strengthening their defenses. Materiel valued at over \$0.3 billion was sold to allied governments during the fiscal year, bringing to a total of \$2.1

billion the value of equipment and services sold to over 60 nations since 1950.

Including these purchases of equipment, about \$150 billion has been expended since 1950 by countries associated with the United States in the collective defense of the free world—more than six times the \$22.8 billion spent by the United States for military assistance during that period. The forces supported by these countries not only protect non-Communist nations against aggression and subversion but also form an integral part of our own defense. A substantially greater proportion of our human and economic resources would have to be devoted to our national security if these allied forces did not exist.

The continued importance of aid programs to the security of the United States was reaffirmed during 1959 by the President's Committee To Study the United States Military Assistance Program, called the Draper Committee after its Chairman, William H. Draper, Jr. The Committee concluded that military assistance represented "the mortar giving cohesion, strength, and credibility to our collective security arrangements" and "the foundation on which our forward strategy is built." To counter the long-term challenge of communism, the Committee recommended placing U.S. assistance programs on a long-term basis, making them less completely dependent on annual authorizations. It stressed the need for a minimum appropriation level of about \$2.0 billion for the next 2 years. In addition, the Committee included among its proposals closer integration of military assistance plans with those of the military services, greater emphasis on joint research and training activities, and adjustments in administrative procedures to improve the management of the program.

The Committee's recommendations were given careful consideration by both the executive and legislative branches. Some of them were incorporated by the Congress shortly after the close of the fiscal year in the Mutual Security Act of 1959. The Department of Defense initiated action to carry out the proposal for improving the internal administration of the program.

For the continuation of the Military Assistance Program in the next fiscal year, the President requested the Congress in the spring of 1959 to authorize and, later, to appropriate, \$1.6 billion in new funds, an amount slightly above the preceding year's appropriation of \$1.5 billion. On July 24, 1959, the Congress authorized \$1.4 billion for military assistance, and on September 28, 1959, appropriated \$1.3 billion—an amount nearly 19 percent less than requested by the President.

Europe

On April 4, 1959, the 15-nation North Atlantic Treaty Organization (NATO) celebrated its 10th anniversary. Its members could

take justifiable pride in their joint accomplishments. The peace and security of its members had been fully protected throughout the period. Forces available to NATO in Europe which had totaled 12 divisions, some 400 ships, and some 400 aircraft in 1949, had been increased to nearly 100 active and reserve divisions, more than 1,000 combat vessels, and nearly 6,000 modern aircraft. An allied command structure had been created providing integrated defense plans and central military direction.

The threat of aggression that led to the creation of NATO 10 years ago has not abated. This fact alone continues to make it essential that any would-be aggressor knows that he will have to contend with the combined and coordinated power of all NATO countries if he attacks any one of them.

In 1949, when the North Atlantic Treaty was signed, the Soviet Union was attempting to seize control of Berlin through a land blockade, an effort that failed because of the allied airlift. Again in fiscal year 1959, the Soviet Union threatened to revise the status of West Berlin and of allied rights there. This new Soviet challenge was the major political problem confronting NATO during the year. The NATO Council at its meetings in December 1958 and April 1959 reaffirmed the determination of the member states to maintain the freedom of West Berliners and to preserve the rights and obligations in Berlin of France, the United Kingdom, and the United States. Protracted four-power negotiations ensued which remained inconclusive at the close of the fiscal year.

Continued emphasis was placed in 1959 on NATO programs for modernizing the weapons and equipment of allied military forces. In accordance with these programs, U.S. assistance has been increasingly centered on modernization rather than on the general maintenance and support of military units. It currently represents but 7 percent of the European expenditures for NATO defense forces.

Closer cooperation was established during the year between the United States and its NATO allies in the military application of atomic energy for mutual defense purposes. On July 2, 1958, the Atomic Energy Act of 1954 was amended to permit a greater interchange of atomic information, other than nuclear components of weapons. Under this authority, a series of bilateral agreements with seven NATO countries was concluded. Arrangements were made to provide Greece, Turkey, the Netherlands, and the Federal Republic of Germany with information and equipment necessary for drawing up defense plans, training personnel, and developing delivery systems for atomic weapons. The accords with Canada and the United Kingdom included, in addition, special provisions relating to military nuclear reactors and the sale of a *Skipjack*-type submarine nuclear powerplant to the United Kingdom. An agreement with France authorized the

purchase of enriched uranium for a prototype nuclear submarine propulsion unit.

As another part of its program to assist in the modernization of NATO forces, the United States had delivered the launchers, missiles, and associated equipment, other than atomic warheads, for 10 missile units by the end of fiscal year 1959. Deliveries scheduled at that time called for raising the number of such units to 30 during the next 6 months, including NIKE, HONEST JOHN, MATADOR, and CORPORAL missiles as well as Intermediate Range Ballistic Missiles. The latter are being delivered to the United Kingdom and Italy in accordance with special agreements.

Modernization was also advanced by cost-sharing arrangements between the United States and various European countries. For example, in May 1959 the United States and Denmark embarked on a 5-year program to build some 20 naval vessels in Danish shipyards to replace obsolescent ships in the Danish Navy.

Multilateral cooperation among NATO states has provided an additional means for the development and production of new weapons. The lightweight reconnaissance and strike fighter aircraft, the G-91, represents a prime example of such joint action. The British developed the engine and the Italians the airframe, while initial production for NATO use is being financed by Italy, the Federal German Republic, and the United States. Similarly, at the close of the fiscal year Belgium, France, Germany, Italy, the Netherlands, and the United States established a new NATO agency to coordinate the production in Europe of the HAWK air defense missile, originally developed for the U.S. Army.

Similar pooling of resources is improving the efficiency of NATO logistic activities. During fiscal year 1959, the NATO Maintenance Supply Services Agency began operating as a central management office for the supply of spare parts and maintenance services to NATO forces in Europe. The requirements for spare parts of all participating countries are being consolidated and competitive bids invited. More economical prices and quicker deliveries can be expected from this procedure. To prevent procurement duplication by NATO members, spare parts inventories will be shared. A further contribution to more effective logistic support of NATO forces is being made by a materiel codification program for uniform item identifications of equipment and components, modeled on the U.S. Federal Catalog and Standardization Programs.

Bases and other military facilities for common use by NATO forces have also been provided through mutual cooperation. Since 1950, military construction projects have been financed jointly under the NATO infrastructure program. The United States provided \$507

million of the \$1.3 billion expended to date in building such facilities as airfields, petroleum pipelines and storage tanks, communications networks, and naval bases. During fiscal year 1959, a new radio net of advanced design was completed to link the Supreme Headquarters, Allied Powers Europe, in France with NATO regional headquarters in Naples, Italy, and Izmir, Turkey, and four additional stations in this system were opened in Norway. To date, about 160 airfields, 5,000 miles of fuel pipelines, storage capacity for about 2 million tons of petroleum products, 15,000 miles of telephone and telegraph wires, 9,000 miles of radio relay circuits, 2,000 miles of submarine cables, and extensive naval facilities have been built under the infrastructure program. Additional work, including extensions of the radar warning and other communications nets, was authorized for 1960 and 1961 by the NATO Council at its April 1959 meeting in Washington.

Modernization of weapons, improvements in logistic support, and completion of additional infrastructure all contributed to the growing defensive power of NATO forces during fiscal year 1959. Higher standards of materiel readiness preserved the deterrent strength of the land, sea, and air forces assigned to the Supreme Allied Commander, Europe (SACEUR), despite the fact that somewhat fewer units than planned were made available. In the case of France, unsettled conditions in Algeria continued to require divisions committed to NATO, while the planned buildup of forces for NATO by the Federal German Republic will not be completed until 1961. During 1959, seven German divisions remained committed to NATO and two more were in training. A total of 12 German divisions will be available to SACEUR when the German Army reaches its full peacetime strength. German naval forces increased in numbers and capability during the year, and 4 of 12 planned air force wings were activated. Still under discussion at the close of the fiscal year was the exact wartime relationship to NATO of part of the French Mediterranean fleet and an agreement concerning the storage of nuclear weapons for NATO forces stationed in France.

The joint effort of the NATO allies has erected a formidable defense shielding the North Atlantic community. NATO forces assigned to SACEUR, totaling about 3,500,000 men, guard a 4,000-mile frontier from the Arctic Ocean to the Black Sea. Their lines of communication are protected by two other NATO forces under control of the Supreme Allied Commander, Atlantic (SACLANT), and the Allied Commander in Chief, Channel (CINCHAN). Standing behind the NATO shield are retaliatory striking forces, such as the U.S. Strategic Air Command and the British Bomber Command, providing a vital part of the deterrent to aggression.

Periodically, throughout 1959, NATO forces were brought together for training exercises to test the effectiveness of joint plans and promote closer cooperation between allied land, sea, and air contingents. SACLANT Exercises TALLY HO, SHARP SQUALL III, DAWN BREEZE IV, NEW BROOM IX, and FAIRWIND IV were designed to improve the capabilities of naval and air forces to perform convoy protection and antisubmarine warfare missions, while SACEUR Exercise TOPWEIGHT in the spring of 1959 helped perfect the defensive and counterattack capabilities of units in Europe. These combined maneuvers significantly advanced the ability of NATO forces to work as a single team for the common defense.

U.S. military assistance continued to be extended during the fiscal year to a European country not a member of NATO—Spain. Military equipment and training was provided to increase the capability of Spanish forces to defend the Iberian peninsula against aggression. This aid program was initiated in 1953, at which time Spain agreed to provide sites for air and naval bases to the United States. Major airbases at Torrejon, Zaragoza, and Moron became fully operational in fiscal year 1959 and construction work for the naval facility at Rota was nearly completed.

While the military assistance agreement of the United States with Yugoslavia was terminated by mutual accord in 1957, provisions have been made for the sale of spare parts and maintenance equipment for the upkeep of the materiel provided to Yugoslav forces in earlier years.

The Middle East and Africa

The tensions besetting the Middle East erupted into violence during the fiscal year, leading to the overthrow of the Government of Iraq and increasing the threat of civil strife, subversion, and external aggression throughout the area. So threatened, friendly countries turned to the United States for aid in reestablishing and maintaining the stability essential for self-government and orderly economic development. Lebanon requested the United States to land troops and other states bordering Iraq asked for accelerated deliveries of military equipment from the United States to strengthen the capability of their forces to cope with the new pressures.

Beginning in May 1958, political unrest in Lebanon, aggravated by external interference, threatened the continued independence of the freely elected government of that country. On July 14, 1958, the Lebanese Government immediately asked the United States to dispatch military forces to the Levant. Less than 24 hours later naval units from the U.S. Sixth Fleet arrived and a battalion of Marines

went ashore near Beirut, the capital of Lebanon. Additional Marine Corps and Army combat and supporting units began to arrive 2 days later, some by air and some by sea. Air Force tactical and transport aircraft flew to the eastern Mediterranean to support the operations. At the peak of the buildup, in early August, approximately 5,000 Marines and 9,000 Army troops were deployed in Lebanon; a sizable fleet of U.S. naval vessels was standing by offshore; and Composite Air Strike Force Bravo, composed of tactical fighters, bombers, and support aircraft, was based at Adana, Turkey, to provide combat and logistical reinforcement for ground and naval units in case of need.

The presence of U.S. forces in Lebanon contributed greatly to a peaceful settlement of the local political crisis. A new President of Lebanon was elected, and U.S. Marine Corps units began withdrawing in mid-August. By October, all U.S. troops had returned to their home stations. To help the new Lebanese Government maintain peace, the United States provided special military and economic grant-aid assistance during the rest of the fiscal year.

Repercussions from the Iraqi revolt were also felt in Jordan, which had joined with Iraq a few months earlier in forming the Arab Union. The Union was dissolved on July 14, and the Government of Jordan requested the United Kingdom for troops to prevent disorder. These forces were sent immediately, and the United States assisted by airlifting supplies for the support of both the British garrisons and the civilian population of Jordan. At the request of the Government of Jordan, the Department of Defense surveyed Jordan's military establishment and prepared a special program of military assistance to help in preserving the internal security and territorial integrity of that country.

Turkey and Iran, which adjoin both Iraq and the Soviet Union, were also subjected to increasing pressure following the Iraqi revolution. At their request, the United States accelerated delivery schedules under the Military Assistance Program for the modernization of Turkish and Iranian forces and increased its help in training these troops to use their new weapons effectively.

Grant-aid military assistance to Iraq was stopped by the United States immediately after the overthrow of the old government. Subsequently, the new government terminated the Iraqi-United States bilateral military assistance agreement and withdrew from the Baghdad Pact. The other members of the alliance, however—Iran, Pakistan, Turkey, and the United Kingdom—strongly reaffirmed their commitment to the principles of collective security and continued their planning for mutual protection in the newly designated Central Treaty Organization (CENTO).

The bonds of friendship and understanding between the United States and members of the alliance were more closely drawn in March 1959, when identical bilateral executive agreements were reached between the United States and Iran, Pakistan, and Turkey. The signatory states agreed to cooperate in building mutual defense forces and to take joint action for the preservation of peace and security.

In the eastern Mediterranean area, the tripartite understandings reached in February 1959 between Greece, Turkey, and the United Kingdom regarding the future of Cyprus reduced the possibility of future friction between these NATO allies, and at the end of the year negotiations were underway for the detailed implementation of the agreement.

The stability and peace of the Middle East, and of Europe as well, is being affected increasingly by events occurring in Africa, where new nations are rapidly emerging from colonial status and striving to build a new and independent life for themselves. U.S. efforts in Africa have been directed toward helping these countries to develop effective democratic institutions and viable economies. While these programs were primarily technical and economic, the Department of Defense has provided upon request some military assistance to African countries. During fiscal year 1959, such assistance was furnished to Ethiopia and Libya, which provide bases important to U.S. security, and to Liberia. In addition, the United States sold small arms to Tunisia. To demonstrate its friendship toward African peoples, the United States sent the flagship of the South Atlantic Command on a 2-month good-will cruise to 14 African countries in the fall of 1958.

Asia and the Pacific

During fiscal year 1959, Communist China stepped up the pace of its offensive against the independent nations along its frontiers, again resorting to overt military action while continuing its policy of constant political and economic pressure. In the late summer of 1958, the Quemoy Islands came under heavy attack, but steadfast resistance forced the Communists to scale down their attack. In March 1959, the Communists ruthlessly employed military force to crush the people of Tibet, a move strongly protested throughout Asia and the free world. The immediate effect of the Communist actions was to make Asian states more keenly aware of the threat to their security and see the need for strengthening their defensive forces.

The successful defense of the Quemoy Islands by Nationalist Chinese forces was a major victory for the concepts of collective security and military assistance. The attack, which began on August 23, 1958, developed into a continuous heavy artillery bombardment

that seriously interfered with efforts to keep vital supplies flowing to the defending garrisons and local inhabitants. The United States moved rapidly to augment its forces in the western Pacific to be ready for any emergency. The Seventh Fleet was strengthened by two aircraft carriers and supporting vessels, an Army NIKE air defense missile unit was dispatched to Taiwan, and the Tactical Air Command sent a Composite Air Strike Force, including a combat unit of supersonic F-104's.

While the United States was thus demonstrating its determination to resist aggression, the military situation was stabilized by the forces of the Republic of China. Drawing upon U.S. advice and assistance, particularly the convoy of supply ships in international waters, the Chinese Navy quickly gained proficiency at landing provisions and ammunition under fire. The Chinese Air Force, equipped and trained through the Military Assistance Program, shot down 33 Communist jets—4 of them with SIDEWINDER missiles—while losing only 4 of their own craft in the aerial phase of the battle for Quemoy. This determined defense preserved the islands. After the Communist attacks subsided in the fall of 1958, the Republic of China continued with U.S. assistance to improve the capabilities of its forces through modernization. The increased firepower of the Chinese Army permitted some reduction in the total number of men under arms.

To the south of Taiwan, the eight Western and Asian nations united in the South East Asia Treaty Organization (SEATO) effectively combined their efforts during the year to build stronger free world defenses. The Asian members of the alliance—Pakistan, the Philippines, and Thailand—increased their participation in the work of the treaty organization and further strengthened their defenses. Ground, sea, and air forces of these countries participated in a number of major SEATO maneuvers during the year, including the amphibious Exercise SADDLE-UP off Borneo, a joint air exercise in Thailand, and a naval defense capabilities exercise in the Philippine Islands.

SEATO's protection extends also to the three Indochinese states of Vietnam, Cambodia, and Laos, although these countries are not parties to the treaty. The United States continued during the year to assist these newly independent nations in maintaining their security forces. With this assistance, Vietnam developed, tested, and adopted a new organizational structure for its army divisions, more appropriate for the terrain and combat conditions likely to be encountered. The effort in Cambodia emphasized the development of logistic support capabilities. In Laos, military training activities bolstered the ability of local forces to counter Communist subversion. Poor internal communications, sparse population, unfavorable terrain, and

long common frontiers with Communist China and North Vietnam make the defense problems of Laos particularly difficult.

In the summer of 1958, both Burma and Indonesia concluded agreements with the United States for the purchase of military equipment to be used in maintaining internal security. Initial deliveries of the items selected were made under the military sales program during fiscal year 1959.

Australia, New Zealand, and the United States, allied through both the SEATO and the ANZUS security treaties, continued their joint efforts to strengthen collective security in the Far East. Considerable progress was made in Australian-United States cooperation for the exchange of information on new weapons and standardization of equipment.

The Republic of Korea, with U.S. military assistance, further improved the equipment and logistic capabilities of its armed forces during the past fiscal year and gained increased combat readiness for coping with ever-possible Communist incursions. An additional wing of jet aircraft was furnished to the Republic of Korea, and U.S. forces in Korea were reinforced with MATADOR surface-to-surface guided missiles—the second area in the Far East to receive MATADOR's, the first being Taiwan. The United States also provided logistic support to other national contingents of the United Nations Command preserving the truce in Korea. The increase in firepower through the modernization of weapons was accompanied by a small decrease in the size of the Korean ground forces.

The growing capabilities of the Japanese self-defense forces during the year allowed the United States to make further redeployment of its combat forces in Japan. The Japanese Army took over full responsibility for ground defense during the year, while the Japanese Air Force assumed additional duties in operating air traffic control communications and air defense warning nets. Increased emphasis on pilot training is hastening the date when the Japanese Air Force can take over completely the air defense mission for the islands. The Japanese Navy was strengthened during the year by deliveries of additional ships, some built in Japan and others loaned by the United States. In addition to assisting in the creation of defense forces, the United States through offshore procurement contracts has materially fostered the development of a stronger industrial base and economy in Japan. During the year Japanese firms built aircraft of U.S. design and produced military vehicles for delivery to Far Eastern military aid recipients.

In the Far East, where most countries lack adequate resources to build their own defenses, U.S. military assistance plays a particularly vital role in maintaining peace and security. With the threat

of Communist expansion unabated, continued vigilance and assistance by the United States will be necessary for some time to come.

The Western Hemisphere

Despite some increased local tension, particularly in the Caribbean area, the nations of the Western Hemisphere continued to cooperate during the year in building mutual defenses as envisaged in the Inter-American Treaty of Reciprocal Assistance of 1947. This pact was the first collective security agreement signed by the United States. Department of Defense contributions to the alliance included grant-aid, sales of military equipment, and participation in the planning activities of the Inter-American Defense Board.

During fiscal year 1959, U.S. policies toward Latin America were designed to encourage further progress in the development of common defenses. At the same time, every effort was made to cooperate with the Organization of American States (OAS) and individual countries in preserving peace and security within the area. For example, special assistance was provided to OAS investigating teams and to the Panamanian National Guard in the spring of 1959 when insurrectionists tried to invade Panama. Similarly, a small Marine Corps training mission was dispatched, upon request, to Haiti to assist in strengthening the defensive capabilities of that country.

In carrying out its military assistance programs in 1959, the United States exercised special care to avoid aggravating local political tensions. No armaments shipments were made to Cuba after March 1958, and in November 1958 further arms deliveries to the Dominican Republic were suspended pending the clarification of joint agreements.

Military assistance programs to Latin American states have always placed great emphasis on training activities. About 1,900 courses in service schools in the United States and the Canal Zone were completed by students from the other American Republics during the year, bringing to 10,800 the total number of such courses financed through military assistance funds. In addition, the United States maintained military advisory and training missions in 18 Latin American Republics. Augmenting this help, U.S. Navy task forces conducted separate antisubmarine training exercises during the year with the navies of Argentina, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, and Venezuela.

Grant-aid, either in the form of training or arms and equipment, was limited to military units with hemispheric defense missions in 12 countries. A special military assistance agreement was reached with Brazil, which had made the island of Fernando de Noronha available for the Atlantic missile test range. The first of four annual

increments scheduled under this program was shipped in fiscal year 1959.

Latin American nations received grant-aid valued at \$53.0 million during the year, bringing total military assistance deliveries to \$347.8 million since 1950. This total includes U.S. excess stocks with an estimated acquisition value of \$110.3 million. As prescribed by law, all military assistance to Latin American nations is subject to a Presidential determination that aid is necessary to further collective security.

The defenses of the Western Hemisphere have also been increased through direct purchases by Latin American Republics of military materiel and services. Since 1950, sales totaled \$177.8 million, including \$5.0 million during fiscal year 1959.

Hemisphere solidarity was further strengthened by the exchange of visits and good-will tours by members of the armed forces of the American Republics. Moreover, U.S. Navy helicopters and supplies aided the victims of severe floods in Uruguay during the spring of 1959.

Protection of the northern reaches of the Western Hemisphere has increasingly become a joint effort by Canada and the United States. The defense against air attack is shared by forces of both nations. Their efforts are coordinated through the North American Air Defense Command, composed of both Canadian and United States elements. During the year, Canada assumed the responsibility for providing a majority of the personnel manning the radar stations of the Distant Early Warning line in northern Canada. This close cooperation was symbolized by the combined naval review conducted as part of the ceremonies that marked the opening of the St. Lawrence Seaway in June 1959.

Particular emphasis was given during fiscal year 1959 to meshing the productive capabilities of United States and Canadian industry to build a broader industrial base for common defense. Military authorities have continued to reach agreement on the standardization of procedures and weapons for use by both countries, with components of this equipment manufactured in Canada as well as in the United States.

The way to even closer United States-Canadian military collaboration was opened in May 1959 with the conclusion of a new, broader agreement on the uses of atomic energy for mutual defense. Under this arrangement, the two nations will exchange information to facilitate the development of defense plans and the training of personnel. Moreover, the United States will make available to Canada the non-nuclear components of atomic weapons systems in order to improve the state of training and the operational readiness of Canadian armed forces.

IX. Conclusion

In the present world situation, the United States has no alternative but to maintain a defense establishment that by its strength and versatility would make any aggression against the free world a most hazardous undertaking.

We now have such a defense establishment. To keep our armed forces adequate to the task, the American people will have to continue to make substantial sacrifices, for the cost of defense will remain high.

The basic reasons for this high cost are that, seeking combat with no one, we must prepare for all possible contingencies and, confronted with an unprecedented scientific revolution, we must devote a larger portion of our resources than ever before to future requirements which contribute little to current combat effectiveness. In addition, since new weapons systems do not necessarily replace old ones, we must maintain an increasingly greater variety of striking forces.

In these circumstances, the careful and wise allocation of resources becomes the key to effective defense. It involves timely decisions on the projects to start, the weapons to place into production, and the programs to cancel because of the progress achieved in other undertakings. It requires placing the new and spectacular in proper perspective and giving effective support to the old and conventional whenever it performs a vital task. It demands gradual adjustment to avoid sacrificing current security to some possible future gain.

If our defense programs are developed with these requirements in mind, our armed forces will continue to have the strength to deter general nuclear war as well as limited war.

The introduction of long-range ballistic missiles has not made manned aircraft obsolete. While these new missiles have an unparalleled capability to penetrate enemy territory, they lack the flexibility of manned aircraft, particularly in case of threatened surprise attack. For some time to come a mixture of missiles and aircraft will provide greater security for the United States than reliance on any single weapons system.

Defense against attack must have the same versatility as our offensive forces. Defense against bomber attack will remain an important requirement with the objective to develop countermeasures that will inflict increasingly prohibitive losses upon an aggressor. At the same

time, means must be developed to reduce the penetration capability of enemy long-range ballistic missiles. In this effort we are confronted with entirely new problems, the effective solution of which may depend on technological breakthroughs as revolutionary as those that occurred in the development of nuclear weapons, nuclear engines, guidance systems, and rocket motors during the past 20 years.

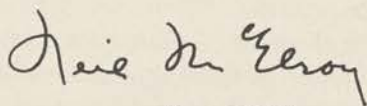
As for our "general purpose" forces, they, too, are confronted by a multiplicity of tasks—readiness for their role in a major nuclear war, maintenance of a capability to counter local aggression by tactical nuclear weapons as well as by nonnuclear means alone, and planning for the deployment of the active forces by themselves or together with whatever reserves might be needed.

Confronted with this wide variety of responsibilities, differences of opinion concerning the allocation of resources are inevitable. It is desirable that those responsible for any specific task should consider their assignment to be of the highest priority and it is natural that they should feel entitled to having all requests fulfilled ahead of those of their competitors. Such a piecemeal approach, however, would court not only economic but also military disaster.

Good defense management requires that decisions be made in the light of overall national needs. The basic merit of any program depends on the degree to which it contributes to our national security and to the deterrence of war; expensive programs which make relatively slight contributions to these goals are of dubious value. To be effective, our armed forces must form a balanced, flexible, and closely integrated team of ground, sea, and air units.

There are no ideal, permanent solutions to defense problems. The increasingly rapid scientific and technological revolutions and the constantly changing world situation have made a continuous review of programs and procedures essential.

A gradual orderly adjustment of our armed forces to the changes in the art of warfare has been made in recent years, facilitated by the greater administrative authority given to the top management of the Department of Defense. The existing defense establishment has the flexibility required to continue to adjust to changing times. Building on these foundations will provide the best assurance that the objective of our national policy, the maintenance of peace, will be met in the years to come.



NEIL McELROY,
Secretary of Defense.

ANNUAL REPORT
of the
RESERVE FORCES POLICY BOARD

June 30, 1959

In accordance with the requirement of Section 171(a)-1, title 5, U.S. Code, the following annual report on the status of the reserve programs of the Department of Defense is submitted for the period July 1, 1958-June 30, 1959.

The Reserve Forces Policy Board met on three occasions during the reporting period for the purpose of examining and studying the reserve components programs. Recommendations pertinent to current matters of policy and legislation affecting the reserve forces were forwarded to the Secretary of Defense as a result of these meetings, with other matters held in abeyance pending future development and study. Members of the Board and the Board's staff made on-site and on-board surveys of reserve activities and facilities and attended meetings of the various reserve associations to obtain firsthand knowledge to be used in the discharge of their duties to the Secretary of Defense.

Changes in Board membership occurred on December 1, 1958, when Brig. Gen. Philip P. Ardery, ANGUS, replaced Brig. Gen. Chester A. Charles, ANGUS; Brig. Gen. Kenneth Stiles, USAFR, replaced Brig. Gen. John R. Alison, USAFR; and Col. George E. Tomlinson, USMCR, replaced Brig. Gen. William W. Stickney, USMCR. On January 22, 1959, Assistant Secretary of the Army Dewey Short succeeded the Honorable Hugh M. Milton II. On February 24, 1959, Under Secretary of the Air Force Malcom A. MacIntyre succeeded the Honorable David S. Smith; and on March 18, 1959, Rear Adm. Robert T. S. Keith, USN, replaced Rear Adm. John McN. Taylor, USN.

General

This report is intended to reflect the actual mobilization potential and readiness of the reserve components against their assigned mission. The Reserve components are charged with the mission of providing trained and qualified individuals and units for active duty in the armed forces of the Nation to augment the regular components, in time of war or national emergency and at such other times as dictated by the national security.

Personnel

The changes in numbers of Ready Reserve officers and enlisted men enrolled and in drill-pay status are indicated for each component in figure 1.

Personnel

Ready Reserve (not on active duty)

	Dec. 31, 1957		June 30, 1958		June 30, 1959	
	Total	Drill-pay status *	Total	Drill-pay status *	Total	Drill-pay status *
Army National Guard.....	*434, 203	386, 383	*442, 369	372, 921	*404, 036	370, 354
Officers.....	42, 458	37, 229	42, 755	37, 942	40, 156	37, 884
Enlisted.....	391, 745	349, 154	399, 614	334, 979	363, 880	332, 470
Army Reserve.....	1, 028, 180	217, 009	955, 462	272, 683	1, 008, 837	298, 642
Officers.....	158, 070	47, 958	157, 825	49, 584	167, 486	47, 365
Enlisted.....	870, 110	169, 051	797, 637	223, 099	841, 351	251, 277
Naval Reserve.....	508, 160	129, 671	530, 440	129, 632	541, 036	120, 350
Officers.....	80, 605	26, 445	82, 408	26, 513	81, 442	25, 454
Enlisted.....	**427, 555	103, 226	**448, 032	103, 119	**459, 594	94, 896
Marine Corps Reserve.....	238, 576	39, 934	215, 749	42, 735	204, 876	42, 356
Officers.....	13, 099	4, 175	13, 434	4, 143	13, 421	3, 537
Enlisted.....	225, 477	35, 759	202, 315	38, 592	191, 455	38, 819
Air National Guard.....	69, 029	66, 870	69, 995	64, 611	70, 994	67, 620
Officers.....	8, 254	8, 254	8, 354	8, 354	8, 473	8, 473
Enlisted.....	60, 775	58, 616	61, 641	56, 257	62, 521	59, 147
Air Force Reserve.....	228, 316	56, 143	214, 809	48, 287	225, 819	54, 744
Officers.....	43, 289	26, 737	42, 819	19, 522	42, 382	21, 209
Enlisted.....	185, 027	29, 406	171, 990	28, 765	183, 437	33, 535

Notes:

* Excludes personnel undergoing 3-6 month active duty training.

* Includes inactive National Guard.

** Includes officer candidates.

Figure 1

The numbers of men participating in the special 6-month active duty training program, officers and enlisted, are indicated by component in figure 2.

The 4 years' operation under the provisions of the Reserve Forces Act of 1955 has enabled the reserve components to show a continual increase in their training readiness. Implementation of the provisions of this act as it pertains to screening, utilization of obligors, and the control of enlistments has resulted in qualitative improvements in the growth and progress of the reserve establishment.

The process of screening Ready Reservists during fiscal year 1959 involved the review of 1,972,300 records. The services report that of the 495,592 released, 434,340 were transferred to the Standby Reserve and 61,252 discharged from reserve status.

Reserve Officers Personnel Act

At the end of the last reporting period the Reserve Forces Policy Board had recommended changes to the Reserve Officers Personnel Act, as amended (ROPA). These recommended amendments, including provisions for permanent promotions, had been incorporated into ROPA Omnibus Amendment bill (DOD 85-250) and forwarded to the Bureau of the Budget. This bill was introduced on May 21, 1959, as H.R. 7325, 86th Congress, and committee hearings were being held as of the closing date of this report. With the passage of this bill, many of the problems encountered in 5 years of implementing this act would be solved.

The Army National Guard

A new peak of peacetime readiness has been achieved by the Army National Guard primarily through two major actions: The input of trained individuals from the 6-month training program and from active Army service and the reorganization of its units into the modern pentomic structure.

It is estimated that on June 30, 1959, approximately 74 percent of the total strength of the Army National Guard was composed of either 6-month trainees or men with prior service. Most of the rest have received basic training through long service in the Army National Guard.

During fiscal year 1959, the objective of the Army National Guard training program was to begin basic unit training in all units and to continue training at the basic unit level. Only units adversely affected by the reorganization had to conduct training at the individual level after the target date for initiating basic unit training. However, by June 30, 1959, most of these difficulties were being overcome and training was progressing according to plan.

As of the end of this reporting period the following major organizations were federally recognized: 21 infantry divisions, 6 armored divisions, 8 armored cavalry regiments, and 11 infantry battle groups (separate). Six more defense artillery missile battalions were federally recognized, bringing the total to 34. An aggregate strength of 399,427 was distributed among 4,497 federally recognized units.

The Army Service School Program of the Army National Guard was 93 percent accomplished during fiscal year 1959. A total of 7,572 officers and enlisted men received training in courses which varied in length from 1 week to 10 months. The program fell short of its goal primarily because States which had not accepted the new troop allotments as of February 10, 1959, were not permitted to submit applications until they accepted the troop allotment. The enrollment of officers and warrant officers in extension courses shows an increase from 66 percent to 80 percent of total officer strength. Enrollment of enlisted men in the

*Special 6 Months' Active Duty Reserve Training Programs
(Actual and Planned)
(Data cumulative from Aug. 10, 1955)*

	Actual			Planned
	June 30, 1957	June 30, 1958	June 30, 1959	June 30, 1960
ENLISTED				
Army Reserve:				
Enlistments-----	90, 386	118, 626	139, 680	179, 480
Entered AD Training-----	64, 673	109, 941	137, 127	172, 927
Completed AD Training-----	24, 249	87, 373	119, 569	147, 757
Army National Guard:				
Enlistments-----	36, 660	88, 563	136, 361	202, 861
Entered AD Training-----	25, 642	69, 914	119, 755	182, 755
Completed AD Training-----	6, 485	45, 334	85, 529	140, 829
Naval Reserve:				
Enlistments-----	387	672	884	2, 670
Entered AD Training-----	387	636	850	1, 136
Completed AD Training-----	184	506	828	1, 106
Marine Corps Reserve:				
Enlistments-----	13, 224	22, 654	28, 752	36, 612
Entered AD Training-----	6, 059	15, 038	22, 064	30, 074
Completed AD Training-----	2, 355	9, 304	16, 404	22, 921
Air Force Reserve:				
Enlistments-----	3, 866	6, 858	10, 012	13, 427
Entered AD Training-----	1, 676	6, 136	9, 613	12, 993
Completed AD Training-----	19	4, 255	7, 435	10, 995
Air National Guard: ^a				
Enlistments-----	n.a.	n.a.	n.a.	n.a.
Entered AD Training-----	9, 649	20, 389	29, 071	37, 571
Completed AD Training-----	4, 841	15, 005	25, 697	34, 756
OFFICERS				
Army Reserve:				
Entered AD Training-----	11, 087	17, 701	25, 141	31, 181
Completed AD Training-----	4, 596	13, 020	19, 993	25, 957
Air Force Reserve:				
Entered AD Training-----		146	159	309
Completed AD Training-----		96	153	153

^a Includes "9-Week Basic" program. Number in training July 1, 1956, plus entrances into training since that date.

Figure 2

extension course program continued to decrease principally because they can no longer qualify for a commission on the basis of the precommission extension course. Increased emphasis was placed on officer candidate schools. Four additional States established such schools during the year, bringing the total to 42. Abbreviated OCS courses were conducted during the winter and summer months by the Continental Army Command at the U.S. Army Infantry School and the Artillery and Missile School. A total of 431 Guardsmen received training in these U.S. Army schools, and 3,000 candidates were enrolled in State officer candidate schools.

Army National Guard aviation attained new heights in strength and flying hours during this period. At the close of the fiscal year, 1,260 aviators were in flying status with 843 aircraft assigned. A total of 140,732 aircraft flying hours were recorded.

The percentage of inactive duty training assemblies for officers, warrant officers, and enlisted men showed a gain for the seventh successive year. Officer and warrant officer attendance was 96.4 percent and enlisted attendance was 89.3 percent. Annual active duty for training attendance was approximately 96.9 percent for officers and 94.1 percent for enlisted personnel.

U.S. Army Reserve

During this reporting period the U.S. Army Reserve was converted into a pentomic-type organization similar to that of the active Army, to support initial mobilization requirements. Continental U.S. Army and oversea commanders were authorized to accomplish reorganization during a 2-year period or before December 31, 1960. However, in order to enhance mobilization readiness at the earliest practicable date, approximately 90 percent of all reorganizational actions were completed by the end of fiscal year 1959. As a result, the great majority of the U.S. Army Reserve units had the distinct advantage of attending annual active-duty-for-training during the summer of 1959 under the new organizational structure.

In a further move toward the strengthening of command and supervision of Reserve units, 46 military districts have now been consolidated into 13 U.S. Army Corps (Reserve), leaving only the Military Districts of Oklahoma, Arkansas, and Louisiana. The consolidations bring about concomitant savings of personnel and funds.

As of June 30, 1959, the U.S. Army Reserve portion of the Ready Reserve totaled 1,008,800 officers and men, including 299,000 authorized in drill units, 15,500 undergoing 6-month training (including nonunit ROTC-graduate officers), 36,000 participating in other paid training, and 658,300 who did not participate in reserve training but were subject to recall to active duty in the event of mobilization or national emergency. The Commanding General, USCONARC, in January 1959 directed that all troop program unit officers of the Army Reserve become branch- and MOS-qualified in order to retain their unit assignments. Officers becoming qualified through Army extension courses must complete a minimum of 80 credit hours each year until completion of the course in which enrolled in order to be considered as maintaining satisfactory progress. As of June 30, 1959, there were 55,549 personnel of the U.S. Army Reserve participating in the extension course program. Additionally, as of the end of February 1959, there were 22,858 Army Reservists enrolled in the USAR school system.

The USAR Aviation Training Program has reached an alltime high in aviation strength and hours flown. A total of 654 aviators on flying status flew approximately 36,000 hours during the period of this report.

The number of persons having completed basic and advanced training since the last reporting period has increased to approximately 94 percent of the total assigned and participating strength in Ready Reserve units. This was due primarily to the continued assignment of personnel who had completed 6 months' active duty for training, and of returning obligors, to units. Readiness has been further enhanced by the increased number of units participating in week-end and multiple drills.

The need for unit administrative assistants, storekeepers, and maintenance personnel in civilian status continues to plague U.S. Army Reserve units. Against a recognized need for 5,300 such personnel, 2,393 had been hired as of June 30, 1959. This represents an increase of 106 employees over fiscal year 1958.

The Naval Reserve

The Navy's Selected Reserve Program during fiscal year 1959 progressed satisfactorily, and the concept is proving to be a means of significantly improving the responsive readiness of the Naval Reserve. It is considered feasible to accomplish the full implementation of this program by end of fiscal year 1961.

As of June 30, 1959, 45 of the ultimate goal of 51 Naval Reserve training ASW (Antisubmarine Warfare) ships had been assigned to the ASW surface program and Reserve crews activated, though not fully recruited, for 36 of these ships. Against a goal of 41 fleet-size ASW air squadrons, there were on this date in the Air Reserve Program 36 squadrons formed, with crews. These ships and aircraft with their Reserve crews will provide the Active Fleet with urgently needed additional ASW elements upon mobilization. All personnel of the Selected Reserve assigned to a drill-pay status will ultimately hold mobilization orders which become effective automatically in the event of full mobilization or upon initiation of hostility against the United States.

Training of Ready Reservists assigned to Selected Reserve billets is oriented to achieve individual or unit readiness in a manner suited to insure overall maximum responsiveness to emergency or war requirements. Participation by reservists in actual fleet operational exercises during fiscal year 1959 was significantly increased and highly successful. Reports by fleet commanders on fleet readiness and capabilities of the units so engaged were particularly favorable, and, in several cases, with regard to both surface and air units, were especially commendatory.

The requirement that all of its reservists, both officer and enlisted, perform 2 years of active duty as a part of their statutory obligation, in addition to a constant review of Naval Reserve training programs and regular careful inspections of unit against assigned missions, aids greatly in maintaining the overall readiness of the Naval Reserve at a satisfactory level.

The strength of the Navy's reserve component as of June 30, 1959, totaled 802,786. This total is composed of the following elements: Ready Reserve on active duty, 75,059; Ready Reserve on inactive duty, 541,036; Standby Reserve, 143,302; and Retired Reserve, 43,389.

Within the statutory limit of 2.9 million Ready Reservists allowed in the reserve components of all the military services, the Navy's share, assigned by the Secretary of Defense, is 530,000. This strength was attained for the first time during the summer of 1958, and the Ready Reserve throughout fiscal year 1959 has been subject to stringent screening in order to maintain this component in the neighborhood of its ceiling. This screening process is effectively improving the qualitative structure of the Ready Reserve.

Marine Corps Reserve

The closing date of this report found the Marine Corps Reserve able to meet its numerical requirements for trained personnel to fill mobilization billets. All officers have completed tours of duty, and over 175,000 enlisted personnel have met or exceeded minimum training requirements for oversea deployment. While the Organized Reserve attained a higher state of readiness, the Volunteer Reserve was again hampered by insufficient funds for active duty training (paid training for nondrill personnel was reduced by 845 billets over the fiscal year 1958 program). Because of this funding limitation it was impossible to reach the desired goal of providing some form of training each year for all reservists for whom a mobilization requirement exists.

Other problems created by fiscal limitations were: (a) A reduction in the 6-month training program, (b) paid drills were reduced from 48 to 46 for the second consecutive year, and (c) approximately 500 officers were forced from drill-pay units.

During this period plans, primarily of an organizational nature, were completed to reorganize the drill-pay components in fiscal year 1960 (mainly through redesignation of existing units and table of organization changes) to bring them more in line with the present structure of the Fleet Marine Force. Plans were also completed to make multiple drills mandatory for all 48 drill units beginning in fiscal year 1960.

By fiscal year 1963 a deficit of some 104,000 enlisted Ready Reservists (due to the concurrent expiration of many 6- and 8-year enlistments) is expected to develop. A means of overcoming a portion of this deficit would be the removal of the limitations now in effect on the 6-month program enlistments as administered to the Marine Corps Reserve, and permit the maintenance of an adequate drill pay structure.

Air National Guard

During fiscal year 1959 the conversion of the tactical squadrons to an all-jet force was completed. Flying training objectives were accomplished, with units flying over 465,000 hours, pilot proficiency increased, and the aircraft accident rate dropped to 17.12—a new low for the Air National Guard. One of the most important means by which this improvement was achieved was the growth in air technician support, which resulted in better aircraft maintenance, supervision over flying operations, and improved flying safety programs at the unit level.

During this reporting period 14,184 personnel completed training courses at Air Force service and technical schools, among whom were 10,692 airmen who completed the regular Air Force basic military training course. The Air National Guard Instrument School had 351 pilots complete their course. This group was comprised of recent basic pilot graduates and pilots from jet squadrons who had not attended a formal instrument flight course.

The officer and airmen personnel objectives were not met, falling short of the programed goal by 3 percent. Gains anticipated were not achieved principally because of: (a) Elimination of surpluses created by Streamline III and other reorganizations; (b) the raising of enlistment requirements by some States; (c) selective recruitment for personnel with needed skills by certain other units; and (d) several units' delayed recruitment pending construction of training facilities. Even though programed strength goals were not met, retention of airmen increased from 52 percent in fiscal year 1958 to 59 percent in fiscal year 1959, and reenlistments increased from 78 percent to 84 percent.

Air Force Reserve

The level of manning in the Air Force Reserve reached its highest peak during this period as a direct result of an improvement in assignment policies for obligated reservists. Ready Reserve units, capable of independent operations, are manned at an acceptable wartime level.

Several factors have contributed to an improvement in reaction time for mobilization of the Air Force Reserve. One is the issuance of Emergency Orders (so-called Vest Pocket Orders) to all Ready Reservists for whom an immediate wartime requirement exists. These orders are triggered by radio and TV announcements, and become effective on either that date or another date specified in the order, but always within 30 days of the declaration of an emergency.

A second factor is the publication of an Air Force manual on mobilization of the Air Force Reserve. This manual was distributed shortly before this reporting period, and implementation of its content was accomplished during fiscal year 1959. The publication contains an inclusive compilation of actions required both before, during, and following a mobilization period. Many problems were anticipated, and an orderly sequence of required actions was developed to minimize possible delays. These actions have placed the Air Force in the best possible position to effect the rapid mobilization of its reserve forces.

The first increment of the new Air Reserve Center course, "Staff Development," was completed on schedule. When all parts are completed it will provide the Air Force Reserve officer with a 4-year instructional program of professional military subjects integrated with a program of current studies dealing with fast emerging problems of national security.

During fiscal year 1959 over 4,000 officers and airmen attended service schools covering a wide range of courses of various lengths. A significant increase in enrollment in the Extension Course Institute (ECI) of the Air University occurred. Over 39,000 Air Force Reserve officers and airmen were participating in this type of training as of the closing date of this report.

The high state of training attained by Reserve navigators assigned to the Navigators Training Squadron Program was maintained throughout the year. Though still utilizing the TC-47 aircraft, the approximately 1,000 officers in this program again demonstrated their exceptional qualifications during the third annual Reserve navigation competition held in May 1959. Performance of these reservists during their tours of active duty for training with MATS is graded against the same standards applied to active force navigators.

The operational readiness of the troop carrier units was increased by the SWIFTLIFT allocation airlift, which was increased from approximately 20 to 40 aircraft during the past year. This allocation provides about 50 percent, or 20 aircraft, to the support of the Army; 25 percent to the Air Material Command for the purpose of airlifting outsized cargo; 15 percent to Air Defense Command; with the remainder being allocated to other missions as determined by Headquarters, USAF.

During this period all Air Force Reserve troop carrier wings were reorganized to conform to the organizational structure and strengths of Tactical Air Command's troop carrier wings. This permits maximum mobility and adopts the functional and maintenance procedure being utilized by the active force troop carrier wings.

As programed, 9 aeromedical evacuation units and 10 casualty staging units were activated during the last quarter of fiscal year 1959. All these units are new to the Air Force Reserve force structure.

The implementation of the Air Reserve technician plan for all 35 troop carrier locations was accomplished by the end of fiscal year 1959 with over 76 percent of the authorized positions filled.

Equipment

Army National Guard and Army Reserve

During fiscal year 1959 the Army National Guard received some new types of equipment. However, shortages in several areas continued to impair effective training. To meet the training needs of new organizations created by the reorganization of the Army National Guard, equipment was redistributed as much as possible. Most of the remaining major shortages were relieved before the new units began annual active duty for training.

Engineer units received 106 TD-18 or TD-20 tractors as replacements for outmoded D-7 models. As of June 30, 1959, Army National Guard units had 1,073 armored personnel carriers, of which 478 were received in this reporting period. However, this is less than the requirement for an effective training program, as was the number of 106-mm. recoilless rifles on hand. Certain types of communication equipment and combat surveillance radar sets were still not available. During this year, 33 percent of the Army green uniforms required were procured, bringing the total procured thus far to 85 percent of requirements. The National Guard Bureau continued to screen excess clothing reported by the States and applied these assets against clothing requisitions.

At the end of the fiscal year the Army National Guard had 658 fixed-wing aircraft, 185 reconnaissance-type helicopters, and 38 flight simulators, including 18 fixed-wing and 78 helicopters procured during this period. The programed procurement figures on these items were not attained due to the higher priority requirements in the active Army.

Property valued at \$159,975,691 was reported as excess by Army National Guard activities during the reporting period. Property with a value of \$29,205,320 was redistributed within the Army National Guard, \$95,070,585 worth was returned to the Army Supply System, and \$55,839,533 worth was turned over to disposal officers.

Improved inspection ratings during fiscal year 1959 reflected the progress made in the continuing maintenance training program and the receipt of additional facilities. The cost of maintenance and operating supplies consumed during the year, as reported by the States, was approximately \$7,711,565, an increase of 3.75 percent over the previous fiscal year. This increase was due to aging equipment, additional issues, change of troop requirements in various States, and numerous equipment modifications.

The reduction in numbers of units occasioned by the reorganization of the U.S. Army Reserve and the redistribution of equipment on hand had the effect of slightly increasing the quantities of equipment available to the remaining Army Reserve units. Consequently, authorized individual and organizational clothing and equipment for assigned personnel of Troop Program units reached an overall average during this period slightly higher than the fiscal year 1958 average.

At the time of this report the overall average of organizational equipment on hand in the U.S. Army Reserve Troop Program units was approximately 15 percent, reflecting a 3-percent gain over fiscal year 1958. To permit a reduction of active Army support of USAR units' annual active duty for training, and to improve these units' self-sufficiency, emphasis has been placed on the issuance of field-type equipment to the Reserve units.

Platoon-level basic unit training can be conducted by the majority of units with the quantities of materiel now on hand. Maintenance at all levels continues to be a most pressing problem.

Naval Reserve

Equipment for training the Naval Reserve is assigned to training centers and facilities. In general, this equipment is not of the same modernity as that utilized by the fleet but does serve to illustrate the basic principles and functions involved. Electronic installations are particularly in need of modern equipment, and action is being taken to modernize the equipment, particularly in the antisubmarine warfare field. This modernization will be slow because of budgetary limitations. The nature of shipboard and shore station facilities makes issuance of equipment on an individual basis unnecessary. Therefore, individuals are supplied only with uniforms to accompany them on mobilization.

In the air programs, special emphasis has been placed on providing firstline aircraft for the ASW squadrons. All fighter and high-speed attack squadrons are equipped with jet aircraft. ASW helicopters have been assigned to the command, and at the close of fiscal year 1959 half the helicopter allowance was filled with helicopters possessing ASW capabilities. The remainder are trainers and utility models.

Escort vessel (DE) type ships assigned to the Reserve Training Command, augmented by Active Fleet ships, cruised surface reservists during this reporting period. Additional destroyer (DD) type ships are being assigned to the Reserve Training Command in connection with the Selected Reserve Programs as they are released from Active Fleet service.

The Marine Corps Reserve

The status of unit and individual equipment of the Ground Reserve continues to be satisfactory. Unit manning levels, which are necessary due to the personnel ceiling imposed, have eliminated to a great degree the need for having full allowances of unit equipment on hand. However, full allowances are available when required and requisitioned to support training. Modernization of equipment in use for training continues. During fiscal year 1959 full allowances of the M48AI tanks have been authorized and issued to tank units and to ordnance field maintenance companies. 155-mm. gun units currently possess full-tracked, self-propelled weapons. Obsolete 60-mm. mortars have been replaced with an allowance of 81-mm. mortars. M38 quarter-ton trucks are being replaced by the M38AI when replacement is required.

Individual equipment needed for training the aviation component is satisfactory. The Reserve air control squadrons are operating the latest FMF-type radar. Their overall supply status is considered to be excellent. The majority of the fighter and attack squadrons are equipped with jet aircraft. These aircraft were considered to be satisfactory in both types and numbers during the year. The very low availability of suitable helicopters severely hindered the training of the Reserve helicopter squadrons and hampered participation in the various air-ground exercises scheduled during the year.

The Air National Guard and Air Force Reserve

The Air National Guard aircraft inventory as of June 30, 1959, totaled 2,409, or 92 percent of the 2,629 aircraft authorized. The inventory includes 1,764 jet fighters, 195 jet reconnaissance aircraft, and 218 jet trainers. Three hundred and eighty-nine of the assigned aircraft are classified as first line.

During the year nine squadrons converted to more modern types of aircraft, including one squadron to F-100 and two squadrons from the conventional to the jet category. At the year's end one squadron was still equipped with F-94C's but it will convert to F-89J's by mid-fiscal 1960. With this action all 94C's will have been removed from ANG program.

The modernization and conversion of the Air National Guard squadrons during fiscal year 1959 continued on a smaller scale than in previous years. Continued close liaison was maintained with appropriate Air Force commands which resulted in an orderly redistribution and transfer of ground support equipment. While some special test equipment and jet engine field maintenance tooling items have continued to be in short supply, the overall equipment support of the Air National Guard is considered to be excellent. Those items which fall in the critical category are on procurement, and estimated shipping dates are satisfactory. With the exception of the communication-electronics and weather (C-E&W) units, Air National Guard activities report approximately 90 percent of mission and training equipment on hand. The C-E&W forces as a whole possessed approximately 80 percent of their equipment authorization for individual and unit training. One of the major objectives in this regard was to authorize for training that equipment which qualitatively satisfied the requirement for D-day mission accomplishment. Equipment of this quality was issued in minimum amounts necessary to meet the needs of effective training operations.

The Air Force Reserve troop carrier units have attained very nearly the number of aircraft needed for the 45 squadrons. The air rescue squadrons had received all of their aircraft as of the close of fiscal year 1959. However, there are some problems concerned with the equipping of these organizations. While the squadrons possess their unit equipment, the attrition equipment (i.e., the 10 percent in excess of the unit equipment) has been reduced considerably during the past year. The aircraft loss has occurred in the C-119G models. The units with C-119G's have been filled out by adding C-119J's to make up the deficiencies. The latter aircraft, although compatible with the C-119G's, cannot be used for troop drops. This creates the problem of determining the combat capability of the units. The C-119C units, in contrast, are oversupplied with unit equipment and are now carrying 18 aircraft per squadron.

The C-123 units have a deficiency in navigator compartments since most of these aircraft are not so equipped. In the active establishment, four compartments are authorized. Without them, units experience difficulty in executing air drops. The tentative modification, providing these compartments, has been approved by the Air Staff but is awaiting the approval of the Weapons Board. Since this has been assigned a very low priority, its accomplishment in fiscal year 1960 is unlikely.

During this period activation of the last three squadrons completed the activation of all units in the 15-wing troop carrier program. A general problem affecting these units has been the difference between the number of aircraft actually possessed and those assigned. The principal reason for this disparity lies in the aircraft which are undergoing IRAN (inspection and repair as necessary). An improvement will occur very shortly as the repairs are completed.

Facilities

Army National Guard and Army Reserve

Under provisions of the National Defense Act of 1950, as amended (as restated in secs. 2231-2238 of title 10, U.S.C.), the Army National Guard placed 92 construction projects under contract in fiscal year 1959. Of these, 72 were for

complete armories and the remaining 20 projects were expansions, conversions, rehabilitations, or construction of motor vehicle storage buildings. The cost to the Federal Government for these projects was \$11.6 million. As of June 30, 1959, a total of 1,071 armories had been constructed for which Federal funds have been provided under the National Defense Facilities Act, as amended. Due to the reorganization of the Army National Guard, 27 of these armories are now considered inadequate without alterations or additions.

The total expenditure of Federal funds for all armory construction projects under this legislation during this reporting period was \$116,681,000. The law also provides for the use of Federal funds for up to 75 percent of the total construction cost, with the State government providing the remainder. Prior to the enactment of the NDFA Act in 1950, the several States and territories had 916 armories considered adequate for continued use which had been constructed without Federal assistance. Presently, only 639 of these armories are considered adequate.

Because of the reorganization, it was necessary to proceed slowly with the armory construction program during the first three quarters of fiscal year 1959. Only 41 construction projects were placed under contract during this period. In the final quarter the program was accelerated and 51 more armory projects were contracted for. This total of 92 was 5 below the 97 projects programed for fiscal year 1959. In fiscal year 1960, 169 armories and 17 nonarmory projects are programed, based on \$27.2 million new obligational authority from the Congress.

The long-range construction facilities estimate for the current Army Reserve troop basis is 1,800 centers. There is a continuing requirement to replace leased and donated facilities that are inadequate due to lack of space for administration, classrooms, storage, and maintenance, or because of poor locations, and which involve high leasing and custodial expenses. The Army commanders report a total of 925 facilities in this category.

During fiscal year 1959, contracts were awarded for 86 centers and 25 additions. As of June 30, 1959, 276 centers had been constructed, including 83 that were completed in fiscal year 1959. There were 115 new centers and 25 additions under construction at the start of fiscal year 1960.

The Naval Reserve

Facilities in the Naval Reserve Program (OTA) number 300 training centers and 19 training facilities. Of this number, 79 percent are class "B" (quonset or Butler) or wooden barracks-type buildings. These aging structures are becoming increasingly difficult to maintain economically.

Closely following the loss of six Naval Air Reserve training facilities in fiscal year 1958, through disestablishment, four additional disestablishments were ordered during fiscal year 1959. Every effort has been made to accommodate the drilling Naval Air Reservists displaced by these actions at the remaining 18 activities of the Naval Air Command. The fiscal year 1959 facility losses reduced the Air Reserve Program by 10 major activities and 73 satellite activities (AAU's) over the past 2 years. Greater emphasis on ASW training, accompanied by an increase in the number of ASW squadrons and a corresponding reduction in the number of VF/VA jet squadrons, has reduced the requirements for aviation facilities capable of supporting jet aircraft.

All Naval Air Reserve facilities are jointly utilized with one or more of the following: Marine Corps Reserve, Air Force Reserve, Air National Guard, and Coast Guard Reserve. Among the 319 training facilities and centers other

than Air, 236, or 74 percent, are jointly utilized by one or more of the other reserve components.

Under austere funding conditions the maintenance of reserve training facilities has continued to be a problem during this reporting period.

The Marine Corps Reserve

As of the close of this reporting period the Marine Corps Reserve occupied a total of 228 facilities. This represents a loss of two during fiscal year 1959, as a result of continuous study of units, facilities, population densities, and transportation networks. Of the 228 training centers, the occupancy is shared as follows: 157 shared with the Naval Reserve; 1 with the Army; 1 with the Army and Navy; 1 with the Air Force; 1 with the Army, Navy, and Air Force Reserves. Of the remaining Marine Corps training centers, 44 are federally owned and 23 are commercially leased.

During fiscal year 1959, certain improvements were made to training centers to provide more adequate facilities for accomplishment of the mission of the Marine Corps Reserve. These improvements are: Construction of 8 rifle ranges, construction of 6 structures to provide storage and maintenance space for automotive and engineer equipment and artillery weapons, alterations to 14 training centers to provide better facilities for training, and the completion of 8 new training centers to replace inadequate facilities. Of these, four were constructed jointly with the Naval Reserve and one jointly with the Air Force Reserve. Of the total number of training centers, 79.4 percent are jointly occupied with another Service.

Marine Aviation Reserve units are based at naval air stations and receive logistic support from the Navy. The facilities available and used during fiscal year 1959 were adequate.

The Air National Guard and Air Force Reserve

Fiscal year 1959 funds in the amount of \$12.1 million were utilized in the construction of facilities for the Air National Guard and in the development of plans for projects to be undertaken in future years. The major items constructed were 2 runway extensions, 3 hangars, 6 aircraft parking aprons, 6 armament storage and supply buildings, 1 AC&W building, and 4 arrestor barriers. Advanced planning was authorized for the design of 10 arrestor barriers, expansion of 4 parking aprons, 5 hangars, 3 AC&W buildings, and 9 runway taxiway extensions.

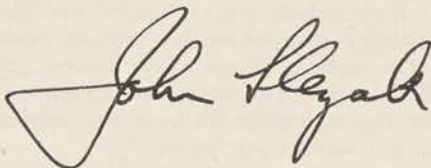
The 567 Air National Guard units operating as of the close of this report occupied the following facilities: 94 flying bases (including 10 tactical support unit flying bases, 3 permanent training sites with tactical units, and 5 permanent training sites with training site detachment only) and 42 nonflying bases.

The projection of funds needed and programmed in fiscal year 1960 is \$16,440,000 to provide for presently authorized units. All construction and acquisition of Air National Guard facilities is accomplished through coordination with the Reserve Forces Facilities Committee of the Office of the Secretary of Defense. At the present time 39 Air National Guard flying bases are in the joint-use category.

The Air Force Reserve obligated a total of \$5.6 million for operational facilities during fiscal year 1959. This includes \$4 million made available late in fiscal year 1958 and not placed under contract until the first quarter fiscal year 1959. At the close of this fiscal year, the 35 required troop carrier bases were all operational to a satisfactory degree. The remaining operational facilities are scheduled for completion by the end of fiscal year 1964.

Flying facilities being jointly used are as follows: 19 with the Regular Air Force, 10 with the Air National Guard, 3 with the Navy, and 5 with civil aviation.

During this period 82 Air Reserve centers (nonflying), where technical nonflying training is conducted, were in operation. Six of these facilities were constructed in locations where Reserve participation and high rent warranted such action. The remaining 76 centers were located in either Government owned or leased facilities.

A handwritten signature in black ink, reading "John Slezak". The signature is fluid and cursive, with a large, stylized initial "J" that loops around the first part of the name.

JOHN SLEZAK,

Chairman, Reserve Forces Policy Board.

Annual Report
of the
SECRETARY OF THE ARMY

July 1, 1958, to June 30, 1959

Contents

	Page
Chapter I. INTRODUCTION.....	113
II. OPERATIONS AND TRAINING.....	115
III. LOGISTICS.....	133
IV. MANPOWER AND PERSONNEL MANAGEMENT.....	149
V. THE SEARCH FOR BETTER WEAPONS, EQUIPMENT, AND TECH- NIQUES.....	166
VI. CIVIL WORKS: WATER-RESOURCE DEVELOPMENT.....	185
VII. STRENGTHENING MANAGEMENT.....	191
VIII. BUDGET AND FUNDS.....	198
IX. CONCLUSION.....	203

1. Introduction

U.S. military forces, like the Nation itself, are fully engaged on many fronts at all times. Military forces in being weigh heavily on the outcome of the protracted conflict which faces us. The Army, together with the Navy and the Air Force, is dedicated to the task of maintaining the peace by preparedness for war. No one can foresee with clarity how or where the United States may be called upon to use its military power. Our land, sea, and air forces may be engaged in conventional operations, varying in size from a small-scale expedition to a relatively large-scale war. They may also be required to fight in a limited nuclear war, or they may even find themselves in the cauldron of general nuclear war.

A proper combination of offensive and defensive weapons systems, consisting primarily of advanced missiles and provided with adequate warning and communications systems, should deter any aggressor from attacking the United States with nuclear weapons. In the past year the Army has contributed an increasingly important share of this deterrent force principally through the extensive deployment of advanced surface-to-air missiles in defense of the continental United States. At least one atomic-capable NIKE-HERCULES battery is now located within each defended locality in the United States.

If the deterrent to thermonuclear war is properly maintained, the United States and Soviet strategic nuclear capabilities will tend to cancel out one another. This means that we are entering a period when the active forms of military power will be modern tactical land, sea, and air power. This inevitably leads to an emphasis on men, an emphasis particularly felt by the Army, since land forces, which are designed specifically to control the land where man lives, depend in the final analysis on man himself. The Army makes full use of modern weapons and equipment, but always in the firm belief that men of courage and skill, and men in numbers, are absolutely essential.

Versatile and strong land, sea, and air forces, fully modernized, suitably deployed or strategically mobile, and capable of both conventional and nuclear action, should be able in conjunction with our many allies to deter or adequately cope with any other kind of aggression which might occur anywhere in the world.

There has been no significant change in the deployment of Army forces during the year. In the most critical areas of Europe and Asia,

Army forces are deployed alongside those of our close allies as continuing evidence of U.S. determination to stand by its commitments.

Here at home, mobile, combat-ready Army forces are essential to reinforce allied or U.S. forces deployed overseas or to move rapidly to new trouble spots which may threaten. For this purpose the Army maintains the Strategic Army Corps, or STRAC, a part of the Strategic Army Forces located in the continental United States. This superbly trained combat force has great flexibility for deployment by air or water in conjunction with the Navy or Air Force. STRAC, in addition to the divisions which comprise its main combat strength, also includes the combat support and service support units required for sustained combat operations. These highly ready and mobile strategic reserve forces can be rapidly tailored to fit the requirements of a specific situation as it actually develops and to work effectively with the Air Force and Navy and the forces of our allies. These forces are able to fight with or without nuclear weapons. The fast deployment of Army, Navy, and Air Force elements to Lebanon and to Taiwan at the time of the recent crises provided excellent examples of the flexibility and utility of highly mobile combat forces.

Within the capabilities of equipment now on hand, the Army is in a high state of combat readiness. The Army continues to work tirelessly to improve its readiness posture and therefore its capabilities to perform its many increasingly important missions.

II. Operations and Training

Operations in time of peace entail keeping the Army poised with all its resources of manpower and equipment in a state of readiness to respond to any challenge which may be inimical to the security of the United States. The posture of readiness is difficult to measure because its effect is principally deterrence of war.

Notable developments in operations and training indicative of the deterrent power of the Army in fiscal year 1959 were—

- prompt response of ground forces to the crises in Lebanon, Taiwan, and West Berlin;

- fast air movement of a 1,100-strong reinforced battle group of STRAC paratroops from North Carolina to the Rio Hato Military Reservation in Panama where they landed by parachute to demonstrate the capability of assault reinforcement of an overseas area from the United States;

- organization of 90 percent of Army Reserve components to the modern pentomic structure;

- the establishment on a NIKE site of a battalion of the California National Guard as an integral active part of the air defense of Los Angeles;

- activation of two battalions to man the new LACROSSE surface-to-surface missile which will be operational early in fiscal year 1960; and

- activation of the first battalion for operation of the HAWK air-defense missile, a highly mobile “homing” missile with excellent low-level capabilities.

Deployment of Forces

Ready Forces Overseas

The collective security of the free world is dependent to a large extent upon a tangible demonstration of the will and ability of the United States to fulfill its international commitments, and Army forces deployed overseas during the past year were clear and unmistakable proof of U.S. intentions—both to allies and to potential enemies. The presence of Army troops on the ground in many parts of the free world had a stabilizing and deterrent effect which could have been achieved in no other way.

The Army in Europe

U.S. Army, Europe, is a part of the U.S. European Command, a unified command, with responsibilities extending geographically from the northern tip of Norway to the eastern extremity of Pakistan. The U.S. European Command has the task of welding the joint combat forces of the United States—Army, Navy, and Air Force—assigned in Europe as part of the North Atlantic Treaty Organization defensive alliance.

During fiscal year 1959 the Army held ready in West Germany, facing Communist forces, 3 infantry divisions, 2 armored divisions, 3 armored cavalry regiments, 2 REDSTONE field artillery groups, 10 surface-to-surface missile battalions, and other support forces. In West Berlin there were two battle groups.

In the northeastern plain of Italy between the Alps and the Adriatic Sea the Army maintained the Southern European Task Force, whose major combat element is one medium missile command. During the past year this task force was reorganized into a combined United States-Italian Force, with Italy assuming responsibility for manning two HONEST JOHN missile battalions.

The potential combat effectiveness of the Army in Europe was excellent during the past year. It was the best equipped and best trained operational army the United States has ever had in the field in time of peace.

German border operations were the responsibility of the three armored cavalry regiments in U.S. Seventh Army during the year. These units patrolled along the border which separates the U.S. area of responsibility in Germany from Soviet satellite Czechoslovakia and the Soviet zone of Germany. The mission of these units was to alert U.S. Seventh Army and the free world in case of attack. To accomplish this mission, motorized patrols, ground observation posts, and listening posts were manned. Elements of the armored cavalry regiments were constantly on the move, watching, listening, scouting, and patrolling and thus maintaining a constant vigil for the security of U.S. forces in Europe.

In support of Army troops in Europe, approximately 92,000 non-U.S. civilians were employed, whose work involved all kinds of support activity, such as communications, hospital support, vehicle operation, maintenance duties, and engineer activities of all kinds. These personnel had an important role in support of military forces and were essential under existing conditions for the success of the Army's mission in Europe during fiscal year 1959. Their numbers are indicative also of a serious shortage of U.S. military manpower.

The Army in the Pacific

Area command in the Pacific resides in the Commander in Chief, Pacific. The commander of Army forces in the Pacific area is responsible for the execution of operational and logistical missions assigned by Commander in Chief, Pacific, as well as missions and responsibilities for Army matters assigned by Headquarters, Department of the Army.

The operational readiness of the principal element of the U.S. Army Pacific was excellent during fiscal year 1959, as indicated by the alert forces deployed in the vicinity of the demilitarized zone near the 38th parallel of latitude in Korea. U.S. Army forces in Korea were organized in the U.S. Eighth Army under the United Nations Command, which includes military forces from eight other nations. U.S. Army troops in the Eighth Army consisted of two infantry divisions, an air-transportable missile command, an artillery group, and a corps artillery. These forces are equipped with some weapons capable of delivering atomic fire.

Korean Army personnel have been integrated into U.S. divisions at squad and gun-crew levels and in U.S. Eighth Army service units. This procedure has proven satisfactory in improving the effectiveness of U.S. units, which were previously operating at reduced strengths in accordance with troop ceiling limitations. However, because of the language barrier, the presence of Korean soldiers in U.S. units reduces the effectiveness of those units in comparison to equivalent U.S.-manned organizations and limits the capability of those units for deployment elsewhere.

The Army strengthened its Pacific forces during 1959 by converting a 90-mm. antiaircraft gun battalion and a SKYSWEEPER battalion on Okinawa to NIKE-HERCULES battalions.

One infantry division, less one battle group, was maintained in Hawaii as a reinforcement for the Army mission in the Pacific area.

Other Army Oversea Forces

In Alaska two reinforced battle groups and two NIKE-HERCULES battalions provided ground and air defense for this new State during fiscal year 1959. Ground troops were kept alert and in a state of combat readiness by constant training exercises under extreme conditions of temperature and weather.

In the Panama Canal Zone, the Army continued to maintain one infantry battle group and one antiaircraft gun battalion for the protection of this area.

In Iceland a battalion combat team of the U.S. Army continued participation in the Iceland Defense Force, a subordinate command of the U.S. Atlantic Command.

In agreement with Denmark, the Army moved a NIKE-HERCULES battalion to Greenland during the past year and it also established there its Polar Research and Development Center.

Troop Movement to Lebanon

During the political crisis in Lebanon in July 1958 when the Lebanese Government requested the support of U.S. military forces, the Army began moving 8,000 combat-ready troops to that country, including an airlifted airborne battle group and reinforced tank and engineer combat battalions. The timely deployment of these troops together with other U.S. military forces served as a deterrent to aggressors to dominate countries in the Middle East. No active military action resulted and Army forces were withdrawn after a 14-week display of readiness to uphold the political freedom of Lebanon.

In response to requests of military aid by the Government of the Republic of China, when the Communist Chinese began an intensive artillery bombardment of the Quemoy Islands on August 23, 1958, the United States provided substantial materiel assistance. In addition, the Army rapidly deployed a NIKE-HERCULES battalion with supporting units from the United States and moved numerous training teams to Taiwan from nearby Far East areas and from the United States to assist in improving the defensive posture of the Chinese Nationalist Army. All Army troop movements were executed on schedule and without incident. The prompt and effective assistance rendered by these forces materially aided the Chinese Nationalist Army in its successful defense of the Quemoy area. (See fig. 1.)

Ready Combat Forces Within the United States

In fiscal year 1958 the Army organized its Strategic Army Corps (STRAC) as a means of providing quick ground reinforcement for U.S. Army forces in oversea areas and for use in other areas of the free world.

At the end of fiscal year 1959 these forces constituted STRAC: Headquarters, XVIII Airborne Corps; 101st Airborne Division; 4th Infantry Division; 82d Airborne Division; 1st Logistical Command; the 2d Infantry Brigade; the 2d and 3d Missile Commands; and Combat Command A of the 1st Armored Division. STRAC was reduced by one division during the year because of the overall Army strength reduction of 30,000 men. STRAC is part of the seven-division Strategic Army Force (STRAF). The four non-STRAC divisions are to be used to reconstitute the STRAC in the event of deployment.

In recognition of the danger of limited as well as general war, STRAC units are designed for quick movement against any kind of

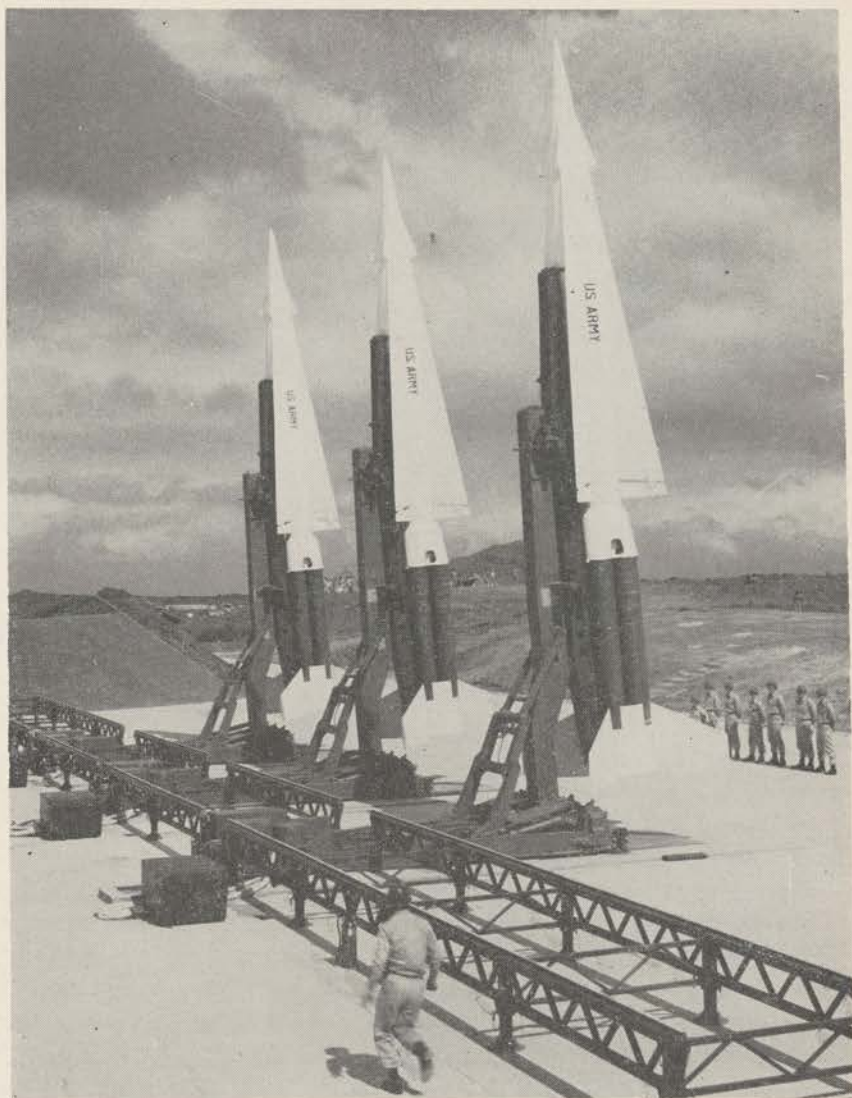


Figure 1. NIKE-HERCULES in Taiwan.

aggression around the world. The high level of combat readiness for this mission requires troops who are fully trained to use a wide range of weapons and equipment so that they may be prepared to apply whatever degree of force is necessary to uphold the national policy of the United States.

While STRAC was powerful, flexible, and ready throughout 1959, the Army defines three main areas in which improvements are being sought.

The first area is modernization. The quality and quantity of weapons and equipment in the hands of STRAC troops have been sufficient to meet requirements of the past. However, to be fully effective, STRAC must be fully armed with the most modern weapons and equipment which the Army has developed.

Manpower is the second area in which improvements are being sought. Units which can move into combat in a matter of hours must be made up of men who have completed up-to-the-minute training. While the majority of the men in STRAC are so trained, there is the unavoidable problem of personnel turnover and the continuing need for trained replacements. In the past year it became clear that the restrictions on the Army's military strength were making it increasingly difficult to hold in STRAC units the level of fully trained men considered necessary for combat readiness. The problem was compounded by the need for longer training periods for individuals in the use of more advanced weapons and equipment.

Strategic mobility is the third area in which there is a need for improvement. The movement of troops from Europe to Lebanon gave dramatic emphasis to the necessity for a careful study of the policies and plans governing airlift and sealift with a view toward providing STRAC and the Army as a whole with the mobility required to meet the increasing threat of limited war.

To airlift a strong combat force of STRAC with all its equipment over a long distance in a matter of a few weeks and to support this force by air until surface shipping can take over will require the development of modern, large payload, high-speed aircraft with longer ranges than those now in use.

Strategic sealift is generally adequate to meet the current mobility requirements of the Army, but the bulk of the present oceangoing fleet was built during World War II and is approaching obsolescence. There is a real need for modernization of the strategic sealift fleet with the objectives of faster vessels with more rapid means of loading and unloading.

A "roll-on roll-off" ship is the kind of vessel required for efficient sealift of Army combat forces. A prototype, the U.S.N.S. *Comet*, which can load and discharge divisional combat vehicles without conventional lift equipment and which can rapidly transport four to five times as many combat vehicles as the World War II Victory ship, was used to transport vehicles from Bremerhaven to Lebanon during the crisis there. The performance of the *Comet* was considered excellent during this operation. (See fig. 2.)

Readiness of the Reserve Components

A basic premise of all Army plans and operations is the concept that the Active Army, the Army National Guard, and the Army

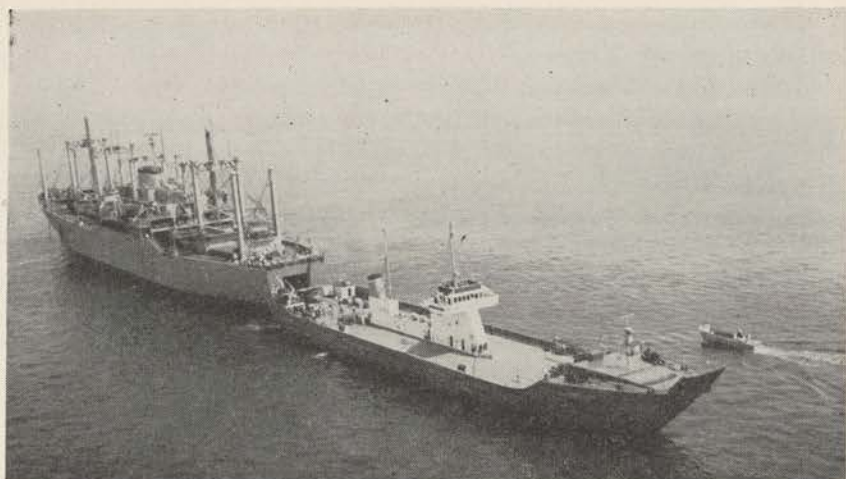


Figure 2. Vehicles roll off U.S.N.S. Comet to Army lighter.

Reserve have complementary roles. During fiscal year 1959, the concept of unity of forces was carried out by integrating an Army National Guard NIKE unit into the active air defense of the United States, placing Army Reserve units within the mobilization base of the Active Army, reorganizing all but one of the 37 reserve components combat divisions into the pentomic organizational structure, and by effecting a priority system to man, train, and equip all reserve components for phased mobilization into one cohesive force.

The Army Reserve forces considered to be immediately available for mobilization are contained in the Ready Reserve with an authorized strength of 1,448,000 officers and men. A total of 700,000 personnel are assigned to units in a paid-drill status and 748,000 are listed as individual reinforcements. The unit paid-drill strength consists of 400,000 National Guardsmen and 300,000 Army Reservists.

The reserve components have been organized into 37 infantry and armored divisions, 27 of which are Army National Guard and 10 Army Reserve. In addition, 13 Army Reserve training divisions and numerous combat and service support units of both the Army National Guard and the Army Reserve have been organized to meet mobilization requirements. Upon mobilization about 1,100,000 of the total 1,400,000 officers and men would be required by the 37 combat divisions and supporting units in the Army Reserve Forces Troop Basis. The balance would be required as individual reinforcements for Active Army units, and to initiate the organization of additional units.

One battalion of the California National Guard was placed on a NIKE-AJAX site in the Los Angeles area during the past year as an integral part of the air defense system in force in the United States.

The Army National Guard continued its training for active participation in the air defense of the United States and Hawaii.

By the end of fiscal year 1959, 20 missile batteries (NIKE-AJAX) of the Army National Guard completed training. During fiscal year 1960, an additional 38 Army National Guard missile batteries (NIKE-AJAX) and 4 Army National Guard missile batteries (NIKE-HERCULES) are scheduled to complete training.

The Army Reserve participated in air defense, with two detachments undergoing training at two Active Army NIKE-AJAX sites in the Chicago, Ill., area. This was experimental training to determine future participation of Army Reserve elements in operational air defense.

Air Defense

In fiscal year 1959 construction of new tactical sites of the Army's part of the air defense system of the United States was stopped except for sites under contract and one new site started in the Dallas-Fort Worth, Tex., defense area. This stoppage was due to a revaluation of the concept of air defense of the United States by the Secretary of Defense in line with the desire of Congress to eliminate possible air defense duplications of the Army's NIKE-HERCULES and the Air Force's BOMARC. At the end of the year an air defense master plan was issued by the Secretary of Defense which reduced NIKE-HERCULES construction in fiscal year 1960 from the original plan of the Department of Defense.

NIKE

The widespread NIKE-AJAX air defense system was strengthened during the past year by the addition of the more powerful second-generation missile, the NIKE-HERCULES. At the end of the year there were more than 80 NIKE-HERCULES batteries on site, including more than 30 batteries overseas and in the State of Alaska. In the coming year, additional NIKE-AJAX batteries will be converted to the NIKE-HERCULES at present defense sites which now protect cities, Strategic Air Command bases, and various installations in the United States, including Alaska, and in Hawaii.

All NIKE-AJAX installations will be either converted to NIKE-HERCULES or supplemented by NIKE-HERCULES on the same sites. The NIKE-AJAX, though not as effective as NIKE-HERCULES, can defeat any bomber operational today. The NIKE-HERCULES has the advantages of having a much longer range, of being much faster, and of having the ability to carry a conventional or nuclear warhead. NIKE-HERCULES is also an effective weapon against air-breathing air-to-surface missiles.

The very high accuracy of the NIKE-AJAX and NIKE-HERCULES has been demonstrated by regular firing for several years. At the end of the year, annual service practice and package firing of NIKE-AJAX missiles totaled over 3,000 and NIKE-HERCULES firings totaled over 400. During the past year the accuracy of the weapon was further demonstrated when NIKE-HERCULES successfully intercepted a target at over 100,000 feet and a Q-5 drone traveling at supersonic speeds up to 2,100 miles per hour at a high altitude, thus achieving the highest and fastest target intercepts to date in the free world.

Safety is afforded in the NIKE system by its "command guidance" system which keeps the missile under control at all times. Additional safety devices have been included in NIKE systems which react automatically to destroy the missile and warhead if flight should be erratic or ground control is lost.

HAWK

HAWK, a "homing" missile which has the capability of destroying supersonic vehicles at treetop level, became operational during the past year. The first HAWK unit was organized during the year and successfully completed its training. Early in fiscal year 1960 operational units will be ready for assignment either overseas, to the Strategic Army Corps, or to continental air defense. Like the NIKE-HERCULES, the HAWK has intercepted successfully the supersonic Q-5 drone and has demonstrated its low-altitude capability by intercepting an F-80 drone flying at an extremely low altitude.

MISSILE MASTER

In continental air defense, the Army's NIKE units and MISSILE MASTER fire-coordination systems are under the operational control of the North American Air Defense Command. The MISSILE MASTER is an automatic data communication network, which integrates in a defense area all elements of Army air defense weapons from target detection to target destruction.

In addition to the MISSILE MASTER system now operational in the Washington-Baltimore defense area, nine more systems were placed under contract during the past year. These systems will be operational by the end of calendar year 1960.

NIKE-ZEUS

The next step in air defense which will be necessary in the very near future is the production of a weapon which will defend against intercontinental ballistic missiles and intermediate-range ballistic missiles.

The Army recognizes the many complex problems presented in the development of an effective antiballistic missile defense. It has been pursuing the solution to these problems aggressively for several years in the development of the only promising weapons system of this type, the NIKE-ZEUS.

Training

Training was emphasized in all Army operations during fiscal year 1959, and each training program was tailored to fit the mission of the command concerned. Training of Army forces stationed overseas was conducted with the objective of maintaining instant combat readiness. STRAC trained for immediate deployment from the United States. The reserve components trained to meet mobilization schedules. Lastly the Army Training Base and service schools provided trained replacements and school-trained specialists to all Army forces.

Training in Europe

With the objective of maintaining instant combat readiness, the U.S. Army in Europe continued to emphasize realistic training under field conditions, stressing individual and unit protective measures on an atomic battlefield.

Army aircraft, as a means of battlefield mobility, were used in all tactical training to transport troops, vehicles, equipment, and supplies. Army helicopters and fixed-wing aircraft were used also to support and conduct long-range combat and reconnaissance training patrols.

The largest Army-wide field-training exercise, FREE PLAY, was conducted in Germany during February 1959. In this 6-day corps maneuver, 50,000 troops participated. As a result of the training and experience gained under continuous field conditions, participating units showed marked improvement in their combat readiness. (See fig. 3.)

Army troops in Europe continued to take part in field exercises directed by the North Atlantic Treaty Organization headquarters which are designed to increase the readiness of the combined NATO forces defending free Europe.

During the past year four theater-level schools were operating in Europe. These schools provide specialist training, leadership training, and several individual training courses essential to the efficient operation of Army forces in Europe.

Fund limitations reduced the frequency of movement of units to major training areas in Europe during the year and also forced cancellation of a major field exercise. The combination of limited

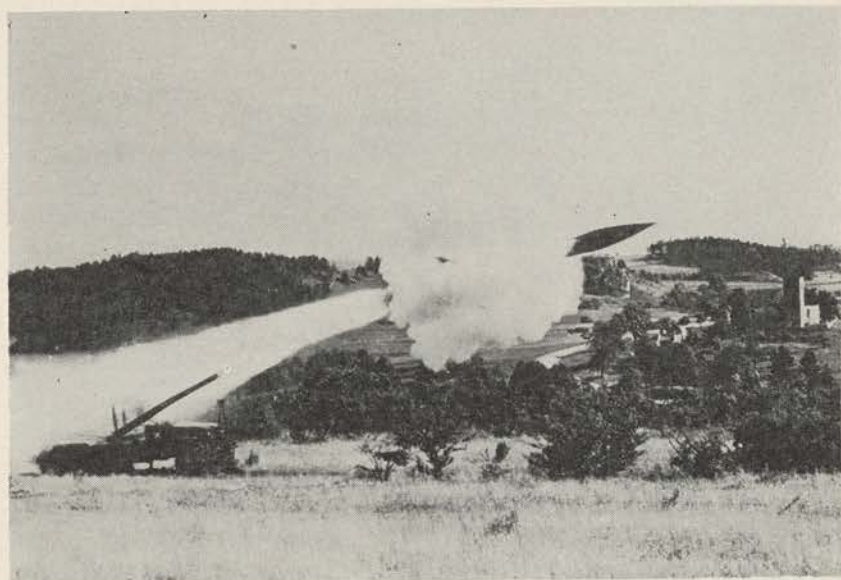


Figure 3. HONEST JOHN firing in training exercise in Germany.

funds and inadequate close-in training areas hampered training in Europe.

Training in the Pacific

The U.S. Eighth Army in Korea carried on continuous field training during the year, emphasizing rehearsal of assigned combat and support missions. (See fig. 4.) Elements of the U.S. Air Force, the Navy, and the Republic of Korea Army participated in much of this realistic training. A major problem of training in Korea stemmed from insufficient troop-space authorizations for administrative and support functions. Consequently, it was necessary to assign the most essential of these duties to combat troops, thereby interfering with combat training.

The 25th Infantry Division in Hawaii carried on effective combat operational training during the year, but lacked air and sealift to support mobility training exercises of the division. This deficiency is a serious handicap to the division, which, however, is well trained to accomplish its operational missions.

Several schools were conducted in the Pacific area; all courses were conducted at troop level rather than at theater level.

Training in the Panama Canal Zone and in Alaska

In the Panama Canal Zone and in Alaska, emphasis was laid on environmental training. Each command operated excellent facilities



Figure 4. Training in Korea.

ties—the Jungle Warfare Training Center in the Panama Canal Zone and the Cold Weather and Mountain School in Alaska. Plans were laid during the year to start polar environmental training near Thule, Greenland.

Training in the United States

During fiscal year 1959 highest priority was given to the training of STRAC to assure its readiness for immediate deployment to any trouble spot in the world. Every effort was made to relieve the STRAC from reserve component summer training, replacement training, and other missions not contributing to combat readiness. These measures have enabled STRAC to conduct a most effective training program which has been responsible for maintaining this force in the highest possible degree of readiness.

Replacement Training

During the past fiscal year, approximately 235,000 Active Army replacements received basic training in Army training centers and in units of the Strategic Army Force.

Approximately 75,500 6-month trainees and 1,500 3-month Reserve component trainees entered training in Army training centers during fiscal year 1959. About 50,000 of these were Army National Guard trainees and the remainder, Army Reservists. After completion of 8 weeks of basic combat training in the Army training centers, the majority of trainees completed advanced individual training and unit training either in Army service schools or at Army training centers, with only a small percentage diverted to apprenticeship in Active Army units.

School Training

During fiscal year 1959, 123,240 Army personnel were graduated from Army service schools, 2,500 from Navy schools, 418 from Air Force schools, 11 from Marine Corps schools, 1,608 from courses conducted by the Defense Atomic Support Agency, and 200 from joint colleges (National War College, 34; Industrial College of the Armed Forces, 40; and Armed Forces Staff College, 126).

Education and training was provided for 1,760 Army personnel in civilian institutions.

A significant development during the past year was the start of training for operator and maintenance personnel on combat surveillance and target acquisition equipment. Ten different courses of instruction in operation and maintenance of medium- and long-range ground radar, drone systems, airborne radar, and aerial cameras, were started. Graduates were assigned to commands which had been issued the new equipment.

Field Exercises and Maneuvers

Seven field exercises and maneuvers were conducted in the United States during the year involving approximately 78,800 men. As far as practicable, these exercises emphasized tactical operations under assumed conditions of extensive nuclear, chemical, biological, radiological, and electronic warfare capabilities for both friendly and enemy forces.

Exercises DARK CLOUD and WHITE CLOUD provided combined unit training in airborne operations at Fort Bragg-Mackall Maneuver Area, North Carolina, for the 82d and 101st Airborne Divisions. Participation in these exercises greatly improved the operational readiness of these units.

Exercise ROCKY SHOALS, a joint-service amphibious exercise, was conducted in the south-central portion of California, and despite insufficient shipping, 13,000 Army troops received excellent training

in many aspects of amphibious operations. This was the first large-scale joint amphibious exercise for troops in the United States since 1953, and, although the final reports were not fully evaluated by the end of fiscal year 1959, there were positive indications of the importance of such exercises to the operational readiness of the Army.

Exercise CARIBOU CREEK was conducted in Alaska by a battle group from the 82d Airborne Division stationed at Fort Bragg, N.C. The maneuver afforded the troops experience of air movement to Alaska and training in extreme cold weather operations.

Exercise BANYAN TREE, a joint Army-Air Force airborne training exercise, was conducted in the Rio Hato Military Reservation in Panama by a reinforced battle group from the 82d Airborne Division. Approximately 5,000 Army personnel participated, although only 1,100 were airlifted to parachute into the military area. This was the first time, either as a training exercise or as an actual operation, that an airborne battle group was flown directly from the United States to an oversea area to execute a parachute assault against an "aggressor" force upon arrival. This training afforded the opportunity to test STRAC reinforcement procedures and provided training in joint operations for U.S. Army personnel stationed in Panama.

Exercise DRY HILLS provided valuable field training for the 4th Infantry Division operating under the new pentomic structure. This maneuver started with a coordinated air and overland movement of the division from Fort Lewis to the Yakima Maneuver Area, Wash.

Exercise LOGEX 59 was a logistical command post exercise conducted at Fort Lee, Va., to afford students from technical and administrative service schools the opportunity to apply their recent instruction. A total of 6,800 military personnel participated in this exercise simulating continuous logistical support of war.

Training of the Reserve Components

During fiscal year 1959 training in the reserve components reached the highest level yet attained during peacetime. Most units of the reserve components dispensed with individual training at home stations and initiated unit training during the past year. This was made possible by the requirement for all non-prior-service personnel who enlisted in an Army Reserve or Army National Guard unit to take 6-month active duty for training. In addition, the reorganization of all but one of the combat divisions of the Army Reserve components, which took place between January 1, 1959, and the beginning of annual field training, enabled most elements to train under the pentomic tactical doctrine during summer camp.

Training of Foreign Nationals

During the past year 11,000 foreign national military personnel received training in tactics, weapons, logistics, and military technology in Army service schools. Included in this number were approximately 535 orientation visits made by senior officers and staff officers to Army service and technical schools. During fiscal year 1959 the Army spent \$44 million in training foreign nationals so that foreign nations might develop self-sufficiency as contributors to the collective security of the free world. This training has been vital in the maintenance of approximately 200 divisions among armies of allies of the United States.

Training of soldiers of allied nations in the operation and maintenance of the NIKE-AJAX, NIKE-HERCULES, the HAWK, and the CORPORAL missiles continued at the Army's guided-missile school during the past year as countries participating in the Military Assistance Program requested these missiles.

During fiscal year 1959 the first foreign units to complete NIKE-HERCULES training were three Italian battalions. At the end of the year personnel from nine other nations were being trained in U.S. Army service schools to man the NIKE-HERCULES.

In addition to formal school training conducted for foreign nationals within the United States, 5,000 Army personnel in Military Assistance Advisory Groups and Missions aided in the training of troops in the armies of 42 foreign nations to teach them the proper use and maintenance of arms and equipment received from the United States.

Military Assistance Program

The Army's participation in the Military Assistance Program represents a tremendous investment in maintaining free world security in a total of 65 independent nations by aiding them to maintain ground troops. Under grant-aid, a part of the Military Assistance Program, the Army supplied many of these nations with materiel and services worth \$12.5 billion over the past 9 years. Arms, equipment, and services valued at \$807 million were supplied during fiscal year 1959. Under the Mutual Security Military Sales Program, another part of the Military Assistance Program, arms and equipment valued at \$561 million have been sold to the free nations of the world in the past 9 years. During fiscal year 1959, \$115 million worth of materiel was sold.

Nations of the North Atlantic Treaty Organization (NATO) started receiving atomic delivery weapons systems during fiscal year

1959. Stocks of nuclear warheads were deployed in conformity with NATO defense plans in agreement with the nations directly involved. In accordance with the law of the United States, all nuclear warheads were retained in the custody of U.S. forces.

In the underdeveloped countries of Asia and the Middle East, military assistance funds have been used to provide construction of barracks, depots, maintenance facilities, and ammunition storage facilities. The total value of the Army's participation in this construction is \$219.7 million, of which \$118.9 was completed by the end of the year.

Army Mapping

Combat troops who must be trained to move constantly over unfamiliar ground as fast as modern combat vehicles can carry them and missilemen who are expected to hit ground targets hundreds and even thousands of miles away need extremely accurate maps and geodetic information of all kinds. Because of this the Army Map Service, one of the largest military mapping organizations in the world, has continued its accelerated program of mapping the earth's surface, has devised newer and better methods for precisely establishing locations on the earth's surface, and has begun evaluation of data recorded from artificial satellites to obtain geodetic information. (See fig. 5.)

In keeping with the requirements of the modern Army, the Army last year produced new and revised military maps covering more than 360,000 square miles of the earth's surface at large scale and approximately 535,000 square miles at medium scale. In order to provide the necessary source materials, usable aerial mapping photography of approximately 150,000 square miles of the earth's surface was provided by the Air Force and commercial contractors.

Emergency requirements for maps of the Middle East accelerated Army map production and more copies of maps were printed in the first quarter of the year than had been scheduled for the whole fiscal year. During the past year a total of 40 million copies of maps of different scales for many areas were printed. As in previous years, private contractors assisted the Army in this accomplishment.

Due to the magnitude of the requirements of world mapping, significant progress can be made only by integrating the efforts of technicians skilled in this field throughout the world. As a result of U.S. efforts through NATO, SEATO, and the Central Treaty Organization (formerly the Baghdad Pact), as well as through independent arrangements with nations not participating in these organizations, valuable contributions are being made to the world treasury of mapping. Currently, the United States has mapping arrangements



Figure 5. Mapping survey party in Alaska.

with 53 countries. During the past year, new exchange arrangements were made between the Army Map Service and Service Geographique de l'Armee, France, and with the Mitchell Library, Sydney, Australia. Many of the arrangements include the exchange of mapping materials and information, while others include permission for such on-site work as aerial photography, recovery and establishment of geodetic control, or utilization of mapping facilities for joint production of new mapping. The Army Map Service participated in geodetic surveys in seven countries.

During the year emphasis was placed on the use of astronomy for making geodetic measurements. In a procedure known as occultation, observation of the positions of the stars and the moon permits the precise determination of locations. Sixty-one occultation predictions were made during the year for determining more accurately interisland connections in the Pacific Ocean.

The Inter-American Geodetic Survey, a U.S. agency manned by Army personnel, carried on computation and adjustment of geodetic

surveys in collaboration with several South American nations. Under the arrangements made through the Inter-American Geodetic Survey, the United States assisted countries of South America in their mapping activities and, in return, received maps and map source materials. The Inter-American Geodetic Survey has been active for many years now in obtaining constant mapping scales for the Americas and in tying together geodetic control for North and South America.

For the purpose of obtaining geodetic and topographic data, the Army participated in the tracking of satellites and has obtained a wealth of data which are still being evaluated. As its portion of the Vanguard program, the Army exercised administrative, logistical, and partial operational control over electronic Vanguard tracking stations, and under its own program, Project BETTY, manned a number of other satellite observation stations. The data obtained from these projects will aid in the development of a more uniform system of geodetically relating the earth's features, and the information also will make possible better estimates of the effects of gravity on ballistic missile trajectories. During the year Army responsibilities in connection with Vanguard were transferred to the National Aeronautics and Space Agency, but Army Map Service continued to receive data on the orbits of satellites for evaluation.

Army scientists and engineers were called upon during the year to make an analysis of existing source materials to determine the feasibility of preparing topographic maps of the moon. The result of this analysis was an operational assignment for the Army to prepare small-scale lunar maps. Obviously, this assignment must be accomplished without the use of the familiar surveyor, transit, and rod man. Instead, information will be obtained from astronomical photographs.

III. Logistics

The principal developments in the field of logistics during fiscal year 1959 were—

- unremitting action in procuring equipment to modernize the Army insofar as stringent funding permitted; Spartan planning for procurement in fiscal year 1960 in view of further postponement of the Army's 5-year materiel program because of budgetary restrictions;

- tentative establishment of tables of organization and equipment for the pentomic division providing a foundation on which to base specific logistical planning;

- successful conclusion of Project ELIMEX eliminating excess and wornout stocks originally valued at \$6 billion; implementation of continuing elimination standards;

- establishment of an improved supply system for fast-moving supply items and repair parts as a result of the experimental Project MASS;

- construction of facilities valued at \$421 million and start of facilities worth \$245 million in addition to the acquisition of 8,986 family housing units; and

- outstanding advances in space medical research as a result of the successful space flight of the Army's monkey, Able, and the Navy's monkey, Baker, in the nose cone of the Army's JUPITER-C missile.

Logistical Management

Support of the soldier on the battlefield has not been simplified but rather complicated by advances in technology. Advances in weapons have brought about changes in tactics. These, in turn, have brought on a need for new equipment to make the new tactical concepts workable. Concurrent with these changes, the whole structure of the method of logistical support has had to undergo constant reorganization.

This process of change was not a sharp and definitive occurrence which provided a modicum of stability for logistical planning as was the case in past history when a scientific advance was adapted to warfare. Today, major scientific breakthroughs follow one upon another, demanding continuous readjustment in the types of arms

the Army must have, the equipment to support these arms, and the tactics for employing them. Added to this, methods of production and storage and issuance procedures constantly must be reshaped and realigned.

In fiscal year 1958 the tables of organization and equipment for the new pentomic divisions has been adopted only tentatively with the understanding that experience would bring about considerable change. In the past year, the composition and equipment of pentomic Army troops has been decided upon more definitely and the objectives of supply have become more concrete. Nevertheless, in view of what is now in the process of research and development, it is only reasonable to suppose that the organizational structure of tactical troops and their methods of fighting will continue to change. Such change will be followed undoubtedly by a need for continued shifts in logistical planning.

Materiel Planning for War

The current concept of how wars of the future will be fought places major reliance on materiel on hand in Army stock and immediately available from commercial sources, rather than on post-D-day production, because reaction speed is the key to victory in today's world of large, ready military forces.

During the past year the Army continued to maintain and improve its combat reserve stocks in oversea theaters to compensate for possible disruption of the supply pipeline. In addition, prestocked reserves continued to be dispersed and protected by confining them to an austere list of selected combat-essential items and by restricting stockage of other items to satisfy only current operating requirements.

Although stocks on hand are the primary requirements of the modern Army, there is still some need for the capability to rapidly increase production of arms and equipment in order to replace stocks and to build up reserves in the event of hostilities. This necessity has emphasized the importance of a suitable modern production base. During the past year Army-owned production plants were reviewed to determine those not needed due to excess capacity or to obsolescence of product. In the past 3 years, 24 Army plants were declared excess. Four of these were declared excess in fiscal year 1959.

In keeping with congressional mandates, the Army continues to emphasize the inclusion of small business firms in day-to-day procurement activities. During fiscal year 1959, the Army awarded to small business concerns, on a prime contract basis, \$1,767 billion, which represented 33 percent of all contracts placed by the Army with both large and small business concerns.

The Army has supported the national economy also by encouraging the placement of contracts with firms located in labor surplus areas by setting aside portions of certain procurement for exclusive negotiation with such firms. Priority under this procedure is given to small business firms in labor surplus areas first, then to other firms in such areas, and thirdly, to small business firms located elsewhere. At the same time, however, the Army continues to comply with the statutory prohibition against payment of a price differential to relieve economic dislocation.

Procurement Deliveries

The value of deliveries of major equipment, including materiel procured for other agencies, totaled \$1,639 billion during fiscal year 1959. This represents an increase of \$228 million over fiscal year 1958 deliveries.

The type of deliveries during the year continued to follow the pattern that has evolved over recent years, that is, a shift to deliveries of guided missiles and supporting equipment and communications equipment at the expense of other items, especially ammunition. Deliveries of guided missiles during the year amounted to \$587 million, more than a third of total deliveries. These are expected to rise to \$737 million in the next fiscal year. Electronics and communications equipment, which had a delivery value of \$168 million in fiscal year 1958, increased to \$278 million in fiscal year 1959 and is expected to be \$265 million next year.

Concurrently, ammunition deliveries continued to decline from approximately \$300 million in fiscal year 1958 to \$182 million in fiscal year 1959. Aircraft deliveries, averaging approximately \$100 million annually over the past few years, decreased to \$74 million. This decrease is explained by reduced purchase of old models pending quantity production of new types. Some increase is anticipated in both ammunition and aircraft deliveries during the next year, but delivery of combat vehicles will decrease from \$183 million to \$100 million. (See fig. 6.)

Improvement of Combat Materiel Readiness

In order to improve its combat materiel readiness the Army has drawn up a 5-year materiel procurement program to fill these four specific requirements:

- a. To provide standard materiel to equip and support the Army as a strong deterrent force, and, if need be, a greatly expanded force in combat;

ARMY PROCUREMENT

MAJOR EQUIPMENT DELIVERIES

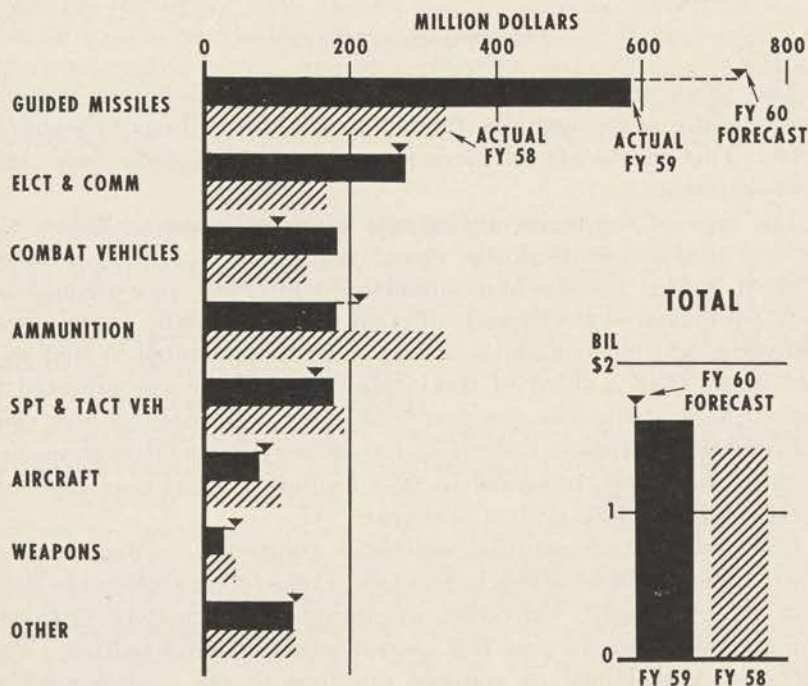


Figure 6

b. To provide newly developed equipment and weapons to improve the Army's combat capability;

c. To follow up with improved models of newly developed equipment to maintain a completely modern Army with the highest possible combat potentials; and

d. To replace items which have been consumed or worn out or lost from inventory for any reason.

These requirements represent the highest priority materiel objective for procurement in the Army's 5-Year Materiel Program. In this program procurement requirements are broken down into annual increments over the 5-year period and will require funding at a rate

of \$2.8 billion annually. Each year this plant is reviewed and changed so that it is compatible with the most recent developments. All planned procurement for any of the four purposes above is carefully screened to insure that items are not purchased which are approaching obsolescence. It is recognized that continuous progress is being made in the area of research and development and that advances in technology cannot be geared to the physical life expectancy of the equipment in the Army's inventory. Therefore, determination is made prior to procurement that money is spent for items which will not only have a long life expectancy, but will also remain modern for a relatively long period of time.

Storage and Distribution

The advent of long-range missiles and the possibility of nuclear or chemical or biological warfare, which might affect any part of our Nation, has necessitated a revision of the Army's depot and distribution system in the theaters of operations. The massive depots of World Wars I and II which specialized in one type of equipment are no longer possible. Likewise, the long supply lines which stretched hundreds or thousands of miles to the rear cannot be depended upon to supply troops in modern atomic war.

In order to attain the degree of flexibility and mobility which is essential for either limited or general war, the Army concentrated during fiscal year 1959 in further streamlining the supply system to include the elimination of items not essential to either current operations or minimum mobilization and combat reserves.

The principal methods which have been used to reduce inventory are—

- a. Standardization of equipment with emphasis on interchangeability of parts;
- b. Single management of items common to the Department of Defense and single management within the Army for items with similar functions;
- c. Emphasis on more active exchange of common items of supply among the military services;
- d. Reduction of nonessential items in the supply system; and
- e. Physical elimination of nonessential items from stock.

Project ELIMEX, a 2-year effort to reduce Army inventories, ended in fiscal year 1959. It was highly successful in eliminating excess stocks of Army supplies originally valued at approximately \$6 billion. This was 20 percent more than the original target set for the project. Most of these stocks were either sold, transferred to another Government agency, donated to civic organizations, or otherwise disposed

of, although significant quantities were set aside for the Military Assistance Program.

In addition to physical disposal of materiel, Project ELIMEX was aimed at permanently reducing the number of line items stocked in the Army's supply system. This was difficult because of the continuous addition of new items particularly in the fields of missiles and communications equipment. However, despite 179,000 new items placed in stock, 259,000 items were deleted, bringing total line items in the Army's supply system down from 737,000 to 657,000 at the end of fiscal year 1959.

As work continues to reduce items of supply to those which contribute directly to success in battle, depots stocking a variety of items are being dispersed. Efficiency in stockage is being carried down to lowest troop levels so that equipment not in daily use is pooled at higher echelons in the rear and stocks of supplies not frequently drawn upon are held in rear areas.

Project MASS Results

During the past year an improved supply system for minor secondary items and repair parts grew out of Project MASS, an experimental system for supply of these items to troops in Europe.

In the course of the experiments, many procedures were tried and rejected. Many more proved to be sound and were retained. Still others were modified and then accepted. For example, original tests provided that a requisition to the supplier would be acted upon without any review as to validity of the requirement in order to reduce administrative delays. This was found to be wasteful, and after careful analysis, necessary editing and more stringent controls were introduced.

Again, original procedures provided air shipment for slow-moving items from the United States to Europe. In view of higher priority cargo for air movement, shipment by air was later restricted to repair parts required for inoperative equipment. Locally controlled cannibalization was established as the primary source of supply for slow-moving parts. Originally the test provided for support directly from the United States, bypassing the communication zone of the theater. The test proved the physical capability of providing direct support, but this procedure has been discarded as unworkable if applied to a fast-moving war over a large landmass. One of the most successful features of the test was the utilization of electrical means for the transmission of requisitions.

The fundamental characteristics of the improved supply system which will permit reduction of stocks at all echelons, particularly in forward areas, are—

a. Stockage in the field for organizational and field maintenance is based upon frequency of demand and combat essentiality;

b. The basis for converting frequency of demand for an item considers both the density of demand for an end item and seasonal fluctuations in demand;

c. Controlled cannibalization is established as the primary source of supply for low-mortality parts. Items required by using units which are not stocked in the theater will be obtained by stripping such items from uneconomically repairable or disposable end items. Only when these nonstocked items cannot be obtained from cannibalization or local procurement will they be requisitioned from the United States;

d. Procedures are in effect to reduce the frequency and cost of requisitioning;

e. Over-the-counter exchange of an unserviceable item for a serviceable replacement is authorized without formal requisition; and

f. Direct delivery of slow-moving items from the United States to forward areas is made when such items cannot be otherwise obtained.

Field Stock Control System

The Army field stock control system was established in 1957 and was designed to reduce the number of stocked minor secondary items and repair parts by computation of demand for each item. While complete evaluation of worldwide-demand data has not yet been made, line items at installation level in the United States have been reduced over 50 percent during the past 2 years.

A further extension of the stock control system is the economical inventory policy, which introduces a cost frequency of demand criterion as a basis of stockage. Currently under test, this system seems to indicate that it can effect further substantial economies in supply operations.

Maintenance of Facilities

Several depot and Army-owned industrial facilities were disposed of during the year, and Army-held facilities in Japan continued to be phased out while minor reductions in facilities were made in Germany. These reductions were more than offset by completed new construction, acquisition of family quarters, and additional fixed facilities in France and Korea.

In terms of building space to be maintained in the United States and overseas, the Army had 965 million square feet of building space at the end of fiscal year 1959, 3 million square feet more than in 1958.

In fiscal year 1958, \$551 million provided for maintenance of facilities was insufficient and left a considerable backlog of deferred maintenance.

nance at the end of that year. In fiscal year 1959, with a greatly increased maintenance responsibility, only \$533 million was allocated for maintenance. The backlog of maintenance of the Army plant now totals \$114 million.

Maintenance of Equipment

During the past several years the Army has been acquiring more and more guided missiles and aircraft. The complexity of this new equipment requires an increasingly greater number of repair parts to insure operational readiness, as indicated by the fact that depot maintenance support of guided missiles and aircraft has risen from \$61 million in fiscal year 1957 to \$141 million in fiscal year 1959. It is estimated that by the end of fiscal year 1960, materiel maintenance funds will be short \$166 million. This shortage of funds will affect for the most part the Army's older types of equipment. Maintenance support of equipment other than missiles and aircraft has declined from a cost of \$244 million in fiscal year 1957 to \$127 million in fiscal year 1959. As a result of this fund shortage the Army must give highest maintenance priority to guided missiles and aircraft in support of the pentomic Army.

Many successful efforts are being made despite fund limitations to overcome the maintenance squeeze on conventional equipment. The "inspect and repair only as necessary" technique has provided some relief. Used since 1958 for vehicles, the program has been expanded during the past year to include all types of equipment and all echelons of maintenance. This technique requires continued use of functional parts of equipment, regardless of evidence of wear, to the maximum limits of their designed life. Similarly, equipment components and assemblies that perform effectively and satisfactorily are retained in service. This system has permitted considerable reduction in deferred overhaul of conventional equipment.

One of the means which gives promise of improving maintenance on a broad scale throughout the Army is the intensive program of product improvement. Although in operation for only a little more than 2 years, this program indicates that by simplifying the construction of equipment and by reducing the degree of individual skill required to operate and maintain it, the whole field of logistical support can be reduced. Logistically minded engineers throughout the Army are now thinking in terms of the following objectives:

- a. Improve reliability to reduce the need for maintenance;
- b. Reduce frequency in cyclic and corrective maintenance; and
- c. Reduce time for fault isolation and repair.

Military Construction

Construction of Army facilities worth \$245 million was started in fiscal year 1959.

Approximately 30 percent of Army construction was for air defense, including the start of projects in support of the development of NIKE-ZEUS, the antimissile missile. The defense of major metropolitan areas and strategic installations was updated by conversion of several NIKE-AJAX sites for NIKE-HERCULES and by original construction of one NIKE-HERCULES facility. Army plans for NIKE construction were restricted during the year, pending revaluation of air defense plans by the Secretary of Defense. (See ch. II, p. 122.) Part of the program was also devoted to MISSILE MASTER construction which provides an integrated control for air defense weapons.

The construction program also included \$18 million for training facilities at various locations to support missile programs. In addition, construction financed by almost \$14 million in other appropriations was started to support these missile activities.

While missile construction accounted for a major part of the program, other urgent operational, training, research and development, and housing requirements were met. In the Army Communications Zone in France, a \$24 million addition was made to existing facilities, most significant of which was the start of two storage depots. Oversea construction also included many large facilities in support of the Army Security Agency and worldwide Signal Corps communication operations. Included in the facilities for training were the new \$3 million Quartermaster academic building at Fort Lee and an academic building for the Industrial College of the Armed Forces costing \$3.75 million. For expansion of medical facilities, a 100-bed hospital at Fort Lee, Va., and an addition to the Army Medical Graduate School, Walter Reed Army Hospital, Washington, D.C., were started.

During the past year 8,561 Army family housing units were either acquired by lease, placed under construction, or in the process of final contract award for construction. This was accomplished under the Capehart program and the leasing program for tactical installations.

Family housing assets on June 30, 1959, totaled 115,000 units, an increase of 38,900 over the past 4 years.

In oversea areas, under the surplus commodity housing program, contract awards were made for 57 units, bringing total family housing overseas to 50,300 units.

Public Law 85-241, approved August 30, 1957, authorized the Secretary of the Army to determine inadequacy of public quarters and to permit occupancy by military personnel and their dependents on a rental basis without forfeiture of basic allowances for quarters. The law, as amended, further provided that quarters which were determined inadequate must be rehabilitated, converted, or disposed of. Over 7,000 units have been designated inadequate, of which 150 have been funded for rehabilitation.

The Army had acquired 14,963 of the 22,248 Wherry housing units by the end of fiscal year 1959. Adequate funds for repairs and improvements have been made available and work is underway.

Almost half of the Army's construction effort during the past year was the construction of facilities for the Air Force. During fiscal year 1959, the Army Corps of Engineers placed approximately \$750 million of Air Force construction and started work on Air Force facilities estimated to cost \$825 million. Approximately one-third of the new work was the construction of launching, detection, and other support facilities for Air Force missiles. The remainder of the construction was mainly for expansion and the improvement of airbases, including such work as increasing the length of runways, strengthening runways to accommodate heavier aircraft, providing additional parking aprons, and construction of ready-crew buildings, alert hangars, operations buildings, shops, warehouses, and quarters for personnel. (See fig. 7.)

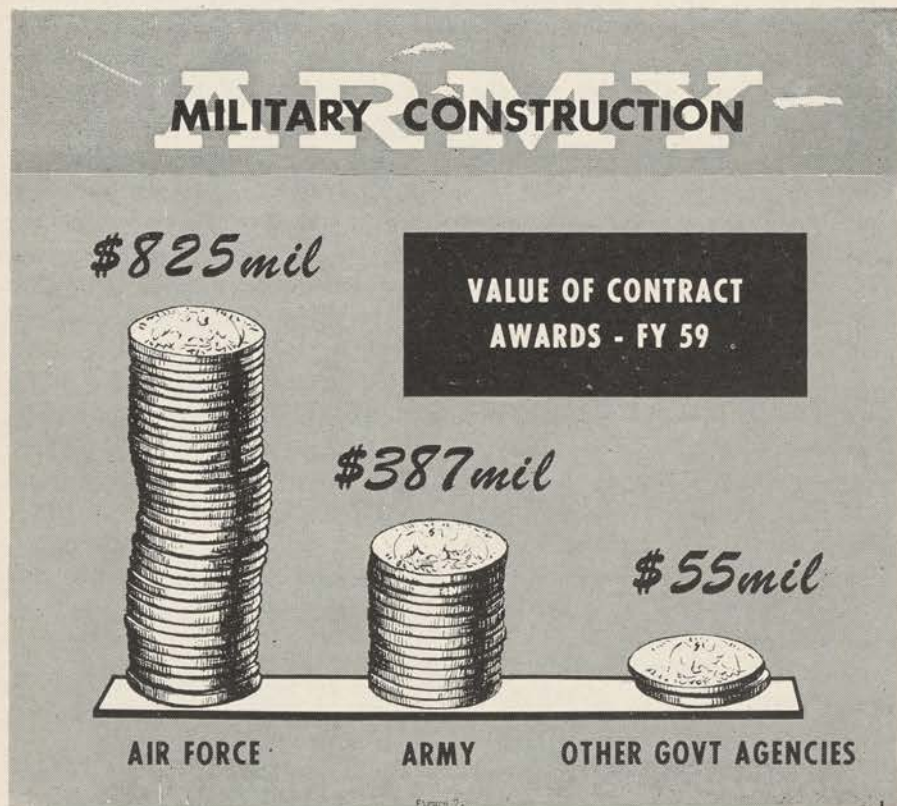


Figure 7

Army Medicine

The ever-present possibility of the use of atomic weapons in battle and the consequent widespread dispersal on a battlefield pose serious problems for the Army Medical Service in conserving and salvaging the Army's fighting strength. In the Korean war a remarkable record was established by the return to duty of almost 90 percent of combat casualties who reached medical facilities. This was accomplished by moving hospitals with complete surgical facilities closer to the fighting troops, by using helicopters and other expeditious means of evacuating troops, by immediate injection of plasma and whole blood, and by similar advanced procedures.

On the atomic battlefield, the Army cannot hope to match its performance in the Korean war because of the probable great imbalance between corpsmen and wounded. Nevertheless, the Army Medical Service does not expect to be overwhelmed. To meet the situation it has training programs underway to teach every soldier what he must know to save his own life or that of his fellow soldier, and to teach its less skilled corpsmen how to take over tasks performed by the more skilled.

Disease Noneffective Rate

Disease noneffective rate throughout the Army declined from a daily average of 11.1 per 1,000 in fiscal year 1958 to 9.9 in fiscal year 1959. This was due in part, at least, to the improvement of standards of patient care, to the careful monitoring of personnel assignments within the Medical Service, and to better utilization of equipment and facilities.

Preventive Medicine

Major problems in military preventive medicine during the year arose from the continuing difficulties in recruiting and training of preventive medicine officers; from the increasing hazards involved in the rapidly expanding military use of radioactive materials, micro-waves, other radiation devices, and missiles; and from the difficulty of providing effective training of individuals and small groups in field sanitation and hygiene. The latter problem was emphasized by the excessive hospital admission rates for diarrheal disease in U.S. forces in the Lebanon operation. A concerted effort during the year indicated progress in solution of all these problems.

Vaccination against poliomyelitis of all Army personnel under the age of 40 years was made mandatory during the year and the decision was reached to vaccinate all recruits henceforth against adenovirus disease beginning in the fall of 1959.

In filling a pressing need of some duration, Army technical manuals in the fields of Army health nursing (public health nursing for dependents) and civil affairs public health were completed.

Professional Medical Training Programs

In keeping with the developments in the field of endocrinology, the Army Medical Service has established a 1-year training program in endocrinology and metabolism during fiscal year 1959.

The programs of internship training for psychologists conducted at Letterman and Walter Reed Army Hospitals were reviewed by the Accreditation Committee of the American Psychological Association during the year and were found to comply with approved professional standards.

College postgraduate training was continued for regular officers to maintain specialists in science fields allied to medicine. The acquisition of allied specialists continued to be difficult because, as experience shows, rarely does a Reserve officer with a Ph. D. degree elect to apply for the Regular Army or for an indefinite reserve category at the conclusion of his obligatory service.

Twenty-five residency programs in the field of medicine and surgery were conducted throughout the teaching facilities in the Army medical hospital system.

Progress was made during the past year in the procurement of equipment and the training of personnel in the continuing effort to establish radioisotope clinics in all teaching hospitals.

Neuropsychiatry

Army neuropsychiatry expanded its efforts to prevent noneffective duty performance due to psychological causes during the year. Mental hygiene consultation services and other Army outpatient psychiatric activities enlarged their spheres of operations to include behavioral and disciplinary problems as well as the more traditional symptom disorders. Stockade screening, in support of the Army correctional program, now evaluates the duty potential of all stockade inmates, makes appropriate recommendations for the administrative discharge of repeating offenders, and provides psychiatric treatment to restorable prisoners. This program significantly contributed to a reduction of prisoners confined in the Army during the past year.

For offenders who are convicted by courts-martial but do not receive confinement sentences, a psychiatry screening program providing a routine psychiatric evaluation was established during the past year.

For almost 2 years a special psychiatric study conducted jointly by Walter Reed Army Institute of Research and Walter Reed Army Hospital has explored the possibilities for a more effective treatment of

schizophrenia in young military personnel. A unique technique, "milieu therapy," has been evolved which provides continuous treatment by a psychiatric team with considerable emphasis upon the utilization of enlisted neuropsychiatric specialists. Preliminary results of a 1-year followup study has indicated that 50 percent of the patients treated by this method can be restored to useful military service as compared to 5 to 10 percent treated by other methods.

As a result of the Army preventive psychiatry program and programs to raise personnel standards in the Army, hospital admissions for psychiatric disorders have dropped to a new low of 8 per 1,000 men during fiscal year 1959. The average admission rate for the past 5 years was 10 per 1,000.

Medicare

In view of the expressed desire of Congress that military dependents make optimum use of service medical facilities, which was reflected in a reduced appropriation for fiscal year 1959, the civilian medical care authorized under the Medicare Program was restricted on October 1, 1958. The principal restrictive changes were—

- a. Establishment of a Medicare permit system which limits free choice of medical service by requiring those dependents who reside with their sponsors to obtain care from service medical facilities, if available and reasonably accessible; and
- b. A limitation restricting to service facilities certain types of surgery which can be planned, outpatient care of injuries, acute mental and nervous disorders, and certain other medical categories.

Generally, these requirements have been effective in promoting greater use of military facilities; however, the curtailment of benefits has resulted in some serious problems which the Dependents' Medical Care Act was established to solve.

The favorable morale advantages evidenced by the establishment of Medicare have been decreased, particularly in those instances where there is no easy access to military medical facilities. There are indications that many dependents either are bearing the expense of the medical services not now authorized from civilian sources or are foregoing treatment.

Reinstatement of the original Medicare program would resolve certain recognized inequities and hardship situations and provide a more uniform program of medical care for dependents.

During the first quarter of fiscal year 1959, dependent admissions to civilian hospitals totaled 93,400 for all services. During the second quarter, 65,100 admissions to civilian facilities reflected a 30.3-percent decrease attributable to the October changes in Medicare. In similar comparative data on admissions to military hospitals, an increase of

6.6 percent is noted. Available data, though presently incomplete, indicate that a similar trend will continue.

Medical Research and Development

The Army Medical Service Research and Development Command has continued medical research in many broad fields during the year to provide new or improved means for the prevention or treatment of disease and injury. Some of the most important projects were—

a. The use of a new type of artificial kidney along with new techniques for treating acute renal failure have reduced the mortality rate in patients treated. A mortality rate of more than 50 percent was expected from this condition under former procedures.

b. The development of a device, an "electrogoniometer," was supported by a research and development contract. With this device it is possible to record, measure, and calibrate tracings of the motions of certain joints of moving feet and to distinguish normal and abnormal patterns. This development may be valuable for faster determination of proper footwear fitting. It may also prove to be beneficial in prosthetic work.

c. Through extramural investigations an antibiotic called Grisefulvin has been found to be extremely effective against a number of fungus infections and is regarded as a major step forward in the conquest of skin infections by fungi.

d. Current studies of the energy value of the food required to maintain body weight in men indicate that they require considerably more food in hot climates than in colder areas. Determination of causes and establishment of accurate ratios of area temperature to food requirement will affect logistical planning in the future.

e. Studies are being conducted to develop an instrument and techniques which will measure accurately the total amount of water in the body at any one time. Since it is now known that man absorbs moisture from the air through the skin, these studies may have far-reaching logistical implications relative to the amount of water needed by soldiers in various climates of the world.

f. New fluorescent antibody techniques for rapid identification of micro-organisms are outstanding. These techniques are being used also in studies of the origin and development of damage produced by disease-causing organisms.

g. Preliminary studies supported by the Army Medical Service have indicated a possible breakthrough in the prophylactic use of gamma globulin for the prevention of hepatitis following blood transfusions. These studies are being accelerated in an

attempt to obtain statistically valid data. Success in this area might have great significance in the saving of military manpower in the event of large-scale casualties.

Space Medicine

The newly established Biophysics and Astronautics Branch of the Army Medical Research and Development Command participated in two successful launchings of primates into space and their reentry into the atmosphere aboard JUPITER ballistic missiles launched from Cape Canaveral. The first flight of one monkey, though not completely successful because of the failure of the recovery mechanism in the nose cone, furnished considerable telemetered data, since the animal was alive on reentry into the atmosphere.

The second flight was made by two monkeys, one Able, sponsored by the Army, and the other, Baker, sponsored by the Navy. This flight was completely successful and the monkeys were recovered with no apparent damage to their systems. Able, the Army monkey, died shortly thereafter of heart arrest while under anesthesia. There was no evidence of injury due to the flight through space. (See fig. 8.)



Figure 8. Monkey Able being released from space flight capsule.

Data from these two historic experiments are still being analyzed; however, the following important facts have been established:

a. It is possible to construct a capsule to support and protect life—to protect two animals of different weights from the stresses of flight and recovery. This is believed to be the most important result of the test.

b. An acceleration of 10 g's, deceleration of 38 g's, the separation of various portions of the missile by explosive action, and a high rate of spin were determined as they affected the monkeys' heart rate and respiration.

c. It was demonstrated on monkey Able that there was no increase in radioactive substances in her body; hence, no appreciable exposure to cosmic radiation.

d. Autopsy on monkey Able indicated complete absence of any gross injury, internal or external, resulting from the flight. Microscopic studies were not completed at the end of the year.

Advanced thinking and experimentation in astronautics in no way detracts from the Army's medical mission of supporting the combat soldier on the battlefield. To emphasize the need for advanced medical procedures for the changing concepts of ground combat, the Office of Special Assistant to the Surgeon General for Combat Development was established during the past year. This office will accelerate the application of new concepts of combat medical support to troop organization.

IV. Manpower and Personnel Management

The principal developments in manpower which were felt throughout the Army during the past year were—

- the strength reduction of 37,000 men of the Active Army;
- the maintenance of 700,000 Ready Reservists in drill units;
- a continuous scrutiny of the use of military and civilian personnel with some resulting realignment of manpower;
- greatly increased enlistment rates over the past year;
- more efficient methods of assignment and provisions for movement for all personnel;
- a thoroughgoing enlisted management system affecting basic assignment, promotion, pay, and prestige of enlisted personnel;
- a continued weeding out of ineffectives and legislative authority to deny induction to individuals failing to meet performance standards; and
- a general rise in morale together with downward trends of disciplinary actions.

Military Personnel

Men, materiel, and doctrine are the three essentials of military force. Each affects the other, and the requirements for each are ever changing. Even in this age of ever-increasing materiel complexity, of accelerated materiel obsolescence, and of rapidly changing military concepts, the soldier, with his precious skills, requires the greatest "production" leadtime and is, in the final analysis, the most important factor in defense.

In the United States, which has no intention of aggression, the only reasons for maintaining military forces is to protect itself and to display in a credible manner that it is ready to enforce its international rights and obligations. As long as the Communist sphere maintains large and well-equipped armies that display and practice aggressive designs, this Nation must have soldiers. These soldiers must be in sufficient number and so qualitatively equipped as to make clear this country's intention to respond to its international responsibilities regardless of the degree of challenge.

With a declining troop strength over the past year, the Army was hard pressed in maintaining adequate strength levels in its units at home and abroad. The numbers of troops required for special activities remained constant and contributed to the overall objectives of the

Army, although not directly strengthening its combat potential. An example of these are the 5,000 troops detailed to training soldiers in some 200 combat divisions in allied nations throughout the world.

The Army recognizes that numbers alone do not constitute strength, and is proud of its accomplishments in continuing to meet ever-expanding requirements in the face of reductions in numbers. The relatively effective manpower position of the Army over the past year has been possible only because of the success of programs to improve the quality and increase the efficiency of the use of human beings. Increased efficiency in management has been brought about by use of the twin tools of manpower management—the effective distribution and utilization of available manpower and personnel management—the proper classification and handling of the Army's men and women. Even so, austere manning levels of the Army imposed by the fiscal year 1960 strength ceiling of 870,000 are causes for serious concern within the Army, particularly in the face of recurring crises such as those in Lebanon, the Formosa Strait, and in West Berlin during the past fiscal year.

Strength

The total Army strength was scheduled to reduce from 898,192 on June 30, 1958, to 870,000 on June 30, 1959. The intermediate objective was 878,200 by midyear. The turn of world events, however, precluded adherence to this schedule due to the tense international situations which developed in Lebanon and Taiwan during the first half of the fiscal year. As a result, the Secretary of Defense directed the Army to maintain its strength temporarily at 900,000, and it was in November 1958 that the reduction to 870,000 was established. Actual Army strength on June 30, 1959, was 861,964. Because of the Army's relatively weak position in Europe, in view of the rising crisis in Berlin, the end-of-year reduction was carried out by reducing forces elsewhere. The reduction demanded a slowdown on some Army activities, but it did not require a shutdown of any mission essential to the defense of the Nation.

Enlistments and Reenlistments

A total of 112,680 voluntary enlistments into the Regular Army during fiscal year 1959 represents a 44-percent increase over non-prior-service gains during the previous fiscal year. This increase is attributed to the combined impact of fluctuations in the national economy, improvements in the Army Recruiting Service, increased service attractiveness, and changes in mental criteria.

Overall Regular Army reenlistment rates during fiscal year 1959 showed an improvement of 4 percentage points over fiscal year 1958 (52.4 percent vs. 48.1 percent). Both first-term (21.5 percent vs.

17.2 percent) and career (83.9 percent vs. 80.4 percent) Regular rates reflected a similar increase. Draftee enlistment rates in fiscal year 1959 approximated those for fiscal year 1958 (5.1 percent vs. 4.7 percent).

Almost 73 percent of the Army's enlisted strength was Regular Army at the end of fiscal year 1959, as compared with only 65 percent Regular Army at the end of fiscal year 1958. Although total enlisted strength of the Army has decreased steadily since 1955, from 985,700 to 758,500, the proportion of Regular Army soldiers compared to total strength has increased from 58 percent to 73 percent. This has given the Army greater stability and a greater depth in professionalism. (See fig. 9.)

ARMY ACTIVE ENLISTED STRENGTH

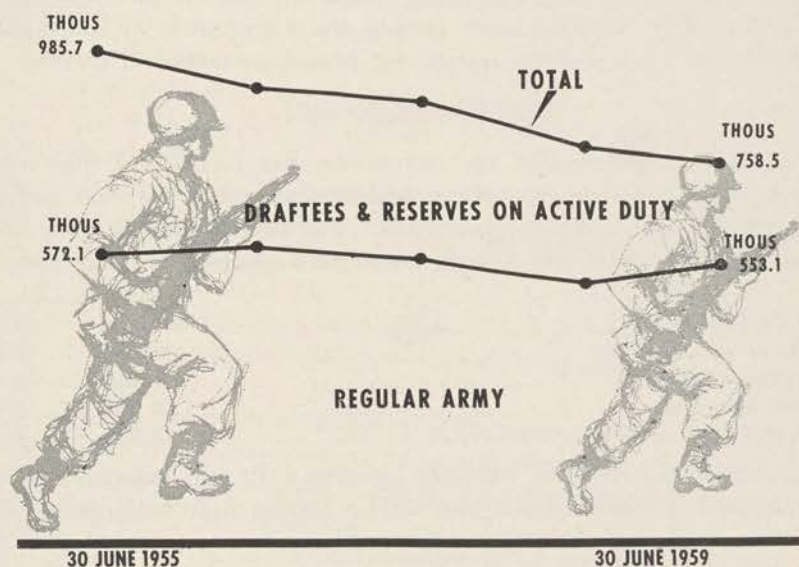


Figure 9

Preinduction Aptitude Screening

Public Law 85-564, enacted in July 1958, permits the President, except during times of national emergency declared by the Congress, to modify the standards for induction otherwise established in the Universal Military Training and Service Act. As a result of this legislation, Selective Service registrants who score from the 10th

through the 30th percentiles on the Armed Forces Qualification Test (Mental Group IV) are now further tested with the Army Classification Battery of tests. Only those who score 90 or better in two or more aptitude areas are accepted for induction.

Army procedures established on the basis of this law went into effect on August 4, 1958. From that date through June 30, 1959, 84,005 Mental Group IV Selective Service registrants have been tested at the armed forces examining stations with the Army Classification Battery of tests, and 53,272 qualified for induction, with 27,742 of these being inducted into the Army.

Army Career Option Group

The Army Career Option Group, which permits individuals coming into the Army to choose a skill or specialty, was placed in effect on January 1, 1959, as a replacement for branch enlistment options. The program has been received enthusiastically, since it guarantees the enlistee a choice of job training in the area of his choice and offers greater potential job satisfaction. From the point of view of the Army's problem of assignment, the Career Option Group introduces more flexibility, making more certain the assignment of the right person to each job without regard for branch or technical service.

Manpower Distribution

The operating forces of the Army—combat forces and their integral supporting elements—comprised 63.2 percent of the total Army strength at the end of fiscal year 1959. The following data show the broad areas in which the Army's year-end strength was being used:

	<i>Strength</i>	<i>Percentage</i>
Operating forces	544, 815	63. 2
Training forces	147, 106	17. 0
Supporting forces	91, 094	10. 6
Special activities	59, 910	7. 0
Transients and patients	19, 039	2. 2

The "Special Activities" category includes units and elements whose missions are of international, joint service, liaison diplomatic, political, research, or other special purpose nature.

Utilization of Manpower

A reduction of 30,000 military personnel and 10,600 civilian employees which the Secretary of Defense directed for the Army during the last year demanded continued maximum effective utilization of the manpower available to accomplish the Army's mission. The Army did not drop any of its principal programs and activities because of the manpower cuts, but its ability to support them was curtailed, most

notable of which was the reduction of the Strategic Army Corps from four divisions to three. Actual reduction of Army personnel for fiscal year 1959 totaled 37,000 military personnel and 10,100 civilian employees.

The basic policies concerning utilization of manpower were reviewed and revised as necessary and were considered sound. At all levels of the Army, increased emphasis was placed on locating and correcting instances of violation of these policies.

The manpower utilization survey is an effective procedure by which basic requirements for manpower and its actual utilization at a specific installation on a specific date are determined. During the past year 456 surveys involving 334,403 positions were conducted, resulting in the redistribution of 12,348 spaces to areas of more effective utilization. Efficiency of the survey system was markedly increased during the past year by the detailed review by the Department of Army staff of substantial numbers of completed surveys.

Directly related to the manpower program is the staffing guide program. Staffing guides provide information of recommended organizational structure and guidance about the kind and numbers of personnel, both military and civilian, needed to staff standard support activities. At the present time, approximately 40 percent of the military and civilian positions in the support area are covered by published staffing guides. The goal is to provide guidance for distribution of 80 percent of these personnel.

The procedure for development and use of tables of distribution by which commanders record the use and intended use of support manpower has been simplified. The recurring review of tables of distribution was strengthened by clarifying the scope and specifying the review and approval levels. Through these actions these tables have become even more effective manpower control documents than they were previously.

Actions taken to minimize instances of duplication of effort or dual staffing include the requirement for all onsite manpower survey teams and those charged with control functions at all levels of command to identify and correct such instances.

The Army's control of support manpower is maintained by constantly trimming or extending the work force to the mission and workload. Actions have been consistently taken to eliminate marginal utilization of personnel and to increase the relative strength of operating forces of the Army by making maximum feasible use of civilian personnel in the support area within the limitations imposed by funds and civilian personnel ceilings. The reduction in total civilian employees of the Army in fiscal year 1959 seriously hampered this practice.

Review of manpower control procedures is being continued with an objective of achieving tighter controls and more consistency in their application by all commands. The dilemma of decreasing personnel and expanding missions is not easy to solve, but the Army maintains a positive attitude toward the problem and anticipates increasingly efficient utilization of manpower in fiscal year 1960.

New Techniques for Assignment of Enlisted Personnel

A major improvement was effected during the year in the reassignment of enlisted personnel from basic combat training to advanced individual training. A newly developed procedure enables the field commands to forward expeditiously to Headquarters, Department of the Army, a variety of personnel information on each basic trainee, making possible better selections for advanced training on an individual name basis. This system has resulted in better qualitative selection of individuals based upon their aptitudes and previously acquired skills, has produced fewer academic failures in the Army school system, and has enabled more accurate forecasts of training base outputs. All of these help the Army achieve more effective utilization of manpower.

Improved centralized control of top-ranking enlisted personnel was placed in effect this year by name assignment of the top two noncommissioned officers and specialists ranks. Under this system, master sergeants, first sergeants, and specialists in pay grades E-8 and E-9 are given assignments based on individual considerations comparable to the officer assignment system. This not only adds prestige to these senior enlisted personnel but also helps the Army to apply their special abilities and skills to the specific locations and jobs which are most in need.

Measures To Decrease Personnel Movement

Efforts were made during the year to decrease the frequency of movement of Army personnel, particularly by limiting the number of permanent changes of station. These measures met with appreciable success. However, as long as the Army maintains large forces in as many different countries overseas as it does today, personnel turbulence will continue. As an indication of the impact of oversea demand for personnel, it was necessary during the year to change the policy on stabilization in the United States of long-service, more senior enlisted personnel. Previously, enlisted personnel of the top five pay grades who had completed 20 years' service were exempted from oversea service if they so desired. As of July 1, 1959, the criterion will change from 20 to 27 years' service.

A certain amount of movement is considered a healthful indication of an alert, progressive military force and is therefore desirable. The

average frequency of movement of career military personnel today is approximately once every 2 years as compared to once every 16 months several years ago. The Army will continue to decrease this frequency of movement during the coming year to the extent that operational readiness, career development, and training requirements permit.

Enlisted Management Program

A significant forward step in personnel management is the Army's Enlisted Management Program, announced in October 1958. The program, designed to improve the effectiveness and enhance the prestige of enlisted personnel, is expected to have a long-term and beneficial effect. Details of the more significant features of the program as developed through fiscal year 1959 are described in the paragraphs that follow.

A. Proficiency Pay

The 1958 military pay legislation provides for proficiency pay to any enlisted member designated as possessing special proficiency in a military skill. Based upon guidance received from the Office of the Secretary of Defense, the Army plan was developed to allocate proficiency pay to all military occupation specialties while regulating the number of personnel entitled to the pay within each specialty.

In fiscal year 1959 proficiency pay of \$30 per month was paid to 13,793 Regular Army enlisted personnel in pay grade E-4 or higher.

B. Enlisted Evaluation System

A new system has been established to evaluate more objectively relative proficiency of individuals. The new system incorporates written and performance tests and performance evaluation reports. These provide composite scores for relative evaluation of enlisted personnel in their military occupation specialties.

The new evaluation system is centrally operated and controlled through the Army Enlisted Evaluation Center established at Fort Benjamin Harrison, Ind.

C. New Enlisted Grades

Public Law 85-422, passed by Congress in May 1958, created two new top-enlisted pay grades, E-8 and E-9, and authorized the Army to have 2 percent of its enlisted strength in grade E-8 and 1 percent in grade E-9. Using these levels as an eventual goal, the Army plans to phase promotions to these grades over a 4-year period. By the end of the fiscal year, 3,300 of these

promotions had been awarded to senior noncommissioned officers who hold key jobs requiring high degrees of training and experience.

Prerequisites for these new grades include 15 years of active Federal service for promotion to E-8 and 18 years for promotion to E-9. As an added incentive to outstanding noncommissioned officers, an exception to the years-of-service requirement provides that 20 percent of the total promoted to E-8 and E-9 may be from noncommissioned officers with a minimum of 8 and 10 years' service, respectively.

D. Permanent Enlisted Promotions

Permanent promotions for enlisted personnel of the Army were reintroduced on July 1, 1958, after a lapse of 8 years, as a means of enhancing the prestige and career stability of Regular Army noncommissioned officers. As promotions to permanent noncommissioned officer grades are made on the "best qualified" basis, this program is expected to assist in retaining for the Army the highest quality personnel.

Many recent changes in personnel policy have improved the position and prestige of noncommissioned officers. Furthermore, commanders at local levels are encouraged to increase the authority and freedom of action of noncommissioned officers by reducing the requirement for officer supervision, by adhering more closely to the chain of command through enlisted ranks, by issuing mission-type instructions rather than detailed orders, by using noncommissioned officers in planning and execution of pertinent training programs, and by granting noncommissioned officers a stronger voice in the discipline of the command.

Women's Army Corps

The strength of the Women's Army Corps, on June 30, 1959, was 732 officers, 39 warrant officers, and 7,837 enlisted personnel. Eighty-seven percent of the total strength was assigned in the United States and 13 percent overseas.

Fifty women were commissioned as second or first lieutenants in the Army Reserve and called to active duty, while three officer candidates received regular commissions as second lieutenants. Nine Reserve officers were recalled to active duty. A total of 3,317 women enlisted in the Women's Army Corps during the year.

Educational opportunity for members of the Women's Army Corps continued during fiscal year 1959. Two enlisted women were accepted for college training in personnel management; 1 officer was selected for the logistics officer program; 3 officers attended the Army Man-

agement School; the first officer of the Women's Army Corps earned a master of arts degree in journalism under the program of training military personnel at civilian institutions; and 3 officers entered the first advanced public relations course conducted at the University of Wisconsin.

Under the Enlisted Management Program, members of the Women's Army Corps have received promotions to pay grade E-8 and are receiving proficiency pay.

Morale

Morale, though stemming fundamentally from leadership, depends in some measure upon the availability of facilities and services considered a basic part of the way of life of the individual soldier before his entry into the Army. Housing, religious and welfare services, pay, and medical services had a noteworthy beneficial impact on morale during the past year.

During fiscal year 1959 there was a notable increase in family housing facilities which relieved the critical housing situation to some extent throughout the Army, although a deficit of 61,000 housing units still exists. (Housing construction is discussed earlier in this report.)

Despite decreasing troop strengths during the past year, attendance at religious services showed an increase over previous years, reaching 36 million. Attendance at religious education classes was 9 million.

On January 1, 1959, the system for pay of military personnel in the Army was revised to provide for an individual pay voucher to replace the centrally controlled pay-record card. The voucher system gives a detailed analysis of each individual's pay by reflecting items of entitlement or deduction together with other pertinent data. Individuals receive a copy of their vouchers on payday along with their pay and are able immediately to determine that their pay for the period is correct. This action has reduced the number of complaints arising from pay procedures, resulting in a beneficial effect on morale.

The authorization of medical care in civilian facilities for certain dependents of military personnel under the Medicare program has contributed vastly to improved morale within the Army. However, the favorable morale advantages initially achieved through the Dependent Medical Care program have been lessened somewhat by a recent cutback in authorized civilian medical services.

General Educational Development

The voluntary, off-duty General Educational Development Program continues as a mainstay of the Army's education system. During the fiscal year ending June 30, 1959, over 45,000 enlisted personnel achieved the equivalent of high school completion; 6,000 passed the 4-part col-

lege level test that is widely accepted as the equivalent of a year in college. Officers and enlisted personnel together completed 60,000 college courses both by correspondence and by actual attendance. In all levels of education, ranging from elementary instruction through advanced college work, a total of 360,000 individual courses were completed by 125,000 participants.

In March 1958, the Army announced a program providing full-time college training for selected enlisted personnel at the graduate and undergraduate level in technical, scientific, managerial, and leadership fields—areas in which trained personnel would be needed to meet specific future Army requirements. Those selected attend a college or university on a full-time basis with the cost of tuition, books, laboratory, and other fees paid by the Army. At the end of the past year, a total of 173 individuals were enrolled in 54 colleges and universities.

Punitive Confinement

The number of prisoners in confinement in the Army has declined a spectacular 72 percent in the past 5 years. While the total Army strength also has declined considerably, the rate of decrease in confinement is almost twice the rate of total Army strength decline. In terms of average rate of confinement per 1,000 of Army strength, there were only 5 prisoner confinements per 1,000 individuals in the Army at the end of fiscal year 1959 compared to almost 13 per 1,000 at the beginning of fiscal year 1955. (See fig. 10.)

The impressive decline of Army prisoners in confinement is the result of a great many recent changes in the Army. However, the most controlling factor is thought to be the intensive drive to raise the quality of manpower admitted into the Army. Coupled with higher standards for enlistment and induction have been more skillful leadership, both at officer and noncommissioned officer level, and the beneficial effects of the military personnel management program.

Of considerable importance in this concerted effort to conserve manpower is the program for evaluation of individuals upon initial confinement to stockades. Through the combined services of legal assistance, mental hygiene consultation, and religious facilities, prisoners in stockades are evaluated early in their confinement for the purpose of determining an individual program aimed at early return to duty.

In the past 2 years, the disciplinary barracks at Fort Gordon, Ga., Fort Crowder, Mo., and at New Cumberland, Pa., were closed. The disciplinary barracks at Lompoc, Calif., were prepared for closure early in fiscal year 1960. Only the Army disciplinary barracks at Fort Leavenworth, Kans., are to remain in operation.

ARMY

PRISONERS IN CONFINEMENT

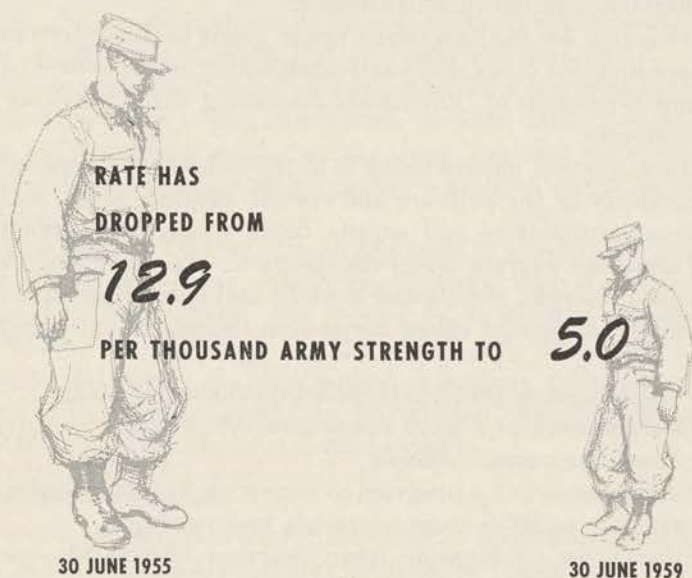


Figure 10

Military Personnel Problems

The relatively small number of young officers in the 3- to 12-years-of-service group, known in the Army family as the "valley," constitutes the most serious problem in officer personnel management. This shortage results from the low procurement and low retention rates during the years 1946 to 1957.

The lines of action are being pursued to prevent this problem from becoming more serious; first, filling in the "valley" by selectively calling to active duty reserve officers of the proper skills and ages; second, retaining greater numbers of reserve officers who complete their obligated service; and lastly, attempting to decrease the resignation rate of young Regular Army officers.

The military pay bill, Medicare, the program to reduce the number of change-of-station moves, and other programs are instrumental in convincing young officers to choose the Army as a career. The program for the promotion of exceptional officers ahead of their contemporaries has introduced strong competition into the promotion system, and this, it is hoped, will appeal to younger officers.

Reductions in the military strength of the Army over the past several years have created surpluses over authorizations in enlisted grades E-6 and E-7, and in some E-5 specialties. This has come about by

the emphasis the Army has placed on retaining combat strength at the expense of support personnel while carrying out reductions. As a result, there were during the past year too many high-grade enlisted men in support functions, while there were too few in the combat arms, particularly in the new technical specialties needed for missiles, atomic weapons, electronic equipment, and aircraft.

Corrective action for the surplus of upper grade enlisted personnel includes retraining for other skills and establishing controls over classification and promotion of individuals possessing skills in excess of Army requirements.

The need for warrant officers today is in the technical and specialist fields, particularly in the aviation and special weapons areas, rather than in the administrative and supply fields which have been the specialized areas for warrant officers in the past. As a result of these changes in requirements, imbalances in skills and specialties have developed within the warrant officer corps even though actual strength is normal.

To solve the foregoing problem these actions have been taken:

- a. Establishment of a more comprehensive program to provide a firm future for warrant officers.
- b. Establishment of a program to encourage voluntary retraining or transfer to MOS areas which are understrength.
- c. Elimination of Regular Army warrant officers who twice failed to be selected for permanent promotion and of certain non-Regular Army warrant officers who fail for temporary promotion.
- d. Involuntary retirement of non-Regular Army warrant officers who have completed 20 years of service, with at least 5 years in officer/warrant officer status, except those retained to meet requirements of the Army.

Reserve Components Manpower

The strength of the Army National Guard on June 30, 1959, was 399,427 officers and enlisted men. This strength, distributed among 4,497 federally recognized units, was relatively stable during the year since it did not deviate more than 2 percent from the 400,000 authorized strength for the year.

The Army Reserve portion of the Ready Reserve totaled 1,008,800, including 299,000 in drill units, 15,500 undergoing 6 months' training, 36,000 participating in other paid training, and 658,300 who did not participate in Reserve training.

Both in the Army National Guard and in the Army Reserve, great stress was placed on higher personnel standards for both officers and enlisted men. For example, in the Army Reserve all troop program officers who were found to be professionally unqualified in their grade and specialty were required to take a minimum of 80 hours of extension

course work per year or to attend a USAR school in an appropriate course.

The requirements for promotion of enlisted personnel in the Army National Guard were raised to include specified time-in-pay grade, with provisions for a limited number of meritorious appointments. Also, a relatively high score in standard Army aptitude tests to qualify for appointment to grade E-4 or higher was required.

New regulations require all applicants for enlistment in the National Guard to obtain a qualifying score on tests, thus eliminating the exception previously permitted for those who had prior service in the armed forces and had satisfactorily completed the third year of high school.

The Reserve Officers' Training Corps is a source of junior officers for the Active Army, the Army Reserve, and the Army National Guard. The program was carried on at selected colleges, military schools, and high schools during school year 1958-59 for 220,000 students. Advanced course training at summer camp opened in June 1959 with 13,447 students in attendance. During the school year 12,600 junior officers were commissioned.

Civilian Personnel

A general pay increase for civil service employees greatly improved the Government's competitive position in the labor market, particularly for scientists and engineers. As a result, the Army was able to meet substantially its needs for such personnel, except for a few highly specialized categories.

A survey of scientists and engineers in the major research and development installations was conducted as a followup to a similar survey made 3 years earlier. Findings revealed that while recruitment and retention are much less a problem now than they were earlier, improvements are needed in some instances to make the best use of skills available, to provide more effective supervision, and to improve working conditions for these personnel.

Strength

At the end of fiscal year 1959, direct-hire civilians employed by the Department of the Army totaled 405,848, of which 345,869 were in the United States (excluding Alaska) and 59,979 in overseas areas. A 2-percent reduction of direct-hire civilian personnel was ordered by the Secretary of Defense to be effected during the year. This reduced Army civilian employment by approximately 10,000 in the United States.

In addition to the direct-hire employees, the Army had 142,090 contract personnel on July 1, 1958, in support activities in the overseas

commands. This strength was reduced to 120,452 because of a decline in the workload and fund limitations.

Personnel Development

Programs for development of professional skills were vigorously promoted throughout the Army. One of the most notable is the program for cooperative training agreements with selected individual college students. In this program, college students spend half of each year at their institutions pursuing the courses of their choice and the remaining portion of the year as civilian employees of the Army performing duties allied to their studies. Approximately 800 cooperative students are now in this program and there is reason to believe that an even larger percentage of these than the 70 percent of fiscal year 1958 participants will accept full-time professional employment with the Army. This program is considered extremely valuable because it not only assures a potential supply of new professional personnel but it also brings the new graduate into the Army professional system with more than 2 years of productive experience.

Professional skills development also was encouraged by contract training of selected employees in colleges and industrial organizations and by the presentation of monetary and honorary awards for outstanding scientific papers written during the year.

Executive Development

Executive development was stimulated throughout the year by encouraging selected civilians to attend the Army's Regional Personnel Management for Executives Program and the Army Management School. In the past year, 968 civilian executives participated in the Management for Executives Program and 94 attended the Army Management School.

Merit Promotion Program

The Merit Promotion Program for the Army's civilian personnel was placed in effect on January 1, 1959. This provided that candidates for promotion be drawn from broad areas of consideration and that their qualifications be examined through use of objective screening processes. Fair and equitable consideration of all who might be qualified is thus insured and the identification and promotion of the best available candidates, regardless of length of service, becomes more probable.

This Merit Promotion Program was established in response to new Civil Service Commission requirements. Although the Army's previously published guidance on promotion programs was in substantial conformance with the requirements of the Civil Service Commission, some procedural changes were found to be necessary.

The program, while allowing considerable local discretion, has resulted in greater uniformity of practice among Army installations in making promotions.

Salary and Wage Administration

Major improvements in the Army-Air Force Wage administration system in the form of consolidated grades, fewer step rates, and a leader pay plan were effected in over half of the Army-Air Force labor market localities. The revised system will be completely installed throughout the two departments in February 1960. These improvements tend to resolve disparities between Army and Air Force grade levels.

Career Programs

In June, the Army started the first of many Army-wide career programs planned for its civilian employees. This program covers the more than 3,500 administrators and specialists working in the area of civilian personnel administration—the Army's counterpart to industrial relations activities.

The program provides for systematic recruitment of well-qualified personnel; planned development at the junior, intermediate, and senior levels; defined patterns of advancement; specially designed performance appraisal and counseling methods; and an Army-wide placement and referral system.

The technical services have developed 135 career field programs covering career fields in supply, procurement, contracting, acceptance inspection, engineering, biological and physical sciences, and management and administration. One hundred and twenty of these programs covering approximately 63,000 civilian employees became operational during the past year; the remaining 19 are targeted for operational status by December 1959.

Career programs of similar patterns will provide further major improvements in the management of the Army's civilian work force. Benefits will accrue to the individual who will be offered a career rather than a job; to the local installation, to the extent that immediate personnel needs will be systematically met; and to the Department, insofar as long-range needs for qualified key executives will be filled.

Canal Zone Merit System and Pay Plans

During the past year the President delegated to the Army responsibility for assuring that our treaty commitments with the Republic of Panama, as they pertain to employment practices of all Federal agencies in the Canal Zone, are faithfully observed.

Under this delegation, the Canal Zone merit system and a uniform wage schedule for all employees regardless of citizenship were placed

in effect for all U.S. agencies in the Panama Canal Zone. In May 1959 members of the Canal Zone Board of Appeals were appointed to serve as the top appellate body for employee appeals alleging faulty application of the pay system.

Suggestion Program

For the second straight year, the Army's Incentive Awards Program earned an award for itself from the National Association of Suggestion Systems. This year's award was given in recognition of the most improved program among member agencies in view of its 41-percent increase in suggestions submitted.

Capitalizing on the impetus resulting from Project Paydirt in 1958, a command suggestion competition was established and annual awards announced to maintain a high level of interest in the program. The Army is divided into three competitive areas for the awards: Armies in the United States; oversea commands; and administrative and technical services. Awards are provided in each competitive area to the commands with the highest suggestion rate and to the command with the highest adoption rate.

Mobilization Planning for Civilian Employees

In addition to mobilization planning for military personnel which is periodically refined and tailored to meet current as well as potential world situations, a comprehensive plan for mobilizing civilian personnel necessary to support the Army's wartime mission was issued during the past year. The planning guidance for the Department of the Army is contained in Civilian Personnel Regulation M-100, entitled "Mobilization Planning and Execution."

The all-inclusive and realistic manner in which the new regulation provides preemergency and postemergency planning and procedures places the Army in the best possible posture to mobilize its civilian work force quickly to meet any emergency situation. The principal features of the plan, some of which are unique in mobilization planning, are:

- a. Delineation of precise preemergency actions for all levels of command. These include securing agreements with specific individuals and maintaining them in the National Defense Executive Reserve system to be ready to fill executive positions; locating potential manpower resources; reclassifying jobs requiring the employment of scarce skills; developing training courses; and providing trained cadres of key operating officials from personnel now employed by the Army to reactivate installations.

- b. Requirements for all chiefs of technical services and commanders of U.S. armies to establish civilian manpower require-

ments for each of their activities having a mobilization mission either for limited or general war. These individuals are further required to coordinate their mobilization planning with regional and local offices of the Civil Service Commission, of the Department of Labor, and of other agencies in order to assure that Army plans are not conflicting.

c. Modifications of all current civilian personnel regulations and reporting requirements which become effective automatically throughout the Army in the event of an emergency.

The degree of coordination to be effected with all agencies having control over personnel and with operating officials of the Army is realistic and practical.

The Civil Service Commission has furnished a copy of the Army's Civilian Personnel Regulation, M-100, to each of its regional offices and to many other Federal agencies with the suggestion that they explore the feasibility of adapting the Army's regulatory format to meet their specific mobilization planning requirements.

Safety

The number of Army accidents declined from 44,500 in fiscal year 1958 to 41,700 in fiscal year 1959, an improvement of 6 percent. The following table illustrates the effect of this improvement. Projected losses were obtained by applying injury and fatality rates for fiscal year 1958 to fiscal year 1959 strengths.

<i>Army personnel</i>	<i>Projected</i>	<i>Actual</i>	<i>Saving</i>
Deaths.....	934	895	39
Nonfatal injuries.....	29,460	28,600	860
Man-days lost.....	774,200	743,400	30,800
Direct cost of injuries.....	\$73,757,000	\$72,640,000	\$1,117,000

Aviation Safety Program

The accident rate per 100,000 flying hours for major accidents during the year was 27.6 as opposed to 28.3 for fiscal year 1958. New mobile devices such as low frequency nondirectional homer AN GRD 6 and ground control approach radar, used by Army aviation, are contributing immeasurably to the success of the Army aviation safety program.

Nuclear Safety

During the past year the Army established the Nuclear Weapons Coordination Group to monitor every conceivable aspect of safety surrounding the increasing types and quantities of nuclear weapons. Since nuclear weapons are now allocated throughout many elements of the Army, this group will oversee the overall aspect of operational safety from the conception of the nuclear weapons system to operational delivery.

V. The Search for Better Weapons, Equipment, and Techniques

While extremely proud of its spectacular accomplishments and future projects in space research, Army research and development continued to keep its feet firmly placed on the ground, for the primary criterion of Army research and development during fiscal year 1959 was to increase combat effectiveness.

Research and Development Policy

Reduction of Leadtime

The Army was very much concerned with the dimension of time in its research and development program during the past year, since projects in this field have meaning only insofar as they can be completed successfully and placed in the hands of troops. A laboratory project is of no value to the soldier as long as it remains in the laboratory. The Soviets are aware of this fact and indications are that their leadtime in military research and development is considerably less than that of the United States.

The Army knows that leadtime can be reduced under the most urgent circumstances and maximum decentralization of authority. This has been proven in the development of the JUPITER ballistic missile which was successfully fired in its tactical configuration only 3 years after the project was started. From its initial firing, JUPITER rapidly progressed through a series of tests to attain an unusual degree of reliability and accuracy. During the past year it was turned over to the Air Force for deployment to Italy with a proven operational capability. Unquestionably, adequate funding and streamlined management at military and industrial levels can expedite all Army research and development as in the case of the development of the JUPITER.

New regulations were issued in the beginning of the last fiscal year to cut leadtime in research and development by providing for the start of production engineering early in the development cycle, by prescribing standard parts for research and development equipment, and by decreasing the testing period. Army agencies and individuals were encouraged to take authorized actions at every level of command and of development to reduce the total time between "concept" and "hard-

ware." No procedure was considered sacrosanct or immune to improvement.

Later in the year further revisions of regulations were taken under consideration for the purpose of expediting the decision-making process, reducing the number of projects of marginal value, and permitting more expeditious development of exceptionally important projects.

"In-House" Research and Development

The bulk of the Army's research and development is carried out by contract with industry and educational institutions. For example, in the Ordnance Corps, which is responsible for 69 percent of the Army's research and development, about 70 percent of that work is performed by contract with industry. A small but important portion of the Army's research and development is conducted "in-house." In this manner, the Army, relying on its great knowledge of the art of weaponry as well as its technical and managerial competency, can effectively and knowingly direct the performance of research and development by an industrial contractor.

In some instances the "in-house" capability goes far beyond making original technical discoveries and laying the groundwork for a research project. For example, the principles for solution to the problem of reentry heating of ballistic missiles were originated by the Army's research and development facilities. The ablation nose cone, which made a 1,200-mile flight in August 1957 and successfully reentered the atmosphere, was originally conceived and basically designed by Army "in-house" facilities. Its development was then carried forward by contract with several universities and industries under careful supervision of Army scientists. Thus, one of the biggest problems in the development of long-range missiles—that of reentry into the atmosphere—was solved expeditiously and inexpensively.

During fiscal year 1959 the Army continued successfully to join its high quality "in-house" research and development capabilities with the vast reservoirs of industrial talent in the development of weapons.

Basic Research

The Army continued to emphasize during the past year a basic research program that will insure the flow of fundamental scientific data related to new weapons.

Most of the Army's basic research is not performed within Army facilities but is contracted to industry and some 180 colleges and universities. Generally, basic research is funded in 10 major fields and 74 subfields that are related in some important way to the needs of the soldier. Although these areas of study may not be immediately applicable to any current military activities, they may have major

importance in some yet undetermined future development. No one knows what major scientific breakthroughs will change the strategy and tactics of warfare in the future. Certainly, however, they will be derived from basic research.

A major event in the progress of Army basic research was the formal establishment during the past year of the Army Mathematics Research Center at the University of Wisconsin. The center is oriented toward both basic and applied fields of research in mathematics. In its day-to-day operations the Army leans upon mathematics as an ubiquitously necessary tool for the design of weapons and structures; for the compilation of maps; for the analysis of communication, transportation, and logistics; and for the development of missiles and other weapons systems. The Army is therefore vitally concerned with continual progress in mathematical methods. The Mathematics Research Center, U.S. Army, is the most important of the several mathematics research facilities to which the Army gives support, and it is recognized as comparing favorably with the finest university mathematics research departments in the country.

The comparatively new science of research in the field of military operations has assisted in the analysis and evaluation of modern military organization for such areas as weapons systems, logistics, tactics, and the making of military decisions. During the past year the Army had several contracts with civilian institutions in this field and it continued to strengthen its internal capabilities in this science by means of war games and simulation.

Recognition of the importance of environmental factors to all aspects of military planning, supply, and combat operations resulted in the establishment during the year of an Environmental Sciences Division at Headquarters, Department of the Army. This Division is concerned with discovering the impact of climate, terrain, vegetation, and native animals on men, equipment, and material, especially in the severe environments of deserts, humid tropics, polar lands, and mountains.

Principal Research and Development Projects

The Army's research and development program is vigorous, imaginative, and bold, and is sharply focused toward weapons systems and techniques for the ground soldier. (See fig. 11.)

In the development of weapons the trends are toward increased lethality and range with lighter weight, a reduced number of types of artillery, a dual atomic-nonatomic capability in selected weapons, and an increase in surface and air mobility. Within the limitations of security some of the principal accomplishments within this field are described below.

ARMY

RESEARCH & DEVELOPMENT

FY 59 FUNDING PROGRAM

	MILLION DOLLARS	
	GUIDED MISSILES	174.7
	MILITARY SCIENCES	95.7
	O&M OF FACILITIES	78.8
	OTHER EQUIPMENT	75.4
	AMMUNITION	25.7
	ARTILLERY	18.4
	VEHICLES	17.8
	AIRCRAFT	12.2
	SHIPS & SMALL CRAFT	1.0
	TOTAL	499.7

Figure 11

New Small Arms Family

The recently adopted family of small arms, consisting of the M-14 rifle and the M-60 general-purpose machinegun, was placed in production during the past year and issuance of the machinegun to troops was started. This new family will simplify production and reduce spare parts, maintenance requirements, and training time. Firing the NATO round of ammunition, the two weapons will replace the seven weapons and the three calibers of ammunition now in use.

Claymore

The directional antipersonnel fragmentation weapon Claymore is a new concept in defensive munitions. The principle of propelling a

fan-shaped pattern of fragments was conceived several years ago and was realized with the standardization of the T48 Claymore during 1959. An improved version of this weapon, the T48E1, was developed and is undergoing tests.

Grenade Launcher

A new weapon for the launching of antipersonnel grenades was developed and tested during fiscal year 1959 to overcome the limited range and inaccuracies of the current rifle and hand grenades. The new grenade launcher is similar in appearance to a shotgun and will provide the infantryman with a greatly improved capability for delivering high explosive fire against close small-area and point targets.

90-mm. Recoilless Rifle

A 90-mm. recoilless rifle was developed to provide small combat units with a greatly improved capability for attacking armor or other hard targets. It can be carried by one man and fired from the shoulder if necessary. Under development also is a 120-mm. recoilless rifle to supersede the 106-mm. system. This will greatly increase the antitank assault capability of rifle companies.

Ammunition

During fiscal year 1959 research and development effort continued on improvement of all types of conventional ammunition. Progress was made in incorporating increased range and larger areas of lethality. Concurrent with projectile development, progress was made in developing multipurpose fuzes.

Chemical Shells and Rockets

The Army now has the ability to disseminate toxic chemicals with the 4.2-inch mortar, the chemical landmine, and the 105-mm. and 155-mm. howitzers. In addition to the aforementioned artillery systems, a chemical 8-inch howitzer shell was under consideration during the past year, and the development of a modified chemical landmine was almost completed. A chemical rocket and chemical warheads for several missile systems were under development.

Incapacitating Agents

Development of incapacitating agents to produce temporary effects for a militarily significant period of time continued during the year. There are two general types of incapacitating agents, those which cause physical incapacitation, rendering personnel unable to perform useful physical activity for a relatively short period of time, and those which cause mental incapacitation. Evaluation of such agents during the past year indicated that considerable progress is being made.

Missile Firepower

LACROSSE

This highly accurate tactical surface-to-surface missile will be used in close support of ground troops and is capable of delivering either atomic or nonatomic warheads against area or small hard targets. Testing has demonstrated high accuracy and suitable reliability of this mobile weapons system which will supplement conventional artillery. Two LACROSSE battalions were activated in late fiscal year 1959 and are now training at Fort Sill, Okla. (See fig. 12.)

LITTLE JOHN

This is a lightweight, simple, rugged, and reliable rocket under development for use as a close support weapon and for assignment to those Army units requiring a high degree of air transportability.

SERGEANT

Using a solid-propellant fuel, this tactical surface-to-surface guided-missile system is under development to replace the 5-year-old liquid fuel-propelled CORPORAL. SERGEANT is invulnerable to any known countermeasures and possesses many improvements over its predecessor in accuracy, reliability, mobility, and field-handling characteristics. Testing to date provides high assurance that the desired SERGEANT capabilities will be achieved and that the system will be available for field use in the near future.

PERSHING

This missile was under development as a solid-propellant replacement for REDSTONE. It is expected to provide the field army with an accurate, all-weather, atomic delivery system that has the high degree of ground and air mobility essential for worldwide troop support. The system was designed to have a rapid target engagement capability with a range to exceed that of REDSTONE. Development was started in January 1958 and proceeded at an optimum rate during the past year.

NIKE-ZEUS

The Army's ZEUS antimissile system is the third generation of the proven NIKE family of surface-to-air guided missiles. It is designed to provide an effective active defense of the United States against ballistic missiles. The Army's ZEUS system is a logical outgrowth and extension of the earlier AJAX and HERCULES systems.

Like its predecessors, ZEUS will incorporate a refined command guidance system of operation, which will be designed to kill intercontinental ballistic missiles. To achieve success in the destruction of



Figure 12. LACROSSE surface-to-surface missile.

targets of this type, many technological advances in automation guidance, propulsion, and radar are required. Progress in all phases of development was achieved on schedule during the past year.

Design of the missile itself was essentially completed and each stage of the missile motor was fired successfully in static tests. The booster motor, fired many times in tests at Redstone Arsenal, is the most powerful, single solid-propellant motor in existence in the free world today. It has a proven thrust of 450,000 pounds which will provide

the ZEUS missile with the ability rapidly to reach extremely high altitudes. At the end of the fiscal year major components of the ZEUS system were being installed at White Sands Missile Range for various tests. The Army considers the ZEUS program to have progressed to the point where production of the system now can be started.

MISSILE A

To insure effective atomic fire support for STRAC units, weapons were sought which would be highly mobile on the battlefield and yet be sufficiently small and lightweight for transport in aircraft available for strategic movement. Feasibility studies were completed on MISSILE A to provide a second-generation missile to be even lighter and more mobile than LITTLE JOHN and to have greatly improved operational features.

MISSILE B

A new divisional weapon, MISSILE B, was in the early planning stages during the past year to employ the latest knowledge of rocketry while retaining the simplicity, reliability, and mobility required for general support under battlefield conditions. It will be the next major missile system to be developed.

REDEYE

In order to provide air defense protection for the soldier on the battlefield from enemy low-flying strafing attacks, the Army continued development of REDEYE. REDEYE is designed as a bazooka-type guided missile, to be fired by an individual soldier from a shoulder launcher. (See fig. 13.)



Figure 13. REDEYE, antiaircraft missile with electronic guidance.

MAULER

This missile, an all-weather air defense guided missile, was being planned for development to protect the forward combat elements of a field army from low-flying aircraft and short-range missiles. This system will be designed as a highly mobile, self-propelled weapon with a high-kill probability and with the capability of moving with and defending columns on the move or units in position on the battlefield. It was anticipated at the end of the year that development of the MAULER system would be started in the near future.

Mobility

A primary consideration for all equipment developed for use on the pentomic battlefield is mobility. All vehicles must be able to move offroad on unimproved ground under all types of weather. In the pentomic concept of warfare it is recognized that the capability to move may often be as important as the capability to shoot.

Research in offroad ground mobility was accelerated during fiscal year 1959. An important event of the year in this field was a meeting held at the Fighting Vehicles Research and Development Establishment in London, England, at which representatives of the British, Canadian, and U.S. Armies met to coordinate research in soils-testing classification and tactical mapping to indicate trafficability of terrain. The results of the meeting are now being circulated for approval by the three national headquarters.

During the past year the Army established the Soils Trafficability Research Facility at the Army Mobility Research Center, Vicksburg, Miss. Some advances were made in tactical mapping to indicate vehicle passability. Utilizing data obtained from investigations in soils testing and classification, trafficability maps were under preparation to be subjected to field testing in representative parts of the world.

Work continued at the Yuma (Desert) Research and Development Center, the Fort Churchill (Arctic) Research and Development Center, and the newly established Thule (Polar) Research and Development Center leading to trafficability classifications of terrain in those environmental regions.

The Army Scientific Advisory Subpanel on Environmental Research visited the Canal Zone during the year to evaluate that area as a possible prototype for trafficability mapping research in tropical areas. The report was favorable and plans for future action are being formulated.

Combat Vehicles

On an atomic battlefield, armor is extremely important to provide protection from atomic bursts. For its personnel carriers and its

tanks the Army continued its investigations to provide armor thick enough to give a degree of protection against direct and residual radiation, yet not so heavy as to impede a vehicle's capability to cross piles of rubble, craters, or streams.

The M-113 aluminum-armored personnel carrier which was standardized during the past year has pronounced advantages over the M-59 personnel carrier in that it represents a decrease in weight from 21 to 10 tons, an increase in range from 120 to 200 miles, an increase in speed from 32 to 40 miles per hour, and an improvement in fuel consumption from 1 to 2.6 miles per gallon. The greatly reduced weight of the M-113 has permitted the use of one gasoline engine, whereas two engines were needed to power its steel-armored predecessor, the M-59. All these improvements are expected to reduce maintenance time and effort.

A new main tank, designated M-60, was standardized in fiscal year 1959 and placed in production. Its weapons system is far superior to those in previous tanks and its diesel engine is an outstanding improvement.

During the past year, the principal effort in combat vehicle research and development has been directed toward an even better main battle tank. Continuing progress was made in weaponry, electronics, propulsion, and protective systems. As a result, a completely new concept of armored fighting vehicles was evolved, which, when translated into hardware, should provide the Army with armored vehicles far superior to those now in existence.

As a result of this research, development was started on an armored reconnaissance airborne assault vehicle intended to replace the present light tank and the 90-mm. airborne assault weapon, M56.

Undergoing tests during the past year was an aluminum-armored, self-propelled carriage for the 105-mm. howitzer which combines a 360° field of fire and an improved ability to move across rugged terrain and streams. The reduction in weight of approximately 12 tons in this type of vehicle is expected to contribute to its greater operating range and mechanical reliability. The same carriage can also mount the 155-mm. howitzer with little additional weight.

Another new lightweight, self-propelled, airborne carriage for heavy artillery was being tested to provide improvement in ground mobility and emplacement time for the 8-inch howitzer and the 175-mm. gun and to make these weapons air transportable. (See fig. 14.)

Logistical Ground Mobility

Through the use of lightweight materials and by combining both the body and frame of a vehicle in a single construction, advances have been made in reducing the weight of general-purpose vehicles.



Figure 14. 175-mm. gun on lightweight carriage.

Mobility is being improved also through the use of independent wheel suspension, low-pressure tires, simplification of maintenance, and fuel economy.

The reduction of repair parts needed for the new wheeled vehicles is an important factor of their development. Whereas present wheeled vehicles, from $\frac{1}{2}$ -ton trucks to 10-ton trucks, now require

6 engines, 6 transmissions, and 6 axle types, the new fleet will require only 4 sets of components. Common parts, such as generators, starters, brake systems, and steering systems, will be interchangeable.

A promising concept for an offroad cargo carrier is a development known as the Goer. An outgrowth of heavy construction equipment, it is a simply constructed vehicle mounted on four wheels with very large low-pressure rubber tires. Two models, a 15-ton cargo truck and a 5,000-gallon tanker, have been constructed, using commercially available parts. These will undergo testing in 1960.

A machine for loading and unloading materials on rough terrain has been under development to mechanize supply operations at temporary field supply areas. Though lightweight, it is a durable fork-lift mounted on large low-pressure tires, capable of traversing rough terrain.

Amphibians

Development of an amphibious 5-ton lighter, the LARC-5, a replacement for the World War II DUKW, was completed during fiscal year 1959. This entirely new vehicle is designed basically as a marine craft, and equipped with four large tires which give it exceptional offroad mobility. Constructed of welded aluminum it is nonswampable. It has a payload of 5 tons, travels in the water at a speed of 10 miles per hour, and on highways up to 35 miles per hour. Preliminary testing of the first prototype indicates that the LARC-5 will successfully meet operational requirements.

Prototypes of a new amphibious cargo carrier, T116, were delivered to Army test agencies during fiscal year 1959. This is an unarmored low-ground-pressure, full-tracked amphibious vehicle which will increase the Army's capability for moving personnel and loads up to 1½ tons over water, marshy terrain, sand, snow, ice, and tundra. It is being tested as a replacement for the World War II "Weasel."

Mobility for Fuels

Major advances in vehicles for transportation of fuel were ready for limited production at the end of the year. For the transportation of fuel, pairs of large tires with a capacity of 500 gallons each are coupled together on a common axle for towing by a vehicle as small as a jeep. As many as five of these units, known as Rolling Fluid Transporters, can be hooked together in a train and towed by a 2½-ton truck.

A collapsible rubber and fabric fuel tank with a capacity of 10,000 gallons has been standardized during the past year. This tank weighs only 535 pounds as compared with its predecessor, the bolted steel tank, which weighed 6,500 pounds. The extremely static nature of fuel storage areas is changed by this device and relatively easy dispersion and mobility of fuel reserves becomes practical.

Another item which increases the mobility potential for fuels is an automatic pipe-welding machine which is designed not only to permit more rapid laying of pipelines but also to permit higher pumping pressures and increased capacity by reason of stronger welds between each pipe section.

The tremendous transportation burden in furnishing varieties of fuel for field operations is being attacked also as a whole by intensive research into multifuel engines. Limited preliminary tests during the past year indicate that it is not only feasible for these engines to use almost any kind of petroleum fuel but also that they are approximately 35 percent more economical in fuel consumption.

Air Mobility

During the past year, the Army continued to develop aircraft which might provide greater mobility to men on the battlefield. New aircraft, tested during the past year, included the Caribou, the Iroquois, and the Mohawk.

The Caribou is a forward area transport airplane with a 3-ton payload designed to "live" with the Army under field conditions. Like the Mohawk, it is designed to operate from small, unimproved fields and to require very low maintenance.

The Mohawk is an observation airplane, specifically designed to conduct surveillance by visual, photographic, and electronic means in order to meet the greatly increased intelligence requirements of tactical units. It successfully completed its first test flight in fiscal year 1959 and an accelerated flight test program was started immediately. (See fig. 15.)

In the rotary-wing field, the Iroquois utility helicopter successfully completed tests during 1959, and issue to field units was started. This helicopter, the first turbine-powered, rotary-wing aircraft designed and manufactured in the United States, represents many improvements over the Chickasaw, which it replaces. It is smaller, easier to maintain, and far more versatile. In later versions, the "B" and "C" models will have an increased payload capacity.

The Army has continued to pursue the development of vertical takeoff and landing aircraft. Extensive research was carried on with such test-bed aircraft as the Vertol Tilt Wing, the Doak Rotating Ducted Fan, the Ryan Deflected Slipstream, and Bell Convertiplane. Experiments during the past year have proven that it is possible to combine the vertical takeoff capability of the helicopter with the advantages of fixed-wing operation for forward flight. Based on the results obtained from these prototypes, operational aircraft required for field use will be developed.

Finally, in relation to air mobility, the Army has initiated a program to investigate the arming of helicopters. Tests with machine-

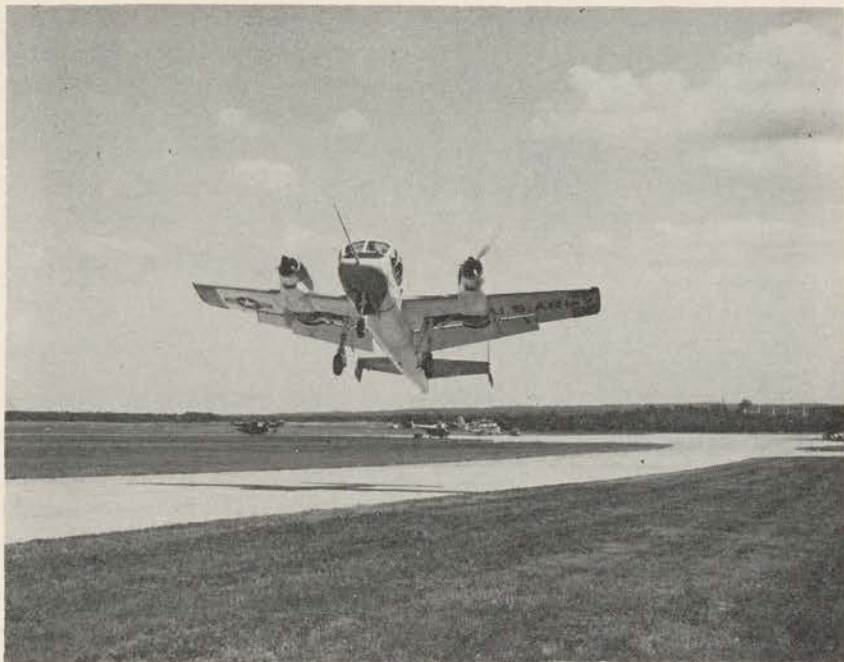


Figure 15. MOHAWK reconnaissance aircraft.

guns and rockets have effectively demonstrated the value of a helicopter as a highly mobile firing platform with offensive power and sufficient evasive capability.

Communications

In modern warfare the battlefield will be an extremely large area in which small groups of men must act together for a common purpose even though separated from each other. For control and effectiveness of present tactics it is essential that easy-to-carry, lightweight communications equipment be available; that it be rugged, dependable, easy to maintain; and that it be adaptable to a wide variety of channels.

So radical are the advances made by the Army in communications that each new discovery opens up whole new fields of investigation which sometimes render obsolete equipment which is under development at the same time. Consequently, it is extremely difficult to settle upon the standardization of signal equipment in the present condition of galloping development because of indications that right around the next corner there may be something better. Nevertheless, the Army has settled for what it considers to be the most advanced field radio practical to manufacture at the moment.

The new tactical command radio set for combat vehicles is designated the XAN/VRC-12. It makes possible extraordinary command

control on an atomic battlefield. It is made up of 3 lightweight components which provide a wider range of communications than the heavier and less dependable 12 components of the old vehicular radio set.

When the new set is procured on a mass production basis, it is estimated that it will cost slightly more per unit than the previous set. However, considerable savings will be possible because of the need for fewer units. Its maintenance will be less than that required for the old set and it will permit a reduction of 30 percent in the time required to train maintenance personnel.

Other extraordinary developments in communications during the past year are—

a. The design and development of a global communication system which will incorporate voice, teletype, facsimile, and video capability. The difficulties of restricting such a system from the eyes and ears of a potential enemy are very great, but considerable progress has been made in this area over the past year;

b. Further advances and incorporation into communications and other electronic equipment of micromodules, which are miniature circuits packaged in plastic blocks;

c. Accelerated development of the "troposcatter" mode of transmission of radio signals. This system promises to be more reliable than any other known method of propagation of radio signals while eliminating the necessity of intermediate relay stations between terminals;

d. Development of nickel-cadmium batteries which are rechargeable dry batteries with a very small factor of deterioration;

e. Improved cold cathode electron tubes which may do away with the present need for complex air-conditioning systems for large electronic machines requiring tubes; and

f. Miniaturized signal recorders, relay equipment, and analyzing devices which were used in the Score satellite to broadcast the President's 1958 Christmas message.

Combat Surveillance

In all past wars a great number of soldiers were used for reconnaissance patrols to gather information about the enemy in order that commanders might secure their forces and plan attacks. In any future war the foot patrol will be replaced in large measure by electronic and mechanical combat surveillance which will provide a continuous watch over battle areas. Progress in electronic and associated technology in the past few years is overcoming the difficulties due to weather, darkness, and inaccessible terrain.

Drone aircraft with improved tracking and control systems, a greater variety of sensors, and increased speed and endurance are

currently under development. Every possible device is being studied to provide all echelons of the field army with reliable, continuous, and accurate information of enemy movements and installations for the purpose of permitting the delivery of immediately effective fire of missiles, artillery, and small arms. Automatic cameras, infrared, acoustic, and seismic devices of all kinds are being studied and adapted for combat surveillance.

Nuclear Developments

During the past year considerable reduction in the diameter, weight, and complexity of atomic warheads has been achieved. Development efforts are continuing in this direction. However, future progress is expected to be slowed down considerably because of the current restrictions on tests of atomic weapons.

Atomic Power

The joint Army-Atomic Energy Commission nuclear power program continued development of a family of stationary, portable, and mobile military plants in power ranges from a few hundred to 20,000 kilowatts. The principal operational advantage of military nuclear power plants is their self-sufficiency. For example, one currently available nuclear fuel core can replace 60,000 barrels of diesel oil with a ratio by weight of 1 to 25,000. The nuclear core can be transported in a single small aircraft.

Two prototype reactor plants were in operation during fiscal year 1959: The 2,000-kilowatt stationary, medium-power plant (SM-1) at Fort Belvoir, Va., and the 300-kilowatt stationary, low-power plant (SL-1) at the National Reactor Testing Station in Idaho. Development continued on a 6,000-kilowatt stationary plant (SM-2) for use in the NIKE-ZEUS systems; a 300-500-kilowatt mobile, low-power plant (ML-1) to be trailer mounted; and a 2,000-kilowatt modular, portable, medium-power plant (PM-1) for Air Force use.

A long-range development effort is leading to a mobile medium-power plant (MM-1), which is a highly compact system for a wide variety of military applications, including possible adaptation to propulsion of an overland snow train.

Preparatory planning continued during the past year, pending availability of funds, for the development of a 10,000-kilowatt floating nuclear electric power plant for general military use in strategic reserve.

Procurement of Army field nuclear power plants continued during the past year with the construction of the stationary plant (SM-1A) at Fort Greely, Alaska, scheduled for operation by the summer of 1960. A portable, modular plant (PM2-A) was under construction for use in a remote Arctic location. It is scheduled for delivery in the

summer of 1960. Plans for procurement of additional Army field plants proceeded with the rate of development. All such plans are contingent upon the availability of future funds.

Training of military personnel from all three services in the operation of military nuclear power plants continued on a schedule consistent with tentative plans for utilization of these plants by the three services.

Space Research and Development

Despite the fact that space is largely an unknown medium which transcends the exclusive missions of all military departments, space technology as a unified national effort is advancing at an explosive rate. During the past year the Army wholeheartedly cooperated in the national space exploration effort under the direction of the National Aeronautics and Space Administration, the civilian space agency, and the Advanced Research Projects Agency of the Department of Defense. Although space experiments undertaken during the past year were primarily for the purpose of gathering basic data, it is believed that they will eventually benefit the Army and its sister Services in the furtherance of their primary missions.

During fiscal year 1959 successful Army-sponsored space accomplishments included the launching of Army's third earth-orbiting satellite, two lunar probes, and the free world's first recovery of living creatures placed in a trajectory through space.

Explorer IV

Explorer IV, a 38.4-pound radiation-measuring satellite, was placed in orbit by an Army JUNO I missile on July 26, 1958. This was a project of the National Aeronautics and Space Administration which the Army supported with equipment and personnel.

Pioneer III

The Pioneer III lunar probe, a 12.95-pound gold-plated cone, was fired by a JUNO II missile on December 6, 1958. Although Pioneer III failed to reach the moon, it did attain an altitude of 63,580 miles and telemetered back, during both ascent and descent, valuable information including precise data on the existence of a second Van Allen radiation belt.

Pioneer IV

The Pioneer IV lunar probe, whose payload was identical to Pioneer III, was fired March 3, 1959. This probe achieved an earth-moon trajectory, passing the moon 41 hours after firing, and entering a perpetual orbit about the sun. Pioneer IV was tracked for 82 hours out to a record-setting distance of 407,000 miles.

Monkeys Able and Baker

In support of the National Aeronautics and Space Administration's man-in-space program, the Army launched a 7-pound rhesus monkey, Able, and a 1-pound squirrel monkey, Baker, in the nose cone of a JUPITER missile. Able, and her Navy-sponsored fellow passenger, Baker, traveled nearly 1,500 miles and reached an altitude of more than 300 nautical miles. This epic NASA experiment demonstrated the Army research capability in bioastronautics.

SATURN

The multistage SATURN, the military space workhorse of tomorrow, was placed in development by the Army during the past year for the Advanced Research Projects Agency. Its first stage is a cluster of eight modified JUPITER engines which are designed to produce $1\frac{1}{2}$ million pounds of thrust. Its second and third stages have been selected and are under development. Booster engines were test fired prior to assembly into a cluster. Modifications of the Redstone Arsenal static test tower, to accommodate a full-scale static test firing of the SATURN booster, were nearly completed during the year. Design of a 305-foot-high service tower, which will be more than twice as big as any such tower yet built, was completed, and construction under direction of the Army Corps of Engineers was about to begin as the fiscal year ended. Approximately 1,700 tons of steel will be used in the tower; yet despite the tremendous weight concentrated on its 50-foot-square base, it will move on steel wheels and rails.

The SATURN is being developed to place multiton payloads into the orbits required in advanced worldwide satellite communication complexes. The Army Signal Corps, which developed the solar batteries for the Vanguard sphere, the communication package for the December 1958 talking Score satellite, and continued developing payloads and associated ground equipment for other communication satellite systems, was making plans to develop the SATURN communication payload.

Future Plans in Space

Army requirements in space, aimed toward the accomplishment of its primary combat functions, its assigned mission in air defense, and necessary supporting functions, have been drawn up during the past year and presented to the Advanced Research Projects Agency of the Department of Defense.

The organization of space branches and divisions within several of the Department of Army general staff agencies during fiscal year 1959 is evidence of the Army's interest in the military potential of space.

Human Factors Research

The human factors research program consisted of a wide range of research to improve the quality and performance of Army personnel during the past year. Research was directed toward the development of new techniques for more effective utilization of personnel and for increasing the efficiency with which Army personnel perform their duties.

The present emphasis of personnel research, one element of human factors research, is upon improved means of identifying combat and leadership potential, development of refined selection devices for enlistment and induction, and classification for training and school assignment and for special utilization. A second element of human factors research relates directly to improved personnel performance through the development of new training methods, techniques of leadership, and the means to increase motivation for training and combat. Special emphasis is being placed upon improving and reducing the length of specialized training courses. In the past year considerable success has been achieved both in reducing the length of various electronics maintenance courses and in improving the quality of graduates.

VI. Civil Works: Water-Resource Development

Since the first appropriation by the Congress of the United States in 1824 for navigation improvements, legislation has delineated the scope, policies, and procedures for a national water-resource development program to be carried out under the direction of the Secretary of the Army and under the supervision of the Army Chief of Engineers. Known as the "civil works" of the Army, this multimillion-dollar activity of more than 3,000 projects in all the States, the District of Columbia, and U.S. territories and possessions, is contributing substantially to the economic growth and well-being of the country.

Progress in Fiscal Year 1959

During the past year, a total of 267 projects were under construction, including 25 multiple-purpose projects with power-generating facilities, 77 channel and harbor projects, 16 locks and dams, 8 bridge alteration projects, 87 local protection projects, 51 flood-control dams, and 3 shore-protection projects. Of these, 25 navigation improvements, 2 bridge alterations, 2 shore projects, 11 local-protection projects, 5 flood-control dams, and 1 multiple-purpose project, although not completed, permitted useful operation by the end of the fiscal year. In addition, continued progress was made on 19 construction features of the Mississippi River and tributaries flood control project.

Appropriations

In fiscal year 1959 total funds appropriated to the Army Corps of Engineers for civil works amounted to \$815,810,300. This was allocated as follows:

Construction, general.....		\$608,246,500
Planning and design.....	\$9,476,500	
Construction.....	598,770,000	
Operation and maintenance.....		114,521,100
Mississippi River and tributaries.....		68,347,500
General investigations.....	300,000	
Planning and design.....	75,000	
Construction.....	51,972,500	
Maintenance.....	16,000,000	
General expense.....		12,738,700
General investigations.....		10,188,500
St. Lawrence River Joint Board of Engineers.....		100,000
Permanent appropriation.....		1,668,000
(Maintenance and operation of dams; hydraulic mining; payment to States)		
Total.....		\$815,810,300

Navigation Projects

Construction for the improvement of navigation was carried on during the past year in coastal harbors and channels, Great Lakes' harbors and channels, and the inland and intracoastal waterways, including some projects in Puerto Rico, Alaska, and the Hawaiian Islands. Navigation facilities provided by these projects carry tonnage of foreign and interstate commerce now exceeding 1 billion tons per year.

There are 23,000 miles of completed waterways, approximately 500 improved harbors, 230 locks, and 190 navigation dams in use in the United States today. During the past fiscal year 93 navigation projects were under construction, of which 25 were placed in useful operation.

Maintenance of navigation facilities, because of limited funds, was directed primarily to deep-draft harbors and major inland waterways to serve the most pressing requirements of commerce. Reduction of an overall backlog of maintenance work was continued on 207 waterway and harbor projects.

The St. Lawrence Seaway, for which the Army Corps of Engineers is the construction agency, was opened to ocean traffic on April 25, 1959, and formally dedicated on June 26, 1959.

Complementary to the St. Lawrence Seaway is the Great Lakes' Connecting Channels Project which is under construction now, with the main channels scheduled for completion in 1962 and the completion of the entire project in 1964. The channels will provide an integrated navigation system for oceangoing vessels from the Atlantic Ocean through the Great Lakes to Duluth, Minn.

Lock and Dam Replacement Program

A \$1.6 billion program for modernization of canalized waterways by the replacement or reconstruction of existing navigation locks and dams calls for 8 new navigation locks and dams on the Monongahela River, 3 on the Warrior River system, 19 on the Ohio River, 4 on the Mississippi River, and 5 miscellaneous projects on other rivers.

Nine new navigation locks and dams, the total cost of which is estimated to be \$398.5 million, were under construction during fiscal year 1959.

Three additional locks and dams for navigation estimated to cost \$139 million were authorized by the Secretary of the Army during fiscal year 1959. Construction had not started on these by the end of the year.

Flood Control

The responsibility for nationwide flood control was assigned to the Army Corps of Engineers by the 1936 Flood Control Act, which also established the basic Federal policy for that activity.

Since 1936, the Army Corps of Engineers has completed 358 projects at a cost of \$982 million.

Under construction during fiscal year 1959 were 155 projects estimated to cost \$3.9 billion when completed. The remainder of the active program, consisting of 236 projects estimated to cost \$1.8 billion, has not been started.

The Flood Control Act of July 3, 1958, authorized the first three hurricane flood protection projects in Narragansett Bay, R.I., New Bedford, Mass., and Texas City, Tex. The cost of these is estimated at \$748 million. Federal participation is limited to 70 percent of this cost.

Despite the progress made in construction for flood control, adequate protection is not available in most river basins as emphasized by the disastrous effects of recent floods. A reasonable degree of protection can be provided to the Nation through orderly prosecution of existing flood control plans, expanded as necessary on the basis of up-to-date engineering and economic studies. This has been proven by results obtained from the operation of completed flood control projects.

The Federal flood control program carried out by Army Engineers has provided reservoir systems, levees, floodwalls, and other flood protection works which have prevented damages of \$10.2 billion through June 30, 1959. During the past year flood control projects prevented flood losses amounting to approximately \$500 million in Indiana, Ohio, Pennsylvania, and Texas, during the fall of 1958; in Illinois, Indiana, and Ohio in February 1959; and in States in the lower Missouri River basin during May and June 1959.

During fiscal year 1959 the following projects for flood control were placed in useful operation:

FLOOD CONTROL RESERVOIRS

<i>Name of project</i>	<i>Type</i>	<i>Total estimated Federal cost</i>
Rough River Reservoir, Rough River, Ky.	124' earthfill dam with uncontrolled spillway, 12' gate-controlled conduit. Channel improvement.	\$9,700,000
Hodges Village Reservoir, French River, Mass.	55' earthfill dam with concrete overflow section.	4,810,000
Dyberry Reservoir, Dyberry Creek, Pa.	112' earthfill dam with uncontrolled spillway.	4,000,000
Russian River Reservoir, East Fork of Russian River, Calif.	160' earthfill dam with fixed crest spillway. Gated outlet works.	13,802,000

<i>Name of project</i>	<i>Type</i>	<i>Total estimated Federal cost</i>
Toronto Reservoir, Verdigris River, Kan.	90' earthfill dam with gated concrete ogee spillway and gated sluices.	\$13, 970, 000
Calion, Ark.	Levees and pumping plant.....	973, 000
Norwich Channel Improvement, Conn.	Channel improvement.....	1, 300, 000
Upper Iowa River, Iowa	Channel improvement and spoil bank levees.	951, 000
Barbourville, Ky.	Levees and pumping plants.....	1, 910, 000
Catlettsburg, Ky.	Levees, floodwalls, and pumping plants.	4, 000, 000
Cumberland, Md., and Ridgeley, W. Va.	Levees, floodwalls, channel improvements, and pumping plants.	15, 500, 000
Worcester Diversion, Mass.	Control dam and diversion channel and tunnel.	5, 270, 000
Belzoni, Miss.	Levees.....	320, 000
Vicksburg Floodwall, Miss.	Concrete floodwall.....	2, 000, 000
Amazon Creek, Oreg.	Earth and concrete lined channel.	1, 266, 000
Greybull, Wyo.	Levees.....	300, 000

Hydroelectric Power

Multiple-purpose projects, in addition to providing large flood storage, are an important component of the Nation's power supply system, representing in fiscal year 1958 4.2 percent of the national electric power production capacity and 20.8 percent of the hydropower capacity. (See fig. 16.) During fiscal year 1959, generating capacity of Army Engineer projects increased by 488,000 kilowatts to a total of 6,104,400 kilowatts. This capacity was installed in 32 multiple-purpose projects located in 19 States. The total power production at these projects during the fiscal year exceeded 26,500 million kilowatt-hours of energy. During fiscal year 1959 the Table Rock Dam on the White River in Arkansas and Missouri was placed in useful operation. Its estimated completed cost will be \$67.5 million.

Local Water Supply

In 18 reservoirs built primarily for flood control and navigation, there is provision for approximately 1,200,000 acre-feet of storage for municipal and industrial water supply which is not considered sufficient for the expanding economy. The Water Supply Act of 1958 allows for greater water supply storage in flood control reservoirs. The act specifically authorizes provision for storage in Federal reservoir projects to meet anticipated future local water supply needs when local interests assure the Federal Government that they will pay the additional construction costs. The Corps of Engineers and the Public Health Service reached agreement in defining their respective

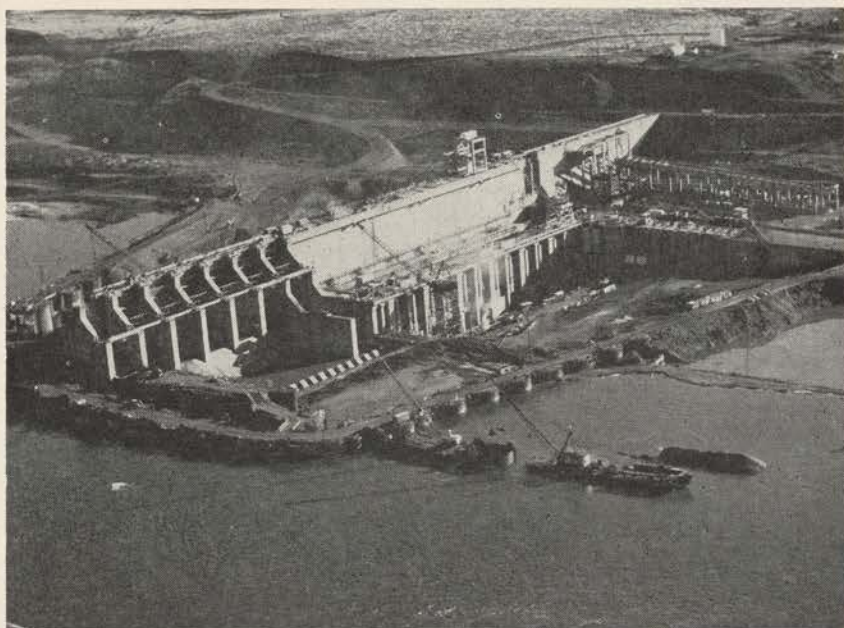


Figure 16. Construction of Ice Harbor project, Snake River, Wash.

responsibilities under the Water Supply Act of 1958 and previous water legislation. Coordination also was effected with the Bureau of Reclamation.

Recreation

Attendance at civil works projects reached a total of 94,793,000 during the calendar year 1958, representing a twentyfold increase over that anticipated in 1946. Public access to the waters of these projects is now available at 3,455 points and boats may be launched at 1,578 ramps. These facilities and others, including playgrounds, camping areas, sanitary facilities, and access roads, are provided to the general public and maintained either by the Army Engineers or by cooperating Federal, State, county, or municipal agencies.

Beach Erosion Control and Hurricane Protection

The policy of Federal assistance in measures to restore and protect against erosion by waves and currents applies to the publicly owned shores of the United States, its territories and possessions. It extends to shorelines other than public if some public benefit can be shown under certain conditions.

During fiscal year 1959, three shore protection projects were under construction, two of which were placed in useful operation.

Assignment of New Responsibilities

New responsibilities and expanded fields of activity authorized by Public Law 85-500 (1958), the River and Harbor, Flood Control, and Water Supply Act, include control of noxious aquatic growths in eight coastal States from North Carolina to Texas, hurricane flood protection, and provision of storage in reservoirs for future water supply needs.

Public Law 85-629, August 12, 1958, authorized inclusion of fish and wildlife conservation as a project purpose.

Investigations

The Army Engineers who were designated to perform the major portion of field investigations of the proposed tidal power development at Passamaquoddy, Maine, had substantially completed their work at the end of the fiscal year. The results of the Corps' investigation of the engineering feasibility, the cost, and the economic justification of the project will be incorporated into the report of the International Passamaquoddy Engineering Board and transmitted to the International Joint Commission on Passamaquoddy in October 1959.

The Army's Board of Engineers for Rivers and Harbors has recommended improvements by the Federal Government of 66 navigation and flood control projects, including a \$1 billion Columbia River Basin Water Plan. The Board disapproved 19 projects.

Before submission to Congress, the Governors of the various States involved and interested Federal agencies will be asked to comment on the recommendations.

VII. Strengthening Management

Army command management, the process of deriving maximum benefits from available manpower, money, and materiel resources, assumed greater importance than ever during fiscal year 1959 because of the pressing need to support increasing programs and activities with decreasing resources. While Army management is primarily concerned with business-type and nontactical activities, it is ultimately oriented toward combat readiness.

The Army Command Management System

Fiscal year 1959 was the first full year of operation of the command management system on a worldwide basis. Because of this, emphasis was placed on the improvement of the use of management data in the exercise of command at all echelons.

A major achievement in the continuing refinement of the Army Command Management System has been the redesign of cost and performance reporting in order to simplify it and cause it to reflect more meaningfully the information needed at operational levels and at Headquarters, Department of the Army. This redesign, coupled with the use of mechanized procedures at Department of Army level for the compilation of the data, is an invaluable tool in the overall management of the Army's operation at all levels of command.

The Army Management Improvement Program

The Army Management Improvement Program is a many-sided effort to seek out and put into practical use improved methods of accomplishing work in a more efficient and economical manner. Each agency of the Army develops and carries out its own annual improvement plan which becomes part of normal daily operations. Improvements which appear to have widespread applicability are published and distributed so that commanders with similar operations might adapt them to their operations. The benefits are, accordingly, multiplied.

Under the management improvement program, Army commanders continue to make selective use of a variety of techniques to improve the management of Army operations. Typically, these include, but are not restricted to, work simplification, incentive awards, automatic data processing, performance analysis, management survey, organizational analysis, training, and engineered standards activities.

During fiscal year 1959, over 800 selected examples of management improvement were reported to Headquarters, Department of the Army. These selected improvements resulted in over \$25 million of benefits in terms of increased production, reduced costs, and more efficient operations. Several of these examples illustrate the value and diversity of the improvements effected:

a. At Ford Ord, Calif., an aluminum target on firing ranges to replace paper targets was found to be about six times more durable. Besides this advantage, it was determined that it works better on an electrically controlled target device in wet weather, thereby saving maintenance labor. Installed at Ford Ord, the new aluminum targets will save an estimated \$88,000 per year at this one installation, even though initial purchase costs are higher.

b. A problem at the U.S. Army Armor School, Fort Knox, Ky., was to provide training to senior officers in the maintenance of guided missiles without excessively costly and critical equipment and skilled personnel. The equipment and personnel needed were located at Redstone Arsenal, Ala., but the cost to bring them to Fort Knox for a 2-hour lecture and demonstration was prohibitive. The problem was solved by beaming closed-circuit television from the Ordnance Guided Missile School at Redstone Arsenal to the classrooms of the Armor School at Fort Knox. Instruction was given on five missiles—HAWK, NIKE-HERCULES, CORPORAL, LACROSSE, and REDSTONE. This was the first use of a closed-circuit television program for this purpose in the Army. This method of instruction has great potential for training throughout the Army and should be particularly valuable in mobilization training.

c. In Army facilities in Japan, hot water and steam heating plants have always been subject to excessive corrosion due to silica in the water. Soda ash was the accepted means of neutralizing the silica; however, experiments conducted by the Army indicated that phosphates were far more efficient. The consequent substitution of phosphates for soda ash lowered maintenance costs of heating systems throughout Army installations in Japan and increased the life of boilers. In addition, fuel consumption was lowered approximately 2 percent, and savings at one installation approximated \$30,000.

d. At Camp Irwin, Calif., a consolidated installation supply organization replaced separate supply and storage activities maintained by each technical service. The consolidation resulted in a reduction and redistribution of personnel and the closing of several barracks buildings. An annual benefit of \$77,000 is estimated as a result of this improvement.

e. In construction of airfield runways it was common practice to maintain the same thickness of subbase across the entire width of runways. A study was made by the Corps of Engineers Ohio River Division laboratories and its Waterways Experiment Station on channelized traffic of aircraft on runways. As a result of the study, it was determined that only the center third of any runway required the thickness previously specified for the entire width since the two outer sides normally are not used by aircraft. By reducing the thickness of the subbase in the two outer 100 feet of a runway 300 feet wide by 12,000 feet long, 87,000 yards less subbase material would be required. This would result in an estimated benefit of \$435,000. This principle of design of airfield runways is now in common use.

f. At Martin Army Hospital, Fort Benning, Ga., approximately 4,000 hypodermic syringes per month were individually wrapped in gauze and labeled, requiring approximately 5 minutes per syringe. By using sterilizer bags the process was reduced to 1 minute per syringe and breakage was greatly reduced. A reduction of approximately 3,200 man-hours per year was realized, with an estimated benefit of \$6,400.

Army Management Training

Over 10,000 Army officers received management instruction in 20 Army service schools and colleges during the past year. This instruction varied from an orientation of a few hours to detailed courses covering several hundred hours.

The U.S. Army Management School at Fort Belvoir, Va., graduated 582 officers and civilians during the year. The school presented 9 management classes of 3 weeks' duration, 2 orientation classes of 1-week duration, and 2 special classes of 1-week duration for Army personnel in Europe.

The Finance School at Fort Benjamin Harrison, Ind., continued to conduct specialist courses in such management areas as military comptrollership, techniques of review and analysis, integrated accounting, budgeting, inventory accounting, and stock fund operation. Approximately 750 military personnel and civilian employees attended these management courses during the past year. In addition to resident instruction, the Finance School provided an extension course program in accounting for military and civilian personnel. Almost 2,000 individuals were enrolled in six extension courses during the fiscal year, reflecting an 85-percent increase over the previous year.

A number of intensive short courses were held in management engineering at Rock Island Arsenal, Rock Island, Ill. Twenty-four separate courses, varying from 3 days' to 4 weeks' duration, were

attended by approximately 3,250 military and civilian personnel during fiscal year 1959.

The Army Audit Agency also provided management instruction for its military and civilian personnel. Its courses were from 1 to 10 days' duration and covered such material as audit management and supervision, work management, personnel management, and automatic data-processing systems. Over 1,200 persons received such training during the past year.

During fiscal year 1959, 250 officers were enrolled in full-time graduate courses in business administration and management at approximately 30 colleges and universities.

In addition to regular college courses, advanced management courses at Harvard University and the University of Pittsburgh of 13 and 8 weeks' duration, respectively, were also attended by 20 Army officers.

The University of Toledo in Toledo, Ohio, provided specialized courses for the Army in financial management, supply, and storage management. During fiscal year 1959, over 1,500 students completed one or more of the courses which vary from 1 week to 4 weeks' duration.

Work Simplification

During fiscal year 1959 the Army Work Simplification Program continued to eliminate nonessential work. Work simplification is a "do-it-yourself" approach to management methods improvement. It encourages the free flow of ideas and creates a climate for change, while enlisting the knowledge, skills, and ingenuity of thousands of Army supervisors in the effort to improve efficiency, increase productivity, expedite work, and stretch tax dollars.

During fiscal year 1959, 11,149 supervisors were trained in the use of work distribution charts, flow process charts, motion economy, and layout studies. As a direct result of this training, 7,374 improvements were installed that resulted in \$7,219,356 in benefits.

Automatic Data-Processing Systems (ADPS)

Utilization of ADPS in business-type operations of the Army had a continual growth during fiscal year 1959. The number of ADPS installations increased from 20 to 31. Use of ADPS in logistic functions continues to increase, with the majority of existing installations being used for financial inventory accounting, stock fund accounting, item accounting, stock control, and similar managerial functions. ADPS at the Army Finance Center has proven successful and economically advantageous in some applications. Equipment proposals are now being evaluated with the objective of expanding the scope of ADPS applications at the Center.

At Headquarters, U.S. First Army, ADPS tests were conducted during the past year on the application of ADPS to personnel management. A prototype ADPS was installed at Fort George G. Meade, Md., to test its adaptability to routine administrative functions of the Army at class I installations. The first area under test was the administration required in supply management. Tests will be conducted also in the procedures of financial management, civilian personnel management, military personnel management, and miscellaneous logistics services after ADPS has become fully operational in the supply management field. If test evaluations prove favorable, the Army will introduce ADPS operations at other selected class I installations on a schedule justified by the requirements.

The Army plans to continue the pursuit of applications of ADPS with the expectation of increased effectiveness in its business-type operations. Stress will be placed on full exploitation of equipment already in use, with emphasis on an interchange of information and ideas between users.

Areas of Management Emphasis

The effort to reduce unnecessary paperwork in the administrative procedures of the Army continued during the past year. It was aimed particularly at reducing administration within the tactical organizations. The following specific areas received special emphasis:

a. Administrative paperwork and man-hours previously consumed in determining responsibility for Government property lost, damaged, or destroyed were reduced as a result of a study completed during the past year. Authority to take action in these matters was decentralized, and the procedures relating to pecuniary liability were simplified, with assurance of equal protection to the Government and to the individual. Reports of survey of minor motor vehicle damage were eliminated on the basis that the cost of administration exceeds the amount of loss or damage.

b. The problem of overlapping inspections and staff visits was studied during the year, resulting in more rigid policies to insure the essentiality of each inspection and staff visit, to eliminate overlap and duplication, and to provide consolidation where practicable. In the future, an annual review of the need for individual inspections and staff visits will be made by each command or agency. Further, an independent examination will be made of the effectiveness of policies and controls of inspections and visits to forestall abuses.

Army Audit Agency

Independent and objective appraisal of the management of the financial resources of the Army is provided by the Army Audit

Agency. Its representatives operate on a mobile basis from regional and branch offices around the world and are stationed at a number of military installations and plants of Army contractors. About 20 percent of the professional staff of the Agency are certified public accountants, comparing favorably with the percentage of CPA's in public accounting firms. As a field arm of the Comptroller of the Army, the Agency provided audit services to 335 military commands and installations during fiscal year 1959 and audited procurement contracts of the Army, involving close to \$4 billion.

The Army Audit Agency also provided a wide range of advisory audit services to contracting officers primarily responsible for the procurement of the weapons and services required by the Army. For example, substantial proportions of this procurement were handled on a cost-plus-fixed-fee basis. Army auditors made on-site reviews of the books and records at contractors' plants to determine whether costs were accurate and reasonable on the basis of contractual provisions. Working with contracting officers, the Agency reduced contractor charges by approximately \$125 million during its audit of contracts in fiscal year 1959.

As a result of the rapid pace of technological progress and the shifting emphasis of military programs, the Army is faced each year with the problem of disposing of excess property. The broad resources and technical experience of the Army Audit Agency were utilized during the past in the Army's many-sided attack upon this problem. The Agency has started a lateral audit on a worldwide basis of the generation, reporting, and disposition of excess and surplus property. The results of this audit are expected to provide Army management with comprehensive recommendations for better control over the generation of excesses and for greater effectiveness of all phases of its disposal problem.

In the fast-moving missile field there are special needs for auditing facilities because the speed with which new missiles may be placed into production and into the hands of troops after development is governed to some extent by the management of available funds. For example, a vertical audit of the Army missile program, which entailed the coordinated effort of audit teams at over 50 locations of plants of prime contractors and subcontractors, was in progress during fiscal year 1959. Through interim reporting, the results of the missile program audits were furnished to the Ordnance Missile Command on a current basis. This permitted the reprogramming of funds to various missile systems of greater urgency. The total result of this audit will provide Army management with an overall look at the programing and budgeting of the entire program. It will tie the actions of the Chief of Ordnance to his commodity commands, to his arsenals, his procure-

ment districts, and to the funding of prime contractors and their major subcontractors. It will also trace supply and operational maintenance from depots to tactical missile installations.

In a continuing program, the Army Audit Agency is working with program managers throughout the Army to develop procedures which will provide more responsive funds management.

VIII. Budget and Funds

The Army's net expenditures during the fiscal year 1959 were \$9.456 billion or 22.9 percent of the total outlay for defense.

For payrolls of military personnel alone the Army spent almost 40 percent of its total budget, so that less than \$6.0 billion was devoted to the Army support of its worldwide operations and maintenance, procurement of new weapons and equipment, the vast research and development program, extensive construction activities, and other programs.

The past year was a period marked by increasing budgetary problems, and the year ahead will be equally difficult. Modernization of Army equipment is lagging seriously; maintenance of equipment and facilities has fallen behind—to mention but two of the serious problems arising from inadequate funds.

These problems stem primarily from the necessity for the Army to hold the line on its obligations and expenditures or, in many cases, to live with less, in the face of: (a) Increased requirements for more complex and more expensive weapons, weapons systems, and equipment; (b) continued rises in costs; and (c) unanticipated demands to support emergency activities in trouble areas of the world, such as Lebanon, Taiwan, and Berlin during the past year.

Notwithstanding the magnitude of these budgetary problems, the Army has made substantial progress over the last several years in developing a central financial management system which endeavors to bring maximum value for each dollar while providing field commanders as much flexibility as possible to use their resources to best perform their assigned missions.

New Appropriation Structure

A step in the improved budgeting system was the establishment of a revised appropriation structure for fiscal year 1960. The revision provided for the alignment of accounts by functional area and established certain new appropriations in line with current concepts of performance budgeting. The revised alignment will permit more cohesive budget presentations and provide more meaningful comparisons within the Department of Defense budget structure when the Army budget is presented to Congress. (See fig. 17.)

Individual changes involve five appropriations. The formerly single Army National Guard appropriation, covering all activities of the

ARMY

APPROPRIATION STRUCTURE

REVISIONS TO APPROPRIATION STRUCTURE

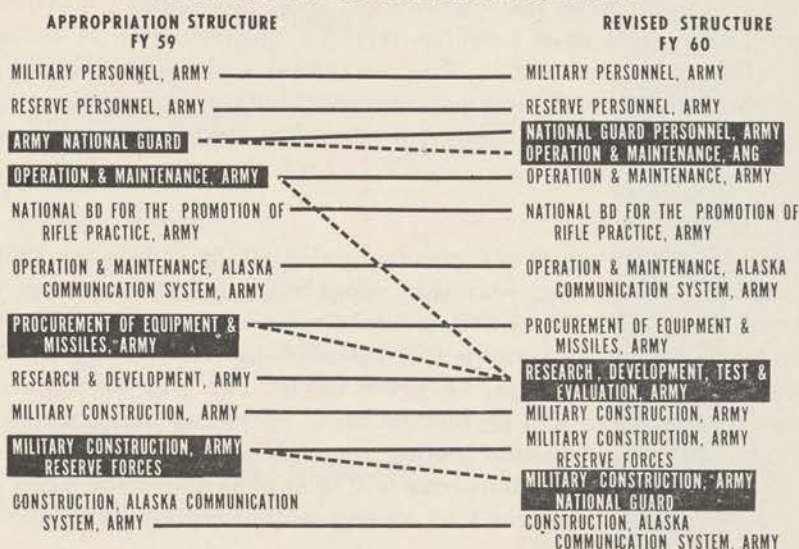


Figure 17

Guard, is divided into two appropriations: "National Guard, Personnel," and "National Guard, Operation and Maintenance."

That portion of the "Operation and Maintenance, Army," appropriation which has provided support for research and development test centers and boards is now transferred to the new "Research, Development, Testing and Evaluation" appropriation (RDT&E). "Production of Equipment and Missiles, Army," formerly associated with the procurement of materiel in support of the research and development effort, is transferred to "RDT&E."

"Military Construction, Army Reserve Forces," breaks out the two budget programs in that appropriation and raises them to individual appropriation status for the Army Reserve and the Army National Guard.

The most significant change is the expansion of the "Research, Development, Test and Evaluation" appropriation to include identifiable funding requirements for test and evaluation as well as for research and development in the 1960 budget.

The research and development program execution in fiscal year 1960 under this new appropriation may be materially improved through this centralization of funding authority under a single pro-

gram director. Under the old appropriation, the research and development effort was supported in substantial degree by other Army appropriations, resulting frequently in time-consuming staff coordination. While the requirement for support from other appropriations has not yet been removed, the new RDT&E appropriation should permit less complex and less cumbersome staff procedures. Further consolidation of support into the RDT&E appropriation is being planned for fiscal year 1961. The centralized authority established under the new appropriation may also contribute to improvement in leadtime by reducing the number of situations attributable to delay in funding decisions.

Direct Obligations

Fiscal year 1959 direct obligations totaled \$9.555 billion, or \$201 million less than in fiscal year 1958. For fiscal year 1960 the Army plans to obligate \$9.987 billion, a net increase of \$432 million over fiscal year 1959. This increase will not alleviate the funding pinch on operations, maintenance, or procurement, but will be applied primarily to research and production areas, including the continued development and production tooling for NIKE-ZEUS, the Army's antimissile missile. A small increase will be applied also to the Army's reserve components' programs to support authorized strength levels for fiscal year 1960.

New Obligational Authority

Fiscal year 1959 new obligational authority for the Army was approximately \$1.6 billion higher than in fiscal year 1958. The bulk of this increase was for the procurement of "Equipment and Missiles" appropriation, since, for many years prior to fiscal year 1959, procurement was financed exclusively by unobligated balances carried over from the Korean war. (See fig.18.)

Funds vs. Requirements

The impact of limited funding in fiscal year 1959 was felt in all activities of the Army, but particularly in those financed by the "Operations and Maintenance" and the "Procurement of Equipment and Missiles" appropriations.

There were two major problems in funding for operations and maintenance during the year:

a. The unanticipated requirement to move tactical troops with supporting elements to Lebanon and Taiwan and the strengthening of forces in West Germany in view of the Berlin crisis.

b. The difficulty of maintaining minimum "standards of living" both for organizations and individuals. These standards slipped considerably during the past year from those maintained

ARMY

DIRECT OBLIGATIONS

APPROPRIATION CATEGORY AND TITLE	FY 1958 ACTUAL	FY 1959 ACTUAL (MILLION DOLLARS)	FY 1960 EST.
● MILITARY PERSONNEL			
MILITARY PERSONNEL, ARMY	3,489.1	3,501.6	3,470.7
RESERVE PERSONNEL, ARMY	205.7	213.5	231.7
NATIONAL GUARD PERSONNEL, ARMY	200.5	208.9	235.0
● OPERATION & MAINTENANCE			
OPERATION & MAINTENANCE, ARMY	3,191.4	3,086.9	3,069.9
OPERATION & MAINTENANCE, ARMY NATIONAL GUARD	133.5	140.7	151.7
NAT'L BD FOR THE PROMOTION OF RIFLE PRACTICE, ARMY	.2	.3	.3
OPERATION & MAINT, ALASKA COMM SYSTEM, ARMY	5.5	5.7	7.0
PREP FOR SALE OF SALVAGE OF MILITARY PROPERTY, ARMY	20.6		
● PROCUREMENT			
PROCUREMENT OF EQUIPMENT & MISSILES, ARMY	1,313.3	1,097.0	1,387.6
● RESEARCH, DEVELOPMENT, TEST & EVALUATION			
RESEARCH, DEVELOPMENT, TEST & EVALUATION, ARMY	801.3	1,021.5	1,101.4
● MILITARY CONSTRUCTION			
MILITARY CONSTRUCTION, ARMY	356.4	239.8	272.0
MILITARY CONSTRUCTION, ARMY RESERVE	22.7	23.9	23.0
MILITARY CONSTRUCTION, ARMY NATIONAL GUARD	15.8	14.8	15.0
CONSTRUCTION, ALASKA COMMUNICATION SYSTEM, ARMY	.2	1	.6
TOTAL	9,756.2	9,554.7	9,965.9

Figure 18

in fiscal year 1958. Operation and maintenance funds were made available to the Army at a rather constant level in the face of rising costs and more complex and costly equipment such as missiles and aircraft. Field inventories of repair parts, which have reached an unacceptably low level, will become further deficient as more major equipment is issued to troop units. This will adversely affect the operational readiness of combat troops since it will require the continued lowering of supply stocks below the levels considered necessary for most efficient operation.

Much as the Army desires to maintain its facilities in first-class condition and to avoid continued deterioration of the Army plant,

first priority in available funds must go to those functions and activities which more directly affect combat capability. As a result, the repair and maintenance backlog of facilities and equipment continues to increase. The unfunded requirements to rebuild unserviceable but repairable major items of equipment have risen from \$93 million at the end of fiscal year 1957 to \$148 million at the end of fiscal year 1959. The backlog of deferred maintenance of facilities has risen from \$80 million to \$114 million during the same period. Program objectives of the Army continue to include provisions for both holding an efficient and economic maintenance level for conventional equipment and facilities and for expanding the maintenance level to meet requirements for the new, highly complex equipment and related new facilities.

Continuous review and analysis is being conducted to maintain balance between programs and funds in order to reduce those activities which are least essential to support the Army's principal missions and to apply any savings to those activities which will contribute the most toward the accomplishment of the Army's basic missions.

The "Procurement of Equipment and Missiles" appropriation funds the procurement of longtime materiel such as guided missiles, aircraft, weapons, ammunition, and vehicles.

In fiscal year 1958 the Army drew up a comprehensive 5-year materiel plan for meeting its highest priority equipment and requirements for limited war and for support of the initial phases of unlimited war. This plan also encompassed the replacement of annual losses of equipment due to consumption, wearout, and obsolescence.

Financial support of the Army's 5-year materiel plan was not provided in fiscal year 1959; in fact, funds were barely sufficient to permit replacement of the annual loss in inventory due to consumption, wearout, and obsolescence. The quality of part of the Army's inventory of equipment was enhanced, however, by initial or continued procurement of several new missile systems and other newly developed items. We can expect that this condition will continue in fiscal year 1960, since once more funds are only about one-half the amount required for the Army's modernization plan. Thus in both fiscal years 1959 and 1960 the Army's quantitative inventory position has not and will not be improved to any appreciable degree.

IX. Conclusion

This report clearly illustrates the high return received by the American people on their investment in today's Army—an army which, during fiscal year 1959, operated on slightly more than one-fifth of the total defense budget.

There is no simple formula or panacea which can assure our national security. Our defense cannot be geared to a single weapons system, strategic concept, or combination of allies. We must create and maintain at the highest level of combat efficiency judiciously planned and apportioned military forces capable of defeating an enemy in any environment. Our national military program must be designed to deter aggression in any of its direct or indirect manifestations. However, should deterrence fail and should war in any form be thrust upon us, our forces must be designed and prepared to insure victory.

Possession of an effective intercontinental nuclear delivery system has been and will continue to be a major factor in deterring global nuclear war. However, if there is an overzealous outpouring of resources for our nuclear deterrent forces, our capability to defend against other forms of aggression must suffer. Land and sea as well as air forces have acted as a deterrent to all types of aggression and all are essential to the security of the Nation. Not only have our land forces contributed materially to the deterrence of general war but have been active throughout the free world in successfully deterring and combating limited aggression.

Within this framework the Army has four principal tasks:

First, to maintain combat-ready forces in critical areas overseas in sufficient strength to forestall aggression, or, should attacks occur, to offer effective resistance.

Second, to maintain highly mobile, combat-ready, strategic forces in the United States prepared on short notice to reinforce our oversea commands or move to the aid of our allies anywhere in the world.

Third, to provide forces on station for air defense of the United States.

Fourth, to maintain a training, supply, and mobilization base which can keep our forces in-being and our strong civilian components at peak combat efficiency.

As can be seen from this report, the Army has maintained during the past year a high state of combat readiness consistent with available resources. However, because of rapid technological advances the Army is now faced with material obsolescence in many critical areas. In fiscal year 1959 the combat potential of the Army was directly related to and limited by the size of its budget. This will also be true in the ensuing fiscal year 1960.

As we look into the future, the need for extensive advancement can be foreseen clearly. The Army is now in a position to reap the benefits of its forward-looking research and development program. If sufficient funds can be provided for the maintenance of an adequate force structure and for the procurement of newly developed equipment, the Army will take great strides forward.

Nevertheless the Army will not lose sight of the fact that it must be ready to fight with what it has. Nor will it let its present battlefield capabilities decline while relentlessly striving for weapons more suitable to the requirements of the nuclear age. Just as in the past, the Army stands ready to respond rapidly and successfully to any "Lebanons" or "Taiwans" which may arise in fiscal year 1960.

Wilber M. Brucker.

WILBER M. BRUCKER,
Secretary of the Army.

Annual Report
of the
SECRETARY OF THE NAVY

July 1, 1958, to June 30, 1959

Contents

	Page
Chapter I. INTRODUCTION.....	207
II. NAVAL OPERATIONS.....	209
III. MARINE CORPS OPERATIONS.....	226
IV. NAVAL PERSONNEL.....	233
V. DESIGN AND CONSTRUCTION OF SHIPS.....	239
VI. DESIGN AND PROCUREMENT OF AIRCRAFT.....	246
VII. WEAPONS.....	249
VIII. MEDICAL AND DENTAL SERVICE.....	254
IX. SUPPLY.....	258
X. SHORE FACILITIES.....	261
XI. RESEARCH.....	265
XII. CIVILIAN PERSONNEL.....	274
XIII. BUSINESS MANAGEMENT.....	276
XIV. CONCLUSION.....	283

I. Introduction

Each year since 1948, the United States has been forced into oversea military action by some emergency or international incident arising from direct Communist probing, Communist inspired or supported crisis, or overt attack. These actions have ranged from a show of naval strength, made during the 1958 Quemoy incident, to full-scale, all-Service combat as in the Korean war.

During the period of this report there has been continued Communist effort to disturb world peace. This persistent Communist agitation to bring international relations to the point of armed conflict was focused this year on Lebanon and on the Taiwan-Quemoy area off the China coast. At the request of the Lebanese Government, U.S. amphibious forces staged initial troop landings to assist Lebanon in meeting its internal emergency and in maintaining order in the face of threatening insurrection. Chinese Communist attempts to blockade Chinese Nationalist forces on Quemoy and the other offshore islands required a speedy concentration of naval forces to be ready for any contingency, to support U.S. policy with regard to Taiwan and the Pescadores, and to advise and assist Chinese Nationalist forces in supporting the offshore island defenders. Continuing pressure on Laos and Vietnam promises a prolonged period of Communist-incited international unrest.

The Navy and Marine Corps, in responding to these emergencies, have tested their preparedness and at the same time demonstrated the ready versatility, mobility, speed, and discrimination of the naval task force. While maintaining its capability for general warfare, this aspect of the employment of naval forces is especially valuable in carrying out U.S. commitments in limited situations.

Analysis of the current world situation defines the Far East and Near East as the border zones between Communist and free world areas. There, unsettled political conditions, mounting nationalist feelings, and aspirations for economic improvement have provided fertile ground for Communist intrigue. This strategic picture presents a highly complex defense problem, one whose solution demands intense awareness of the maritime principles involved.

On the solution of this problem, the Department of the Navy has concentrated work, planning, research, and efforts to increase the efficiency of the Navy and Marine Corps members of the defense team.

To all maritime nations, control of the seas is a vital matter—a matter of national survival if such control is contested. Throughout the history of the United States such control has been the naval mission. In this period of rapid change, control of the oceans (traditionally, their surfaces) now closely involves the deeps of the seas, the space above them, and their littorals. As interest and activity in outer space grows, that new frontier assumes increasing importance in the planning for and the future role of naval forces. The Navy and Marine Corps, fully aware of the threat implied in Communist domination in any of these areas, have continued developing forces capable of worldwide operation against these threats.

II. Naval Operations

Employment of Forces

International conditions and U.S. foreign policy are requiring the continuing worldwide employment of U.S. naval forces: The Sixth Fleet in the Mediterranean, Seventh Fleet in the western Pacific, and other Atlantic and Pacific Fleet units ready for immediate movement to any troubled area. The striking power of these forces is built around aircraft carriers, operating in conjunction with antisubmarine, amphibious, logistic, service, and other components.

Prominent among the year's operational incidents were fleet alerts and movements occasioned by the flareup of local international tensions in two widely separated areas of the world—Lebanon and Taiwan. The readiness and responsiveness of U.S. naval forces were exemplified in these incidents, which are described in succeeding paragraphs.

All operations and training exercises constantly stress the improvement of antisubmarine warfare capability. Almost continuous antisubmarine exercises, ranging from individual units to large-scale fleet operations, have been held in the Atlantic and Pacific, training personnel in the use of equipment and tactics necessary to combat the submarine threat.

During training exercises and in special cruises, naval units have "shown the flag" around the world and from the Arctic to the Antarctic, while participating in NATO, SEATO, and bilateral exercises, International Geophysical Year operations, and while supporting the missions of other U.S. armed services. In one instance, a special preview of the future was provided when on June 8, 1959, the first official "missile mail" was delivered by the submarine *Barbero* from 100 miles east of Florida via a REGULUS I missile containing 3,000 letters which landed at Mayport, Fla., after a 20-minute trip. The President's "People-to-People" program was advanced through personal contact of naval personnel with citizens of various localities, and in rescue and assistance operations to be described later.

Large-Scale Exercises

Large-scale fleet exercises were fewer this year, due to the naval operations required in the Lebanon and Taiwan incidents. It was not

until October that the Sixth Fleet resumed normal operations with Exercise CRESCENT HINGE, a simulated atomic air strike over southeast Europe. In February 1959, the Second and Sixth Fleets, operating in the western Mediterranean, conducted Exercise BIG DEAL, stressing offensive air strikes coupled with fleet air defense problems. In April, the Sixth Fleet attack carrier striking force participated in Supreme Allied Command Europe (SACEUR) Exercise TOP WEIGHT which involved atomic strike, fleet air defense, antisubmarine warfare, and amphibious air support. The Sixth Fleet's amphibious force, after withdrawing from Lebanon, continued assault landing exercises along Mediterranean shores. Various exercises in the western Atlantic helped develop procedures for tactical employment of new amphibious-type ships and provided training for midshipmen. In the Arabian Sea and Persian Gulf, the Middle East Force participated in combined exercises with allied navies, promoting closer relationships with nations comprising the Baghdad Pact parties.

In the eastern Pacific, ready attack carriers of the First Fleet conducted air defense and air strike exercises. Submarine and air opposition added realism and tested task group defenses against such enemy threats. Two large-scale amphibious exercises were conducted on the west coast, each involving two amphibious squadrons, with Marine Corps and Army troops participating in division strength. Seventh Fleet exercises in the western Pacific involved units of various SEATO nation navies.

Special Operations

Lebanon

On July 14, 1958, President Chamoun of Lebanon requested the assistance of U.S. armed forces in maintaining orderly government in that country. The response to his request set in motion a number of fleet operations.

The U.S. decision to land troops in Lebanon was made the same afternoon. The Chief of Naval Operations, acting for the Joint Chiefs of Staff, immediately ordered Commander in Chief Naval Forces Eastern Atlantic and Mediterranean (CINCNELM) and Commander Sixth Fleet (COMSIXTHFLT) to sail the Sixth Fleet to the eastern Mediterranean and to land Marines in Lebanon at 1500 (Beirut time), July 15. The landing was made as scheduled, and U.S. Marines secured the local airfield in preparation for the airlift of U.S. Army forces from Germany. On July 16, CINCNELM assumed overall command of the operation as Commander in Chief Specified Command Middle East (CINCSPECOMME). A second battalion of Marines was landed by Amphibious Squadron 2 on July 16, a third by Amphibious Squadron 4 on July 18. More Marines were transported

from the United States, with immediate support being provided by 847 Marines airlifted from Cherry Point, N.C., and reaching Beirut on July 20.

Task Force 23, including the carriers *Forrestal* and *Randolph* and two destroyer divisions, was organized and stationed off the Virginia capes. Task Force 24, in the northern European area with the midshipmen embarked, continued scheduled visits but prepared for rapid movement if necessary. Both task forces joined forces in mid-Atlantic on July 30 and returned to east coast ports as Middle East tensions subsided. In a preparatory move, an augmented amphibious squadron plus a carrier, organized as Task Group 44.0, lifted two Marine battalion landing teams plus miscellaneous air units to the Caribbean area for training, but as the emergency in Lebanon abated this group was soon disestablished.

With the arrival of all scheduled Army combat units early in August, the Marines commenced reembarking in their transports to provide a ready reserve afloat. Phasing out of all naval and military forces commenced in October, and on October 25 SPECOMME was inactivated, with operational control passing to CINCNELM.

Sixth Fleet airpower was reduced temporarily in August when the carrier *Essex* was sent to reinforce the Seventh Fleet in the Taiwan area, but was strengthened with the arrival of *Forrestal* and *Randolph* in September. In the meantime, all Pacific Fleet ships had been alerted and placed on short sailing notice, and antisubmarine and air-early-warning patrols were increased. The Eastern Pacific/Middle Pacific Ready Force of three attack carriers and two antisubmarine aircraft carrier task groups was activated for emergency deployment. *Lexington* and six destroyers moved to the western Pacific; *Yorktown* and some amphibious units moved to Hawaii. By August 1 the Pacific Fleet, except in the western Pacific, had resumed normal operations.

Only two attack aircraft carriers were deployed in the western Pacific on July 15, but with the arrival of the *Lexington*, Commander Seventh Fleet was able to keep two carriers continuously at sea while all three rotated periods of port availability. After the Lebanon alert, *Essex* sailed from the Mediterranean on August 23, and joined Seventh Fleet operations off Taiwan.

Taiwan

On August 23 the Chinese Communists commenced heavy shelling of the Kinmen Island complex off the China coast west of Formosa. The Chinese Nationalists at the same time increased their naval activity in the area. Seventh Fleet forces, including three Attack Carrier Task Groups plus cruisers and destroyers, moved to the

Taiwan area until the situation clarified. A basic problem was whether or not to furnish assistance in the effort to resupply the Kinmen Island complex, where conditions became critical in mid-September. U.S. patrol and escort of Chinese Nationalist supply craft was restricted to international waters. The Chinese Communists executed a temporary cease-fire in October, and early in November resumed their shelling on odd-numbered days only, which had the effect of reducing tension in the western Pacific area and resulted in a gradual reduction of the U.S. forces involved. By December, Commander in Chief Pacific Fleet officially reverted the western Pacific area to its normal condition of readiness.

Operation HARDTACK

A series of atomic tests was conducted from April through August at the Eniwetok proving grounds and Johnston Island by Joint Task Force 7, which included 27 surface ships and 31 patrol aircraft and helicopters.

Evacuation from Nicaro, Cuba

Conflict between the Cuban Army and rebel forces in this area on October 22 endangered lives of Americans at the Nicaro nickel mine owned by the United States, and resulted in a State Department request for their evacuation by the Navy. Air evacuation was considered unsafe due to small-arms fire at the local airfield. On October 24, the *Kleinsmith* (APD 134) picked up 59 persons, unassisted and without incident. Additional ships were available in the area if needed.

Virgin Islands Inaugural

The destroyer *Blandy* represented the Navy at the September 25 ceremonies installing the Honorable John D. Merwin as Governor of the Virgin Islands. On the following day, *Blandy* transported the new Governor and his party to St. Croix for additional ceremonies there.

Submarine Operations

On October 6, 1958, the nuclear submarine *Seawolf* completed a continuous submerged run of 60 days during which she demonstrated the ability of such craft to conduct unrestricted operations while completely submerged. The crew lived under artificial atmospheric conditions with no adverse effects. Nuclear submarines *Skate* and *Seawolf* each had previously conducted submerged operations of more than 30 days' duration. Both *Nautilus* and *Skate* completed transits under the Arctic ice cap to reach the North Pole.

Antarctic Operations

Logistic support operations for Operation DEEP FREEZE IV began in October. Within a month, aerial resupply and the airlift

of relief personnel scheduled to spend the winter there had been completed by aircraft of the Military Air Transportation Service and Air Development Squadron 6. The icebreaker *Glacier*, first of nine participating ships, reached McMurdo Sound on November 10 after working through 600 miles of severe pack ice. Another, the *Edisto*, later freed the Belgian ship *Polarhav* from pack ice and assisted the *John Biscoe* in resupplying British bases on the Palmer Peninsula. The Antarctic program of the International Geophysical Year was completed on December 31. Research programs continue at Byrd Station, Pole Station, Camp Hallett Station, and the McMurdo Sound base. All Antarctic resupply operations ended on April 10, 1959.

Transatlantic Cable Breaks

Following breaks in five transatlantic cables late in February 1959, the destroyer escort *Roy O. Hale* boarded the Soviet fishing trawler *Novorossisk* off Newfoundland to determine if she had been responsible. Although the trawler had been operating in the trouble area, her master disclaimed knowledge of the cable breaks.

Attacked Aircraft

On June 16, 1959, a U.S. Navy P4M patrol aircraft flying over international waters off North Korea was severely damaged by two MIG-type (Soviet) fighters. The plane landed safely in Japan with one man wounded.

Operation Inland Seas

Celebrating the opening of the St. Lawrence Seaway, a task force of 26 ships and embarked amphibious troops operated in the St. Lawrence and the Great Lakes for about a month during June and July 1959. The value of opening U.S. inland ports to the sea was strikingly demonstrated, and thousands of people had an opportunity to see their Navy-Marine Corps team in action for the first time.

Humanitarian Operations

In early October the cruiser *Helena* used helicopters and boats to rescue passengers and crew of the Norwegian ship *Hoi Wong*, aground in the Paracel Islands. Heavy December rains in Morocco flooded miles of land near the U.S. Naval Facility at Port Lyautey. Naval personnel aided disaster victims with food and money and used the only available helicopter in surveys, rescue work, and food lifts. At about the same time, fire destroyed half of the Japanese town of Koniya in the Ryukyu Islands and the carrier *Yorktown* and seven destroyers furnished food, clothing, and shelter equipment.

For 10 days in April, the U.S.S. *Edisto* provided food and medical aid to assist the Government of Uruguay in flood relief operations.

During the first 6 months of fiscal year 1959, 37 ships of the Military Sea Transportation Service (MSTS) gave assistance at sea, including 16 search or rescue missions.

Operational Readiness and Capability

Air Offense

The Navy's striking forces, composed of attack carriers, guided-missile ships, cruisers, and destroyers, are powerful combinations of units trained in all the skills and tactics of modern warfare. Aircraft and guided missiles which seek out the ultimate targets are the heart of these forces. The combat aircraft assigned to attack carrier forces comprise fighters, heavy attack bombers, and light attack bombers. Fighters, normally used defensively as interceptors, can turn offensive and deliver bombs when speed is essential. Heavy attack bombers can deliver nuclear weapons over ranges of 1,000 miles in any weather. Light attack bombers, refueled in flight, can carry nuclear and conventional weapons to long ranges for accurate delivery in visual weather conditions.

New all-weather attack planes are under development. The A3J will provide the option of high speed and altitude performance with low-level attack capability. The A2F will be equipped for accurate low-level attacks necessary in close support. The air-to-surface missile BULLPUP, highly reliable and accurate and designed for use by light attack aircraft in close troop support and interdiction missions, was deployed operationally in the Pacific Fleet in April 1959.

The first nuclear-powered carrier, *Enterprise*, is presently scheduled for completion in September 1961. *Independence*, fourth *Forrestal*-class carrier, was commissioned during the year, and *Ranger*, third of that class, was assigned to the western Pacific in her first deployment.

Carrier operating efficiency, and consequently, air strike capability, continues to improve. The mirror landing system has greatly reduced major accident rates. A newer lens-type optical landing system proved highly successful in its operational evaluation aboard *Ranger*, and will go into carriers now building. An automatic carrier landing system, which lands planes without pilot control and offers increased all-weather capability, will go into all new carriers plus *Midway*- and *Forrestal*-class ships.

Investigations of nuclear power for aircraft progressed through design and operational analysis studies. An operational nuclear-powered subsonic turboprop seaplane would be the next step in such development, to provide experience factors on which to assess its sea-air power potential. By using existing seaplanes, it is expected that this program could reach flight-test stage in 5 or 6 years.

Air Defense

Fleet air defense is accomplished by modern ships equipped with long-range radar and surface-to-air missiles, high-performance interceptor aircraft equipped with air-to-air missiles, and communications equipment designed for control of widely dispersed task formations. The defensive capability of naval forces is supported further by their mobility and by their ability, while widely dispersed, to conduct coordinated operations. As can be seen, the adequacy of air defense is directly influenced by the degree to which modern high-performance equipment can be applied to it.

Guided missile systems, now operational and contributing to such defense capabilities, include both surface-to-air and air-to-air categories. Operations of the *Boston* and the *Canberra*, both TERRIER missile cruisers, and the *Gyatt*, a guided-missile destroyer, have increased the experience level of missile ship crews and of fleet forces in general. The cruiser *Galveston*, first ship with long-range surface-to-air guided missiles (TALOS), has completed technical evaluation.

The air-to-air missiles SPARROW III and SIDEWINDER 1A, both operational, have deployed with fleet squadrons. Their performance and reliability is being improved. SIDEWINDER production has been accelerated to meet U.S. and allied needs, and development of improved versions of this missile is underway.

A nuclear-powered missile cruiser now building will carry TERRIER and TALOS surface-to-air missiles and is scheduled for completion in October 1960. Undergoing conversion for either TALOS or TERRIER missiles are five World War II light cruisers, and three World War II heavy cruisers are being altered to carry TALOS and TARTAR missiles. Keels were laid for additional TARTAR destroyers and TERRIER frigates, and space could be made available for a POLARIS missile launching system in several guided-missile cruisers, should this system be approved for future adoption.

The TARTAR is completing development as a small, short-range missile suitable for destroyers and for secondary battery use on large ships. This missile can home on aircraft at extremely low altitudes. The first TARTAR destroyer will be commissioned in September 1960 and 18 TARTAR destroyers have been authorized.

The EAGLE, a long-range air-to-air missile system now under development, is calculated to overlap the service life of the SPARROW III/F4H system. EAGLE, plus improved airborne radar and greater aircraft endurance, will enable a combat air patrol to assume most of the outer perimeter air defense beyond the range of surface-to-air missiles. It is planned for all CVA attack carriers.

Greater air defense capability for task forces is promised by the F4H-1 all-weather fighter and the WF-2 airborne early-warning

(AEW) plane, now under evaluation. Both are carrier based. The F4H-1 has far exceeded the speed of sound and has zoom climbed over 80,000 feet with normal armament of four SPARROW III missiles. Radar carried by the WF-2 offers improved target detection plus target height determination, heretofore impossible with carrier-based AEW planes. Both planes are scheduled for fleet use in the calendar year 1960.

The new AEW long-endurance airship, ZPG-3W, first flew on July 21, 1958, and reached the fleet near the end of the year. Meanwhile, various existing aircraft are being improved through visual-assist radar, infrared detection equipment, and reduced susceptibility of fire control radar to enemy electronic countermeasures. Combat direction in fleet air defense will be improved by a new naval tactical data system. The Naval Electronics Laboratory is testing a development model and fleet operational evaluation will commence in 1961.

Naval air defense units continue to serve in provisions for continental air defense as well. Operational plans assigned Navy interceptor squadrons as augmentation forces for U.S. air defense, while airborne early-warning aircraft and radar picket destroyer escorts extend the Distant Early Warning (DEW) line to sea. Ocean station radar pickets comprise the surface portion of the seaward extension of the contiguous radar coverage.

Antisubmarine Warfare

The greatest challenge to U.S. control of the sea is the threat of enemy submarines. Improvements in the capability of antisubmarine forces have been offset by the increased submerged speed and endurance of modern submarines. The possibility of destructive submarine-launched missile raids on coastal cities gives the problem an urgency not known in preatomic years.

Every possible means of defeating submarines is being investigated. Measures of countering them fall into two broad phases: Destruction of home bases, building yards, and support facilities, and defeat of the submarine at sea. This second and most difficult task requires time, assorted electronic equipment and weapons, varied force components, and widely deployed forces.

The four phases of the search for and destruction of the submarine are *detection, localization, classification* (including identification), and *kill*. Improvements in all phases have been realized during the past year, and research and development have pointed the way to further advances. It should be pointed out that, thus far, the water medium has proven much less permeable to detection devices than has the atmosphere. Sound has been, and for the foreseeable future will con-

tinue to be, a most important means of *detection* of submarines. An intensive research and development program is under way in this field and in the related areas of oceanography and hydrography. Significant improvements are being realized and new items of sonar equipment, both shipborne and airborne, have been produced and either are being installed or evaluated. Considerably longer detection ranges will be obtained with them.

Localization ability has been enhanced by these new sonars, and this is particularly true of the new aircraft systems. An improved helicopter-dipping sonar, with excellent detection and localization capabilities, is undergoing evaluation also.

New equipment and techniques have increased the ranges and probabilities of *classifying* a target as a submarine and of identifying it as "friendly" or "nonfriendly," although not to the levels required. Continued research and development is required in these areas at a high priority, next after that devoted to detection.

Our antisubmarine weapons are progressing markedly in range, speed, depth, and probability of hit. Improvements are being achieved in homing torpedoes, with either atomic or conventional explosive warheads, and in atomic depth bombs. Rocket-assist, as employed in ASROC (a ship-launched, rocket-assisted homing torpedo), is being provided in several of these weapon types in order to project them to extended ranges which match the increased sonar ranges and, thereby, to provide an early attack capability.

New and better antisubmarine ships are being built, although not at a rate sufficient to compensate in numbers for those becoming obsolescent. A Fleet Rehabilitation and Modernization Program is giving emphasis to extending the life of existing destroyer types. Additional information on antisubmarine warfare ships and weapons is set forth in chapter IV.

Replacement of all antisubmarine aircraft types, except seaplanes, has just commenced and will be continued at an increasing pace each year until completed about 1965. The P2V long-range, land-based patrol plane will be replaced by the P3V (modified Electra) which has much greater speed, capacity, range, and endurance. The S2F-3 (modified Tracker) will provide similar advantages over the S2F-2, and the HSS-2 represents a marked advantage over the HSS-1 and -1N. The HSS-2 is an all-weather, twin-turbine, amphibious helicopter which, with the S2F-3, will operate from the antisubmarine carriers (CVS's). The destroyer-based helicopter concept (Dash) has been basically evaluated, and more advanced installations will begin operational tests in 1960. Chapter V contains more detail concerning these aircraft.

The new nuclear-powered submarines, with their high speed, maneuverability, and greatly extended endurance, will themselves be

especially potent antisubmarine weapons systems. Attention has been given to the provision of realistic training aids and substitutes for the services of actual submarines, which are in great demand and short supply. Two types of submarine simulators have been developed, and a large cylindrical tank which was employed in certain atomic tests has been moored in deep water about 45 miles southwest of Point Loma, Calif., to provide a practice submarine target. If successful, similar targets probably will be moored at appropriate locations.

Organizationally, the direction of the antisubmarine warfare effort has been centralized and strengthened considerably within the Office of the Chief of Naval Operations and in the technical bureaus and the Office of Naval Research. To provide greater top-level civilian and military concentration on the total program and its problems, the Secretary of the Navy, on November 17, 1959, established the Navy Antisubmarine Warfare Committee. The membership comprises the Secretary of the Navy (Chairman); the Under Secretary of the Navy; the Assistant Secretary of the Navy (Research and Development); the Chief of Naval Operations and Deputy Chiefs of Naval Operations; the Chiefs of the Bureau of Naval Weapons, Bureau of Ships, and Naval Research; and the Directors of Naval Intelligence and the Long Range Objectives Group in the Office of the Chief of Naval Operations.

In the operating forces, additional special antisubmarine task groups have been formed in the general model of the well-known and highly successful Task Group Alfa. In the Atlantic, these are Task Group Bravo, which is almost identical to Alfa, and Task Group Charlie, which is composed of destroyers and patrol aircraft and is engaged primarily in escort-of-convoy tactical development. From time to time, as the availability of trained units permits, one or two other Atlantic Alfa-type groups are formed for advanced training and exercises. In the Pacific Fleet, a program is under way which, by April 1960, will provide an antisubmarine organization very similar to that in the Atlantic. At present there is one semipermanent hunter/killer group in the Pacific. This soon will be increased to two, plus a third group about half the time, depending on the availability of the component elements.

Submarine Warfare

A strong, balanced submarine force is an integral part of the Navy. Its primary mission is the destruction of ships, particularly submarines, and it thus forms an important component of antisubmarine strategy. Typical of submarine progress, its missions also include missile strikes, radar picket, reconnaissance, mining, aircraft refuel-

ing, support of underwater demolition team operations, and troop carrying.

Most U.S. submarines were built during World War II. The present building program, while designed to forestall potential mass obsolescence, places emphasis on superior offensive capability and constant readiness to perform assigned missions, rather than the weight of numbers alone.

Six new submarines joining the fleet included the nuclear-powered *Sargo*, *Swordfish*, and *Skipjack*. *Skipjack*, the first submarine combining nuclear propulsion and advanced hydrodynamic design, completed builder's trials and is the fastest underwater craft in existence. Four more submarines were launched, including the nuclear-powered *George Washington*, first fleet ballistic missile submarine. Still building are 18 nuclear-powered and 5 fleet ballistic-missile submarines.

The nuclear-powered submarines continued to demonstrate their spectacular operating ability. While developing their own capability for antisubmarine warfare, they have helped other units develop tactics against enemy nuclear submarines. The *Nautilus*, during the course of a 1,700-mile 97-hour passage under the Arctic ice pack, reached the North Pole on August 3, 1958. For this historic feat she received the first Presidential Unit Citation awarded in peacetime. The *Skate* reached the North Pole less than 10 days later, operated under the ice pack for 10 days, and surfaced near the pole. She again conducted under-ice operations later in the year, and on March 17 surfaced at the North Pole to conduct memorial services for famed Arctic explorer Sir Hubert Wilkins, who first attempted polar submarine navigation. Fulfilling the request of his widow, Lady Suzanne Wilkins, his ashes were scattered at the pole.

Amphibious Forces

Existing amphibious shipping, about 75 percent of which is World War II construction, is rapidly approaching obsolescence. This deficiency is of special concern as it affects the Navy's ability, either in limited war or general hostilities, to move U.S. ground forces into trouble areas. An adequate substitute for amphibious lift will never be fully supplied by airlift. This was proved during the Lebanon incident, when restricted flyover rights and saturated terminal facilities critically delayed airlift operations. More and faster ships are needed to provide the "anywhere, anytime" amphibious capability which offers the Nation's most evident and effective response to threats of limited war. Yet, high shipbuilding costs and low annual replacement programs widen the gap between current modern amphibious shipping inventory and the minimum future goal.

On April 2, the keel of the first amphibious assault ship (LPH) built as such, the *Iwo Jima*, was laid down. It will be an important contri-

bution to amphibious capabilities. It was necessary, on the other hand, to inactivate four assault transports during the year to provide part of the crews for the carriers *Boxer* and *Princeton*, which were redesignated as LPH's.

Mine Warfare

Minelaying forces, aircraft and submarines, are kept in a high state of readiness. The principal mining aircraft, A3D and P2V types, require consistent fundamental training to keep mining capability alive. Development of new types of mines with increased reliability and effectiveness has progressed satisfactorily, although economy considerations have deferred stockpiling them. Mines presently in stock have been improved as the result of mining exercises.

Three new minesweepers were added to mine countermeasures forces during the year and tests of helicopters have proved it feasible to use them as high-speed minesweepers. Existing units, trained in all phases of mine countermeasures against known mines, provide a minimum peacetime force. Materiel readiness continues to increase, and new and improved equipment designed to eliminate existing deficiencies is under development.

Harbor Defense

A small harbor defense program, approximating 1,300 officers and men, provides a base of trained personnel from which to expand when and if necessary. Harbor defense exercises on both coasts have included Reserve Harbor Defense Divisions as part of their regular drills. Research and development is in progress to improve and extend capability in this field.

Fleet Ballistic Missile System

Consisting essentially of POLARIS missiles, nuclear-powered launching submarines, and logistic support facilities, the fleet ballistic missile system will provide a practically invulnerable retaliatory weapon, independent of foreign bases. This high-priority program has been accelerated, looking toward operational employment in 1960 instead of the previous 1963 goal. As mentioned previously, the first six POLARIS submarines are under construction and three more will be started soon.

Development of the POLARIS missile is on schedule. Flight tests of a full-scale missile commenced September 27, 1958. Solid propellants have proved satisfactory in static tests of large-scale engines. Launching techniques have been developed; the first practical underwater launching test occurred March 23, 1958.

The test ship *Compass Island* has been evaluating new navigational equipment and obtaining the precise navigation data required for

POLARIS use. The U.S.S. *Observation Island* has completed her shakedown, preparatory to employment as a test ship for the POLARIS weapon system.

Support Readiness and Capability

The increasing age and declining efficiency of active underway-replenishment ships are generating future problems in maintaining sufficient capability for sustained support of deployed fleet units. One POLARIS submarine tender is included in next year's building program, but many more modern mobile logistic support ships will be needed to arrest obsolescence of fleet support.

A number of tankers in the nucleus fleet of the Military Sea Transportation Service have been fitted for limited fuel transfer at sea. Continuation of this program will provide 34 tankers, altered so as to provide what is the only expeditious means of refilling fleet underway-replenishment oilers. The Bureau of Ships and the Bureau of Supplies and Accounts are developing new cargo-handling techniques and equipment for replenishment at sea.

Military Sea Transportation Service (MSTS)

MSTS provides ocean transportation for all Department of Defense personnel and their dependents, fuel, cargo, and mail (excluding that carried by fleet units), and furnishes services to other Federal agencies as determined by policies of the Secretary of Defense. During the year it engaged also in oceanographic surveys and in operations supporting missile test ranges, ocean radar stations, and military stations in the Arctic.

Through continued reductions, the MSTS nucleus fleet reached a total of 151 ships and craft, the smallest since July 1950. These reductions were caused principally through reduced military commitments in oversea theaters, combined with service policies to rotate their personnel by air transportation. Twelve transports were rendered idle and placed in a ready reserve status during various periods of the year. Forecasts for the coming year indicate that this downward trend will continue. It may necessitate the permanent layup of some transports, which will result in reduced capability to meet mobilization emergency requirements.

MSTS operations produced gross income of \$423 million, \$47 million less than last year. Tariff adjustments reduced this figure to approximately \$412.0 million. More than \$324 million—approximately 79 percent of MSTS expenditures—were paid to commercial interests. MSTS lifted 12,394,519 measurement-tons of cargo, 556,586 passengers, and 16,669,660 long tons of petroleum. About 76 percent of the cargo and 53 percent of the petroleum, oil, and lubricants were moved in American-flag ships.

Naval Observatory

The Naval Observatory continues the work which has made it one of the world's foremost astronomical observatories. Capabilities of the observatory are constantly utilized in many aspects of the space effort, particularly in the computation of orbits, in mathematical astronomy, and in the fields of time and absolute frequency. The Nautical Almanac Office, in addition to its usual navigational publications and the American Ephemeris, has undertaken calculation and production of the annual ephemeris issued for surveyors by the Department of the Interior, and has commenced computation of "Sight Reduction Tables for Air Navigation, Vol. 1, for Epoch 1965.0." The Time Service Division can now supply time measurement accurate to one-thousandth of a second. The first atomic time system in the world has been established, and corrected time signals are now issued with respect to atomic time as well as universal time. This Division will commence transmission from the Navy Radio Station, Summit, C.Z., in December 1959.

The Observatory has continued astronomical programs involving observations of double stars, electronic amplification of low-light intensities, and positions of the sun and other solar system members. It is participating in an international plan to chart 21,000 reference stars in the Northern Hemisphere, and is charting the marginal zone of the moon.

Hydrographic Office

Continuing to supply the Navy and the merchant marine with nautical and navigational aids, and supporting other Department of Defense activities, the Hydrographic Office has also strengthened relations with similar agencies throughout the world and is collaborating with the International Hydrographic Bureau. Several navigational surveys in the Johnston Island area were completed and a survey of the Northern Bahamas was initiated. A revised edition of "The American Practical Navigator" (Bowditch) was issued, as were 36 new charts and 37 new editions of existing charts. The airborne magnetic survey program for ocean areas was deferred, and project aircraft were diverted to classified programs of high priority. Sixteen new aeronautical charts and 14 new editions of such charts were produced. Continued liaison with the Air Force in publications of joint interest has resulted in money savings and reduced requirements.

Through special chart productions, hydrographic surveys, ice reconnaissance and forecasting services, and the assignment of special personnel, the Hydrographic Office supported Arctic resupply and submarine operations and aided DEEP FREEZE IV operations in the Antarctic. Missile programs were supported by special charts

and surveys; undersea warfare programs by development of oceanographic forecasting and sonar prediction surveys and a special-purpose antisubmarine warfare chart; and aviation programs by production of air-targeting materials, special seaplane studies, and Hydrographic-Oceanographic Data Sheets.

Communications Support

The possibility of sudden emergencies, emphasized by ballistic missiles and nuclear weapons, demands reliable, rapid communications systems. Like ships, however, and in the face of an increasing traffic load, most communication equipment is the overage World War II type, is expensive to maintain, and lags behind the rapid advance of the weapons systems it must support.

In May 1959 automatic switching went into operation with service between both coasts. A very-low-frequency station now building at Cutler, Maine, should be completed in 1962.

Programs designed to increase the reliability, speed, and security of naval communications are in progress. Installation of single sideband equipment is planned for tactical communications with widely dispersed forces, and will increase range at no added cost in power, weight, or space. Line-of-sight communications, especially for ship-to-air and air-to-air use, continue to rely on double sideband equipment in the ultra-high-frequency (UHF) range, and this is being improved through increased power and rapid frequency-shifting features.

Communications with submarines, especially POLARIS submarines, is under intensive study. The new station in Maine will greatly extend the range of submerged radio reception and provision of similar capability on Guam is being investigated. Promising prospects for two-way communication with submerged submarines are being found in long-range underwater sound in the audio frequency band and in improved submarine antennas.

Shore system landline (wire) circuits are being replaced by microwave radio where security or economy is increased, and some shore circuits have been converted to the single sideband technique with increased transmission speeds and reliability. Presently under test, and expected to prove 100 percent reliable, is the communication moon relay, using the moon as a radio reflector when it is above the horizon of communicating stations.

Material Readiness

Material Condition

Progressive material deterioration continues in the fleet. The rate of significant failures in ships of the fleet has quadrupled since 1955.

For the fiscal year 1959, 72 percent of the ships inspected by the Board of Inspection and Survey were found unsatisfactory.

Over 80 percent of the active fleet comprises World War II ships. Aging, they require more maintenance; yet labor and material costs increase faster than do funds allocated for maintenance. More operations, at higher speeds with fewer ships, increase maintenance requirements while reducing maintenance time. Adding to the problem, personnel experience levels are not perceptibly improving.

The Fleet Rehabilitation and Modernization (FRAM) Program, initiated to arrest this deterioration, provides for the planned rehabilitation and modernization of 255 World War II ships over a 4-year period. Funds have been appropriated for the fiscal year 1960 for a first increment of 34 ships. In addition, all active fleet ships reached in the regular overhaul schedule receive thorough overhauls, even at the expense of deferring other ships scheduled for later overhaul. In all, 400 ships started overhauls during the year, 116 of them in commercial yards.

Military Improvements

Only the most urgent improvements in the fields of antisubmarine warfare, air defense, electronic countermeasures, submarine warfare, and replenishment at sea were accomplished. Other items were deferred to provide additional overhaul money. The program to improve ship habitability was limited to essential air conditioning for ships assigned to hot and humid areas and to health and sanitation items in a few ships.

Mobilization Posture

Reserves of personnel, ships, aircraft, material, and facilities are essential for emergency augmentation and are constantly reviewed to determine those requiring priority treatment. Reserve mobilization capabilities can now provide approximately 120,000 Ready Reservists, plus 46 antisubmarine warfare ships and 25 fleet-size air squadrons from the reserve training organization, for immediate active duty in a national emergency.

Financial factors have permitted little improvement in the general readiness of Reserve Fleet ships; only nine destroyers were modernized and overhauled this year and these austere. Ships with high mobilization priority have been identified, so that available funds and manpower can be used where most productive.

The mobilization potential of naval aviation depends primarily on Selected Reserve units. Such units, for antisubmarine carriers and Marine air wings, require minimum additional training for effective augmentation of active forces. Antisubmarine units of highly ready

patrol aircraft and carrier-based aircraft provide immediate resources for air antisubmarine forces. Reserve transport and air support squadrons are ready for prompt employment.

Oversea base support capability shows minor improvement. Planned mobilization development is minimum and flexible; high-priority sites required in various contingencies have been identified. All mobilization planning has been carefully scrutinized, objectives clarified, priorities established, and requirements placed on an austere, realistic basis.

III. Marine Corps Operations

The U.S. Marine Corps provides a compact, versatile striking force, uniquely qualified to fulfill the expeditionary needs of our maritime nation. The Fleet Marine Force, by nature and by design, is an integral element of seapower. Its landing forces are deployed and deployable on the high seas as components of the fleets. These landing forces, with integrated skills for land and air combat, can be projected readily and flexibly as national policies dictate. The Marine Corps is dedicated to the principles of economy, effectiveness, and responsiveness. These are the assets the Marine Corps strives to refine; these are the attributes of a force-in-readiness.

Employment of Forces

The Fleet Marine Forces, three Marine divisions, and three Marine aircraft wings, together with their supporting force elements, remain capable of meeting requirements for limited war and the initial requirements of general war tasks. The current and projected deployments of these division/wing teams, their supporting forces, supplies, and equipment support the national strategy of maintaining ready, mobile forces suitably deployed to be responsive instantly to such international crises as may arise. Those elements of the Fleet Marine Forces located in the western Pacific and the Mediterranean areas are prepared for immediate commitment to combat and are backed by substantial forces on both the east and the west coasts of the United States which are equally ready for deployment and entry into combat. The Marine Corps continues to develop further and emphasize the doctrine of initial entry into combat via amphibious vertical envelopment.

During the past year, in furtherance of maintaining the instant combat readiness of the Fleet Marine Forces, two significant achievements have been made. The organization of Amphibious Squadron 10 by the Navy has given the Marine Corps a vehicle which will permit more rapid surface deployment of elements of the air-ground team to troubled areas. Additionally, transoceanic flights by Marine Corps jet aircraft have demonstrated the ability of this component of the air-ground team to deploy immediately over long distances for the support of Marine ground units.

Rapid response by Marine Corps forces to the directives of the President during the Lebanon crisis aptly demonstrated the effective-

ness of the balanced fleet with embarked Marine Corps forces as a vital, flexible element of national strategy. The ability of the balanced fleet to project naval power ashore in the precise degree of force required and to sustain that force ashore continues to assure the United States of a capability quickly responsive to international problems.

Marine Corps Objectives

To maintain the Fleet Marine Forces at maximum efficiency and peak readiness, the Marine Corps continues to place primary emphasis on attainment of adequate force levels for the effective manning of combat elements; provision of the fast, modern amphibious shipping required for vertical envelopment tactics; and lightness and flexibility in both organization and equipment. Continued lower personnel strengths have caused temporary reduction of some elements of the Fleet Marine Force to cadre status. Specifically, six battalion landing teams have been so reduced and Marine aviation elements were reduced by the equivalent of six squadrons. The net effect of this loss has been to decrease the combat effectiveness and staying power of each division and aircraft wing by about 20 percent.

Marine Corps capabilities for amphibious operations are directly proportional to the capabilities of amphibious shipping. The modern concept of amphibious vertical envelopment requires shipping different from the World War II types which were developed for over-the-beach amphibious operations. As a partial solution, the U.S.S. *Boxer* and the U.S.S. *Princeton* have been maintained in the active fleet as interim amphibious assault ships, with Marines contributing to their complements. For a satisfactory solution, there should be sufficient fast, modern amphibious types to provide in the active fleet a simultaneous lift for two Marine division wing teams.

Study and evaluation of the organization and equipping of the Fleet Marine Forces continue, to insure that they will keep pace with the requirements of rapid commitment to either general or limited war situations. Included in this study and evaluation is specific consideration of the reorganizational steps required to accomplish early reactivation of certain Fleet Marine Force units which are now in cadre status. Greater flexibility with newer, lighter, and more effective equipment is a principal objective. Concurrently, improvements in the expeditionary characteristics of Marine aircraft wings are being pursued, including the ability to move ashore rapidly and operate modern jet aircraft from short airfields.

Operations and Training

Operating forces of the Marine Corps constitute 63 percent of Marine Corps strength and are comprised of the Fleet Marine Forces, Security Forces, and Ship's Detachments.

The Fleet Marine Forces consist of three Marine divisions and three Marine aircraft wings, together with necessary headquarters, combat support, and service units. Approximately two-thirds of the Fleet Marine Forces are assigned to the Pacific Fleet and one-third to the Atlantic Fleet. These forces provide the fleet commanders with the means of projecting naval power ashore, wherever and whenever required.

Marine Security Forces have assumed increased commitments in providing security for newly constructed special weapons storage sites, although their overall strength has been reduced. This was accomplished by replacing Marines with civilian guards and deactivating several Marine barracks. Marine detachments afloat increased by two during the year, with the activation of detachments for the amphibious assault ships *Boxer* and *Princeton*.

Certain operations this year deserve special mention as examples of Fleet Marine Force readiness. At the beginning of the year, a provisional Marine force consisting of three battalion-landing-teams was embarked in fleet units in the Mediterranean. When the situation in Lebanon deteriorated, these Marine landing teams were dispatched to Beirut on July 15 and the first landing was accomplished within 15 hours of the time that the order had been communicated to the commander of the Sixth Fleet. Within 3 days all the battalion-landing-teams had landed, secured the northern, eastern, and southern approaches to the city, and established effective security over the airport, harbor, and port facilities and the American Embassy in Beirut. By mid-December all Marine forces committed in Lebanon had returned to the continental United States, except for the single battalion-landing-team routinely maintained afloat in the Mediterranean.

In late August 1958 when the Chinese Communists threatened the offshore islands, Marine Aircraft Group 11 was deployed from Japan to Taiwan to augment air defense forces there and to provide fighter augmentation for the Seventh Fleet. By September 1 this group was performing limited air operations, and by September 8 was fully operational from its new base at Ping-Tung, Taiwan. Of interest is the fact that during the period it operated in Taiwan, personnel of the group provided training and technical assistance to Chinese Nationalist pilots which later permitted them to employ SIDE-WINDER missiles successfully in air combat against Communist aircraft.

To maintain an adequate air defense in Japan, Marine Aircraft Group 13 was deployed from Hawaii to Atsugi, Japan, to replace Marine Aircraft Group 11. A significant feature of this deployment was the transoceanic flight of 24 of the group's combat aircraft, accomplished through the utilization of inflight refueling en route.

MAG 13 redeployed to its home base in March 1959 preliminary to the return of MAG 11 to Atsugi in April.

Progress in conducting operations under the modern amphibious warfare doctrine was highlighted by the aforementioned redesignation of aircraft carriers *Boxer* and *Princeton* as amphibious assault ships. This constituted the first major step toward creating a modern amphibious capability in both oceans. Also, the Fleet Marine Force, Atlantic, has formed a special force, a Provisional Marine Brigade, which is maintained in constant readiness to mount out rapidly, and is specifically designed for embarkation in fast, modern amphibious shipping, including the amphibious assault ship.

The Fleet Marine Forces are in a high state of combat readiness, and have completed a cycle of amphibious training which commenced with small unit training and progressed through major amphibious exercises. Since the *Boxer* joined the Amphibious Force, Atlantic Fleet, in January, a series of six helicopter-launched brigade amphibious exercises has been conducted. Atlantic and Pacific amphibious exercises totaled 25—18 at the battalion-landing-team/helicopter squadron level, 6 at the regimental-landing-team/air group level, and 1 at the division/air wing level. Additionally, the battalion-landing-team in the Mediterranean conducted about 12 practice landings including joint, NATO, and unilateral amphibious exercises.

Reserve training included the assignment of individual reservists to periods of active duty for training in Marine Corps formal schools and with regular Marine Corps units, with organized units and elements of other services, and in extension courses and other nonpay training programs. Reserve unit training, normally consisting of 24 or 48 drills, was reduced to 23 or 46 drills to reduce expenditures. In addition to these drills, all units conducted 15 days of annual field training. Emphasis was placed on unit training exercises and field maneuvers, and within the various Reserve Districts, exercises combining aviation and ground units were conducted whenever possible.

Landing Force Research and Development

Development of guided missiles to meet the specialized requirements of the Marine Corps has proceeded as planned. Notable progress was made in the air defense missiles HAWK and REDEYE.

A prototype 115-mm. gun-boosted rocket launcher has progressed satisfactorily, as has the amphibian vehicle LVTE-1, an LVTP-5 modified for clearing landmines.

In the field of transportation, the Marine Corps is closely watching the development of hydrofoils, ground effect devices, and planing hulls that can be used in the development of high-speed amphibious vehicles. For engineer applications, development was completed and

procurement started on a sectionalized rubber-tired tractor that is transportable by helicopter, and a 6,000-pound forklift for use on rough terrain. Development was started on a smaller (3,000-pound) forklift for similar use.

Personnel protection equipment has continued to advance and prototypes of the man-load body armor concept are now being evaluated. In electronics, major emphasis has been placed on ground equipment that will improve air defense and air control capability. New projects are being started on better air defense radars, helicopter homing beacons, and helicopter navigation systems, as well as advanced studies of drone helicopters. The expeditionary capabilities of Marine aviation squadrons to operate from minimal airfields have improved with the receipt of jet-assisted takeoff equipment, airfield arresting gear, and a new type of airfield matting.

Marine Corps Personnel

Strength Levels

The Marine Corps completed its reduction to an active duty strength of 175,000. Marines in the Fleet Marine Forces increased from 52.7 percent to 54.6 percent of total strength by the end of the year. Since the fiscal year 1960 will be a period of high personnel turnover, a reduction in the availability of men for the Fleet Marine Forces is anticipated.

The strength of the inactive Marine Corps Reserve on June 30 was about 316,000. The Ready Reserve was about 3,000 below its authorized strength of 208,000, with 42,356 in drill-pay units. The number of ground units conducting paid drills remained at 229. The aviation reserves added 5 helicopter units and deleted 4 Reserve groups due to the closing of four naval air stations, for a new total of 85 drill-pay aviation units.

Officer Programs

Efforts to improve officer quality and stability included elimination of the 2-year obligor program; increasing the mental requirements for officer candidates; measures to increase reserve officer retention; and expanded warrant and limited-duty officer programs.

In October 1956, the Defense Advisory Committee on Professional and Technical Compensation (Cordiner Committee) recommended that "the Marine Corps consider the establishment of appropriate programs to raise the educational level of its officers, with particular emphasis on assisting officers in obtaining baccalaureate degrees." In March 1957, the Commandant of the Marine Corps established such a program and by the end of the fiscal year 1959, 150 officers had received baccalaureate degrees.

Enlisted Programs

The program of enlisting reservists for 2 years' active duty was discontinued. Emphasis was placed on the 4-year enlistment and over 80 percent of new men were enlisted for 4 years. Standards for reenlistment were raised.

Changes in the rank structure were made which resulted in lowering the ratio of noncommissioned officers from 58 percent to 37.4 percent of the enlisted population, thereby achieving a more realistic rank structure.

A current project has as its objective the establishment of a systematic determination of enlisted billet grade requirements for personnel in all Marine Corps organizations. It is anticipated that this project will provide the foundation for a realistic and valid enlisted job evaluation system which will lead to the correlation of rank requirements among occupational fields, and thereby improve the efficiency with which Marines are assigned and guided through their careers.

Six thousand proficiency pay awards were made to Marines in pay grades E-3, E-4, and E-5, 85 percent in critical skills and 15 percent on the basis of outstanding effectiveness. There has not been sufficient experience as yet to judge the effect of proficiency pay on retention of personnel.

Supporting Establishment

Logistic support was provided primarily from Marine Corps Supply Centers at Barstow, Calif., and Albany, Ga. In addition, units in the Pacific are provided logistic support as available from local Army and Navy sources. An initial 3-year phase in the establishment of an integrated supply system, utilizing the latest electronic data-processing techniques, was completed.

Efforts to modernize Fleet Marine Force equipment resulted in the following improvements:

- (1) Significant deliveries of the M103A1 tank with 120-mm. gun and of the 106-mm. recoilless rifle mounted on the Mechanical Mule, M274;
- (2) Delivery for test and evaluation of the first model of an improved fire control system for the TERRIER land-based weapon system and seven preproduction pilot models of a lightweight $\frac{1}{4}$ -ton truck (Mighty Mite);
- (3) Negotiation of a contract for additional M274 Mechanical Mules and a $2\frac{1}{2}$ -ton truck van.
- (4) Order and initial delivery of high-powered partially transistorized single-sideband radio equipment to replace shorter range AM vehicular radios.

The Marine Corps Auxiliary Air Station, Yuma, Ariz., was commissioned on January 1, 1959, and construction of a new helicopter facility at Futema, Okinawa, was initiated.

Although water rights at Camp Pendleton, Calif., continue to be a problem, litigation in this matter should be completed during the fiscal year 1960.

On June 30, 1959, construction contracts totaling \$26.5 million were in progress for Marine Corps ground forces facilities. A regimental-size camp and storage warehouses in Okinawa made up \$14.1 million of this total; all other construction was in the United States.

During this fiscal year, 1,323 Capehart Act housing units were under construction. The Marine Corps acquired 2,193 units of Wherry Act housing which had been declared public quarters, leaving a current public quarters shortage of 9,738 units.

IV. Naval Personnel

Among primary challenges of the year were the high personnel turnover and the urgent necessity for advanced training in greater numbers in order to keep abreast of technological developments. Continuing tasks can be foreseen in providing sufficient opportunities for promotion, in improving the quality of officer and enlisted personnel, and in maintaining personnel stability.

The active duty strength of the Navy was as follows:

	30 June 1958	31 Dec 1958	30 June 1959
Grand total.....	641, 005	634, 739	626, 340
Total officers.....	71, 560	70, 416	69, 795
Men.....	68, 864	67, 715	67, 057
Women.....	2, 696	2, 701	2, 738
Total enlisted.....	563, 506	559, 017	552, 221
Men.....	558, 955	554, 166	547, 236
Women.....	4, 551	4, 851	4, 985
Total officer candidates.....	5, 939	5, 306	4, 324
Midshipmen (Naval Academy).....	3, 483	3, 555	2, 534
Naval aviation cadets.....	1, 393	1, 265	1, 111
Officer candidate school.....	918	302	570
Aviation officer candidates.....	145	184	109

Personnel allocations for the 864 active fleet ships were austere. The manning level (ratio between peacetime allowance and wartime complement) remained at about 81 percent except during the Lebanon and Taiwan operations, which showed that a level of at least 84 percent is necessary for active ships. Improvement of this ratio is being attempted through constant balancing of fleet units and supporting shore activities to achieve optimum manning and support of the operating forces.

Reductions in supporting forces continued, with few additional support facilities being planned. Air stations at Atlantic City, N.J., Chincoteague, Md., Columbus, Ohio, Denver, Colo., and Niagara Falls, N.Y., plus a few other air activities, were disestablished. Personnel strength was built up at the Pacific Missile Range and at the Naval Station at Roosevelt Roads, P.R. (to support guided missile programs).

Officer Personnel

The experience level in the junior officer years remains low. It is anticipated that this will be remedied in time through increased retention of younger reserve officers. It was decided this year to discontinue the warrant officer program, and this also should help to raise the experience level.

There will be no further input of warrant officers after the fiscal year 1960, and the program will be phased out through normal attrition. The limited duty officer (temporary) program will be expanded to assimilate those warrant billets requiring the supervisory qualities of an officer and ultimately will consist of more than 9,000 well-qualified officers distributed among various occupational fields. Warrant officer billets requiring technical skill rather than supervisory skill will be redesignated for master chief petty officers.

Enlisted Personnel

The petty officer situation improved somewhat due to an increase in reenlistments. Notwithstanding this improvement, the loss of new petty officers persisted at a high rate. Only a slight reduction in basic training was possible. Within the numbers allowed, petty officer strength has been maintained at 53.3 percent of total enlisted strength, or about 89 percent of the number of petty officers considered to be necessary. Better balance among ratings has been obtained. Within nearly all ratings, pay grades E-4 and E-5 (2d- and 3d-class petty officer) continue to be problem areas with respect to retaining trained personnel.

Procurement of Personnel

Recruitment quotas for officer candidates and officers were met with the exception of those for women officer candidates, aviation cadets, and aviation officer candidates. Thorough screening of applicants helped to assure recruitment of the finest young men and women.

Legislation has been initiated which would make it unnecessary for a regular appointee in the Naval Reserve Officer Training Corps to request retention in the Regular Navy. If it is approved, an NROTC regular graduate will be aware from the beginning that he has a career awaiting him in the Regular Navy, as does a graduate of the U.S. Naval Academy.

The Navy Enlisted Scientific Education Program has been converted to an officer candidate program to train highly qualified in-service personnel at civilian educational institutions as career officers in scientific fields of special value to the Navy. The former Navy Enlisted Advanced School Program has been absorbed in this new program.

All enlisted quotas were met this year, with a marked increase in the quality of personnel recruited. The High School Graduate Training Program continues to be most effective in attracting trainable young men. As a result of emphasis in the nuclear field of this program, the total number of enlistments in this specialty reached a new high of 887, compared with 584 in 1958 and 113 in 1957 (fiscal years). Enlisted reservists serving, or called to active duty, with the regular establishment are now given the opportunity to join the Regular Navy at the expiration of their current enlistment in the Naval Reserve, thus affording the advantages of regular career status to those reservists who desire it.

The complexity of modern weapons and military equipment is still increasing, and emphasis on procurement of high-quality highly trainable personnel will be continued. Intensified recruiting efforts coupled with improved recruiting techniques and management effectiveness have enabled the Navy Recruiting Service to achieve its goals at savings in both funds and manpower.

Promotions

Legislation has been initiated which will provide reasonable promotion opportunity for officers in the so-called "hump" year groups resulting from World War II. Beginning next year, the authority of this legislation will be utilized to create additional vacancies in commander and captain grades by a "noncontinuation" process. Captains with at least 5 years in grade and commanders who have twice failed of selection to captain will be considered by a board established for the purpose, and certain percentages of officers will be retired short of the normal 30- to 26-year points appropriate to their grades. Those not recommended for continuation will be retired at the end of the fiscal year in which considered, provided that they will have 20 years' service for retirement purposes. They will receive a compensatory \$2,000 lump-sum payment.

Effectuation of the new pay grades E-8 (Senior Chief Petty Officer) and E-9 (Master Chief Petty Officer) is in progress. It will take approximately 3 years to achieve full strength in these grades.

Proficiency pay is now an integral part of the Navy enlisted pay structure and will be phased in over a period of 4 years. The enlisted advancement system was used to select candidates who are proficient in the technical aspects of their ratings. The Navy authorized 12,823 proficiency pay awards, each granting a monthly pay increase of \$30.

A selection board met in April 1959 to consider enlisted personnel in certain rates who have over 20 years of active service, whose enlistments expire in the fiscal year 1960, and who desire retention on active duty. Personnel not selected within quota limitations will be retired

or transferred to the Fleet Reserve, thus improving advancement opportunities for others in their ratings.

Training and Education

Additional requirements for the support of advanced weapons systems have necessitated expansion of training at the Submarine School, New London, Conn.; the Sonar School, Key West, Fla.; and the Nuclear Power School, Mare Island, Calif. The naval electronics warfare simulator installed at the Naval War College will assist in the teaching and in fleet analysis of tactical concepts generated by new weapons. Prospective commanding and executive officers of nuclear-powered ships will be assured of intensive nuclear power training prior to commissioning of such ships.

Overall, medical training decreased in proportion to the decrease in Navy strength. The attractions of naval internships and residency training are proving to be great career incentives for young doctors. During the 1958-59 intern year, there were 373 applicants for 176 available internships, permitting a high degree of selectivity. Augmentation of thermonuclear, biological, and chemical warfare passive medical defense training is continuing. A nursing course related to nuclear medicine was instituted for Navy and other service nurses, and several new enlisted training courses have been established. Training of medical officers of NATO and SEATO nations has continued at previous levels; training of foreign medical officers under the Military Assistance Training Program will increase moderately next year.

The training of dental officers has remained stable during the past several years, with not more than 3.8 percent of the total number of dental officers on active duty receiving training at any one time. This year there were 624 dental technicians trained—478 in the basic course for general dental technicians and the remainder in advanced or specialized schools for general, repair, or prosthetic technicians.

Efforts are being made to increase the postgraduate student program, particularly in the scientific and engineering areas. Nuclear power and guided missiles are being given increased emphasis, as are leadership and language instruction. Many postgraduate curricula have been revised and consolidated around a core curriculum, and the entire field of officer postgraduate education is being reviewed in an effort to find means of providing advanced technical training for an increased number of unrestricted line officers.

After-hours courses in foreign languages for officers in the Washington area are being conducted on a year-round basis as one means of increasing the language capabilities of the officer corps. Steps have been taken to insure that all officers assigned to Military Assistance

Advisory Groups receive foreign language training prior to going overseas. In addition, all officers stationed overseas will be directed to study the indigenous language until they become proficient.

The need for reemphasis on leadership was further recognized by the establishment of three leadership schools. These 4-week courses were established at Norfolk, Va., Great Lakes, Ill., and San Diego, Calif. In addition, 1 week of leadership training was added to the curricula of all advanced technical schools and a new officer correspondence course in naval leadership is under preparation. This is part of an intensive program to reemphasize and revitalize the leadership qualities of officers and men, in order that they may meet with increasing effectiveness the challenge of technological innovations and the problems arising from modern social, economic, and political conditions, and from the pressures of international tension. Results after the first year of operation have been very encouraging, with constantly increasing interest in this vital subject. There has been evidence of improvement in individual and group productivity, in morale, and in proficiency.

The third Naval Nuclear Power Training Unit was established at the Atomic Energy Commission's reactor site near Windsor, Conn., and the Naval Nuclear Power School was established at the Mare Island Naval Shipyard, Vallejo, Calif. These activities are in support of the rapidly expanding requirements for training and qualifying reactor operators for nuclear-powered ships. Orientation material on space technology has been introduced at the Postgraduate School, Monterey, Calif., in officer candidate programs, and in Fleet Training Centers. Enrollment in correspondence courses has increased 13 percent.

Beginning next year, "closed book" end-of-course examinations will be given for most officer courses. These examinations replace the written professional examinations formerly required for officers prior to promotion.

Personnel Research

Research in the assessment of human abilities and aptitudes has proceeded systematically. An improved group of basic tests was developed and put into operational use. Development of a test designed specifically for the selection of enlisted personnel for nuclear power training was completed and is now being used on an experimental basis. Initial evaluation is highly encouraging. In the continuing effort to reduce personnel turnover, the dynamics of change in career motivations and attitudes of enlisted personnel during their first enlistments are being analyzed.

Discipline

There was significant improvement in the state of discipline, as measurable in terms of reduced numbers of absence offenses, fewer courts-martial cases, and fewer confined personnel. Effectuation in April 1959 of revised standards and procedures governing administrative discharges of enlisted personnel was a notable development. Such discharges are designed to eliminate marginal personnel early in their careers with a character of discharge not reflecting discredit upon them, rather than waiting until they become major disciplinary problems requiring other than honorable discharge, confinement pursuant to court-martial sentence, or both.

A forward step has been made in personnel rehabilitation by revitalizing the corrections program. This involves new screening and testing methods, better designed to identify prisoners who have potential for future useful naval service. Those who do not have such potential are separated at the earliest practicable date; those who do are given intensified counseling and training, aimed at returning them to duty equipped to hold their own in competition with their contemporaries.

Naval Reserve

At the beginning of the year, the Naval Reserve consisted of approximately 759,000 officers and men, and increased to approximately 803,000 by June 30, 1959.

Further development of the Selected Reserve, formed in 1958 within the Ready Reserve, has been a significant achievement of the year. It is composed of forces and units trained and immediately available for assignment to active-duty billets in an emergency. Units with assigned personnel, ships, and aircraft have been established to provide the fleet with additional antisubmarine warfare forces upon mobilization and are organized into the Antisubmarine Warfare Component. All remaining paid drilling units of the Selected Reserve have been assigned to three other components, i.e., Active Fleet Augmentation (Surface and Submarine), Fleet Support, and the Shore Establishment. Personnel assigned to the Selected Reserve are subject to immediate active duty on the commencement of hostilities against the United States, or when specifically needed in a national emergency.

V. Design and Construction of Ships

Increasing mobility and versatility typify the ships currently being designed and built. The aircraft carriers completed or under construction and conversion are prime examples. Self-contained yet highly mobile air bases are the *Independence* (CVA-62), *Kitty Hawk* (CVA-63), *Constellation* (CVA-64), *Coral Sea* (CVA-43), *Oriskany* (CVA-34), and, in a class by itself, the nuclear-powered *Enterprise* (CVAN-65). Singly or in groups, these ships can speed to exert the degree of military pressure that is needed, where it is needed. The mobility of these floating airfields not only provides an economical means of enabling the United States to bring airpower to bear on widely dispersed areas but also renders them difficult for an enemy to locate and destroy.

Independence, for example, can cover over 700 miles in 1 day, and for offensive purposes her powerful new jet aircraft can extend that range much farther. *Oriskany*, completely revamped and back with the fleet, now has vastly improved capabilities. With her new angled deck, aluminum planking, and steam catapults, she will be able to operate much heavier aircraft than ever before. Her combat information center has been completely remodeled. The various tactical functions, although located in one space, are now separated into "modules" according to function or task. With this modular combat information center, her officers will be able to direct operations more efficiently.

Most powerful of all is *Enterprise*, whose eight nuclear reactors will give her a range far exceeding that of even *Forrestal*-class carriers. She has many additional improvements over other new carriers, including internal combustion catapults having greater power than steam catapults.

An added fillip to the flexibility of the Navy's air arm will be the advance aviation base ship (AVB), a conversion in the 1960 program. Starting with an LST hull, the Bureau of Ships has designed changes that will enable this ship to support aircraft operations at temporary fields on distant coastal areas.

The increasing versatility of the Navy is also well illustrated by its missile submarines, able to fire missiles deep inland from a point near the enemy shore. The two submarines converted some years ago for REGULUS I missiles have now been joined by the newly built REGULUS I submarines *Grayback* (SSG-574) and *Growler* (SSG-

577). This small fleet will soon be augmented by *Halibut* (SSGN-587), launched last fiscal year with its REGULUS I bow-hangar having in itself about the displacement of a World War I submarine. Nuclear power will give this new naval weapons system vastly increased endurance.

The even more powerful fleet ballistic missile submarines are being constructed rapidly. The first of these nuclear-propelled, POLARIS-armed ships was launched on June 9, 1959, when *George Washington* (SSBN-598) took to the water. Already the keels of four others are laid and contracts for four more are let—the last four to be built to the *Ethan Allen* (SSBN-608) design. These will be improved versions of the SSBN-598 class, incorporating all recent improvements in submarine systems. Each will carry 16 POLARIS missiles.

Proteus (AS-19) is being converted as a tender for the POLARIS submarines. *Proteus* is large, but even so a 44-foot longitudinal section must be inserted amidships to provide the space needed for servicing SSBN's—replenishing their missiles and other weapons, providing food, medical care, and recreational facilities for their crews, accommodating relief crews, and performing myriad other functions. Since no other submarine tenders of appropriate type are in the reserve fleets, additional POLARIS submarine tenders will be built from the keel up; one such ship is included in the fiscal year 1960 program.

Triton (SSRN-586), as well as the missile submarines, will add to the Navy's versatility, for her nuclear reactors and powerful radar will provide a far-ranging, hard-to-find early warning system having immense value in many distant areas of the world. Launched this year, she will soon be in service.

Great strides are being made in increasing the effectiveness of the submarine in its more traditional specialty—the destruction of ships that threaten freedom of the seas. Swift, *Albacore*-hulled *Barbel* (SS-580) joined the fleet last fiscal year and the other two ships of this class were launched. Conversion of *Seawolf* (SSN-575) began. This conversion consists primarily of replacing her sodium reactor with a pressurized water reactor. The nuclear fleet was enlarged by the addition of *Swordfish* (SSN-579) and *Sargo* (SSN-583), sister ships to the transpolar cruising *Skate* (SSN-578). The fourth and last of this class will be completed in the fiscal year 1960.

The rapid evolution of submarines is indicated by the delivery in the same year of *Skipjack* (SSN-585). This first ship to combine nuclear power and the *Albacore* hull form has already demonstrated its exceptional speed and maneuverability. Five more of these ships will be completed by the end of the fiscal year 1961.

Advanced detection and attack features plus the improvement demonstrated by *Skipjack* have been incorporated into the latest class of

submarines, the *Thresher* (SSN-593) class. Nine of these ships are now being built; four submarines originally authorized as guided-missile ships (SSGN's) were redesignated SSN's at the time the REGULUS II missile program was canceled. The attack submarines in the fiscal year 1960 program will also be built to the *Thresher* design. *Thresher* will operate at greater depths than submarines now in the fleet, and will be the quietest submarine ever built. Her main propulsion machinery will be of a new, quieter design and will be sound isolated. Her auxiliary machinery is being purchased to specifications containing strict noise limits, and she will have the "cleanest" hull yet achieved. She has no superstructure whatsoever and an extremely small "sail."

The guided-missile cruiser, frigates, and destroyers now building are designed to handle a wide variety of tasks. Equally adept as anti-aircraft and antisubmarine warfare ships, they can also screen high-speed task forces and support amphibious operations.

The two-reactor *Long Beach* (CGN-9) will have the best equipment available for performing these various functions. TERRIER and TALOS missiles, coupled with powerful search and guidance radars, will defend against threatening aircraft. Long-range sonar, antisubmarine rocket-assisted torpedoes (ASROC), and antisubmarine homing torpedoes will counter enemy submarines. *Long Beach* was ready for launching at the end of the year.

The 19 guided-missile frigates now building have antisubmarine warfare capabilities similar to the *Long Beach*. In addition, they will have twin TERRIER missile launchers for operations against enemy aircraft. Ten of them are *Farragut* (DLG-6) class ships with TERRIER launchers aft only; of these, six have already been launched and all are due for completion by the end of the calendar year 1961. The other nine frigates are DLG-16 class "double-enders," with TERRIER launchers both forward and aft. These are bigger ships with far greater endurance. *Bainbridge* (DLGN-25) is similar, but with her nuclear power plant she has 45 times greater endurance.

Even the 18 *Charles F. Adams* (DDG-2) class ships in the programs of fiscal years 1957 through 1959 have antisubmarine warfare features similar to those of *Long Beach*. Their antiaircraft armament consists of guns forward and TARTAR missile launchers aft. The 1960 guided-missile destroyers will be generally similar.

The three *Albany* (CG-10) class conversions in the 1958-59 programs will be as versatile as the new ships, and will have the most powerful guided missile systems afloat. They will have TALOS launchers both forward and aft, TARTAR amidships, and antisubmarine equipment equivalent to that in *Long Beach*.

The remaining cruiser and destroyer types in the Navy's shipbuilding and conversion programs are very nearly as flexible as the fore-

going types. The six guided-missile light cruiser conversions under way will specialize to some extent in antiaircraft work, three of them using TERRIER and three using TALOS missiles. *Galveston* (CLG-3), already at sea although not ready for unrestricted service, successfully fired the first TALOS missile ever shot at sea.

Four of the *Forrest Sherman*-class destroyers were delivered during this year and the last two were nearing completion. These ships have antiaircraft guns, antisubmarine torpedoes, "hedgehog," antisubmarine weapons, and medium-range sonar. The *Claude Jones*-class of escort vessels, the last of which will be finished in the fiscal year 1960, are similarly equipped. The 1960 escort vessels will be bigger (50 feet longer, approximately 800 tons greater full load displacement) and will have the ASROC antisubmarine weapon plus the latest antisubmarine homing torpedoes. Present plans are to include very-long-range sonar in a bulbous bow dome, and facilities for the drone antisubmarine helicopter (Dash). The Dash concept permits flying an antisubmarine weapon to the immediate area of the target rapidly and with no risk to personnel in stormy weather. It will involve installation of a helicopter platform and special radio control equipment, among other things. Dynamic roll stabilizers will improve sonar performance and helicopter operations.

Long-range sonars are very large equipment. Their effectiveness is greatly reduced by self-generated shipboard noise. Seeking a way to get these electronic giants aboard destroyers and escort vessels without placing them where their effectiveness would be dissipated by noise, the Bureau of Ships designed and installed a very large dome as an integral part of the bow of *Barry* (DD-933) and placed the sonar transducers within it. Evaluation indicates that this is a very promising step in the solution to the problem, hence the bow dome of the 1960 escort types.

This same concept has been used in the design of an escort research ship (AG) in the 1961 program. This ship will test an experimental hull of advanced hydrodynamic design for development of an optimum design for escort vessels. She will have very-long-range sonar in a large bow bulb. A nacelle located under the main hull and extending well aft of it contains the main propulsion electric motors which obtain their power from gas-turbine generators located amidships. These motors drive contrarotating propellers. The electric motors will provide an extremely quiet mode of propulsion, while the forward location of the main sonar will isolate it from what little noise is created aft. Valuable information gained in testing this ship should lead to greatly improved sonar performance, and may improve future destroyer types, as did the *Albacore* for submarine designs.

Many of the improved antisubmarine weapons and equipment will be placed aboard active destroyers in the course of the Fleet Rehabili-

tation and Modernization (FRAM) Program. This program stems from the Navy's concern over block obsolescence, particularly of its destroyer types. Generally, it will provide for complete rehabilitation of selected active fleet destroyer types, together with significant modernization of their electronics and ordnance systems. The Mark I program is designed to extend the useful life of these ships for another 8 years; the Mark II program, for another 5 years. Most of the ships will receive long-range antisubmarine weapons such as ASROC or Dash, as well as the Navy's new homing torpedoes. The sonar capabilities of these destroyers will be significantly improved. Better radar, electronic countermeasures, communications, and navigation equipment will be installed. A new combat information center will be provided so that the new electronic equipment can be more effectively employed. Prototypes for both the Mark I and Mark II destroyer programs were started during this fiscal year.

Planning for the FRAM Program has not been confined to destroyer types. It has included submarines, submarine tenders, destroyer tenders, antisubmarine warfare support aircraft carriers, and certain amphibious warfare vessels. A prototype modernization of a submarine was begun.

The emphasis on antisubmarine warfare—in improving capabilities through the FRAM Program and in placing a strong array of the latest equipment aboard new ships—is also illustrated by the hydrofoil submarine chaser (PCH) which has been included in the fiscal year 1960 program. This has been designed to be a 110-ton ship which, when "flying" on its hydrofoils, is expected to be able to make over 40 knots even in fairly heavy seas. Normally, PCH's will operate in pairs, in a sort of grasshopper technique. One will proceed through the water in its displacement condition at low speeds, using its long-range retractable sonar and its variable depth sonar to detect submarines, then directing its partner to the target. The partner will proceed to the target at high speed and drop its homing torpedoes for the kill.

Other construction and conversion projects are helping to improve the Navy's amphibious warfare capabilities. All but one of the new tank landing ships (LST) had been completed by year's end. The newly converted fast attack transport *Paul Revere* (APA-248) joined the fleet and a similar conversion of *Francis Marion* (APA-249) began. The keel of the amphibious assault ship *Iwo Jima* (LPH-2) was laid, and work on the yet unnamed LPH-3 will start in the fall of 1959.

The Bureau of Ships completed the design of the amphibious transports, dock (LPD), in the fiscal year 1959 and 1960 programs. These ships are a combination attack transport, attack cargo ship, and landing ship, dock. They will be able to accommodate 900

troops—Marines and all their support equipment including tanks, missiles, food, fuel, and innumerable other items. The troops and equipment can be off-loaded either by helicopter or assault landing craft. There will be a helicopter landing area aft. The after end can be opened and flooded to permit landing craft to enter the ship, take on their load, and leave again. All of this is packed into a 520-foot hull which will have a full load displacement of 13,900 tons.

Two inshore minesweepers and four nonmagnetic ocean minesweepers were completed during the year. A major step was taken in the development of an all-purpose minesweeper with the designation of minesweeper, special (MSS). She is filled with styrofoam, so that if a mine explodes close and smashes in a portion of the underbottom, the effect on operating capability will be almost nil. With five diesel right-angle drive units—in effect, “outboard” engines—it will be difficult to knock out all of this ship’s propulsion system. While the ship is expected to take tremendous punishment and survive, her men will be shielded from such risks. The very small crew will remain in the pilothouse during sweeping operations and this pilothouse will be shock mounted to reduce the blast effect of mines that go off nearby.

In order to conduct basic and applied oceanographic research at sea, leading to new military applications, particularly in undersea warfare, designers have worked closely together to develop the design of the oceanographic research ship (*Agor*) in the fiscal year 1960 program. This ship will have extensive deck areas and laboratories for scientific work. Her regular engines are sound isolation mounted for quiet operation. She also will have a special retractable motor driving a rotatable bow propeller to permit her to maintain a very stable position. Her tank stabilizers will greatly reduce roll, whether she is dead in the water or moving.

Since World War II, the cost of building, modernizing, and maintaining the Navy’s ships has increased very greatly. Rising prices of both material and labor, and technological developments—nuclear power, guided missiles, electronics, etc.—are the prime causes of this rapid increase. The rise is making it increasingly difficult for the Navy to remain within a level budget and maintain an up-to-date fleet. Only the ships at the very top of priority lists can be built, converted, or modernized. Although the FRAM Program for the fiscal year 1960 included only top-priority ships to start with, the expensiveness of doing the work has already led to significant reductions. Merely to begin the FRAM Program in the current fiscal year, and to overhaul and repair active fleet ships so as to maintain at least the status quo, required a severe cutback in many other areas. For instance, programs for combating obsolescence in reserve fleet ships practically ceased. Programs for improving active fleet ships

were greatly reduced by the end of the fiscal year; operational improvements were reduced to bare safety items; the military improvements list program—originally stringent—was halved; the program for improving habitability aboard ships was eliminated during the last half of the year. Prospects for the immediate future are even less favorable.

Strong measures are being taken to reduce to an absolute minimum the costs which are within Navy control. One source of increasing costs—changes in specifications to improve ships which are under construction or conversion—is being rigidly policed by a board of flag officers which reviews all significant changes and approves only those which are absolutely essential. Value engineering—a concerted program to engineer economy into ships and equipment—is being pushed and a searching study of means to reduce administrative and personnel costs in the ship program has been made. Savings thus made are substantial, but they have not been able to keep up with the growing costs of keeping the fleet modern. Further economies must be found if a reduction in the effectiveness of the fleet is to be avoided.

VI. Design and Procurement of Aircraft

Increased costs are affecting the buying and operating of aircraft as well as ships. For this and other reasons, aircraft procurement again declined, being 9.3 percent lower than last year. Those ordered this year were 72 percent combat types, 14 percent trainers, and 14 percent utility types. A number of new aircraft were procured for other users, including the Army, the Coast Guard, and foreign governments under the Military Assistance Program.

New aircraft models in the Navy 1959 procurement program included the Y/P3V-1, the C-130B, the W2F-1, and the A2F-1. The first is being bought as a test model of the Lockheed P3V-1, which arrangement will allow early modification and prototyping of this new patrol bomber prior to its procurement in the fiscal year 1960. The ski-equipped Lockheed C-130B aircraft is in an Air Force-developed, medium-range, land-based utility transport for use in Antarctic operations.

The W2F-1, an improved version of the WF-2 Tracer, is a twin-engined turboprop, carrier-based, all-weather airborne early-warning airplane, capitalizing on recent advances in electronics. When available to the fleet in operational quantities, the W2F-1 will supplement and eventually replace the WF-2 and AD-5W airplanes in the Navy's carrier-based airborne early-warning squadrons. The A2F-1 is a subsonic, low-level, all-weather attack plane which will provide round-the-clock close air support for ground troops.

There was a 23-percent decrease in target aircraft procurement; contracts for three types of targets were canceled. By the end of the year the only target remaining in the procurement program was the new KDB-1, designed for training operations with surface-to-air and air-to-air defensive weapons systems.

As a result of the reduced procurement and rescheduling, 21 percent fewer aircraft were accepted this year than in the fiscal year 1958. Among those accepted were three new versions of the basic A3D-2 Sky-warrior attack plane—the A3D-2Q (countermeasures); the A3D-2P (photographic reconnaissance); and the A3D-2T (bomber-navigation trainer). Other aircraft deliveries included the HSS-2, an improved, gas-turbine-powered, all-weather antisubmarine warfare helicopter, and the HU2K-1, a turbine-powered, all-weather utility helicopter; the F8U-2, an improved version of the F8U-1

Crusader, a day and night visual fighter; the A3J-1 Vigilante, the Navy's first supersonic carrier-based, all-weather attack airplane; the S3F-3 Tracker, a twin-engine (reciprocating), carrier-based antisubmarine airplane which houses the most modern developments in antisubmarine warfare electronics and armament; the carrier-based WF-2 airborne early-warning aircraft; and the ZPG-3W, the Navy's largest airborne early-warning airship, equipped with the latest electronic devices. Three types of target aircraft were received for service use, a new one being a medium-performance recoverable target.

In November 1958, the P6M Seamaster jet seaplane program was reduced by more than one-third. Later, shortly after the end of the fiscal year, the entire program was terminated. Overriding urgency of other Navy programs made the additional expenditure of funds for the seaplane evaluation project unjustifiable. The F8U-3 Crusader III, long-range, all-weather fighter program was terminated also, in December 1958. This decision was reached after extensive preliminary evaluation of both the F8U-3 and F4H-1 all-weather fighters. The F8U-3 airplanes which had been accepted and used in the competitive evaluation have been transferred to the National Aeronautics and Space Administration for use in research projects.

Among new developments is a drone antisubmarine warfare helicopter for operation from small ships. Funds have been programmed for prototypes of a single-engine model (SDN-1) and a turbine-powered operation model (DSN-2). A new high-speed, low-cost, expendable missile target is being evaluated by the Navy and the Air Force. It will fulfill a need for an air-launched target for pilot training in the firing of radar-guided or heat-seeking air-to-air missiles.

Sound aviation practice brooks no compromise with safety and concerted efforts to make flying safe are bearing fruit. Navy and Marine Corps pilots have recorded the safest year of flight in the history of naval aviation—2.6 major accidents per 10,000 hours of flight. Since a large proportion of these accidents occur during carrier landings, the Navy is constantly on the alert for any device to improve landing techniques.

The human body is not naturally adapted to the altitudes and speeds which modern planes are capable of reaching, and demand has been growing for special survival equipment and protective clothing for pilots. This year the Navy completed development of the first U.S. space suit—the Mark IV full pressure suit. This suit has been selected, in a slightly modified version, by the National Aeronautics and Space Administration (NASA) for Project Mercury's man-in-space flights. It is the result of 9 years' experimentation to develop an emergency full pressure suit for use by pilots at altitudes above 45,000 or 50,000 feet. The Mark IV and its earlier model, the Mark III, were first used by deployed fleet squadrons in December 1958.

Operational use of the full pressure suit has resulted in provision of shipboard facilities for ventilating them in carrier ready rooms, and of a special flight-line taxi for transporting pilots wearing them between ready rooms and aircraft. Both measures provide cool, low-humidity air to ventilate the pressure suits and evaporate perspiration during preflight periods.

VII. Weapons

The fleet ballistic missile POLARIS and its associated system continue to receive a major proportion of work and funds. The effort to perfect efficient antisubmarine weapons has been increased. As in other programs, rising costs are creating problems in the planning and management of weapons and ordnance materiel.

Fleet Ballistic Missile System

Research, development, and test of the major components of the Navy's fleet ballistic missile weapons system saw significant progress in all areas. This essential system, which combines the range, endurance, and relative invulnerability of the nuclear-powered submarine with the fast-reacting POLARIS ballistic missile, is on schedule and planned for operational status in late 1960.

Polaris Missile

A progressive series of ground and flight tests of development test vehicles was conducted and confirmed the design characteristics for major subsystems. The first 10 of the full-scale development model test vehicles were flown during this year from the Atlantic Missile Range. The test program successfully demonstrated the launching from land of a full-scale, solid-fuel POLARIS test vehicle, the ability of the POLARIS flight control system to stabilize such an aerodynamically unstable vehicle, successful motor separations, precise motor cutoff and ignition, the ruggedness of the guidance system, and successful operation of the reentry body.

Many test vehicles were successfully launched from the submerged launcher "Pop-up" off the California coast—some through large waves generated by a cruiser. This series of firings provided assurance of the compatibility of the missile and launching techniques and proved the feasibility of large-scale missile firings from a submerged launcher.

The reentry body design was confirmed by ground and flight tests, and materials able to withstand the intense heat of reentry were selected and tested. Arming and fuzing devices were subjected to a variety of tests with successful results. The first complete missile guidance systems were produced. Compatibility of the guidance and fire control systems was demonstrated.

The propulsion development program has been proceeding successfully. High-energy propellants were tested in numerous ground tests. Lightweight motor cases were developed. Substantial improvements were achieved in manufacturing techniques and processes.

Missile Submarine

Construction of six POLARIS submarines proceeded satisfactorily along with the accelerated schedule for the fleet ballistic missile. The U.S.S. *George Washington*, first submarine in the program, was launched on June 9, 1959. A specially designed fire control system was produced and became available for installation in shore test facilities. The radically new navigation equipment designed for these submarines is undergoing tests at sea aboard the navigation test ship *Compass Island*. A shore-based navigation test facility was established for the advance testing of its components. Considerable progress was made in developing the novel electronic and communications equipment required.

Support

Naval personnel to man the POLARIS submarines were trained at contractors' plants, aboard the test ships, and at naval schools with specialized curricula and special training equipment. Construction of the Naval Weapons Annex at Charleston, S.C., was initiated and will be in operation in time to load missiles in the first of the submarines. Conversion of the first fleet ballistic missile submarine tender began at the Charleston Naval Shipyard.

Pacific Missile Range

Established last year by the Secretary of Defense, the Pacific Missile Range will be developed over the next 15 years. During the fiscal year 1959, construction commenced for various Missile Impact Location Systems (MILS) facilities at Midway, Eniwetok, and Wake Islands to support initial intercontinental ballistic missile firings by the Air Force.

Surface Weapons Systems

TALOS, the Navy's long-range, surface-to-air guided missile, was fired at sea for the first time from the guided-missile cruiser *Galveston* on February 24, 1959. One version of the TALOS missile was satisfactorily evaluated at the White Sands Missile Range, New Mexico. Full production of another version was begun and the first delivery was received late in the fiscal year. Development commenced of a new radar concept for use with a more advanced TALOS missile. Results have shown a reduction in cost, weight, space, and maintenance problems. A digital computer which will bring similar savings also became available for TALOS-armed ships.

An advanced version of the medium-range, surface-to-air TERRIER guided missile began evaluation and is expected to become operational soon in the fleet and from mobile ground launchers of the Marine Corps. The performance of this advanced TERRIER is vastly improved over the original model which is now operational on two guided-missile cruisers (*Boston* and *Canberra*) and one guided-missile destroyer (*Gyatt*). It was flight tested at the Naval Ordnance Test Station, China Lake, Calif. Like the original TERRIER, the new weapon is a supersonic missile powered by two stages of solid-fuel rockets and is able to intercept any present-day supersonic bomber many miles away.

TARTAR, the Navy's short-range, surface-to-air guided missile, developed by the Bureau of Ordnance for smaller ships and with a high volume of fire, is in production. The missile has been successfully fired from the test ship *Norton Sound*, and has proved highly effective against both low- and high-altitude targets. It is about 15 feet long and slightly over 1 foot in diameter and utilizes miniaturization techniques fully.

Underwater Weapons Systems

Development of the SUBROC antisubmarine missile, to be launched from submerged submarines at ranges well beyond the capability of present weapons, proceeded satisfactorily on an accelerated schedule. Flight test vehicles were subjected to intensive component and function tests such as missile water entry, shock tube ejection, and water-to-air interface penetration, with good results.

ASROC, an antisubmarine rocket, entered its final development phase. The installation of the prototype ASROC weapon system in the U.S.S. *Norfolk* was completed, and the contract for production has been let. Operational evaluation should be completed during the summer of 1960. ASROC is a missile system which will provide a long-range antisubmarine capability for all new construction destroyer-type ships and for some older ships scheduled for modernization.

Development was started of an advanced lightweight antisubmarine torpedo to be launched from aircraft or surface vessels. This torpedo will have greatly increased speed to counter nuclear submarines and will be capable of attacking at greater depths.

ASTOR, an electric submarine-versus-submarine high-speed torpedo, was in the final stages of development. This weapon system is capable also of destroying surface vessels, with greater reliability than any underwater weapon presently in operation.

Fleet evaluation of the Mark 44 torpedo was started. This is a target-seeking, electrically propelled torpedo which can be launched

or projected from either aircraft or surface ships. It is a great improvement over other torpedoes in the fleet.

The first submarine sonar designed specifically for controlling weapons was successfully demonstrated and represents a significant technical advance.

Air Weapons Systems

SIDEWINDER, the reliable and effective infrared homing missile developed by the Naval Ordnance Test Station, China Lake, Calif., was operational on all fighter planes in the fleet, on many Air Force planes, and on some foreign aircraft. On September 24, 1958, Chinese Nationalists fired SIDEWINDER missiles in combat against Chinese Communist MIG planes over the Quemoy/Chinese mainland area and scored a decisive victory. These are the first air-to-air guided missiles ever fired in combat. An advanced version of this missile is under development.

ZUNI, a 5-inch folding fin aircraft rocket, was made available to the fleet. This rocket can utilize any of four types of warheads and has both air-to-ground and air-to-air capabilities. Built for high-speed aircraft to replace the World War II HVAR, ZUNI is adaptable to practically any fighter or attack plane. Certain aircraft can carry up to 48 ZUNI rockets to be fired singly, in pairs, or in rippled salvos. Its speed is twice that of sound and its accuracy and lethal warheads give ZUNI a far greater kill probability against hard and soft targets than any other rocket.

A new high-performance 20-mm. gun, externally mounted in a pod suspended on a bomb rack, appears to be highly effective and reliable. Operational evaluation is scheduled for early in 1960. It enables the arming of types of naval aircraft which otherwise would lack conventional aircraft guns. Its rate of fire, in excess of 4,000 rounds per minute, will furnish an offensive and defensive capability to aircraft in many "cold war" and limited war situations.

Other Weapons Development

Successful tests have been made of hybrid rocket motors—that is, solid fuel with a liquid oxidizer. This type of motor shows great potential for high performance and increased loading density.

A pyrotechnic device which produces the flash, sound, and cloud formation of a nuclear burst went into final development. This device, to be carried by aircraft, is a training aid for teaching techniques of survival under nuclear attack.

Power cartridge applications in missile systems and aircraft are rapidly increasing. In addition to the development of many specific items, work was started to increase the reliability of cartridge-actuated devices in high temperatures and at high altitudes.

Two new explosive compounds, diaminotrinitrobenzene (DATE) and triaminotrinitrobenzene (TATB), were developed at the Naval Ordnance Laboratory, White Oak, Md. These compounds are very resistant to high temperature and shock, and it is expected that they will be used widely in plastic-bonded explosive systems.

Development of a high-energy, plastic-bonded explosive composition (PRXN-2) was completed. In comparison with other explosives it shows considerable promise with respect to physical properties, stability at high temperatures, and explosive characteristics. It is easy and safe to manufacture and handle and can consistently be pressed to high density.

Investigation of the hazards of electromagnetic radiation (Hero Program) disclosed that a few types of weapons could be actuated unintentionally by electromagnetic fields. Preventive operating instructions were issued, and design changes are being made to eliminate this hazard.

Under the sponsorship of the Department of Defense Advanced Research Projects Agency (ARPA), work is continuing on the refinement of doppler techniques for satellite tracking and orbital measurements. This idea was conceived at the Applied Physics Laboratory of Johns Hopkins University and will have direct application to military requirements. Limited tests have been made of an experimental satellite launching system which shows great promise for putting small vehicles into orbit at greatly reduced cost.

VIII. Medical and Dental Service

Health of Personnel

Measured in terms of availability for duty, a decade ago about 22 of every 1,000 active duty personnel were hospitalized each day of the year. Last year this figure was 14. This year it decreased to 12, due mainly to the fact that the widespread influenza outbreaks of 1958 were conspicuously absent in 1959.

A general reduction was observed also in the incidence of other acute respiratory infections, including pneumonia. The cumulative improvement over the years can be attributed largely to the increasing use of new medications and vaccines available for preventive medicine and to improved methods of treatment. Moreover, an expanding percentage of the sick and injured are now being treated on an outpatient basis and returned to duty with minimal lost time from work or training.

Several health challenges arose during the year, however. Outbreaks of acute infectious hepatitis occurred among personnel of ships operating in the Mediterranean—as many among shipboard personnel in February 1959 as occurred during all the last half of the previous fiscal year. Prompt action by Navy preventive medicine units kept this epidemic from assuming larger proportions. There was also an increase in venereal disease cases, 170 per month over last year, the increase among shore-based personnel abroad and ships' personnel offsetting the reduction achieved in the United States.

The death rate fell from 1.9 to 1.8 per 1,000. Of the 1,500 deaths of active duty personnel, 570 were due to motor vehicle accidents and 350 to aviation accidents. The rate for the former was about the same as last year, while that for the latter dropped about one-fifth. Invalidings from the service, through action by physical evaluation and medical survey boards, increased by 1,500 to 12,100 persons.

A daily average of more than 12,900 patients occupied beds in world-wide Navy medical facilities during the year. Eighty-five percent of these were in shore-based naval hospitals. Of every 100 patients in these shore hospitals, 66 were active duty Navy and Marine Corps personnel and 14 were dependents of military personnel, while the remainder were Army and Air Force retired persons, Veterans' Administration beneficiaries, etc. Fourteen percent of the Navy and Marine Corps patients worldwide were in naval facilities other than

naval hospitals, occupying an average of 1,537 beds each day. The number of Navy and Marine Corps patients in Army and Air Force hospitals increased by almost 10 percent, primarily as a result of the hepatitis outbreak in the Mediterranean area. The amount of outpatient care remained about the same as for last year.

Dental care provided to eligible personnel by 376 Navy and Marine Corps dental activities included over 7 million diagnostic and treatment procedures for more than 2 million patients. Recruits, on the average, required 12.9 surface restorations and 1.5 extractions. Of all the dental care required for recruits, 20 percent to 25 percent was completed at the naval training centers and Marine Corps recruit depots.

Medical Facilities

At year's end, there were 26 naval hospitals, 31 station hospitals, 4 U.S. naval dispensaries, 69 dispensaries with authorized beds, and 111 dispensaries without beds in operation. Total operating beds amounted to 15,956, the number of fully staffed and equipped beds being adjusted throughout the year to assure the optimum 80-percent occupancy. With few exceptions, there was also an appropriate medical facility on each ship. There were 340 dental facilities (of which 116 were in ships) and 9 mobile dental clinics.

The program to centralize ward food distribution in hospitals advanced further. Systems incorporating motorized tray assembly tables were planned, funded, and by the end of the year partially or completely installed at the Chelsea, Mass., Philadelphia, Pa., Charleston, S.C., and Jacksonville and Pensacola, Fla., hospitals.

Aviation Medicine

Provision of new-type aviation physiology training devices continued to keep pace with space age demands. Three 100,000-foot low-pressure chambers (which simulate conditions at this altitude) are under contract. Final specifications for a 250,000-foot low-pressure chamber were established and contract negotiations are in progress. At the same time, five Martin-Baker ejection seat static procedural trainers were delivered to training units, while seven Martin-Baker ejection seat trainers were under construction.

The need for provisions for emergency escape from aircraft at altitudes below 1,000 feet and at low-level speeds above 500 knots has become urgent. To obtain this low-level, high-speed escape capability, aircraft producers are required to install the Martin-Baker low-level ejection seat in designated aircraft. The ejection seat itself is being improved to protect the airman from windblast. The new rocket catapult ejection seat continues under evaluation and will be in operational use in the near future. When utilized, this system subjects

the airman to lower "G" forces and provides a higher trajectory favorable to normal parachute recovery.

A new and revolutionary means of picking up a downed airman with relatively high-performance, fixed-wing aircraft, beyond the range of helicopter operation, shows great promise.

Continued interest in the conservation of hearing and the protection of personnel from excessive noise and vibration led to increased procurement of sound-attenuating devices for flight deck and ground crew personnel. Several large jet airbase dispensaries were equipped with automatic audiometric devices for the rapid and repeated testing of those exposed to high intensity noise.

Submarine Medicine

The nuclear-powered submarine has brought added importance to this field. Fourteen medical officers specializing in it have transferred to the Regular Navy since June 1956, and 15 will enter training during the first quarter of the fiscal year 1960. Of these new trainees, 11 will commence the basic training in submarine medicine and 4 will begin training in radiobiology.

A short 7 weeks' course in radiobiology was established for officers entering the nuclear power program, to be followed by practical instruction at an Atomic Energy Commission reactor site. Officers willing to obligate themselves for longer periods of service will still be able to attend the more complete academic courses in nuclear medicine at Reed College and the University of Rochester.

Medical Research

Research projects in clinical medicine covered a wide variety of subjects, such as malaria, dentistry, cardiovascular disease, neuropsychiatry, liver disease, and burns. Much of this was carried on at naval hospitals in circumstances where it would assist in medical and surgical treatment. At Great Lakes, Ill., there was extensive study of respiratory diseases and evaluation of vaccines for use in preventive medicine.

A squirrel monkey trained by the U.S. Navy School of Aviation Medicine (USNSAM) was carried to a height of about 300 miles in two JUPITER missile biological research flights. Physiological data were transmitted to the earth during each flight. No severe physiological reaction occurred, and the period of zero gravity did not produce a marked change in any of the physiological functions measured. A biological research package, developed to permit testing the performance of trained rats over a 2-week period while in orbital flight, will be ready for use when a vehicle becomes available in which to launch it.

The Navy Medical Department participated in developing the full pressure suit accepted by NASA for the Mercury Project astronauts, as well as the contour couch for supine positioning and restraint for that project.

Advances in the knowledge of ionizing radiation have been made. The Navy continues to support psychophysiological testing and training of Project Mercury astronauts by means of the dynamic flight simulator and the Air Crew Equipment Laboratory low-pressure chamber. In one test six men, isolated for 7 days for psychophysiological studies within a multiman crew bioastronautical test facility, were supported by a liquid oxygen source within a closed ecology system. Isolation was complete with no outside communications available to the test subjects.

A rotating room was developed and built by the U.S. Navy School of Aviation Medicine for studies of long-term low "G" force effects relating to coriolis force effects on human response and performance. The school installed and instrumented a new human disorientation device for studying spatial disorientation during orbital and interplanetary flight.

At Chelsea Naval Hospital, blood cells were preserved for over 24 months, reconstituted, and successfully transfused in patients. The blood bank was utilized to preserve unusual types of cells which are readily available to the clinician when they are needed. There were studies at Camp Lejeune of the heat casualties which occur when troops transfer rapidly from temperate to tropical climates. The environmental change results in measurable physiological stress and the lowering of troop efficiency.

Many studies on the biological effects of ionizing radiation were under way. One, for example, showed that the incidence of animals bearing detectable tumors becomes large 180 to 300 days after irradiation. Investigations in medical aspects of biological-chemical warfare defense involved the development of methods for quickly recovering and identifying adequate samples of biological and chemical agents to which an individual has been exposed.

The scope of the dental research program was broad. Advances toward more effective operative procedures were made by studying problems related to high-speed rotary cutting instruments. Investigations were conducted at the Naval Academy to determine the effectiveness of certain drugs, topically applied, in caries prevention. Studies were continued in Antarctica on the effect of severe cold and dehydration on oral health, and other projects involving more fundamental approaches were conducted at the Naval Medical Research Institute to determine the differences between caries-resistant and caries-susceptible teeth.

IX. Supply

Along with the trend in basic defense programs, there has been a shift in the emphasis of logistics programs from conventional forces, equipment, and weapons to special weapons systems, nuclear power, research and development, and support of contractor production. Although the number of logistics vessels and shore-based supply activities in commission have been reduced, greater requirements and consumption rates have increased the logistic task. The increased workload has been assimilated by consolidating and improving supply distribution facilities; more effective and economical procedures in supply management, field purchasing, and transportation; greater utilization of automatic data-processing equipment; vigorous disposal of surplus; and development of more sophisticated inventory management techniques.

For flexibility and responsiveness to changing operational demands afloat and ashore, supply support operations in the San Francisco Bay area were consolidated. Plans for similar consolidations in the New York, Norfolk, and Charleston areas are under joint study, and repair parts stocks have been consolidated in the San Diego area. Realignments of inventory managers have been made to permit consolidation of similar functions or to improve communications and coordination. Criteria have been established for transferring central inventory management of virtually all susceptible Navy stocks to centralized supply demand control points, thus reducing Navy Department headquarters workload.

During this fiscal year, conversion of approximately 1,400,000 naval items of supply to the new Federal system of cataloging was completed, and all inventory managers are now using only the new cataloging data. An accelerated item reduction program is continuing, the range of items being reduced in accordance with schedules established by the Armed Forces Supply Support Center. Approximately 101,500 Navy Federal stock numbers were eliminated in reviews under this program.

Successful completion of an aggressive disposal program has enabled reduction of the investment level of the Navy Stock Account from \$2.056 billion to \$1.870 billion. As a result of the Navy-wide disposal program, which includes both Navy Stock Fund material and material not carried in the fund (such as ships and aircraft), approximately \$3.3 billion of property was disposed of during the

year. Included were 2,400 aircraft and 167 ships. Redistribution of excess personal property approximated \$157.2 million, of which nearly \$124.8 million was redistributed within the Department of Defense and \$32.4 million to other Federal agencies.

The aviation supply organization encountered pressing problems, and a broad program of solutions was devised, based upon the recommendations of two reviews by the Office of Naval Material, reports of the General Accounting Office and the staff of the House of Representatives Committee on Appropriations, and the report of a special board convened by the Secretary of the Navy. The responsible administrators of aviation supply have vigorously attacked these problems and by the end of the fiscal year had completed action or had made substantial progress on all issues raised. Among the important solutions were clarification of management responsibilities; development and refinement of a comprehensive inventory control program for repairables; intensification of management attention to high-cost items while managing low-cost items by wholesale methods; improved reporting and control of contractor performance; and improved field stock status reporting. While the full impact of these improvements will not be measurable for several months, immediate improvement in several areas has been evident.

To strengthen fleet support further, standard electric accounting machine card requisition/issue procedures were introduced to simplify the supply operation and reduce paperwork. Likewise, the material readiness of 367 active ships has been improved through issuance of coordinated shipboard allowance lists. By survey of 119 active ships, excess material valued at \$6.95 million has been off-loaded, while onboard allowance deficiencies of \$12.2 million have been identified. Appreciable savings are being realized and increased fleet endurance achieved through the use of "ration-dense" food—dehydrated, compressed, or concentrated food products which extend the "at sea" time of the fleet and reduce replenishment and transportation costs.

Other means of increasing supply efficiency being explored include systematic methods improvement and engineered work standards. Paperwork requirements have been a target for substantial reduction through refinement of supply procedures and installation of additional mechanized stock recording and reporting equipment, ashore and afloat. Additions and replacements are increasing the capacity of existing automatic data-processing equipment, and new equipment has been installed at the inventory manager and stock point levels. The aviation supply data transmission system has been expanded, and a data transmission system for ship-to-shore requirements is being tested and evaluated by the Atlantic Fleet and

the Naval Supply Center, Norfolk, Va. Supply demand control points have installed transmission equipment for material identification data and have tied into the Armed Forces Supply Support Center net for rapid transmission of Federal catalog and item identification data.

Supply research and development programs have been stepped up. Engineering solutions to shipboard problems of mobile logistic support are being studied, including the development and evaluation of equipment necessary for helicopter resupply at sea and the use of helicopters for cargo handling in support of Marine Corps operations. A contract was placed for an underwater fuel cache as a first step in the development of underwater storage facilities. New clothing for missile handlers and catapult crews of aircraft carriers and new anticontamination clothing for personnel aboard nuclear submarines were developed and approved. Efficient galley layouts and equipment were perfected for nuclear-powered submarines. A technique was established for determining the military essentiality of repair parts aboard ship, thus enabling a prototype ship's allowance list to be designed for maximum endurance, economy, and effectiveness.

Progress in the transport of material has paralleled other developments. A POLARIS movement plan was developed to move POLARIS missiles and related materials expeditiously, entailing maximum use of each mode of transportation to obviate disruption of production schedules through transportation failures. An improved priority system was devised to insure transmission, processing, and movement of material requirements through the logistics pipeline in accordance with relative military importance and need, and is scheduled for full implementation on January 1, 1960. Prompt and proper shipment of personal belongings being an important morale factor, the use of demountable household goods containers was expanded to provide better service for military and civilian personnel and their dependents. With regard for its economy and logistic effectiveness, the use of air transport for priority freight is being furthered as an expeditious means of improving supply support.

Corresponding improvements and economies were effected in the handling of freight shipments and the operation of cargo terminal facilities through application of sound traffic management principles. During the first 10 months of the fiscal year 1959, terminal sections of major supply system activities handled 6.4 million measurement-tons of material in inland shipping, and 4.3 million measurement-tons in ocean shipping. Total effort to move this volume was reduced from 8,456,000 to 7,893,000 man-hours; a ratio of 1.36 measurement-tons per man-hour compared with a ratio of 1.25 in the previous year.

X. Shore Facilities

The Naval Shore Establishment is adjusting to the trends in military concepts and weapons systems, and changes are taking place not only in physical plant but in engineering, administrative procedures, and management as well.

Shore Construction

There was a net increase in the real property inventory of \$470,600,000 this year, to a new total of \$9,022,357,000. Major projects completed included work on Midway Island for direct support of airborne early warning, authorized and funded in July 1955 for \$40 million; Navy's largest pier on pilings, at the Naval Base, Newport, R.I. (\$10,680,000); major POLARIS research and production facilities on the west coast and at Cape Canaveral; and a new type gas-air catapult arresting-gear test facility and jet sled tracks at the Naval Air Station, Lakehurst, N.J.

Construction projects started during the year total about \$300 million in cost. They include expansion of existing facilities at Point Arguello, Calif., for the Pacific Missile Range; construction of a dry-dock for the repair of *Forrestal*-class carriers at Bremerton, Wash.; a 1,100-man addition to Bancroft Hall at the Naval Academy; a training facility for fleet ballistic missile submarine crews at New London, Conn.; a research facility, the world's largest radio telescope, at Sugar Grove, W. Va.; and a radiation exposure evaluation laboratory at the Naval Medical Center, Bethesda, Md.

On June 30, 1959, construction contracts amounting to \$900 million were in progress, and included the \$62 million very-low-frequency radio station at Cutler, Maine; increments totaling \$37.5 million for the master jet station at Lemoore, Calif.; the third increment of the subsidence remedial work at Long Beach, Calif.; and facilities for the relocation of the functions of Naval Air Station, Anacostia, to Andrews Air Force Base, the new area being designated "John Towers Field." Plans are being made to relocate the former Naval Receiving Station (now Naval Station, Washington, D.C.) to the Anacostia site when it is vacated by the air station.

Political unrest in Cuba and Morocco has affected construction programs in those countries. At Guantanamo Bay, Cuba, the program to remedy the critical shortages of power and water was greatly impeded. Contract work by the Cuban Electric Co. on the

power-generating problem was delayed, but resumed early in 1959. Fresh water is supplied from off the base by contract with a local Cuban company which is unwilling under present political conditions to expand its facilities in order to meet base requirements. In connection with this problem, a contract to increase water storage facilities on the base has been awarded, and possible sources of water within the base are being investigated. In Morocco, only the most urgent or emergency projects are being approved until the ultimate status of the station is clear.

Planning and Design

Technological advances in weapons systems require new types of shore facilities for which there are no precedents and create challenges in design and construction planning. New and revised design and construction guidance and criteria are being formulated which will meet these challenges, provide structures at the lowest overall cost (including maintenance), and satisfy operational requirements.

Research has continued in several fields, including support for amphibious operations, effects of nuclear weapons on structures, and construction economy. An atomic blast simulator capable of performing at low cost types of tests of structures (on a scaled basis) formerly possible only at the Nevada test site and at the Eniwetok proving ground, has been developed and installed at the Navy Civil Engineering Laboratory, Port Hueneme, Calif. A master shore development plan for the Charleston, S.C., naval complex has been completed; others have been initiated at Norfolk, Va., and San Diego, Calif.; and still others are scheduled for accomplishment later.

Real Estate

Title to 582,478 acres of land was acquired, 443,275 of them by transfer from other Government agencies, while land disposals totaled 20,331 acres valued at \$176 million. In addition, at the end of the fiscal year major disposal actions involving approximately 89,700 acres were in process. With improvements, these represented a total cost of about \$487.5 million. Twenty-two industrial reserve facilities, with book value of more than \$200 million, are leased to private interests.

Housing

Total requirements for Navy and Marine Corps family housing (including fleet personnel) are estimated at a minimum of 278,516 units as of the end of the fiscal year 1959. There are 58,470 adequate Navy-controlled units and 97,207 families have adequate quarters in private housing. This leaves 122,839 families inadequately housed. Of these, 41,493 are in inadequate Navy units and the remainder in inadequate private housing.

By the end of the year, the Department of the Navy had acquired Wherry Act housing projects at 20 locations, amounting to 12,549 units of the 24,503 units under Navy sponsorship. Of 11,319 new quarters authorized under the Capehart Act, 8,995 are completed or under construction.

Utilities

Procurement of utility services, exclusive of long-lines communications, totaled \$55,744,000. Savings through contract negotiations, hearings before State utility commissions, and municipal rate negotiations were approximately \$4,211,000. Leased long-lines communications services (approximately \$6,250,000) include new automatic teletypewriter service, which was placed in operation this year. New commercial telephone service for the Naval Base at Newport, R.I., incorporates "in-and-out" dialing and other features of the nationwide mechanization program of the telephone industry, a service eliminating most of the requirement for switchboard operators.

In operation of its mobile power reserve, the Navy has been a major contributor to the Government's emergency power needs. The loan of steam-generating cars of its east and west coast railway electric power plants, for use in the testing of nuclear reactor components, avoided the necessity to purchase steam generators and resulted in savings of approximately \$250,000 for the Government. Increased attention is being given to the applicability of nuclear power plants, especially for use at isolated and remote locations. Studies of this will be carried on during the coming year in conjunction with the Atomic Energy Commission. A floating powerplant (YFP-10) was made available to the Air Force to power an early warning installation in Greenland.

Maintenance

A beginning has been made on a cost analysis of maintenance operations, which is expected to lead to more effective budgeting and more critical appraisal of maintenance expenditures. An effort is underway to apply engineered performance standards for public works departments to all major air stations within the next 2 years. Work improvement measures in maintenance management have been initiated with highly gratifying results.

Extensive studies in motor transportation and the economics of equipment ownership are being prosecuted. Coupled with a review of equipment usage in the Shore Establishment, these studies are expected to bring significant savings through the more effective use of fewer units of equipment. Attention is also being given to wider use of electronic devices to analyze the performance of internal-combustion engines without disassembly.

Despite savings and increased efficiency in maintenance management, the general condition and level of maintenance is deteriorating at some shore facilities, reserve training centers for example. This is a product of the three-way "squeeze" caused by normal deterioration working against an expanding plant, less maintenance funds, and increased labor and material costs.

XI. Research

The future capability of the Navy and the Marine Corps is being assured by an effective research and development program covering a broad field. Important research objectives this year were increased antisubmarine effectiveness, improved all-weather operation of carrier aircraft, and better air defense. Next year's program will contain several fully integrated weapons systems. Typical of the intricacy of modern weapons, many of these extend beyond the technical fields of any single organizational component. In these cases a "lead" bureau is designated to carry development responsibility for the entire system.

Weapons and Equipment

The 1959 development program included these items, in part:

An all-weather low-altitude attack aircraft (A2F), a subsonic turbojet plane designed for shore-based or carrier-based operations. It will probably be test flown in 1960.

An internal combustion catapult powerplant. With development well advanced, this system will enable rapid launching of heavy aircraft, and is presently planned for the first nuclear-powered carrier, *Enterprise* (CVAN 65).

A close support artillery weapon. Transportable by helicopter, this rapid-fire artillery piece is superior to the 105-mm. howitzer in all respects, and has been test fired successfully.

The Navy Tactical Data System. A complete three-station tactical data system network is being assembled for technical evaluation.

An assault landing craft (LCA). Designs for this craft, similar to the Landing Vehicle, Tracked (LVT), have been completed. The LCA will have a water speed of 15 knots and a land speed of 25 knots.

Guided-missile development is providing the best possible balance between present needs and future requirements in conventional and nuclear warfare. The program includes EAGLE, an all-weather long-range, air-to-air missile; air-to-air missiles SIDEWINDER 1C and SPARROW III; the air-to-surface missiles BULLPUP and CORVUS; and the surface-to-air missile SUPER TALOS. These missiles have been discussed elsewhere in this report, as has the fleet ballistic missile POLARIS.

Operational requirements have been forwarded to ARPA for research and development on a high-accuracy navigation system using earth satellites; communications satellite relay systems; and electronic reconnaissance satellite; a reconnaissance surveillance satellite system; a naval weather satellite system; satellite surveying systems; anti-satellite systems; an air/sea launch system for satellite payloads; and a sea-based manned maneuverable interceptor spacecraft system.

Among items which have been evaluated are new and improved sonar equipment; new torpedoes, including an antisubmarine homing torpedo which can be launched from the air or surface; improved aircraft submarine detection systems; and the operational concept of a drone antisubmarine helicopter (Dash). Air and submarine-launched antisubmarine mines are ready for evaluation after successful initial tests. Mine defenses will be improved by a helicopter-towed mine countermeasures system and a high-frequency sonar which are under development.

Basic Research

Foundation research continues at a pace designed to support and advance the diverse and complex technology required by modern naval forces. Highlights of this year's program are found in materials research, in the exploitation of high-altitude balloons for upper atmosphere and astrophysical investigations, and in signal processing.

Significant advances have been made in the discovery (by synthesis or composition) of new materials; also in the determination of new properties and uses of known material in extreme environments through improvements in the measurement and prediction of mechanical, thermal, and electrical properties. Development and instrumentation of reliable high-altitude balloons is leading particularly to new and important observations in solar physics and cosmic rays. In signal processing, construction of both masers (microwave amplification by stimulated emission) and parametric amplifiers is advancing. In addition, computer technology has made notable progress in the design of more flexible and more self-reliant, information-handling systems.

Chemical Sciences

Worthy of special mention are recent results in the synthesis of new compounds with applications to the development of materials which retain their relevant physical chemical characteristics at high temperatures. The perfluorobenzenes are examples of such compounds. A new branch of chemistry as extensive as the chemistry of benzene itself is in promise. The chemical industry is considering large-scale development of these new perfluorobenzenes because of their inherent resistance to change at high temperature.

A new synthetic fluoaluminate crystal has been made which, mica-like in physical properties, exhibits desirable electrical properties up to 750° F. It cleaves readily into optically clear plates as thin as 0.0005 inch. A synthesis technique has been discovered whereby a composition comprising uniformly dispersed nickel in polymeric carbon can be prepared easily to yield what promises to be a high temperature (up to 1,800° F.) semiconductor. A large new project on inorganic polymers is expected to produce new chemical knowledge and discoveries leading to plastics and rubberlike materials suitable for use at temperatures of 1,000°–1,200° F.

Boron has been prepared in new and interesting forms including a new crystalline variety. The Army Signal Corps has described samples tested as being the purest boron ever investigated by that activity. New phosphides and silicides of transition metals, which exhibit interesting corrosion resistance, have been prepared and described for the first time.

Physical Sciences

The outstanding capability of balloon-borne systems for astronomical and atmospheric research is vividly demonstrated by Project Stratoscope. This project succeeded in photographing the limb and disk of the sun with higher resolution than ever before attained. The pictures established for the first time the scale of the solar granulations and revealed unexpected details in their structure. Success of this project has encouraged the design of a 36-inch telescope which will provide a resolution of the order of 0.1 second of arc and light-gathering power sufficient to allow its use at night. For comparison, predicted satellite stabilities are of the order of 1 minute of arc.

Ultrasonic techniques for studying metals in the superconducting state has proven especially valuable. Much current research effort is concerned with measurements of the velocity and attenuation of sound in various media as a function of frequency, temperature, and pressure. These data give information on energy transfer within the molecules, as well as very consequential information on the material. Data on ultrasonic attenuation in the superconducting region have been particularly helpful in evaluating theories of metals.

Mathematical Sciences

Through logistics research, methods were developed for quantifying relative military worth of equipment and parts for combat ships. These methods will be used in conjunction with usage data in determining allowance lists for ships. Important contributions in subjects fundamental to logistics are an integrated collection of studies in linear and nonlinear programming and a book on "Strategy and Market Structure" using a game theory approach.

Progress in automatic data processing requires increased speed and capacity for conventional computers by development of new components; more capable and reliable computer systems by utilization of novel techniques and organization; emphasis on understanding and development of self-organizing computerlike systems for adaptive control, for pattern recognition, and for handling large amounts of data. Studies are proceeding in information retrieval and mechanical language translation.

Earth Sciences

In 1957 the National Academy of Sciences-National Research Council established the Committee of Oceanography. The first report, published in 1959, recommends a substantial expansion of oceanography in the United States. The Navy portion of those recommendations is being implemented by Project TENOC, a 10-year expansion program for oceanographic research including the construction of specially designed oceanographic research vessels.

In late 1957, the Office of Naval Research undertook the development of ARCAS, a rocket probe for meteorological research at elevations between 100,000 and 200,000 feet. Coordination with other interested agencies has resulted in broadened support and participation, including research activities of the Navy and the Air Force. The demand for ARCAS is so great that present planning calls for delivery within the next year of more than 800 engineering test rounds. This foresighted and well-coordinated effort will assure the accelerated development of a critically needed item with substantial savings in time and money.

The first of three International Geophysical Year rockets containing spectrographic solar instrumentation was launched from White Sands Proving Ground on May 5, 1958. The rocket carried an extreme-ultraviolet spectrograph for the range of 500 to 2,100 angstroms, and a camera which photographs the disk of the sun by using only the light of the Lyman-alpha line of hydrogen (1,216 angstroms) and is capable of $\frac{1}{2}$ -minute arc resolution. The spectra obtained appear to confirm the earlier finding that the Lyman-alpha line is less than 0.3 angstrom in half-width.

A project to evaluate and use the maser is now underway at the Naval Research Laboratory in cooperation with Columbia University. First used with the laboratory's 50-foot reflector to observe the extremely weak radio waves from other planets, distant galaxies in collision, and clouds of ionized hydrogen gas between stars, the maser operates at about 9,000 megacycles per second. It was installed as a radio frequency preamplifier in the 3-centimeter radiometer used for radio astronomy studies, and the composite apparatus was mounted at the focus of the reflector in April 1958. A tenfold improvement

in the usable signal-to-noise ratio was realized in this first attempt to evaluate and use the antenna-maser-receiver combination.

Minitrack observations made on the U.S.S.R. satellite, 1957 Alpha II, and others made on the U.S. satellite, 1958 Alpha, yielded data which enabled scientists to determine the density of the upper atmosphere. The results thus far indicate a density about 40 times greater than previous values for that altitude obtained from calculations using models of the atmosphere. Another study was made recently on atmospheric drag of the 1957 Alpha II and both U.S. satellites, 1958 Alpha and Beta.

In May 1959 for the first time, highly detailed photographs of the entire sun were taken in the light of the Lyman-alpha line of hydrogen. Lyman-alpha light is in the extreme ultraviolet region of the spectrum, midway between visible light and X-rays. It originates in regions of the solar atmosphere 4,000 to 6,000 miles above the sun's surface. The photographs were taken from an altitude of 123 miles by a small, specially constructed solar observatory in the nose of an AEROBEE-HI rocket launched from White Sands, N. Mex., on March 13, 1959. The experiment was designed and the launching conducted by the Naval Research Laboratory as part of the Solar Activity Program of the International Geophysical Year.

Biological Sciences

A technique employing ultrasonic waves for special types of brain surgery has shown effectiveness in the treatment of certain nervous disorders. New or improved methods for the preservation and storage of tissues (red blood cells, skin, bone, and cartilage) have advanced the therapeutic measures to be used following radiation and traumatic injuries.

The lives of severely burned persons may be saved by the use of serum containing antibodies specific for the toxins derived from burned tissue. For the first time it has been shown (by tracer techniques) that choline is taken up by living adult nerve and incorporated into cholesterol.

The human disorientation device has been developed as a research tool in the field of aviation medicine for the generation of angularly accelerated motion to enable medical research in the field of animal or human responses to angular acceleration. The device produces accurately known and controlled values of angular acceleration about two axes of rotation when the subject is seated so that his head is located at the point specified by the intersection of the axes. It allows medical study of sensory responses to angular acceleration, vertigo, and similar phenomena required for analysis of human behavior and human performance limitations in the rapid maneuvering (spin and tumbling, etc.) of high-speed aircraft and spacecraft.

Psychological Sciences

Navy support of psychological research is calculated to maximize the Navy's manpower resources. Projects have concentrated on increasing our fund of knowledge of man's physiological and psychological potentialities in order to use manpower in the various kinds of environments in which our Navy operates (underwater, surface, air, distant space, cold, warm, stressful, etc.) and to achieve peak efficiency in the combined efforts of personnel who must perform in ever-increasingly complex and global systems.

Material Sciences

In many aspects, the relationship between the physical and mechanical behavior and properties of materials at high temperatures and their composition and structure is very poorly understood. Thus, it has not been possible to specify in advance on theoretical grounds what the properties of a particular alloy will be. Recently, a method has been developed for calculating the relative stabilities of a given metal to permit reliable predictions of the occurrence, and the type and temperature range of a phase transformation. This is a significant step toward being able to calculate and preselect future alloy systems of practical use, thereby greatly reducing the large amount of experimentation now needed for alloy development.

As yet, much work in the selection of materials must necessarily be empirical. In order that the empirical approach may be prosecuted most efficiently, improved testing methods are required. One method (the Notch ductility test) has been employed in developing and selecting the higher quality steel and welds for new submarine hulls. The concepts derived from these tests have established the basis for defining the optimum characteristics of the materials which are being used in the current construction program. Among a variety of materials, HY-80 "high-chemistry" steel was quickly identified as the best in all respects of weldability and as the ultimate in resistance to brittle fracture. Many years of empirical tests of new submarine hull structures were obviated by the store of data and know-how accumulated through the years.

Electronic Sciences

The radiotelescope facility at the California Institute of Technology was completed and placed in operation. This facility, which includes two 90-foot steerable parabolic reflectors mounted on tracks to permit operation as an adjustable interferometer, is the most versatile in the world today, and its reflectors possess the most accurately finished surfaces.

A space surveillance system with operational control centered at the Naval Weapons Laboratory, Dahlgren, Va., was placed in operation on a 24-hour basis in February 1959. It has since detected and tracked every known object in space which has passed over the United States. The system, developed by the Navy for ARPA, includes two electronic "fences," each 1,000 miles in length, stretching east and west across the southern United States.

Since 1949, when work on ionosphere reflection radar started, many problems in circuits and techniques have been solved. Subsequent research, and the resulting cross-correlation radar, detected ionization produced by missile launchings and atomic tests by means of ionosphere reflection. Work is continuing toward improving the system and evaluating its capabilities for surveillance work.

Continuing the search for new communication channels for naval use, scientists proposed using the moon as a reflector for radio communication signals. From calculations based on the assumption that radiowaves would be diffusely scattered back to the earth from the entire visible hemisphere of the moon, it had been thought that overlapping repetitions would render the signal practically unintelligible. However, persistent research revealed that all radiowaves reflected by the moon come from a relatively small spot, with little diffusion. This discovery led to the first transcontinental circuits via moon relay. An official transcontinental message was first sent by reflection from the moon in November 1955 from the Naval Research Laboratory in Washington, D.C., to the Navy Electronics Laboratory, San Diego, Calif. A new source of communication channels has thus been made available.

Transparent films of phosphor that create different colors can be deposited one on top of another, thus permitting the development of a completely new approach to color television. Cathode ray tubes with several combinations of two primary colors are in successful operation and tubes with all colors are in the experimental stage.

Engineering Mechanics

In the more basic aspects of structural mechanics, a breakthrough has been achieved by developing an analytical method of deriving shell theories, in a systematic manner, from the exact three-dimensional linear theory of elasticity. This work establishes a long-sought theoretical basis for determining the accuracy of shell theories to be used in new designs of weapons and weapons systems. Successfully applied to problems concerning rotationally symmetric deformations of cylinders, this work now will be extended to unsymmetrical deformations as experienced in most designs of submarine hulls and in missiles subjected to complex loading conditions.

Energy Conversion

Following earlier experiments and investigations on heat transfer by liquids at or near their critical points (first observed with ammonia), the enormous transport of heat by natural convection in a fluid near its critical point was further confirmed in a larger installation with carbon dioxide. The heat transfer in this instance corresponds to an apparent heat conductivity more than 2,000 times that of solid copper. It also was found that, at temperatures above the critical point, the heat transfer rate decreases suddenly.

Research leading toward the control of thermonuclear reactions on a laboratory scale, and hopefully on a large, economical power-producing scale later, is being pursued in many countries throughout the world. One approach has been under experimental investigation by the Department of the Navy for several years. The basic idea uses high-frequency-field speed shock waves to preheat a tube containing deuterium gas, and then compression of the resultant plasma by a strong magnetic field. These experiments are being conducted with a high current condenser bank capable of producing currents in excess of 5 million amperes in times of the order of 6 microseconds. With this apparatus, it is possible to generate pulsed magnetic fields in the 500,000-gauss range and temperatures up to 20 million degrees Kelvin (36 million degrees Fahrenheit).

General Science

The Coordinated Science Laboratory at the University of Illinois has made considerable progress in the development of decision-making procedures and weapons assignment criteria, using as major tools the Cornfield tactical data system, a special-purpose tracking and sorting computer, and a general-purpose high-speed computer. A high resolution radar system having the novel feature of utilizing storage tubes for proper data processing has been developed, and gives resolutions many times that of conventional radar systems. Continuing effort is leading to the development of an electrostatic gyroscope, which will be capable of navigation accuracies between 10 and 100 times better than any system now in process.

Exploratory and foundational research programs in Navy laboratories have contributed greatly to solutions of development problems and have helped to indicate new areas for exploitation. In satisfying operational requirements some recent accomplishments of these programs follow.

Molecular magnetism (ferrites) is being investigated at the Naval Ordnance Laboratory, White Oak, Md. In attempting to understand forces responsible for ferromagnetism, a large number of new ferrites were prepared and the magnetic properties measured. One of these,

a nickel iron aluminate, was found to have a reasonably high magnetic moment and minimum losses at a frequency in the neighborhood of 1,000 megacycles. This ferrite is being used by the British Admiralty Laboratory for a ground search radar and as a Faraday rotation isolator in microwave systems used by the Hughes Aircraft Co., Airtronics, Sperry Rand, Harvard University, and Stanford University—applications all based on the published results of Navy research.

To meet the need for an instrument which would determine meteorological conditions at high altitude, a study was instigated which led to an instrumented LOKI rocket intended to accomplish the required mission to 100,000 feet altitude. As a result of the study, engineering development of such a meteorological rocket called HASP was started. The first version, useful to 100,000 feet, has been released.

A most recent accomplishment in solid state physics is the development of a transistor which will both improve the signal-to-noise ratio and increase the frequencies of operation, making the simpler transistor technology competitive with masers for some applications.

The Naval Ordnance Laboratory has been investigating the application of nuclear techniques to nondestructive testing of large propellant grains. A gamma ray technique has been developed which is superior to the X-ray techniques usually employed. The Laboratory is presently studying a neutron technique which promises even greater improvement.

For the last few years, work has been in progress at the Naval Weapons Laboratory, Dahlgren, Va., on methodology for employing digital computers in war game studies. Pursued in collaboration with the Operations Evaluation Group of the Chief of Naval Operations, it is making valuable contributions to tactical planning.

XII. Civilian Personnel

On June 30, 1959, the Department of the Navy had 357,108 employees and was the third largest employer of civilian personnel in the Federal Government. Employment decreased 6,621 during the year, with an increase in foreign areas. The accession rate was 14.7 percent, while the separation rate was 16.6 percent.

CIVILIAN EMPLOYEES

30 June 1958

	<i>Total</i>	<i>United States</i>	<i>Territories and possessions</i>	<i>Foreign countries</i>
Graded.....	139, 454	129, 054	5, 623	4, 777
Ungraded.....	224, 275	202, 573	11, 516	10, 186
Total.....	363, 729	331, 627	17, 139	14, 963

30 June 1959

Graded.....	138, 422	127, 632	5, 464	5, 326
Ungraded.....	218, 686	196, 013	11, 588	11, 085
Total.....	357, 108	323, 645	17, 052	16, 411

Employment

During the year the Department's merit promotion program was revised to comply with new requirements of the Civil Service Commission. Naval activities have implemented new promotion plans (individually reviewed and approved by the Department) designed to fill vacancies with the best qualified employees, provide opportunity for progressive development of employees, insure a high level of employee performance, and retain capable employees.

"Campaign Forty," a promotional effort directed at increasing employee participation in the suggestion program, was initiated during this year to commemorate 40 years of Navy experience with this tool of management. Excellent results have been obtained; during the first 6 months 37 percent more suggestions were submitted than in the comparable period of 1958.

Prompted by a White House directive on agency personnel programs, a Navy-wide survey revealed a healthy state of employee-management relations. Communications appeared to be the only weakness of consequence. Activity reports indicate that conscientious

action is being taken to improve employee-management relations and Civil Service Commission inspections corroborated those reports.

During the last 6 months of the year, substantial reductions in force were necessary. In order to avoid adverse effects upon employees to the greatest extent possible, a vigorous outplacement program was instituted by Navy bureaus and their field activities. As a result of these efforts 4,599 of the 8,852 employees affected by reductions in force in five major bureaus have been placed; of the remainder, 639 were retired.

Position Classification and Wage Administration

Reviews and evaluations were made of wage setting and position classification in field activities, and classification standards and occupational analyses are under continuous study and development. Wage surveys were performed to keep pace with the pay levels in private industry. The passage of Public Law 85-872 in September 1958 required that all wage schedules be placed into effect not later than the first day of the first pay period which begins on or after the 45th day following the date on which wage surveys were ordered. All Navy wage schedules were approved and issued within the time limits required. New or revised schedules were approved and issued for 126 labor market areas in the continental United States, and 32 schedules were issued for 20 wage areas overseas.

Training

Work-study and cooperative educational programs for engineers and scientists have been expanded, with a total employment of 1,200 student-trainees in 51 naval activities. A detailed occupational analysis and manpower survey of all industrial relations personnel was undertaken. This study will aid in establishing career development plans for employees engaged in the field of industrial relations. The provisions of the Government Employees Training Act (Public Law 85-507) were effectuated, delegation of authority being made to chiefs of Navy bureaus and offices for the approval of training in non-Government facilities.

Considerable attention is being given to improving the quality of civilian leadership. The "Code of Ethics for Government Service" was published and disseminated, and programs for management and supervisory development are being revised to stress the importance of personal example, good management practices, and moral responsibility.

XIII. Business Management

Procurement and Contracting

Analyses of proposed contracts and review of requests for authority to negotiate contracts have led to improved procurement practices including better price evaluation and wider competition. Improved techniques in the pricing of missiles and related electronic equipment were instituted and are of continuing significance since the major part of Navy procurement funds is spent for these items and for aircraft.

Greater participation by small business firms in Navy procurement continues to be sought. During the fiscal year 1959, small companies received \$1,122,838,000 in prime contract awards. Their proportion of total direct Navy purchases decreased, however, from 18.7 to 16.2 percent. Primary reasons for this decline were the growing complexity and size of individual Navy purchases; a revised definition of "small business" in certain industries, which reduced the small business population; and generally depressed prices in the petroleum market, which made it more difficult for small business concerns to compete for Government contracts.

In cooperation with the Small Business Administration, procurements set aside totally or partially for small business by the Department of the Navy were substantially increased. Procedures for greater utilization of small firms to meet research and development requirements were developed through symposia, at which Navy technical personnel acquainted qualified concerns with the Department's general research and development requirements. Improved techniques for classifying contractors' capabilities in the research and development field also helped.

Increased effort was made to reduce the number of contractor-operated plants in the Department's industrial plant reserve, and to align the program with the latest mobilization planning. As a result, 29 plants were removed from the reserve this year, compared with 8 last year. Of the 126 remaining, 17 Government-owned contractor-operated plants, and 13 privately owned, privately operated plants, recapturable in an emergency (national security clause), have been declared excess to current and mobilization requirements. These plants are in the process of disposal and should be removed from the reserve during the fiscal year 1960.

During the fiscal year 1959, the Department authorized its first auction sale of surplus Government property located at a privately operated plant. The sale, involving several million dollars of aircraft quality machine tools, resulted in an excellent return of 25.3 percent of the original cost.

Contributions to industrial mobilization planning in an international sense are noted in Navy participation in the North Atlantic Treaty Organization (NATO) groups of experts. In cooperation with the Army and the Air Force, this participation has produced important standardization agreements within the NATO family. By this means, all participating countries design equipment under common agreements and resultant products will be compatible. Exchange of technical data has also led to coordinated production between various NATO countries, some examples of which are SIDE-WINDER missiles, maritime patrol aircraft, and most recently the Mark 44 torpedo.

Financial Management

During the fiscal year 1959, \$11.7 billion was expended in maintaining the readiness and capabilities of the Navy and the Marine Corps for the Nation's defense. This amounted relatively to about 15 cents of every dollar expended by the Federal Government and about 28 cents of every dollar expended for military purposes by the Department of Defense.

In drafting the Navy budget for the fiscal year 1959, fund estimates were based on the paramount objectives of immediate readiness, maximum striking power, and maximum capability in antisubmarine warfare and fleet air defense. Integral with those objectives were the research and development and procurement necessary to provide for future capabilities. After extensive consideration, Congress appropriated \$11.8 billion in new obligational authority; that is, new authority to incur obligations for the future payment of salaries, purchase of equipment and supplies, and contractual services. Since the Department entered the fiscal year with "carryover" or prior-year funds of \$11.4 billion, nearly all of which was already obligated or held in a reserve status for long leadtime items of procurement, it had available for expenditure from these sources during the year a total of \$23.2 billion. Having spent \$11.7 billion during the fiscal year, \$11.5 billion was carried forward into the fiscal year 1960 for expenditure then or in later years as deliveries are made under procurement contracts and work orders. Net returns to the Treasury amounted to about \$93 million.

The broad purposes or functions for which Navy expenditures were made in the fiscal year 1959 are set forth in the following table:

<i>Budget category</i>	<i>Amount (millions of dollars)</i>	<i>Percent</i>
Military Personnel.....	\$3,280	27.9
Operations and Maintenance.....	2,789	23.8
Major Procurement and Production.....	4,965	42.3
Military Construction.....	339	2.9
Research and Development, Test and Evaluation.....	798	6.8
Revolving and Management Funds.....	-433	-3.7
Total.....	\$11,738	100%

The Department spends over half its funds each year on current readiness, primarily for military personnel and operations and maintenance. The other half represents costs of modernization, which comprise principally research and development, production, and procurement. As the table shows, more funds were expended for major procurement than for any other purpose. These expenditures (about 42 percent of the total) were for new aircraft, missiles, ships, combat vehicles, weapons, ammunition, electronics, and other procurement items of a long leadtime nature. Almost \$2.2 billion were spent for new aircraft alone, just under 19 percent of the total Navy budget. Expenditures for shipbuilding amounted to \$1.7 billion, while missile expenditures totaled \$568 million.

Military personnel costs approximated \$3.3 billion, or about 28 percent of the total. These costs, which supported an average of about 637,000 officers and men of the Navy, and approximately 185,000 Marines, consist mostly of pay, allowances, subsistence, individual clothing, and individual transportation. Also included are about \$107 million of expenditures applicable to Navy and Marine Corps Reserve components.

The third large expenditure category, "Operations and Maintenance," amounted to \$2.8 billion, or 24 percent of the total. This important cost segment included funds for maintaining and operating the fleet, aircraft, and Marine Corps units, as well as the Shore Establishment with its air stations, shipyards, ordnance plants, supply depots, and hospitals. With this sum, about 860 active fleet ships and about 7,600 Navy and Marine Corps aircraft were operated. It also supported three Marine divisions and three Marine air wings.

Research, development, test, and evaluation expenditures totaled \$798 million, or about 7 percent of the budget. This money applied its major emphasis on antisubmarine warfare, guided missiles, nuclear propulsion, all-weather attack capability for carrier-based aircraft, and efficient air defense systems for naval formations, along with basic and supporting research.

All of the foregoing data reflect advances to the "Management Fund" for the POLARIS missile program. Advances for that pur-

pose exceeded expenditures by about \$507 million. This excess accounts for the negative expenditure amount shown for "Revolving and Management Funds" in the preceding table.

Organization

The Department in this fiscal year took a serious look at its organization and its method of doing business. This self-appraisal was made by a committee composed of top military and civilian executives and chaired by the Under Secretary. A major consideration prompting this survey was the recent great advance in the science and technology of modern weapons systems and the need to assure the adequacy of the Department's administration in meeting the challenge.

As a first result of these deliberations, the responsiveness of the organization of the Department as a whole to existing law was tested and affirmed, and continuation of its "consumer-military command/producer-business administration" bilinear form of organization was approved.

The committee concluded that there were areas where certain changes in organizational structure could improve the Department's effectiveness and made pertinent recommendations to this end. Many of these recommendations have already been implemented and others are in progress. Among the major areas singled out for improvement were those relating to research and development, weapons systems development, and officer career specialization.

Steps have been taken to increase the stature of research and development functions in the Office of the Secretary and the Office of the Chief of Naval Operations. One of the three Assistant Secretaries of the Navy has been designated as Assistant Secretary for Research and Development. This action provides for more effective coordination and direction at the secretarial level of the efforts of bureaus and offices and Headquarters, Marine Corps, in fulfilling research and development requirements of the operating forces. In the Office of the Chief of Naval Operations, responsibility for research and development functions has been consolidated under a newly established Deputy Chief of Naval Operations (Development).

In weapons systems development, action is underway to reduce substantially the time between the expression of an operational requirement and the delivery to the combat forces of a fully developed and effective weapon or weapons system. The Bureaus of Aeronautics and Ordnance are being combined into a new Bureau of Naval Weapons. This will eliminate numerous problems of cognizance, coordination, and management which have resulted from split responsibilities for weapons systems development between the former two Bureaus. It will place the responsibility for approximately two-thirds of the

total weapons systems development effort of the Department under the direct authority and control of a single executive in the "producer" organization. It will also simplify the funding of these weapons systems, insure full utilization of the Navy's professional and technical talent, and permit more efficient use of naval facilities and laboratories.

In the consideration of officer career specialization, the Assistant Secretary of the Navy (Personnel and Reserve Forces) has been designated by the Secretary of the Navy to take steps to promote career opportunities in both the officer specialist categories and the regular line. Included in the plans are expansion of the Engineering Duty Group to cover all fields of engineering involved in the development of naval weapons; expansion of the Staff Corps of the Navy to include a staff corps of legal officers; and provision of opportunities for a modest number of line officers to take postgraduate training in law. The general purpose involved is to insure that the Navy makes full utilization of the professional and technical abilities of its officer personnel.

Automatic Data Processing

Comprehensive consideration has been given this year to business-logistics management aspects of automatic data processing. Recognizing the potential of modern machines, the goals of an overall program have been established, together with policies and procedures for insuring economical and efficient exploitation of this potential in improving management. The Department plans, at the earliest practical date, the use of automatic data-processing equipment at every activity of the Navy and Marine Corps where it is militarily or economically advantageous. Looking beyond immediate or marginal economic gains, early use in management problems is intended to provide management with operating experience and familiarity with its potential, both of which are prerequisites to full exploitation of modern electronic equipment and methods. In conjunction with operations research and other advanced mathematical techniques, improved and more sophisticated scientific management information systems will thus be provided to cope with the growing complexity of management.

The Department of the Navy now has 37 electronic computer installations serving the data-processing needs of business-logistics management, 13 of which went into operation during this year. Typical applications of these computers include aviation logistics; production scheduling; personnel, financial, and cost accounting; inventory control and accounting; and facilities management.

It has been possible to make some noteworthy achievements in more scientifically oriented management information. A model production planning and control system applicable to jobshop-type activities (such as the Naval Weapons Plant) was evolved and is now awaiting

test. Also, a mathematical model promising a scientific solution of the naval aviation logistics problem (which involves several billion dollars annually) has been constructed and is now being tested. Scientific solutions to problems in optimum assignment of personnel and in optimum evaluation of petroleum bids are nearly complete, and demonstrate the amenability of management decision processes to scientific analysis and manipulation.

Printing and Publications

The use of automated techniques in printed communication processes is being investigated and shows considerable promise. An example is a sequential card system of composition which, when applied to the production of the Navy Stock List, brought savings estimated up to 45 percent from early results. New types of electronic printing equipment are being developed and are expected to contribute substantially to technological progress and effective communication.

Management Improvement

As mentioned, increased attention has been given to providing a more scientific basis for management decisions—for weighing and relating the thousands of factors which influence such decisions. Due to the complex controls which must be maintained over the development of weapons systems and the general fulfillment of military requirements, progress reporting has been an acute management problem, and benefit has been shown in a program evaluation and review technique (called Pert) which has been developed for the POLARIS program. In key management spots, emphasis has been placed on the design of information systems which provide managers with “finger-tip” control over dynamic programs. Managers need to know the exact status of progress relative to plans and to be able to make quick adjustments in resources, objectives, and timetables.

In addition to large-scale automation of data/information systems, considerable progress was made in small-scale automation. Key officials have been indoctrinated in the advantages and applications of source data automation—a technique for capturing data in a common machine language at its source. In tape or punched card form, it can then be used automatically for many purposes while at the same time eliminating error, conserving manpower, and speeding business processes. The technique has been applied to a variety of operations, such as commercial procurement, personnel administration, and ammunition stock control.

Several milestones were passed in the long-range effort to improve industrial operations. Wider use of engineered performance standards has been achieved and used as a more scientific basis for determining manpower and material requirements and for controlling

production. The Bureau of Ordnance's progress during this year has been noteworthy, with savings of several millions of dollars. Standards developed by the Bureau of Yards and Docks were installed by the Bureaus of Ships, Ordnance, Aeronautics, and Supplies and Accounts in their public works areas. Similarly, the Bureaus of Aeronautics and Ordnance are installing standards developed by the Bureau of Supplies and Accounts for supply operations. Special industrial management methods, such as the "line of balance" technique, were more widely applied to give better control over production programs. This particular technique is also being tried in unprecedented areas such as the forecasting of recruiting and training requirements for submarine crews.

By applying functional (statistical) work measurement standards, the Chief of Naval Material was able to reduce the field inspection service by 889 people over the past 2 years. Highly refined staffing guides were also developed for 2,200 people in automotive maintenance work. Application of these standards is expected to make more than \$2 millions' worth of manpower available to perform other workload.

Streamlining paperwork and reducing administrative overhead requires ceaseless attention. The Chief of Naval Operations continued his review of administration operations in each of the fleet commands in order to get military personnel "away from the desks and onto the deck." Last year, reviews were completed in the Service Force of the Pacific Fleet and Naval Forces, Eastern Atlantic and Mediterranean. Work was finished on a single system for classifying directives, correspondence, forms, reports, and other documents by subject. The system, scheduled for use in all ships and stations by January 1, 1960, eliminates dual systems, improves reference, and simplifies training. Many actions were taken to eliminate reports and reduce paperwork. Through the reduction and improvement of forms and reports and the streamlining of procedures in which they are used, a sizable amount of manpower was saved for more productive work.

Hundreds of individual improvements were made in single organizations and in specific systems—too many to list here, but each demonstrating the worth of concerted effort to do things better. For example, the Bureau of Medicine and Surgery has improved the methods of control of medical department linens so that the manpower required for such control is drastically reduced. The Medical Department also extended the use of a remote control dictation system, which conserves the professional and clerical time devoted to preparing medical records.

XIV. Conclusion

As the Navy and Marine Corps endeavor to plan for the uncertain years ahead, a difficult problem is faced: How to divide resources between the requirements for immediate readiness and future capability. There is urgent need for modernization of the operating forces, but overage ships must eventually be replaced. This requirement increases in magnitude each year. New ships have been authorized and are being built. Their quality is excellent, but their number is insufficient to meet the replacement problem.

The accumulative aging of the fleet is felt severely in its carriers. The utmost possible modernization of World War II *Essex*-class carriers has considerably extended their useful life, but they cannot be made enough, younger, or larger, to handle the newer heavy high-speed planes. Their effectiveness as attack carriers cannot last much beyond 1966. A steady replacement program for these and other active fleet ships is imperative.

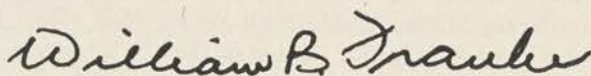
Because of missile development and probings into outer space, the future of the airplane demands major consideration. Missiles are expensive and short lived. Planes likewise are expensive and wear out. Yet not in the immediate future—perhaps never—can missiles be seen completely replacing piloted aircraft, particularly in limited war. The capability to cope with specific targets and defense situations requires the versatility of the airplane combined with discriminating human judgment which electronic-mechanical systems cannot provide.

Accordingly, aircraft and aircraft carriers continue as a major factor in the planning for and employment of naval forces. The attack carrier striking force remains the spearhead of the naval weapon, a powerful retaliatory force whose mobility is the best defense against ballistic missiles. Its versatility, repeatedly demonstrated in recent years, is indispensable for limited war situations. Because of its ability to hunt submarines at sea and destroy their bases and support facilities, it is vital to antisubmarine warfare.

Also essential in limited war situations is the amphibious capability which gives effect to the expeditionary role of the Navy and Marine Corps. This year's action in Lebanon emphasized the pressing need for modernization and replacement of existing amphibious shipping. Faster and more efficient amphibious ships, necessary to the new Marine concept of vertical envelopment, will be required for future

buildup of ground forces in areas where airlift capabilities may be restricted, as they were in Lebanon.

Considering the global scope of possible future operations, there is urgent need for comprehensive knowledge of the seas which cover 70 percent of the globe. Their judicious use, whether in times of peace or war, can immeasurably strengthen the Nation. Seapower means more than just ships and aircraft deployed across the seas—it means the ability, vital to the United States and our allies, to use the seas to the best interests of the free world, while denying their use to any potential enemy.

A handwritten signature in dark ink, reading "William B. Franke". The script is fluid and cursive, with the first name "William" and last name "Franke" clearly legible. The middle initial "B." is written in a smaller, more compact style.

WILLIAM B. FRANKE,
Secretary of the Navy.

Annual Report
of the
SECRETARY OF THE AIR FORCE

July 1, 1958, to June 30, 1959

Contents

	Page
Chapter I. INTRODUCTION.....	287
II. COMBAT FORCES.....	290
III. MANPOWER.....	302
IV. MILITARY TRAINING.....	308
V. HEALTH AND WELFARE.....	317
VI. INSTALLATIONS.....	326
VII. RESEARCH AND DEVELOPMENT.....	332
VIII. PROCUREMENT AND PRODUCTION OF MATERIEL.....	341
IX. LOGISTICAL SERVICES.....	347
X. MANAGEMENT.....	352
XI. BUDGET.....	358

I. Introduction

During the period covered by this annual report, the U.S. Air Force entered a new phase in military weapons systems development and operation.

Keynoting this period has been the word "change." Change is evident in almost every area of Air Force activity and effort. Most dramatic, perhaps, are the changing proportions of missiles and manned aircraft—in our forces and in those of our potential enemies—with missiles clearly on the increase. Until now our strategic capability has rested almost completely on the manned bomber and our major defense problem has been associated with countering this type of threat. But the nature of this problem is changing rapidly as missiles become an increasingly important element in our strategic striking force, and warning and defense against such attack become the major concerns of our defense forces. This trend will continue for some time to come, with missiles, and eventually aerospace craft, both complementing and replacing current weapons wherever it is militarily advantageous and economically practicable to do so.

Our operational concepts are changing, as well as the nature of our forces and the personnel who man them. As is the case with military equipment, decreases in the quantity of military manpower place greater premiums on quality. Thus the character of the force is changing toward a professional, career-oriented body.

Our problem goes beyond maintaining our day-to-day capability at peak performance. We must plan for and develop the weapons we shall need in the critical era ahead. Ballistic missiles, piloted and unpiloted air-breathing vehicles, aerospace craft and satellites, and a strong national scientific and industrial technology—these are the basic ingredients of aerospace power.

We must be continuously aware that these future strategic aerospace systems are interrelated with, and have an impact upon, current military doctrine. Early warning and communications satellites, the most immediate priorities among the various space projects, employ our most advanced ballistic missile technology. Other projects which are revolutionizing military strategy include weather, navigation, and meteorological satellites. Aside from their obvious nonmilitary applications, they will perform important military functions for all the military services. Indeed, in terms of national importance, the

need to develop these systems is every bit as urgent as the need for intercontinental ballistic missiles was 5 years ago.

Our future offensive and defensive missions, as we reach farther out in aerospace, will be analogous in principle to those missions we now conduct at the lower altitudes. Just as manned aircraft will be a vital contributing factor to national security for some time to come, so will its logical successor, manned aerospace craft, assume equal importance in the future role of aerospace power. The judgment and reasoning ability of man have always been required to assure complete accomplishment of the Air Force mission, regardless of the sophistication of the equipment. Man and his powers of decision and his ability to reason will continue to be decisive in space.

Our intention in the Air Force is to take advantage of the strong points of manned and unmanned systems. The balance in favor of any one system over another will change over the years, depending upon new developments and increased experience with newer systems. These changes will be directly reflected in our force structure. As far as we can see today, however, there always will be a requirement for a mixture of manned and unmanned systems.

The need for a missile warning system which will give us "positive" warning is clear—and critical. The feasibility of using high-powered radar to detect missiles has been verified and the Air Force has been charged with the responsibility of constructing such a system. Three ballistic missile early warning radar stations are planned, two of which are now under construction. By the time it is anticipated that a full-scale ICBM attack could be launched against this country, the BMEWS system is expected to be able to provide that critical margin of warning which will enable us to launch our strategic strike forces on their mission. Another promising approach is the joint ARPA/Air Force project called Midas, a satellite system employing infrared sensors.

However, warning is not the whole answer. Even with an effective missile early warning system we will receive less than 30 minutes' warning of an incoming ballistic missile attack. Thus we are devising additional methods of protecting our own forces, including dispersal and hardening. We are dispersing our offensive aircraft and missiles by providing additional locations that will permit them to be launched more quickly while at the same time reducing their vulnerability. Hardening, the physical protection of individual locations, which is particularly adaptable to missile systems, has been given special attention in the construction of strategic missile sites.

In the manpower area, military tasks today call for skills and versatility beyond anything required in the past. Missiles, aircraft, and their supporting equipment have become a maze of electronic, hy-

draulic, and electrical systems. As a result, the technician strength of our operational squadrons has been forced upward over the years. This is particularly true in the missile squadrons. The expanding need for technicians has caused an increase in the overall technical strength of the Air Force from 34 percent at the end of World War II to about 46 percent today, with a substantially greater expansion in this area expected to take place in the years ahead.

Obviously, the character and composition of the Air Force will continue to change over the years as we penetrate deeper into the new technology—the aerospace age. Throughout this period of change, the Air Force has continued to be the most effective single military instrument with which to deter and, if necessary, to overcome the primary threat which faces us.

II. Combat Forces

The Air Force reduced its major combat forces during fiscal year 1959 from 117 to 104 manned aircraft wings and 1 missile wing. It was possible to make this reduction with no loss of fighting strength because of the improved weapons systems becoming available and the greater flexibility in their use. Furthermore, the unit equipment of heavy bomber wings has been increased to 45 planes from 30, and bombers and associated refueling planes are being dispersed on single-squadron bases.

New and increased requirements led to expansion of some activities by the Air Force during the year. These included new missile units, maintenance of a high alert status by the strategic bomber and tanker forces, and the repositioning of the air defense forces. The increased costs of these programs dictated the utmost economy in all flying operations not directly in support of the combat forces.

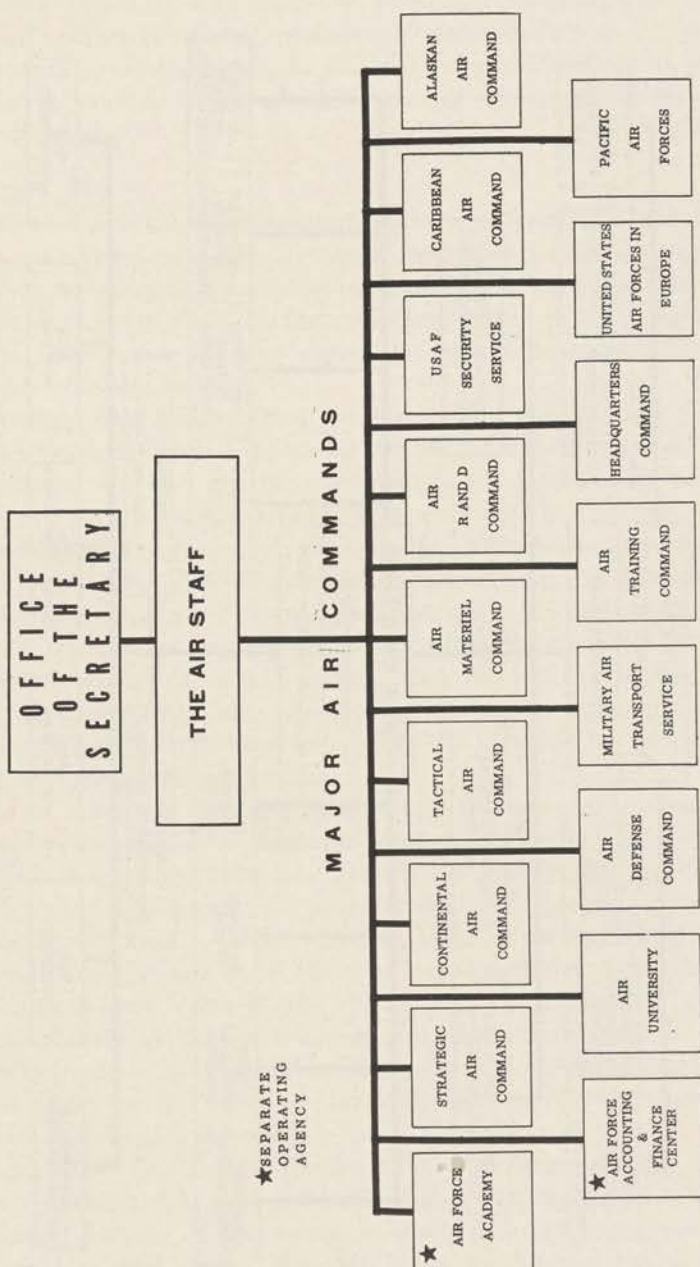
To provide more detailed and current information on USAF combat resources, the Air Force began construction of an Air Force Control Center in Washington. This improved system will inform senior Air Staff officers of unusual developments and provide them with the latest data needed for USAF decisions and actions.

The Department of Defense Reorganization Act of 1958 prescribed certain changes in the functions to be performed by the Chief of Staff and the Vice Chief of Staff. In general, increased authority and responsibility were delegated by the Chief of Staff to the Vice Chief. As a result, the Chief of Staff was given more time for his duties with the Joint Chiefs of Staff, which had been assigned a much greater degree of direct operational control over the combat forces of the Nation.

Concurrent with the 1958 reorganization, the Air Force began a thorough study of its basic doctrine, to embrace the impact of space technology on USAF operations. The aerospace concept thus evoked considers that the earth's sensible atmosphere and the space beyond are operationally indivisible. The aerospace concept in USAF doctrine is consistent with the declaration of policy and purpose contained in the National Aeronautics and Space Act of 1958.

Air Force planners made further progress in the field of air battle analysis—estimating the effects of different planning decisions on the expected outcome of general and local wars in varying time periods

DEPARTMENT OF THE AIR FORCE



JUNE 30, 1959

Figure 1

OFFICE, SECRETARY OF THE AIR FORCE AND THE AIR STAFF

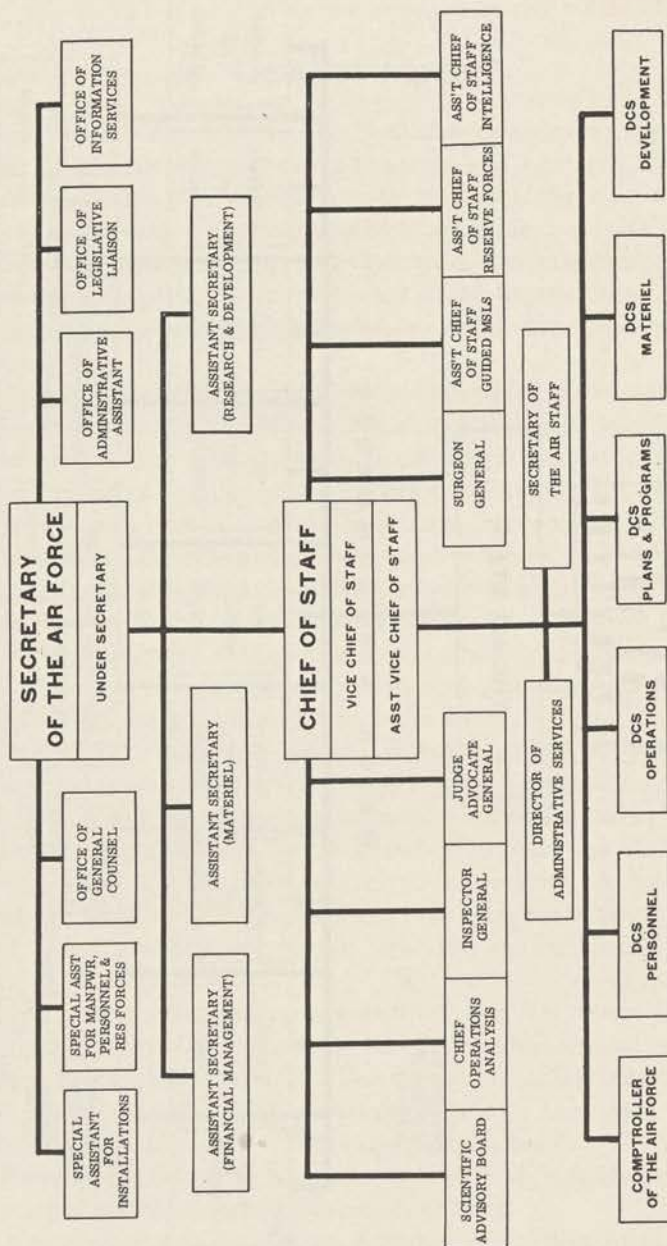


Figure 2

JUNE 30, 1959

and under varying conditions. The detailed operations and interactions of opposing air forces and their immediate supporting elements are simulated on high-speed electronic computers, permitting isolation and study of the influences of variable factors. Many improvements are being made in the mathematical models to provide greater realism and to include new concepts of operations for future weapons systems.

Strategic Air

General war is the most serious threat to the security of the United States. The Strategic Air Command remained the Nation's primary deterrent to general war. Approximately \$7 billion, or about 40 percent of the Air Force budget, was programed directly in support of SAC, whose general war capability represents almost the entire free world force of its kind.

Although SAC is identified primarily as a general war force, it also exercises influence in lesser situations. Therefore, not all of the expenditures on SAC can be attributed to its general war deterrent function. SAC acts as a strong right arm, backing up the employment of free world forces in lesser conflict. For example, during the Lebanon crisis of July-October 1958, more than 1,000 modern jet bombers ready for takeoff were quietly poised in the background while the more spectacular developments took place on the immediate scene of action. Ground, naval, marine, and tactical air units moved promptly and openly into troubled areas, secure in the knowledge that their deployments were covered by the invisible but omnipresent might of strategic airpower.

Most of SAC's 43 strategic bomber and reconnaissance wings were still equipped with B-47 medium bombers, supported by tankers to provide intercontinental range. During the year the last B-36 passed out of active service, and all operational heavy bomber wings were equipped with B-52's. This aircraft, with its jet tanker (the KC-135), will provide our most effective long-range delivery system for some time to come. The B-52G, which began entering SAC units by the end of the year, can fly intercontinental missions from the United States without refueling. This heavy bomber force is based in the United States beyond reach of attack by short- or intermediate-range weapons of probable enemies.

Dispersal of the strategic force over a much larger number of bases which was begun last year diminished its vulnerability to attack. A substantial portion of the strategic bomber-tanker force maintained a constant ground alert. The Air Force established the feasibility of a round-the-clock airborne alert to insure the survival of a bomber force large enough to carry certain devastation to any aggressor.

During fiscal year 1960, phaseout of the B-47 force and conversion to more modern bombers will begin. The supersonic B-58 will be the next bomber to enter the strategic strike force. For the next few years the manned bombers will continue to make up the bulk of the strategic force, and their penetration qualities will be improved by air-launched missiles as well as by better electronic countermeasures and diversified tactics. The Air Force believes that manned aircraft and missiles are complementary weapons and intends to exploit the best features of both in order to attain the optimum use of aerospace power.

The Air Force accelerated its strategic missile programs, for these weapons are vital to the Nation's future security. Assigning operational control of strategic missiles to SAC in late 1957 has assured the unified command and use of strategic air weapons, thus exploiting the targeting information, strategic studies, communications, and operational control systems that have been developed and utilized over the years.

The 702d Strategic Missile Wing at Presque Isle AFB, Maine, received SNARK missiles and ground support equipment on schedule. By late June 1959 the Royal Air Force in the United Kingdom had received enough SM-75 THOR's to equip its first squadron. Three more RAF THOR squadrons are being trained in the United States. The United States will deploy two Italian-manned SM-78 JUPITER squadrons to Italy, according to an agreement reached between the two nations. In May 1959 Headquarters USAF approved a final operational plan for the SM-65 ATLAS. One squadron is expected to become operational late in calendar year 1959. Two air-launched missiles—the GAM-77 HOUND DOG, an air-to-surface missile, and the GAM-72 QUAIL, a diversionary missile—are also scheduled for early operational use. These will increase the ability of the B-52 to penetrate enemy territory and extend the plane's useful life.

Missiles are entering combat Air Force units just as soon as their reliability, accuracy, and overall effectiveness are fully proven. The Air Force is acutely aware that a proper balance must be maintained between aircraft and missiles at all times to guarantee fulfillment of the Air Force's primary responsibility for the Nation's strategic airpower and for its air defense. Adequate fulfillment is possible only if modernization of combat forces is continuous without interruption of their day-to-day readiness.

The elements of a mixed force of manned aircraft and missiles, properly employed, can complement one another by attacking those targets for which they are individually best suited. The enemy must then diffuse his defenses to meet the threat of a diversified attack

coming in at different speeds and altitudes and from all directions. Furthermore, the effectiveness of the manned aircraft attack can be increased by the disruptive effect of preceding missile attacks. Thus a mixed force can make the enemy's defensive problem difficult and costly, while materially enhancing the Air Force's offensive power.

Tactical Air

The tactical air forces, going from 45 to 35 wings, bore the brunt of the reduction in the number of USAF combat wings. These 35 wings and their supporting units comprised more than 125 squadrons of various types, operating tactical fighters and bombers, reconnaissance aircraft, tactical missiles, transports, and tankers. Although these units are usually thought of as especially adaptable to limited warfare, the range of their aircraft and their nuclear power would make them a significant factor in a general war.

The Tactical Air Command, in the United States, dropped 7 tactical fighter wings, 1 tactical bomber wing, and 1 tactical reconnaissance wing, with a reduction in personnel strength from 60,000 to 46,000. Despite this decline, TAC accepted a new function—the training of its own aircrews—from the Air Training Command.

The Lebanon crisis of July 1958 gave TAC an opportunity to test its ability to deploy a strike force quickly to a distant part of the world. In response to an appeal from the Lebanese Government, the President ordered the dispatch of U.S. military forces to the revolt-torn country. On July 15, 1958, the Joint Chiefs of Staff directed TAC to rush a composite air strike force, known as CASF Bravo, to Adana, Turkey, to help support the U.S. military action in Lebanon. The force was organized and deployed by the Nineteenth Air Force—established for just such a contingency. The first F-100's took off from Myrtle Beach, S.C., within hours, refueled in the air three times en route, and touched down at Adana after less than 13 hours of flying time. CASF Bravo, which included tactical fighters, bombers, and support aircraft, was in place within 3 days. It remained in Turkey until late October, then returned to the United States and disbanded into its constituent parts.

A substantial contribution to meeting the Lebanon crisis was made by the U.S. Air Forces in Europe which deployed interceptor aircraft from Germany to Adana, Turkey, to bolster the air defense of that area. USAFE also provided the airlift for the movement of Army Task Force Alpha from Rhein-Main Air Base, Germany, to Lebanon as well as logistical air support, and established a special airlift of petroleum products to Jordan. For these operations, USAFE was augmented by 36 MATS C-124 Globe Masters over which it assumed operational control. The C-124's remained assigned to the operation for a period of approximately 2 months.

At the end of August 1958, the JCS directed the Air Force to deploy a second composite air strike force to Taiwan as a precautionary measure against the menacing moves being made against Quemoy and Matsu by the Chinese Communists. The Nineteenth Air Force organized CASF X-Ray Tango (including tactical fighters, tactical bombers, reconnaissance planes, and transports) and dispatched it to the Far East on August 30. In support of the emergency, a fleet of MATS C-124's transported across the Pacific a combat unit of supersonic F-104 Starfighters, including pilots, ground crews, partly disassembled aircraft, and weapons. Within 17 hours after the alert the first aircraft reached Taiwan, and although the crisis never reached the combat stage, CASF X-Ray Tango helped deter the Chinese Communists. The speed and efficiency of this deployment brought TAC the Mackay Trophy for the most meritorious flight of calendar year 1958.

The Quemoy-Matsu crisis also alerted the Pacific Air Forces, which poised interceptor, tactical fighter, and tactical bomber units to reinforce CASF X-Ray Tango, if needed. Once the emergency eased, PACAF units reverted to their normal duties. During the year PACAF added two TM-61 MATADOR missile units and reduced its tactical fighter wing complement by one. Also, PACAF bases in Korea for tactical fighters and bombers were improved.

The structure of the U.S. Air Forces in Europe remained stable. Additional facilities were made available at Aviano, Italy, and Adana, Turkey, to accommodate TAC squadrons rotated from the United States in fulfillment of commitments to NATO. The significant contributions to USAFE to meeting the Lebanon emergency have already been discussed.

The Air Force began preparations for equipping tactical fighter aircraft with the GAM-83A BULLPUP, developed by the Navy. This air-to-surface missile will greatly increase the effectiveness of fighters against tactical targets. BULLPUP will augment other armament and eventually replace the free-falling bomb as one of the tactical air-to-surface munitions. Modification of aircraft for use of the BULLPUP has been accomplished to the extent that funds have been made available for it.

TAC's first training launches of the TM-76A MACE began in January 1959. One tactical missile group in Germany began converting from the MATADOR to this newer tactical surface-to-surface missile. During the Taiwan crisis Chinese Nationalist fighter aircraft used the GAR-8 SIDEWINDER missile with sensational success against Chinese Communist fighters over the Formosa Strait.

Superior types of aircraft continued to flow into the tactical air forces during the year. In addition to the supersonic F-101's and F-104's, TAC had one squadron equipped with the F-105 Thunder-

chief and was reporting favorable results. The plane was still undergoing operational testing at Eglin AFB at the end of the fiscal year. The last of the B-57 light bombers passed out of the combat inventory. In June 1959, TAC received the first three production C-130B's—turboprop troop carriers.

Air Defense

The Air Force continued to push vigorously the development of a direct air defense against both manned aircraft and missiles. To this end, an elaborate network to provide tactical warning of attack by manned jet aircraft and air-breathing missiles was practically complete at the end of the year. The network consisted of the Pine Tree line, the Mid-Canada line, and the Distant Early Warning (DEW) line, which runs across the northern fringe of the North American continent with extensions eastward from Baffin Island. Construction of two coastal and two ice cap stations was begun in Greenland in the past year. When completed, they will augment and link the early warning chain with U.S. Navy picket ships and early warning aircraft operating out of the Azores, and a connection will be made eastward to the NATO defense system. To the west, extension of the DEW line was completed during the year along the Aleutian Islands chain to join with air defense forces operating out of Midway and Hawaii in the Pacific Ocean. Other North American radar stations, early warning picket ships, early warning patrol aircraft, and offshore Texas Towers complete this system—a vast and intricate network whose effectiveness depends upon rapid and reliable communications.

The Semi-Automatic Ground Environment (SAGE) system became operative on July 1, 1958. SAGE incorporates a completely new system that centralizes control of the air battle by the use of automatic electronic devices. SAGE can make the complex computations required for successful interception and attack of subsonic and supersonic targets which could not be made rapidly enough by either the interceptor pilot or the ground controller.

On June 27, 1958, the New York Air Defense Sector was the first SAGE link to be formally integrated into the Air Defense Command. By March 15, 1959, when the Bangor Air Defense Sector became the fifth to join the control network, the 26th Air Division, covering the northeastern area of the United States, became the first fully operational SAGE division.

SAGE is bringing about a major change in the air defense system. The three air defense forces will be eliminated in 1960. The air divisions, of which there will be 10 (9 United States, 1 Canadian), will report directly to NORAD for operational control. Each air division will consist of three to five air defense sectors, composed of interceptor squadrons, BOMARC missile squadrons, and one SAGE direction center per sector. At division headquarters a SAGE

combat center will control the operations of the whole division. Each combat center and direction center will have two large digital computers (one for standby purposes) to monitor all aircraft flight plans and data from radar installations in its area. Information from adjoining areas can be consolidated and viewed on radarscopes.

At the end of June 1959, Canada and the United States had almost completed arrangements for the Continental Air Defense Integration, North (CADIN), which will add more heavy radars and gap fillers in Canada and will use BOMARC missiles controlled by the SAGE system.

A complete perimeter identification belt around the United States came into existence in February 1959 with the establishment of the Gulf of Mexico air defense identification zone (ADIZ) and extension of the Atlantic coast ADIZ's. All aircraft entering the United States from any direction must adhere to prescribed regulations or be subject to interception. Civil and military air traffic engaged in domestic flight operations are relieved of the burden of filing ADIZ flight plans.

The Air Force continued to speed the incorporation of a system for the timely detection of intercontinental ballistic missiles into its warning network. At the end of June 1959 construction was in progress on the first two ballistic missile early warning system (BMEWS) stations in Greenland and Alaska, and negotiations were underway for construction of a third station in the United Kingdom. The purpose of these sites is to give maximum advance warning of a missile attack—warning time that will be only 15 or 20 minutes at best.

The modernization of fighter-interceptor forces continued, with eight squadrons converting from the F-89L and the F-94C to the F-102, F-104, F-101B, and F-106. The last two types carry the MB-1 GENIE nuclear aircraft rocket. In January 1959, ADC departed from the usual deployment of 25 aircraft per squadron and began deploying 12, 18, 24, or 30 aircraft per squadron. By shaping units to meet the needs of each geographical area, ADC expects to obtain the best air defense possible with the resources available to it.

In April 1959, ADC was authorized to establish an air defense training force of 50 B-57's to simulate bomber attacks against the United States. These aircraft will provide realistic training for the whole air defense system.

The Air Defense Master Plan, projecting the air defense system to be operational for the continental United States in fiscal year 1963, was approved by the Secretary of Defense in June 1959. This came after a year of divergent service views as to the level of resources to be allocated to such defense and the manner in which these could best be expended. The Air Force strongly supported a continued research and development effort to develop a truly effective ballistic missile



TYPE	(PROGRAMMED)			
	6/30/57	6/30/58	6/30/59	6/30/60
STRATEGIC	50	44	43	43
AIR DEFENSE	32	28	27	25
TACTICAL	55	45	35	34
	137	117	105	102

Figure 3

defense system, improvements in the number and quality of surveillance radars, improvements in the SAGE system, and continued programs for the BOMARC missile. These proposals reflected the USAF concepts of area defense and centralized integrated control of air defense weapons.

Air Transport

The Military Air Transport Service continued to operate more than 500 4-engine cargo aircraft over 115,000 miles of routes that girdled the globe. In support of the three military departments, MATS moved 1,097,750 passengers and 263,840 tons of cargo. Passenger-miles flown in channel traffic amounted to over 3 billion and total passenger and cargo ton-miles to 869 million. MATS also drew heavily on civil airlines to assist in meeting the special requirements created during the year by the developments in Lebanon and the Far East. Commercial carriers flew more than 40 percent of the MATS passenger-miles and more than 25 percent of the MATS ton-miles at a cost of \$71 million. Commercial transports made about 500 of the 2,000 MATS-controlled flights each month over the Atlantic or Pacific in regular channel traffic.

Fiscal year 1959 was the first full year for the operation of the Industrial Fund for Airlift Services. Under this system MATS transport operations are financed by a revolving fund to which each military service makes payment for services rendered. Each service submits requirements for airlift directly to MATS and is billed in return, the revenues going to replenish the Industrial Fund. The new system permits a more accurate allocation of costs among the services.

MATS maintains military transport, troop carrier, and service forces, including necessary bases and air route facilities, to meet the wartime requirements of the Department of Defense. Its peacetime operations therefore are essentially training activities. MATS schedules airlift to meet the periodic forecasts of requirements made by each service. The contract transportation provided by the civil airlines represents the difference between the airlift produced by MATS training operations and the airlift normally required by the overseas theaters. MATS also maintains part of its transport fleet on base in a state of readiness, able to move promptly to support SAC, TAC, the Army, or the Navy in the event of hostilities.

The transport furnished by MATS in the Lebanon and Quemoy-Matsu crises, as previously discussed, afford apt illustration of the MATS concept of operations. During this same period, from July to December 1958, MATS flew more than 900 additional special missions from the United States to stations in every part of the globe. By calling on the civil airlines to take over part of the traffic, MATS was able to free enough of its own planes to fly these special missions. MATS and the civil airlines thus joined to meet unusual needs without impairing either the routine airlift to U.S. forces overseas or the MATS ability to support emergency war operations.

Some of MATS' special missions presented severe operational problems. Among them were Operation DEEP FREEZE in the Antarctic, resupply of weather and scientific expeditions on the drifting Arctic ice islands, missions to White Alice and DEW line sites in Alaska, and airlift support for various Army maneuvers. MATS transported on a regular basis huge missiles and their supporting equipment to Cape Canaveral, Fla., for testing and flying THOR missiles and related equipment from California to England. It also supported the downrange tracking stations of the Atlantic Missile Range extending to Ascension Island in the South Atlantic.

MATS continued to operate global systems of weather forecasting, communications, air rescue, and aerial photography and charting. The Air Weather Service flew 33 hurricane missions and 328 fixes on storms in hazardous operations, but nevertheless logged 96,764 hours and more than 19,000 miles of accident-free flying. During the year the Air Rescue Service flew 23,970 hours on missions of mercy, saving 445 persons from possible death and bringing aid to 1,550 others in

desperate circumstances. The Air Photographic and Charting Service completed 135,000 scale-miles of aerial map photography during the year. To comply with enlarged requirements, APCS formed a new photomapping squadron, with 15 RC-130 HERCULES turboprop aircraft authorized. The Airways and Air Communications Service neared completion of a fully automatic switching system which will link 250 continental U.S. bases with important oversea installations through a 450,000-mile circuit. The continental U.S. and Pacific sections of this vital part of the AIRCOM system were completed.

MATS continued its steady improvement of an already outstanding record of air safety. The overall aircraft accident rate, including every phase of operations, declined from 3.35 per 100,000 flying hours during fiscal year 1958 to an alltime low of 2.5 during fiscal year 1959.

In conjunction with the other services and the Joint Chiefs of Staff, the Air Force made a detailed study of Department of Defense airlift requirements and capabilities for both peacetime and wartime. This study dealt with capacity to meet small war needs during fiscal year 1959, wartime military aircraft requirements, plans to move TAC's rapid reaction force during general war, and revision of aircraft planning factors. In general, the study concluded that the airlift capacity is adequate to meet requirements, although there were manageable deficits during certain periods of operation.

III. Manpower

Air Force personnel strength was reduced during fiscal year 1959. Between July 1, 1958, and June 30, 1959, military manpower declined from 871,156 to 840,435. Strength on the latter date included 131,602 officers and warrant officers and 708,833 airmen. About 225,000 officers and airmen were stationed overseas. The number of civilians employed directly by the Air Force dropped from 315,806 to 313,466 during the year. This decrease of less than 2,400 was slight compared with the 24,500 reduction in fiscal year 1958.



USAF PERSONNEL STRENGTH

ON ACTIVE DUTY AS OF JUNE 30

	1958	1959
AIRMEN	738,217	• 708,833
OFFICERS	132,939	• 131,602
MILITARY TOTAL	871,156	• 840,435
CIVILIAN (DIRECT HIRE)	315,806	• 313,466
CIVILIAN (FOREIGN CONTRACT)	56,883	• 50,628
CIVILIAN TOTAL	372,689	• 364,094

Figure 4

Manpower Objectives

The USAF military manpower objective for June 30, 1959, held to the programed 850,000, but the civilian objective was reduced during the year from 324,582 direct-hire to 314,693 and from 67,746 contract-hire foreign civilians to 52,026. The Air Force sought to achieve manpower objectives without loss of efficiency, and at the same time to make manpower available for additional high-priority programs. The major commands completed a manpower utilization survey at the beginning of the year that made available for reassignment 35,500, or 3.2 percent of the total manpower authorizations.

The current military manpower program establishes requirements for increases in certain critical activities through fiscal year 1963, chiefly for SAC dispersal and alert, tanker squadrons, and missile programs. To accommodate these increases and stay within the military manpower objective of 845,000 effective in June 1960, substantial revision of the existing program became necessary. The following table indicates the nature of reductions made in areas of manpower utilization during the fiscal year:

	June 30, 1958		June 30, 1959	
		Percent		Percent
Operating forces.....	569, 279	65. 4	557, 293	66. 3
Supporting forces.....	149, 727	17. 2	141, 451	16. 8
Training forces.....	144, 811	16. 6	134, 848	16. 1
Miscellaneous ^a	7, 339	. 8	6, 843	. 8
Total.....	871, 156	100. 0	840, 435	100. 0

^a Includes hospital patients and personnel on special assignments.

On September 9, 1958, the Bureau of the Budget directed that all agencies reduce employment for 1959 at least 2 percent below that which could be reasonably financed from appropriations for the fiscal year. This reduction was to be achieved by attrition and by not establishing new positions. In compliance, the Department of Defense on October 9, 1958, lowered the direct-hire civilian employment ceiling for the end of fiscal year 1959 to 314,693. The Air Force accomplished the direct-hire civilian reduction by the end of the year.

Changes in the Airman Structure

Legislation enacted by Congress in 1958 was being put into effect. Creation of two new airman grades brought about some of the important changes. On September 1, 1958, 1,997 master sergeants (E-7 pay grade) were promoted to the new grade of senior master sergeant (E-8). In recognition of the accent on leadership, responsibility, and technical skills in the Military Pay Act, the new grades were awarded to the most valuable and responsible airmen. No airmen were promoted to the grade of E-9, in accordance with the policy requiring senior master sergeants to demonstrate their abilities and qualifications for further promotion. By the end of June 1959, about 5,000 master sergeants had been appointed to senior master sergeant.

The "proficiency pay" plan, provided for in the Military Pay Act of 1958, had an important effect on the status of airmen. On November 1, 1958, this incentive plan to retain airmen skilled in the most critical technical fields went into effect, and 6,157 airmen began receiving an extra \$30 per month. By the end of June 1959, about 19,000 airmen were receiving extra pay benefits. Over a 4-year period an estimated 107,000 airmen in technical specialties are expected to benefit from incentive pay provisions.

By the fall of 1958 it became evident that the upward trend in the retention of enlisted men, noted at the end of the previous fiscal year, was continuing at a generally satisfactory rate—46 percent for first-term airmen and 93 percent for career airmen.

The Air Force began a new Personnel Quality Control Program which raised enlistment and reenlistment standards and encouraged a more critical evaluation of individual performance. It also provided closer examination of the ability of noncommissioned officers to lead and supervise other airmen.

The Officer Corps

The USAF officer corps remained relatively stable during fiscal year 1959. Enough reservists were commissioned in the Regular Air Force to bring the percentage of Regulars up from 33.5 at the end of June 1958 to 37.9 by June 1959. At the end of the fiscal year the number of Regulars stood at 48,271, an increase of over 5,000 from the total at the end of the previous fiscal year. Opportunities for career status as Regular officers, increased pay under the Military Pay Act, and the required 5-year tours (including 1 year of training) are expected to increase the retention ratio among rated officers from 35 percent to 65 percent. A rise is also expected in the nonrated group resulting from career opportunities and increased pay.

The number of new officers commissioned during the fiscal year 1959 dropped to 8,875 from the 10,720 of the previous year because of the reduction in total USAF strength and a rise in retention rates. Most notable in the acquisition of new officers was the graduation of the first class of 207 cadets from the Air Force Academy. The graduation of this first class terminated the agreement under which the Air Force had been receiving one-fourth of the graduates of West Point and Annapolis. A new agreement, however, beginning with the 1959 graduating classes of the three service academies, authorized as many as 12½ percent of the cadets to choose commissions in another service.

Women in the Air Force

On June 30, 1959, WAF strength consisted of 7,109 officers and airmen, an overall decline of 10 percent from the previous fiscal year. Actually, officer strength at 733, increased by 61, while airman strength at 6,371, declined by 841 from the totals of the previous year. The total complement included five warrant officers.

In view of the continuing reductions in USAF personnel, WAF airman strength is scheduled to be cut to 5,000 by the end of June 1960. This reduction will be brought about by normal attrition and by curtailing the enlistment of women without previous military service.

WAF officer strength will be increased to 750 by the end of June 1960. But the recruitment goal for new WAF officers will be cut to 125 for fiscal year 1960 as compared with 160 in 1959. Only four women graduated from AFROTC in 1958 and none in 1959. Because of the disappointing response, the Air University is in the process of eliminating WAF ROTC. However, WAF cadets already in the advanced course will be allowed to complete their training.

For several years the majority of new WAF officers have been obtained through direct appointment and subsequent officer training in grade. Hereafter, they will receive training at the new Officer Training School, entering the first class with male students in November 1959. Those who successfully complete the course will be commissioned second lieutenants. Female civilians are no longer eligible for Officer Candidate School, but qualified WAF airmen and Civil Air Patrol cadets are encouraged to apply for OCS.

Civilian Personnel

The ratio of Wage Board (blue collar) to Classification Act (white collar) workers reflected a 2-percent shift in favor of the white-collar employees. At the end of the fiscal year the ratio was 52 percent blue collar and 48 percent white collar.

The Air Force continued to employ many foreign nationals overseas. Of the 36,070 civilians employed directly overseas, more than 60 percent were locally hired nationals, as compared to 63 percent of 38,485 employed the previous year. In addition, 50,628 foreign nationals were employed under contracts or through agreements with other governments. This was a reduction of more than 6,000 from the previous year's figure.

The USAF civilian turnover rate improved significantly during the year. The monthly separation rate averaged 1.6 percent compared with 2.1 the previous year, while the monthly addition rate averaged 1.5 percent compared with 1.4 percent in 1958. Approximately 55 percent of the separations were voluntary, consisting of resignations and transfers to other Government agencies. The remainder were essentially involuntary, a result of reductions in force, terminations of temporary or excepted appointments, extended leave without pay, retirements, and removals for inefficiency or misconduct.

In spite of the definite improvement in the retention rate, the Air Force attempted to reduce still further the loss of valuable employees, particularly those in scientific and technical positions. It conducted a special study to identify the types of positions in which turnover was excessive and to determine whether any further action could be taken to reduce the loss of people with essential skills. The provisions of the Government Employees Training Act, adopted in July 1958, en-

UTILIZATION OF MANPOWER

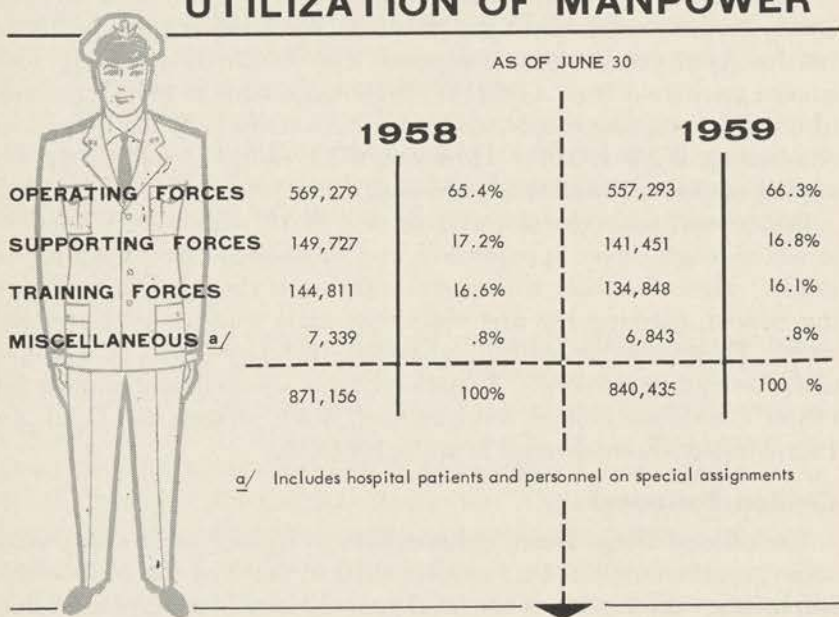


Figure 5

abled the Air Force to further the professional competence and career development of many of its employees.

The Federal Merit Promotion Program, put into effect by the Air Force in January 1959, increases the number of employees considered for promotion and gives greater assurance that the best qualified are selected. Tests have been devised to help determine which employees are the best qualified for promotion to various positions. The merit promotion program has functioned equitably and smoothly and has been well received by management, unions, and employees.

A joint inspection agreement reached in September 1957 between the Air Force and the Civil Service Commission has proved mutually beneficial. USAF survey reports have been substituted for many independent CSC inspections, thus reducing duplication and avoiding disruption of normal work schedules.

In January 1959 the U.S. Government established a new merit system for all Federal employees in the Panama Canal Zone. Based on the 1955 treaty with the Republic of Panama, the merit system provides citizens of the United States and the Republic of Panama with the same basic wage rates and opportunities for Federal employment.

For its outstanding record in the hiring of handicapped workers, the Air Force won the Distinguished Service Award from the President's Committee on Employment of the Physically Handicapped.

This is the highest award the Committee grants to an agency or employer.

Estimated first-year benefits of \$44 million resulted from the employee incentive award program during fiscal year 1959. Participation rose from about 25 percent in fiscal year 1958 to 27 percent, and 20,085 suggestions were adopted. In addition, 12,199 employees received recognition for superior work or special acts or services.

IV. Military Training

During fiscal year 1959 the Air Force continued to adjust training programs to conform to reductions in manpower and training funds. Graduations from training schools declined, but at a lesser rate than in fiscal year 1958. Technological changes in USAF weapons and equipment made it necessary to revise training courses to keep them abreast of the needs of the combat commands.

Flying Training

The number of pilots trained by the Air Force declined markedly—falling in the current year from 4,207 to 2,698, of whom 2,358 were Air Force, 125 Air National Guard (ANG), and 215 from countries in the military assistance programs. Five primary and five basic schools are utilized to train these pilots. Because of the continuing reduction in USAF manned aircraft wings the annual pilot training rate will be further reduced to 2,300 beginning with fiscal year 1961.

The Air Force increased the total flying time in its primary flying school curriculum from 130 to 147 hours. Training time in the twin-jet T-37 increased from 100 to 120 hours, but in the single-piston-engine T-34 it was cut from 30 to 27 hours. Conversion from prop-driven aircraft to the T-37 jet progressed rapidly during the year. By June 30, 1959, three primary schools (at Bainbridge, Graham, and Bartow Air Bases) had been fully equipped with T-37's and were graduating primary jet students. By March 1961 all primary schools will be using the T-37.

Basic flying training time will increase from 130 to 140 hours with the introduction of the T-38 supersonic trainer during fiscal years 1961-64. The T-38 will replace the T-33 in basic pilot training by fiscal year 1964. Basic flying training in conventional aircraft ended in January 1959 when the last pilots to train in these aircraft graduated from the school at Reese AFB, Texas, and the last B-25 was eliminated from the program.

Interceptor training courses at Perrin and Moody AFB's graduated 584 pilots for the Air Force and 107 for the Air National Guard and foreign countries. Beginning in fiscal year 1961, graduations for the USAF are scheduled to be reduced to 250 per year, and F-102's will be introduced into the interceptor training program.

The instrument instructor school for pilots at James Connally AFB, Tex., graduated 469 students between July 1, 1958, and June 30,

1959. At Randolph AFB, Tex., the jet qualification school turned out 651 graduates during the same period. The helicopter course at Stead AFB, Nev., trained 164 pilots.

The need for high-performance aircraft in navigator training remained acute. As tactical aircraft attain greater speed and altitude, the navigator trainers become increasingly outmoded. Consequently, the graduate joining a combat command is thrust into an environment for which he is not adequately prepared. The combat commands therefore must give their new navigators a great deal of training in combat aircraft. This incongruous situation not only increases training costs but seriously detracts from emergency war capability. The Air Force has a requirement for UTX (T-39) radar interceptor trainers and UCX advanced navigator trainers to replace ATC's TB-25M's and T-29D's.

The number of graduates from navigator courses declined again, falling from 2,180 in fiscal year 1958 to 1,587—1,507 USAF, 68 ANG, and 12 foreign graduates. To enhance prestige and serve as an incentive to young navigators, the Air Force approved the awarding of a master navigator rating to senior navigators who have accumulated 3,000 hours of navigation time and 15 years of rated service. The badge resembles that of the command pilot, having a star encircled by a wreath mounted atop a pair of wings.

In a major reorganization of survival training in May 1959 the USAF Combat Survival Agency was eliminated and its functions transferred to the 3635th Combat Crew Training Wing (Advanced). At the same time, training in water survival, combative measures, and survival weapons was added to the general survival courses already being taught, and an additional course in resistance training was added.

Technical Training

During fiscal year 1959, 66,496 airmen completed technical training courses, a drop of 13 percent from the 76,434 in the previous year. Although sizable, this reduction was only half the drop of 26 percent which occurred in fiscal year 1957. The continued reduction in completed technical training courses primarily reflected the steady shrinkage in the size of the Air Force and the lack of funds and instructors for regular technical training. Of the 66,496 technical school students who graduated, 42,546 were classified as highly technical, 13,084 technical, and 10,866 semitechnical.

The Air Force continued its intensive efforts to improve the quality of technical training. One of the greatest deficiencies was the lack of suitable classrooms at the technical training schools. The Air Force obtained some new facilities, but higher priorities for other requirements caused the deletion from the budget of all the classrooms for

Lackland AFB, Tex., and reduction of the number planned for Amarillo AFB, Tex.

The retraining of higher aptitude airmen who were in overcrowded fields continued throughout the year. About 1,000 received schooling in the radio-radar field alone. The Air Force planned to retrain or cross-train about 30,000 airmen during fiscal year 1959 and 1960.

For several years the Air Force has had problems in striking a proper balance between general and specialized technical training. During recent years the trend has been away from general training and toward specialized courses. At one time, airmen received a broad general course within a technical field—electronics, for example—and later learned specific tasks or took specialized courses on particular items of equipment. They received additional specialized instruction as on-the-job training in the field.

The Air Force is now trying to cut down on the number of specialized courses without increasing the length of the general ones in order to reduce overhead costs. If the number of specialized courses is reduced, field commanders will have to accept graduates with broader and less specialized training. There will be more flexibility of assignment, but an increase of expensive on-the-job training in the field will also be required.

Revising technical school courses quickly enough to meet the needs for new skills is one of the most critical USAF training problems. To keep the technical training programs more nearly current, frequent determination of trained personnel requirements will permit quarterly revisions in the program to make the courses more responsive to technological change.

Professional Education

Enrollment in the Air Force Reserve Officers' Training Corps (AFROTC), a main source of new USAF officers, declined markedly from 97,408 students at 179 institutions at the end of June 1958 to 80,166 at the same number of institutions at the end of June 1959. Of these, 74,208 were lowerclass students and 5,958 were upperclass. Graduates during the year totaled 3,754. The Air Force obtained 4,307 new Reserve officers from the AFROTC. These included some prior-year graduates. Since officers who complete flying training must spend 4 years on active duty after receiving an aeronautical rating, the retention rate among ROTC graduates rose and fewer rated officers were required from other sources.

The Air Force conducted summer training for about 4,575 cadets at 16 bases. There were 24 encampments, 14 between mid-June and mid-July and 10 in August. Flight instruction of ROTC students was expanded to include 161 institutions and 1,658 cadets. The Air Force is seeking legislation to permit continuation of flight instruction for

ROTC cadets begun in 1957. Officer Candidate School graduated 466 new officers.

The Air Force Academy graduated its first class of 207 students on June 3, 1959. Of these, 205 were commissioned second lieutenants in the Regular Air Force, 1 accepted a commission in the Marine Corps, and 1 was medically disqualified. Six members of the graduating class have been accepted for graduate study under the Air Force Institute of Technology program. One received a Rhodes scholarship and will attend Exeter College, Oxford University, during the next 2 years. Approximately 1,580 students are enrolled in the Academy for the 1959-60 term.



Figure 6

The Academy completed moving from its temporary site at Lowry AFB, Colo., to its permanent site near Colorado Springs in September 1958. On April 24, 1959, it was accredited by the North Central Association of Colleges and Secondary Schools. The Board of Visitors to the Air Force Academy inspected the institution in May and once again recommended that primary pilot training be added to the curriculum and that flying facilities be constructed.

In December 1958 the Air Force revised the physical standards for admission to the Academy, making possible a more diverse selection of students. Under the new standards at least 50 percent of the graduates must meet physical requirements for pilot training. No change in the curriculum was involved.

The Air Force has received authority to offer preparatory training for the Academy to 200 students during the 1959-60 school term. The students will attend the Naval Preparatory School at Bainbridge, Md., and the Army's Military Academy Preparatory School at Fort Belvoir, Va.

The Air Force completed plans for an Officer Training School for direct commissioning of men and women college graduates. The first

class of 75 candidates will begin the 12-week professional course in November 1959, and a total of 300 men and 125 women are expected to graduate before the end of June 1960. Future enrollments will be adjusted to meet changing needs.

A related program for selected airmen interested in a USAF career will provide as much as 2 years of undergraduate schooling plus officer training that will lead to commissions. The program, to start in February 1960, will emphasize academic studies corresponding to specialities in which the Air Force has specific personnel requirements.

To improve the administration and academic control of its various service schools, colleges, and special courses, the Air University assumed direct control of all of them on July 1, 1959. The Air Force established at the Air University a permanent Educational Requirements Board, with a supporting secretariat, to prescribe future educational requirements for commissioned officers. New criteria adopted for the selection of officers to attend Army, Navy, Air Force, and joint professional schools lowered the maximum age for attendance, the purpose being to assure the Air Force of more useful service from officers after they complete professional school courses.

To prepare for work with space vehicles, officers will be assigned to companies holding research and development or production contracts for space vehicle systems. These officers will be trained in design, development, production, and testing of space vehicles.

Enrollment in the Air Force Extension Course Institute expanded rapidly; 265,750 students were enrolled in 110 courses—a gain of almost 56,000 over last year. The Institute handled these extra students without adding any people to its staff. A total of 206,388 students completed courses in fiscal year 1959.

Reserve Forces

By June 30, 1959, both the Air National Guard (ANG) and the Air Force Reserve (AFR) had reached a degree of readiness never before achieved in peacetime. All units had been assigned mobilization tasks, and many had specific missions to perform immediately after mobilization.

The most significant improvements in AFR readiness resulted from adoption of the Air Reserve Technician Program at all troop carrier bases and the reorganization of AFR troop carrier wings to conform to TAC standards of strength and structure. The resulting increase in mobility and effectiveness was clearly demonstrated during the Army-Air Force Exercise DARK CLOUD/PINE CONE II, held May 23–June 9, 1959. The performance of AFR troop carrier units in this exercise drew praise from both Army and Air Force field commanders.

At the end of June 1959, AFR personnel totaled 552,768, of whom 225,819 were in the Ready category. Of these, 42,382 were officers and 183,437 airmen. ANG personnel totaled 70,994, of whom 8,473 were officers and 62,521 airmen. All ANG reservists were in the Ready group. The composite gain over fiscal year 1958 was 62,780 for the AFR and 999 for the ANG.

In the AFR, improved assignment policies for reservists with military service obligation enabled most Ready Reserve units to obtain the manpower they would require in wartime. Emergency orders, called "vest pocket" orders, were issued to many members of the Ready Reserve for whom there was an immediate wartime need. Holders of these orders would be recalled by radio and TV announcements upon declaration of an emergency.

Both the ANG and the AFR further modernized their equipment during the year. The ANG aircraft inventory at the end of June stood at 2,409, reaching 92 percent of the aircraft authorized. The inventory included 1,764 jet fighters, 195 jet reconnaissance planes, and 218 jet trainers. Of the total, 389 were considered first-line aircraft. ANG aircraft were assigned to 24 tactical wings, 10 support flying squadrons, and 51 State and territorial headquarters. Fighter squadrons were equipped with F-84's, F-86's, F-89's, F-94C's, and F-100's. Tactical reconnaissance squadrons had RF-84F's, RB-57's, and B-57's. Troop carrier squadrons had SA-16's, aeromedical squadrons had C-119's, and the air transport squadron had C-47's. During the fiscal year, nine squadrons received more modern aircraft, one getting F-100's in place of F-86H's and two turning in their conventional planes for F-84's.

Although certain test equipment and field maintenance tools were still hard to get, the overall equipment of the ANG was considered excellent. With the exception of communications-electronics and weather (CE&W) units, which were about 80 percent equipped, the ANG possessed about 90 percent of its mission and training equipment.

The Air Force Reserve's 45 troop carrier squadrons (15 wings) had acquired almost all of their necessary aircraft, and the air rescue squadrons had all of theirs by the end of the fiscal year. Of the 740 aircraft authorized AFR units, 688 were on hand. These included 622 C-119's, 46 C-123's, and 20 SA-16's. In many cases, however, C-119G's were replaced by C-119J's, which cannot be used to air-drop troops. The C-123 units were also deficient because the aircraft lacked navigator compartments. The addition of these compartments, needed for executing airdrops, was awaiting final approval by Headquarters USAF at the end of the fiscal year.

The AFR rounded out its 15-wing troop carrier force with the addition of its last 3 squadrons during the year. These were the 337th at Bradley Field, Hartford, Conn.; the 706th at Barksdale AFB,

Shreveport, La.; and the 78th at Bates Field, Mobile, Ala. Some of the aircraft of these units were not actually on hand because they were undergoing inspection and repair.

During the past year, \$12.1 million was used to construct facilities for the ANG and to develop plans to be carried out in future years. The major construction projects included 3 hangars, 6 parking aprons, 6 storage and supply buildings, 1 aircraft control and warning building, and extension of 2 runways. On June 30, 1959, 567 ANG units occupied 42 nonflying bases and 94 flying bases, 38 of which were being used jointly with other agencies.

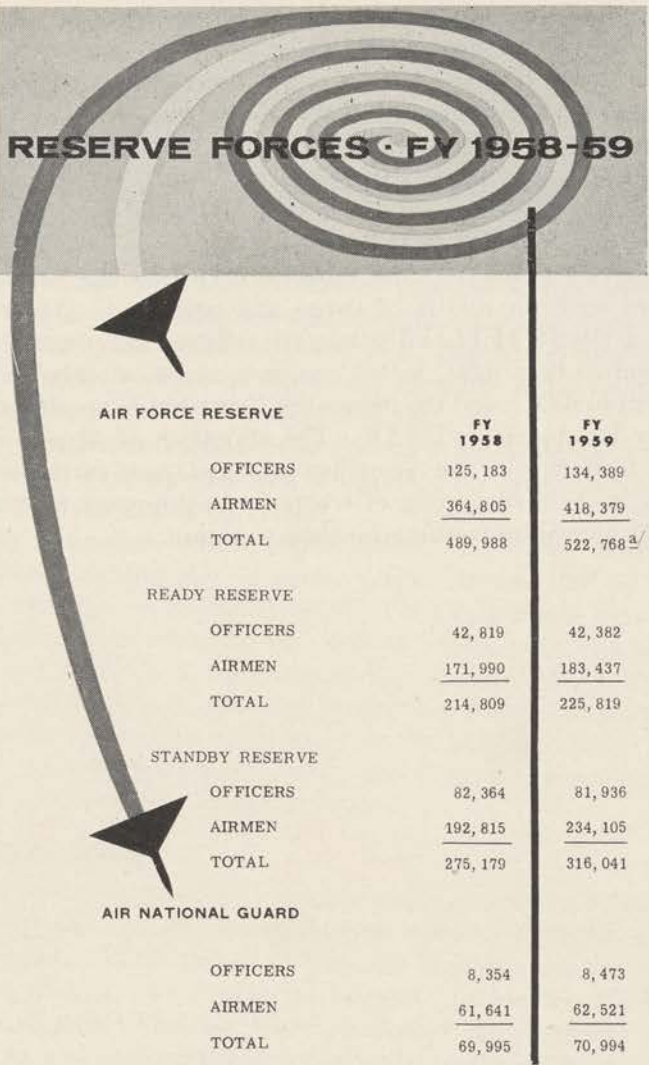
The AFR had \$8 million obligated for the construction of training bases during fiscal year 1959. All 37 AFR flying facilities were shared with other agencies—19 with the Regular Air Force, 10 with ANG, 3 with the Navy, and 5 with civil aviation.

The 82 Air Reserve Centers in operation were devoted entirely to nonflying technical training. Seventy-six of these centers were located on Government-owned or -leased property, and the other 6 had been built especially to meet AFR needs in places where the large number of reservists and high rents made it advisable. Additional construction will depend on cost and the availability of adequate Government-owned or commercial facilities.

Progress in training programs added to the competence of the reserves. ANG units flew more than 465,500 hours, pilot proficiency increased, and the accident rate fell to 17.1 per 100,000 flying hours—an alltime low. Increased use of the Air Reserve Technician Program resulted in better aircraft maintenance and better supervision over flying operations. More than 14,000 members completed courses in USAF service and technical schools, of whom 10,700 were airmen finishing the Regular Air Force basic military training course. In addition, 400 pilots completed the course of instruction at the ANG instrument school. These were recent basic pilot graduates and pilots from jet squadrons who had never attended a formal instrument course. All basic pilot graduates also received advanced training in their specialties—fighter-interceptor, fighter-bomber, or tactical reconnaissance.

A new Air Reserve Center course on staff development will be introduced in the fall of 1959. The course will furnish officers 4 years of instruction in professional military subjects, plus current studies dealing with the problems of national security. The first AFR academic instructors' course was held at Air University in September 1958, and a similar one will be held in the fall of 1959. This course is designed to train teachers for the centers and improve technical instruction.

During the year, more than 4,000 AFR officers and airmen attended school on active duty. The courses covered a wide range of subjects,



RESERVE FORCES • FY 1958-59

AIR FORCE RESERVE		FY 1958	FY 1959
OFFICERS		125, 183	134, 389
AIRMEN		364, 805	418, 379
TOTAL		489, 988	522, 768 ^{a/}
READY RESERVE			
OFFICERS		42, 819	42, 382
AIRMEN		171, 990	183, 437
TOTAL		214, 809	225, 819
STANDBY RESERVE			
OFFICERS		82, 364	81, 936
AIRMEN		192, 815	234, 105
TOTAL		275, 179	316, 041
AIR NATIONAL GUARD			
OFFICERS		8, 354	8, 473
AIRMEN		61, 641	62, 521
TOTAL		69, 995	70, 994

^{a/} The total figure for Air Force Reserve, 1959, includes 10,908 in Retired category

Figure 7

but with emphasis on technical courses. There was a substantial increase in the use of schools operated by the Army, Navy, and other Federal agencies. The year also witnessed a large increase in the use of the Extension Course Institute of Air University. More than 39,000 AFR officers and airmen were enrolled in the Institute on June 30, 1959. Under a new training policy, supervisors of mobilization assignees may require that they enroll in some of the Institute courses if they need further skill in their AFR specialties.

AFR navigators maintained their high state of readiness throughout the year. Although they still had to use TC-47 aircraft, the 1,000 officers in the Navigator Training Squadron Program demonstrated exceptional qualifications during the third annual Reserve Navigation Competition held in May 1959. They were graded by the same standards applied to active force navigators.

In January 1959 the Air Force doubled its allocation of aircraft to Operation SWIFTLIFT by adding 20 planes. SWIFTLIFT is an arrangement whereby the cross-country training of aircrews is combined with the airlift of cargo and personnel. At present, 50 percent of the SWIFTLIFT planes are assigned to support the Army; 25 percent to help AMC airlift outsized cargos, mainly jet engines; 15 percent to ADC; and the remaining 10 percent to special jobs designated by Headquarters USAF. The allocation of 50 percent of the aircraft to work with the Army has provided troop carrier units with training in the airdropping of troops and equipment, previously the most difficult type of training for them to obtain.

V. Health and Welfare

The larger proportion of officers and airmen electing to make a career of the Air Force reflects in part the higher morale resulting from improved conditions and benefits. The Air Force emphasized career and educational opportunities, dependent medical care, and other family services as important elements in its program to raise the quality of its officers and enlisted men.

Two desirable trends became evident in adult education—an increase in overall participation and a significantly larger interest in group study and civilian school classes.

The dependent school population of Air Force families overseas increased considerably in recent years. In the 1956-57 school year, for example, an estimated 40,000 USAF children were enrolled in overseas schools. During the 1959-60 school year, the estimated enrollment will exceed 52,000, including about 43,000 in 91 elementary and 23 high schools operated by the Air Force and 9,300 in schools operated by the Army, the Navy, or through contracts. In addition, 5,800 dependents of Army, Navy, and civilian personnel are expected to attend the overseas USAF schools.

Medical Service

Advances in aerospace medicine accompanied the technological advances made toward placing manned vehicles at higher altitudes and into space. At the School of Aviation Medicine and at USAF laboratories, medical men sought the means of protecting life during aerospace flights. The Air Force realigned its programs to meet the present and anticipated responsibilities in the fields of nuclear medicine, special weapons defense, radiobiology, radiation health physics, and the biosciences in general.

Medical Personnel

The standards of overall medical service rose perceptibly by the simple measure of the ratio of medical personnel to total USAF personnel. In a year when the uniformed strength of the service declined from 871,156 to 840,435, the number of USAF Medical Service officers rose from 10,284 to 10,429. This number included 3,297 physicians, 1,778 dentists, 317 veterinary officers, 2,009 medical service officers, 149 medical specialists, and 2,880 nurses. There were 23,623 Medical Service airmen, including 3,072 assigned to dental duties.

There were still too few specialists in such fields as radiobiology, nuclear medicine, aviation medicine, psychiatry, and otolaryngology. The retention of physicians trained in these specialties who had completed their service obligations remained a major problem.

To retain qualified personnel, the Medical Service continued incentive pay for physicians and dentists ranging from \$100 to \$250 per month, based upon years of active duty. The Medical Service also sought to stabilize assignments to a greater degree. Whenever possible, physical plants were improved and training opportunities increased. Partly because of these efforts, 337 officers accepted Regular commissions during the year.

Special programs continued to appeal to qualified young people interested in careers as regular or reserve officers in the Medical Service. At the end of June 1959 more than 300 students and interns were being sponsored under the 5 programs for senior medical students, senior dental students, military medical interns, civilian medical interns, and dental interns. The program for senior dental students was concluded at that time.

Under the residency deferment program (Berry plan), begun in 1954, approximately 230 physicians had completed residency training in their specialized fields and become available for active duty in the Air Force by the end of June 1959. Of 495 physicians commissioned by the Air Force from the 1958 medical school graduating classes, 254 were selected for residency training in needed specialties, bringing the total number in residency training at the end of June 1959 to 684. The remainder of the 495 were scheduled for active duty sometime in fiscal year 1960.

Training courses for officers of the Medical Service covered a variety of subjects including medical administration and supply, surveys of recent advances in military medicine, and basic and advanced refresher courses in the medical, dental, and veterinary fields. Officers received training primarily at the School of Aviation Medicine, Randolph AFB, Tex., and at its branch at Gunter AFB, Ala. The Medical Service utilized the USAF Hospital at Lackland AFB, Tex., as a teaching center for virtually all the recognized specialties in the general medical field. Medical officers also received training in a large variety of other military and civilian institutions.

The Air Force placed greater emphasis on the medical aspects of modern warfare, especially nuclear and missile operations. Approximately 20 physicians received training in the use of radioisotopes and were either eligible for licensing or fully licensed by the Atomic Energy Commission. More than 6,000 officers received training in disaster casualty control in various USAF indoctrination courses. The Air Force increased its participation in mass casualty courses conducted by the Army, but the quotas were still not adequate for USAF

needs. All courses for airmen contained training in disaster casualty control. Medical training in the Military Assistance Program was expanded to include a new course of advanced training in aerospace medicine.

Health in the Air Force

The health of men and women in the Air Force markedly improved during calendar year 1958 after a setback during 1957 primarily as a result of the Asian flu epidemic and the high incidence of respiratory illnesses. The annual admission rate to medical facilities for treatment decreased 12 percent in 1958, from 340 per 1,000 average strength to 300. Provisional information indicated that in 1958 the admission rate for diseases of the respiratory system, including influenza, decreased 40 percent. However, the admission rate was still higher than the 249 per 1,000 rate achieved in calendar year 1956.

Similarly, the daily noneffective ratio decreased from 10.5 (military personnel out of every 1,000 off duty because of medical reasons) in calendar year 1957 to 10.1 in calendar year 1958. However, this rate was somewhat higher than the 9.2 rate in calendar year 1956. The daily average number of Air Force personnel occupying beds decreased to 6,651 in 1958, nearly 13 percent below the 7,621 of 1957. The daily hospitalized ratio was 7.7 per 1,000 compared with 8.4 in 1957.

The reduced death rate of 2.0 per 1,000 average strength in 1958 compared to 2.1 for 1957. This represented a slightly reduced death rate from injuries—1.6—and an unchanged rate from disease—0.4. Of the 1.6 deaths per 1,000 from injuries, aircraft accidents accounted for the same death rate as in 1957—0.6—while motor vehicle deaths showed a slight reduction to 0.6. Deaths from miscellaneous injuries accounted for the remaining 0.4.

Air Force Hospitals

In this period the modernization of medical facilities made strides to close the gap between the demand and the supply.

During fiscal year 1959 the Air Force completed construction of nine hospitals, five dental clinics, two dispensaries, and six miscellaneous projects. The latter included a flight medical laboratory, a research building, and an academic building for the new home of the School of Aviation Medicine, at Brooks AFB, Tex. Under construction at the end of the fiscal year were six hospitals, four dental clinics, seven dispensaries, and three miscellaneous projects. The latter included a 500-bed addition to the USAF Hospital at Lackland AFB.

On June 30, 1959, the USAF Medical Service was operating 189 fixed inpatient facilities containing 11,992 operating beds, of which 3,175 were overseas. In the United States the Medical Service oper-

ated 93 fixed hospitals; overseas it operated 40. The remaining facilities were smaller ones classified as dispensaries. Class A dispensaries, authorized 24 beds or less, numbered 31 in the United States and 25 overseas and had a total of only 600 beds. The Dental Service operated 437 fixed dental facilities and 12 trailer-mounted dental clinics.

By June 1959 the American Hospital Association had accredited 64 USAF hospitals, including 56 in the United States. Because of limited resources, the Joint Commission on Accreditation of Hospitals was restricted in its surveys of military hospitals located overseas.

During calendar year 1958, USAF facilities cared for a daily average of 8,720 bed patients, of whom 5,190 were Air Force military patients. The number of Air Force military patients cared for in USAF facilities represented 78 percent of all USAF patients hospitalized everywhere. Bed occupancy in USAF facilities for USAF military personnel fell to 59.5 percent in 1958 from 64.4 in 1957; for nonmilitary (primarily dependents) it rose to 35.9 from 30.6; and for patients from other military services it declined from 5.0 to 4.6. The increase in the proportion of nonmilitary bed patients followed the decrease in admissions of the military personnel and the new restrictions on dependents' use of civilian medical facilities.

Dependents' Medical Care

Because of the mounting costs of the Dependents' Medical Care Program it became necessary to restrict the freedom of dependents to choose civilian medical facilities at Federal expense when comparable services were available at military facilities. Military facilities were in many cases no longer being used to capacity. At the direction of the Department of Defense, the Air Force stipulated that on and after October 1, 1958, spouses and children residing with their sponsors within the United States, Alaska, Hawaii, and Puerto Rico might obtain authorized medical care at Government expense from civilian sources only after it had been determined that such care could not be provided by a service medical facility located within reasonable distance of the patient's residence. Emergencies and certain other specified circumstances were excepted. Spouses and children not residing with their sponsors were to continue to have free choice between service medical facilities and civilian medical facilities.

After the restriction went into effect, the average daily patient load (ADPL) for dependents in USAF medical facilities rose from 2,167 in October 1958 to 2,532 in March 1959. While the Surgeon General had taken the position in June 1958 that USAF medical facilities could support an optimum additional 300-350 dependent ADPL, this figure had actually been surpassed. The increase was made possible chiefly by the decrease in military ADPL.

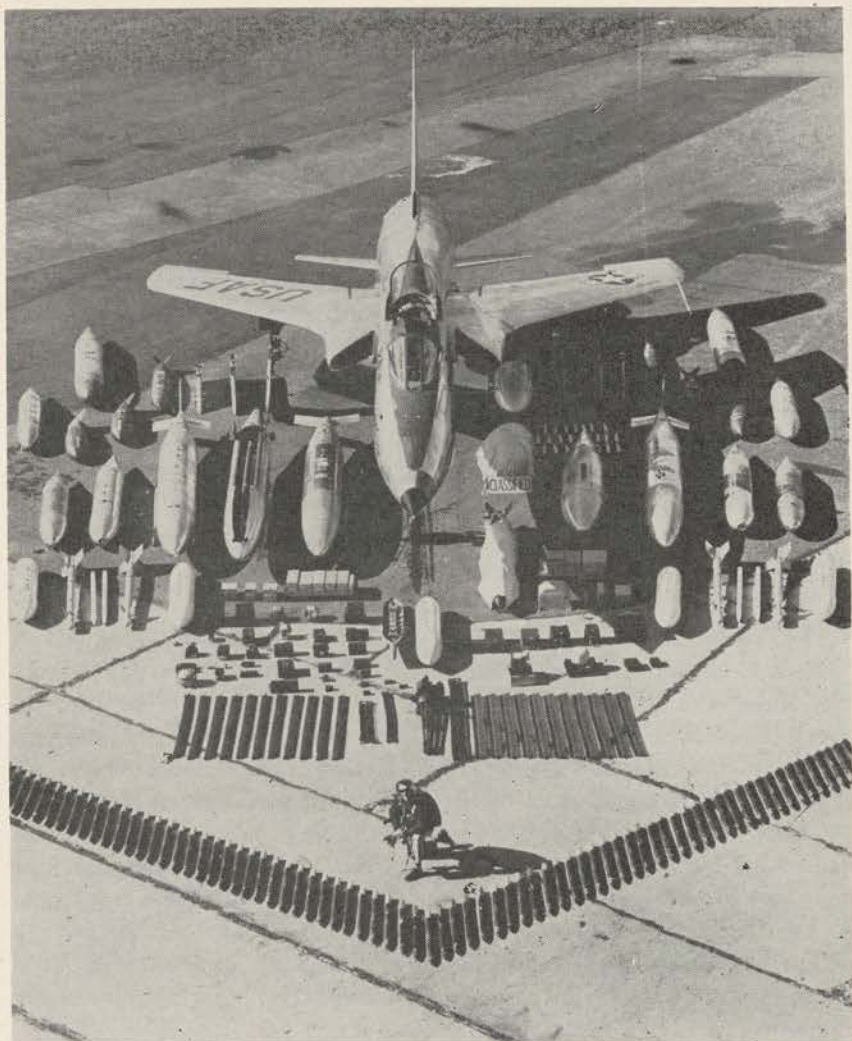


Figure 8. F-105 with array of armaments.

By June 30, 1959, the Air Force had obligated \$77,546,000 under Medicare since its inauguration December 7, 1956. This included a charge of 2.3 percent payable to the Department of the Army for administering the program. In fiscal year 1959, \$32,283,000 was obligated for the care of USAF dependents in civilian hospitals; the average cost per physician's claim was about \$85 and the average cost per hospital claim was about \$125.

Medical Research

The Aero Medical Laboratory at Wright-Patterson AFB, Ohio, holds an unusual position among service laboratories because it per-

forms applied research and actually develops items of personal and safety equipment. During the year, the AML conducted applied research in physiology (stresses of heat, cold, altitude, toxic agents); biophysics (isolation, confinement, acceleration, etc.); bioacoustics (noise and vibration); human engineering of weapons systems; and personal protective equipment.

The Laboratory's "stress-testing" program contributed greatly to the selection of the Project Mercury astronauts. In developing the battery of tests, USAF scientists engaged in interesting basic research, including the isolation and confinement studies.

The study of the physiological and psychological reactions to the zero gravity states was enhanced by using the C-131B, which allows for free movement inside the fuselage by contrast with fighter types. The Laboratory also completed development and testing of the "X-15 full pressure suit" and delineation of tolerable escape and reentry profiles for space flight.

In addition to all the emphasis on space, a great deal of effort was expended in developing and testing adequate personal equipment and escape devices for current weapons systems.

The Aeromedical Field Laboratory of the Air Force Missile Development Center at Holloman AFB, N. Mex., continued to investigate the human factors involved in space flight. In space biology it engaged in research on subgravity, sealed cabin environment, and biological effects of cosmic radiation. In biodynamics—defined as the study of the effects of mechanical forces on living tissues—research covered a variety of problems ranging from seat belts to patterns of deceleration in space flight. This research program centered around a unique complex of test facilities, including a 35,000-foot high-speed test track. All of the biodynamics research was in some measure an outgrowth of the deceleration and windblast studies that began at Holloman AFB in 1953 to cope with the problem of escape from high-performance aircraft.

The Arctic Aeromedical Laboratory, at Ladd AFB, Alaska, investigated scientific problems affecting living conditions and combat efficiency in the Arctic. Experiments in biochemistry sought to determine the best composition of Arctic and global survival rations, requirements for energy sources and vitamins under cold conditions, and the impact of cold and diet upon specific enzyme activities. The Laboratory studied biochemical evidence to find how organisms are affected by cold, fatigue, semistarvation, and other stresses likely to be encountered in the Arctic. Physiology research at Ladd AFB was concerned with factors involved in body heat regulation under Arctic conditions and with techniques designed to increase tolerance of cold.

In support of the national effort to place man in space and bring him back, the School of Aviation Medicine undertook to evolve a system for maintaining small animals in sealed, self-contained ecological systems under a variety of physical conditions, such as weightlessness, acceleration, vibration, and spinning.

The school also carried out further experimental studies in the use of the space-cabin simulator. Twenty SAC pilots volunteered to act as subjects for a 1-year study, beginning in October 1958. After physical and mental examinations and 2 days of cabin indoctrination, each man completed the full-scale run of 7 or 8 days' confinement in the cabin simulator.

Nuclear weapons and space flight present many radiological problems. The School of Aviation Medicine investigated the hazards of acute and chronic effects of radiation exposure and the possibility of finding compounds to protect against or modify these effects. To find the answers, the Air Force collaborated with the Atomic Energy Commission and let contracts for studies.

In cooperation with the Aero Medical Laboratory at Wright-Patterson AFB, Ohio, and the Air Force Flight Test Center at Edwards AFB, Calif., the School of Aviation Medicine continued the development of instruments for use in studying man's physiological reactions to flight. Many factors involved in these reactions and in man's performance can be observed only during actual flight. Such observation was made possible by installing biomedical research instrumentation in as many vehicles as possible where new experiences and stresses upon the operator could be expected.

Chaplains

The number of chaplains on active duty with the Air Force increased slightly to 1,041 by the end of June 1959. During fiscal year 1959 the Air Force called to active duty 113 chaplains, but it lost 96. In addition, 106 civilian clergymen were appointed or reappointed as auxiliary chaplains to supplement the military chaplains for service both in the United States and overseas.

Air Force chaplains conducted a series of missions for Catholic and Protestant personnel and their families at airbases in the Pacific and in Spain. Torah convocations and High Holy Day services were conducted for Jewish personnel in Alaska and at eight Air Force bases in eastern Canada and Greenland.

For the sixth year, the Air Force sponsored spiritual life conferences for Protestant personnel and their families at Estes Park, Colo., and Ridgecrest, N.C. Also, the Air Force sponsored several spiritual retreats for Catholic personnel during National Catholic Youth Week in October 1958. The Armed Forces Chaplains Board arranged

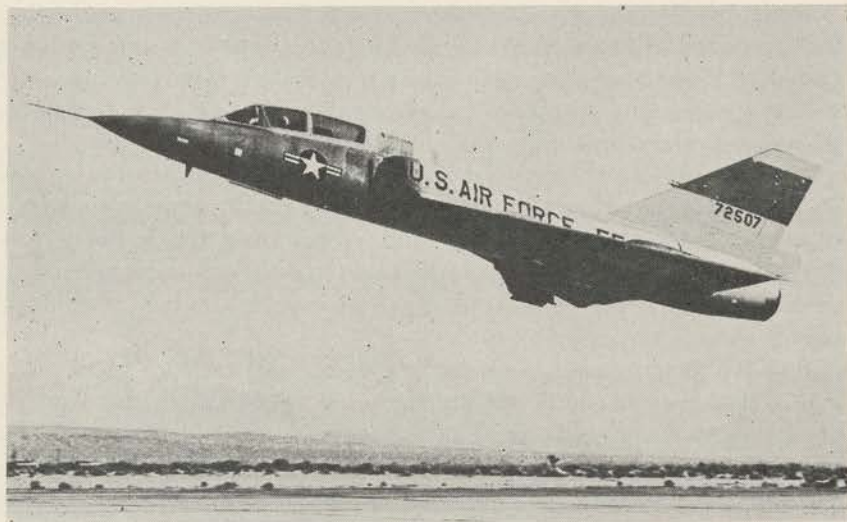


Figure 9. F-106B all-weather jet interceptor.

spiritual retreats for Protestant and Catholic chaplains both in the United States and overseas.

At a series of regional conferences for chaplains in the United States in April and May 1959, the Chief of Air Force Chaplains and members of his staff made presentations on the overall USAF chaplain program. Separate sessions were held by the staff chaplain of each major command with his chaplains to discuss matters pertinent to their respective commands. "Our High Calling" was the theme of a conference held in Washington, D.C., in February 1959 for staff chaplains of all major commands.

At the end of June 1959 the chaplaincy was holding services in 523 USAF chapels, including 204 in oversea areas. By the end of the year, 17 new chapels had been completed and 24 others were under construction. In the 1959 construction program, Congress authorized five new chapels, four of them to have chapel annexes. In addition, it authorized enlargement of three chapels and the addition of an annex to another chapel. Congress appropriated funds to build these facilities as well as three chapels and four chapel annexes that had been authorized in prior years. The estimated cost of this construction was \$2.6 million.

Judge Advocate General

The problem of rapid turnover of young lawyers on active duty in the Air Force remained critical. The Judge Advocate General's Department lost 169 officers during the fiscal year and added 197 new ones.

The Office of the Judge Advocate General completed the revision of manuals on legal research, military justice, and civil law-military affairs. Nearing completion were manuals on the law of air warfare and on procurement. The office prepared four volumes of a five-volume course on military justice for the Air Force Extension Course Institute.

To acquaint USAF personnel and their families with the laws and customs of the areas in which they are serving, the Air Force inaugurated a Preventive Law Program in the spring of 1959. Brochures will be prepared in oversea areas and selected U.S. areas to acquaint personnel with foreign law.

During the year the Boards of Review handled 1,907 court-martial cases. Of these cases, 458 were petitioned to the U.S. Court of Military Appeals by the accused and 3 were certified to the court by the Office of the Judge Advocate General. During this fiscal year, 56 petitions were granted, 431 were denied, 1 was dismissed, and 7 were withdrawn by the accused. Two cases were remanded to the Boards of Review for further review. The court reversed the Boards of Review in 33 cases and sustained in 30; 54 cases were pending before the court at the close of the fiscal year.

The Claims Division received 1,554 claims (24 reopened, 1,530 new claims) totaling more than \$4 million and closed 1,723 claims amounting to more than \$5 million. Thirty collections made for the United States amounted to \$59,750. On June 30, 1959, there were 249 cases on hand totaling \$3.6 million.

The Tax and Litigation Division received 410 cases and closed 314. There were 981 cases on hand at the end of June 1959.

VI. Installations

Programs

Congress appropriated \$785 million in new money for USAF military construction, making available for fiscal year 1959 a total of \$1,713.4 million. This included a carryover of \$902.6 million from fiscal year 1958, \$5.5 million of reimbursements, and a recovery of \$20.3 million from prior-year obligations. Approximately \$1,418 million of the total amount could be used for new contracts, the remainder being reserved for miscellaneous Government costs, overhead costs of construction underway, and advance planning on new work.

In October 1958 the Air Force forwarded its fiscal year 1960 construction authorization program, totaling \$1,073.9 million, including \$4.8 million for the Air Force Reserve, to the Office of the Secretary of Defense. Congress actually authorized \$797.5 million for the Regular Air Force, including \$296.9 million for construction within the United States, \$73.1 million overseas, \$417.5 million for missile sites and ballistic missile early warning sites, and \$10 million for unforeseen contingencies. An additional \$4.1 million was authorized for Air Force Reserve construction. The Air Force requested \$988 million in construction appropriations for fiscal year 1960 and received \$780.8 million, including \$4 million for the Air Force Reserve.

During the year the Air Force acquired 17,400 acres of land, costing \$3.6 million, on which to build new facilities or to expand established ones. By condemnation, it obtained 4,800 additional acres at a cost of \$960,000. In addition, 278,000 square feet of building space and 11,000 acres of land were leased, at a cost of \$700,000 and \$1 million, respectively.

As a result of the inactivation of 12 combat wings during the year, 7 installations were inactivated and 2 were transferred to other services. To eliminate other nonessential facilities, the Air Force required that all Regular USAF and Reserve activities occupying leased facilities be relocated on active USAF bases wherever possible. The Air Force disposed of 2,400,000 square feet of building space, 223,000 acres of land valued at \$21 million, and also declared five land ranges excess. In addition, the Air Force released its recapture rights on all airfields inactivated since World War II, and surrendered all long-term leases on airfield property. These actions were expected to benefit communities in developing civil aviation at commercial airports.



Figure 10. GENIE nuclear-armed rockets on F-101B.

Construction

The Air Force started no new major bases in fiscal year 1959. During the fiscal year the Air Force awarded construction contracts amounting to \$1,158.4 million, which surpassed the contract total for the previous year by \$230 million. The major construction program included (1) BOMARC and ICBM facilities, (2) Ballistic Missile Early Warning System (BMEWS) sites, (3) SAGE facilities, (4) radar improvements, (5) DEW line extension, and (6) airbase construction or expansion. Maintaining the combat integrity of the SAC retaliatory force constituted a principal charge upon the Air Force construction budget. Dispersal of B-52 squadrons and their complementing tanker fleets reduced their vulnerability to attack and improved their reaction time. To this important end, construction contracts at established bases during the year amounted to \$191 million.

New contracts were let for auxiliary installations, chiefly radar gap fillers and aircraft control and warning facilities. New missile facilities were placed in the vicinity of established bases.

The Air Force awarded contracts for four new BOMARC sites, costing an estimated \$18 million, and expected to award contracts for seven additional BOMARC bases, costing approximately \$22.6 million, early in fiscal year 1960. Two planned projects were canceled during the year.

Contracts were let for the construction of ICBM sites at five USAF bases: Francis E. Warren AFB, Wyo., \$23 million; Lowry AFB, Colo., \$675 million; Offutt AFB, Nebr., \$20 million; Fairchild AFB,

Wash., \$24 million; and Forbes AFB, Kans., \$22 million. In addition to these operational bases, additional construction estimated to cost about \$44.4 million was started at Patrick AFB, Fla., and Vandenberg AFB, Calif., for ICBM testing and training facilities.

By the end of June 1959 the Air Force had awarded contracts amounting to \$124 million for all BMEWS work at Thule, Greenland, and Clear, Alaska. The contract at Thule supplemented the original \$25 million contract under which work began in fiscal year 1958. A contract was also awarded for building a communications-cable terminal building at Cape Dyer on Baffin Island.

New contracts for SAGE facilities during the year totaled more than \$15 million at 12 sites. To improve radar communication systems throughout the country, the Air Force awarded contracts totaling \$22 million. Contracts for the eastern extension of the DEW line amounted to more than \$30 million.

With the addition of more than \$22 million of actual construction work during the past year, the \$139 million Air Force Academy stood 95 percent complete by June 30, 1959. Nearly 90 construction contracts had been completed and 13 more were almost complete or well underway. The largest project still under construction was the \$3.6 million hospital. The last major contract, for the cadet chapel, was out for bid at the close of the year.

The Air Force Academy Construction Agency, Headquarters USAF, directed and coordinated the work of a construction force of more than 5,000 people. The cost of Government engineering and construction supervision, including the architect-engineering contracts, remained under 8 percent of total construction costs. This is an overhead cost lower than the Air Force generally experiences when its contracts are handled by construction agencies outside the Air Force. Completion of the essential facilities on schedule permitted the cadets to move in and begin classes on September 2, 1958.

At the end of June 1959 the Air Force was using 267 major bases. The following tabulation depicts the six main types, including foreign bases and contract flying schools in which the Air Force has no real property interest:

Active Major Installations

<i>Classification</i>	<i>Total</i>	<i>United States</i>	<i>Overseas</i>
Operational.....	162	84	78
Operational support:			
Flying.....	13	7	6
Nonflying.....	12	3	9
Training.....	42	42	0
Research and test.....	7	7	0
Logistical.....	18	16	2
Non-USAF (no real property interest):			
Foreign base.....	8	0	8
Contract flying schools.....	5	5	0
Total.....	267	164	103

Family Housing

Surveys in recent years have shown that adequate family housing is one of the most important factors in retention of military personnel. The Air Force has continued to make gains in providing living quarters and believes that this has resulted in raising reenlistment rates. A total of 19,997 new housing units were completed during the year—17,348 in the United States and 2,649 overseas. New units started numbered 26,714, of which 24,378 were in the United States and 2,336 overseas.

During fiscal year 1959 the greatest activity occurred in the Capehart (title VIII) projects and the Wherry rehabilitation and improvement program. Since the Air Force must own the land on which they are built, Capehart houses are virtually limited to bases within the continental United States. The only exceptions are the 1,050-unit project at Anderson AFB, Guam, and the 600-unit project in Hawaii. More than 400 of the Hawaiian houses were completed this year.

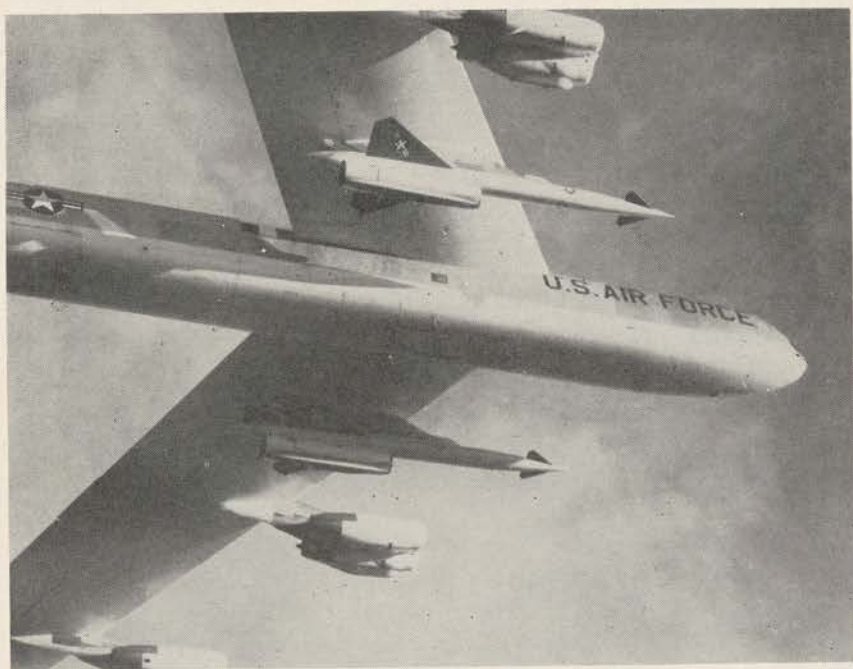


Figure 11. HOUND DOG missiles carried by B-52.

The chief problem with the Wherry housing, of which the Air Force has acquired about 30,000 units, was their condition. Because of the type of construction, failure of the sponsors to maintain them properly, and rising rents, many of the units had fallen below the Air Force standards of quality. Rehabilitation and improvement of these houses had gotten well underway by the end of June 1959.

A more detailed breakdown of 1959 family housing construction is contained in the following tabulation:

<i>Type</i>	<i>Units placed under construction</i>	<i>Units completed</i>
Zone of Interior:		
Appropriated funds.....	1, 192	1, 161
Title VIII (Capehart).....	16, 138	14, 687
Wherry rehabilitation and improvements.....	7, 048	1, 500
	24, 378	17, 348
Overseas:		
Appropriated funds.....	134	88
Title VIII (Capehart).....	1, 650	410
Surplus commodity.....	552	569
Rental guaranty.....		1, 582
	2, 336	2, 649
Total.....	26, 714	19, 997

The total picture of family housing construction, as it appeared on June 30, 1959, is given below:

<i>Type</i>	<i>Existing*</i>	<i>Under construction</i>	<i>Planned</i>
Appropriated funds.....	38, 209	1, 696	614
Wherry.....	37, 112		
Title VIII (Capehart).....	16, 365	27, 934	18, 412
Rental guaranty.....	4, 968		
Surplus commodity.....	2, 072	2, 115	3, 137
Total.....	98, 726	31, 745	22, 163

*Excludes 14,591 inadequate housing units and 2,756 trailers.

Base Maintenance

Major repair, modification, and alterations lengthened the useful life of USAF base facilities and made them adaptable to future requirements. During fiscal year 1959 the Air Force contracted for \$103.6 million for base maintenance, about \$27.4 million less than for fiscal year 1958.

In April 1958 the Air Force established a new procedure for reviewing and approving requests for major repair, modification, and minor construction sent to Headquarters USAF by the field commands. Previously interested agencies reviewed and coordinated individual requests, but their judgments were often faulty and decisions slow because only a few had all of the background facts. Under the new procedure, all projects are reviewed at the same time by the Construction Review Panel, which makes recommendations on the annual military construction program. This has proved to be effective and has cut the processing time more than 75 percent.

For fiscal year 1959 the major repair and modification program totaled \$100.25 million, and the real property maintenance program,

handled by contract, totaled \$77.3 million. The 1960 budget estimates of the two programs were presented together for the first time and were studied concurrently by the Budget Advisory Board's working group. The real property maintenance program received an increase of \$3 million, while the major repair and modification program was reduced by \$16.9 million.

Losses from 1,558 fires at USAF bases amounted to \$4.5 million, slightly higher than the record-low losses of \$4.15 million incurred during the fiscal year 1958, but still considerably under the \$11.1 million losses incurred during fiscal year 1957.

VII. Research and Development

The research and development program in the Air Force has made considerable progress during the past year, both in the development of new weapons systems for the near future and in the acquisition of fundamental knowledge that will lessen the development problems and costs of more advanced future weapons.

In the next decade there will be a balanced but variable mix among aircraft, missiles, manned spacecraft, and satellites. The specific ratios comprising this mix will largely depend upon how soon aerospace vehicles mature.

Development planners provided long-range guidance for the advancement of technology and the creation of systems and techniques essential to the accomplishment of USAF missions in the more distant future. Looking into the 1962-70 time period, they made a thorough analysis of the capabilities of manned bombers to penetrate enemy defenses and measured the value of various penetration aids. Among the more advanced subjects under study were guidance-navigation in aerospace and a surveillance space station.

To accomplish the multiple tasks of bringing to fruition newer weapons systems with their associated equipment, and to attain a higher degree of perfection in older weapons systems, Congress appropriated \$751.8 million during fiscal year 1959 for USAF research and development. These funds were augmented by transfer of \$28.2 million from other accounts, a total increase of \$65 million over the \$715 million of the previous year. USAF scientific and technical activities also received money from other appropriations, particularly those for procurement and production. In the 1960 budget, the research, development, test, and evaluation account contains certain items that previously appeared in procurement appropriations.

The Air Force stressed the importance of continually improving techniques and procedures for the management of its weapons systems. Rapid changes in operational concepts and inevitable technological progress, plus budgetary limitations, demand a high degree of flexibility and timeliness in the development, production, and support of weapons systems. In May 1959 a study group of general officers was established to review the management of weapons systems. Management problems are of far-reaching importance because they involve interrelated actions by the Air Staff, the major operational commands, ARDC, AMC, other Government agencies, the scientific community,

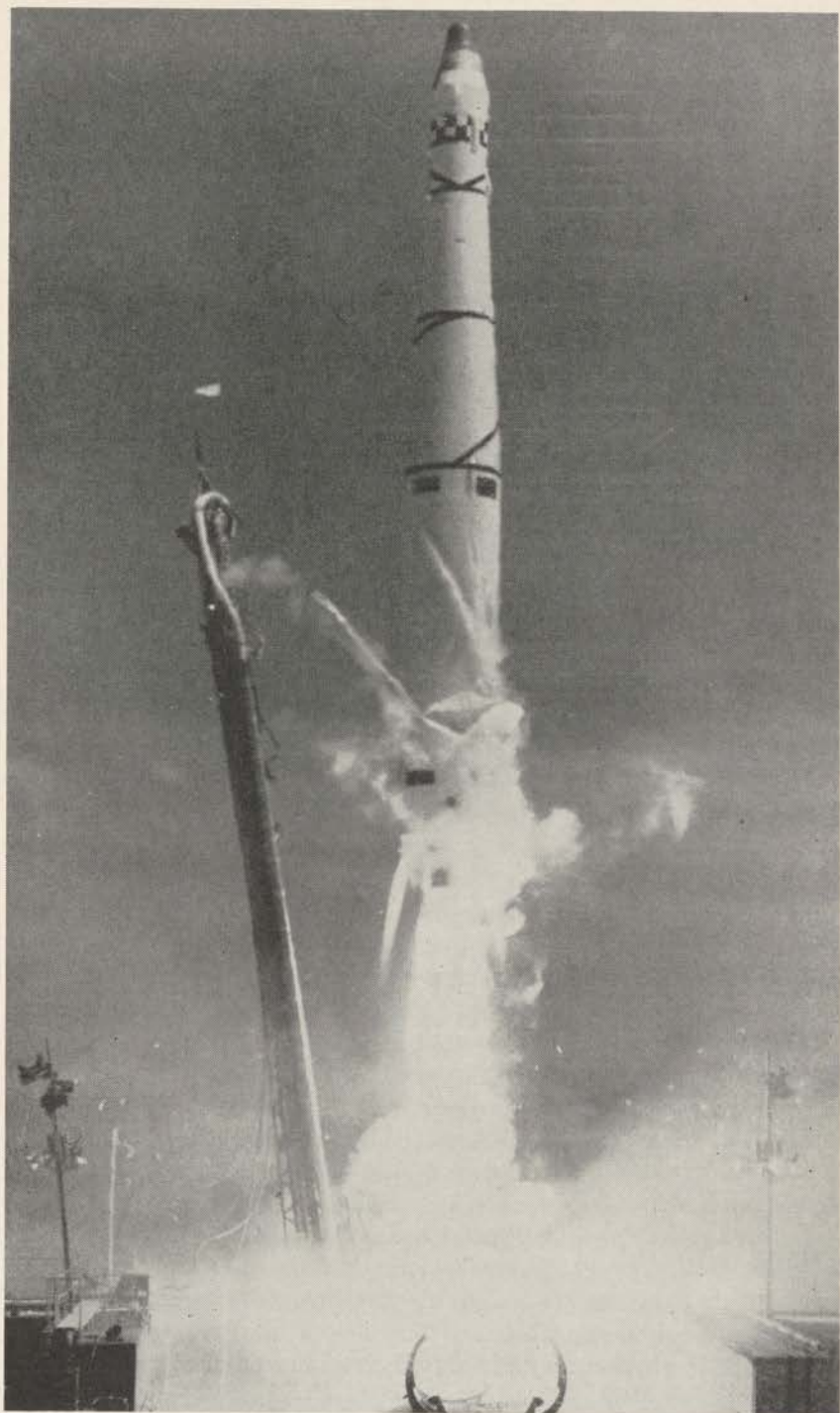


Figure 12. Discoverer satellite on launching vehicle.

and industry. The study group will draw upon the vast quantity of knowledge and data accumulated within the Air Force to help it formulate recommendations for improving the management of weapons systems.

To its own strong national scientific and industrial technology, the United States added the fruits of a constant exchange of scientific and technical knowledge with friendly nations that desire to bolster the defense of the free world. Under the Mutual Weapons Development Program during the past year, the United States signed 116 agreements with France, West Germany, and Italy for the exchange of data on weapons. The Italian G-91 lightweight strike fighter went into production for NATO forces.

Astronautics

In July 1958, Headquarters USAF established the Directorate of Advanced Technology under the Deputy Chief of Staff, Development. The purpose of the new agency was threefold: (1) To supervise at the Air Staff level the formulation of an Air Force advanced technological program; (2) to serve as the focal point within the Air Staff for contact with the Advanced Research Projects Agency (ARPA) and the National Aeronautics and Space Administration (NASA); and (3) to coordinate the responsibilities of the Air Force for research and development for space projects within the limitations imposed by the ARPA/NASA assignments.

The primary USAF role in astronautics is to support NASA and ARPA projects. For Project Mercury, NASA's man-in-space effort, the Air Force will provide 10 ATLAS boosters as well as the launch facilities and technical assistance. In addition, the Air Force conducts balloon tests for NASA and supplies training equipment for the men who are candidates for the flight into space. THOR boosters will also be furnished for the deep space probe and the lunar satellite project.

In a major scientific achievement in October 1958, Pioneer II, the Air Force's second attempt at a lunar probe, traveled almost 80,000 miles, or more than one-third the distance to the moon. Boosted by a THOR and a modified VANGUARD second stage, Pioneer II radioed back to earth information on the earth's magnetic field, micrometeorites, and radiation densities. ARPA's Project Score, in December, placed in orbit a 9,000-pound instrumented sustainer stage of an ATLAS missile, proving the versatility of the ATLAS and the accuracy of its guidance system. This satellite, containing special communication equipment, broadcast the voice of the President, marking the first use by this country of a satellite as a means of communication.

In December 1958, ARPA assigned to the Air Force the task of developing certain systems and techniques for operating space vehicles.

Under Project Discoverer, four launchings took place between February and the end of June 1959, two achieving polar orbit. These launchings tested propulsion and guidance systems, stabilization equipment, and techniques for aerial recovery of capsules carried in the nose cones. The recapture of capsules carrying live animals is an important step toward the success of the man-in-space program. The booster stage of the Discoverer is a modified THOR, the second stage an AGENA, a new vehicle with a special rocket engine.

The X-15, a joint Air Force-Navy-NASA responsibility that is closely related to space activities, performed a captive flight March 10, 1959, then made its first powerless flight to earth June 8, 1959, when it was dropped from a B-52 at 38,000 feet. This piloted aircraft has been designed to reach heights of 100 miles and speeds of 3,600 miles per hour. The X-15 is expected to fly "weightlessly" in space, then reenter the earth's atmosphere. The X-15 will investigate man's physiological problems at very high speeds and altitudes as well as aerodynamic heating, stability, and control of the vehicle within the limits of its performance.

The Air Force is developing the DYNA-SOAR, which will be a manned boost-glide vehicle of global range, designed to explore at suborbital velocity areas beyond those investigated by the X-15. This vehicle is expected to fly from subsonic speeds at low altitudes to a speed of about 17,500 miles per hour. The DYNA-SOAR will be an important laboratory for obtaining data for later development of manned military weapon systems and satellites.

Weapon Development

Strategic Air Weapons

The design of the SM-65 ATLAS proved to be basically sound. In November 1958 a fully equipped ATLAS went the full distance of 6,325 nautical miles from launching pad to target area in the South Atlantic.

The advanced, two-stage SM-68 TITAN made excellent progress, meeting all objectives in its flight tests beginning in February 1959. TITAN installations will be dispersed and placed underground to guard against surprise attack.

The Air Force accelerated the development of a third ICBM, the SM-80 MINUTEMAN, which will be relatively inexpensive and easily maintained by a few people in dispersed and hardened sites. It will be technically feasible to deploy some of these missiles on railway cars and trucks, giving the SM-80 the operational attribute of mobility. The MINUTEMAN will be a solid-propellant, three-stage missile with a self-contained, all-inertial guidance system. An ablative shield will protect the warhead against the intense heat MINUTEMAN must endure when it reenters the earth's atmosphere.

The Air Force continued to improve the performance of its manned bombers. The B-52H, a missile carrier, will have an advanced electronic countermeasure system, accelerated takeoff, and greater range, primarily because of its more efficient turbofan engine.

Encouraging progress was made in the development of the B-70 Valkyrie, now in the advanced stages of design. Comparable in size to the B-52, and powered by six J-93 engines, the Valkyrie will be able to carry large nuclear weapons plus air-launched ballistic missiles.

Air-to-surface missiles extend the range of bombers and increase their effectiveness. The first fully powered GAM-77 HOUND DOG was fired by a B-52 down the Atlantic Missile Range in April 1959. The Air Force has initiated tests to determine the compatibility of the B-58 and the HOUND DOG. In December 1958 the Air Force terminated development of the SM-73 GOOSE decoy missile. The GAM-72 QUAIL, a diversionary missile that will help SAC bombers penetrate enemy air defenses, made successful flight tests.

In its search for an advanced missile to succeed the HOUND DOG, the Air Force has used a B-58 traveling at supersonic speed to fire an experimental air-to-surface missile with a ballistic trajectory. Since the potential strategic value of this new weapon, the XGAM-87A, is very great, the Air Force awarded a contract in May 1959 for its development.

The development of a nuclear propulsion system for aircraft is proceeding. The Air Force has a definite requirement for a manned nuclear-powered aircraft with high performance characteristics. The powerplant originally proposed promised only marginal performance, and the Air Force is currently working on the development of a superior propulsion system.

Air Defense Weapons

The Ballistic Missile Early Warning System (BMEWS) is expected to provide early and reliable warning of enemy ICBM attacks. BMEWS will consist of radar stations in the northern latitudes, a central computer in the United States, and a communication system for the transmission of data.

In October 1958, two IM-99 BOMARC's, directed by a SAGE computer at Kingston, N.Y., were simultaneously launched from Cape Canaveral, Fla., against two separate targets. This was the first multiple launch of the missile. The USAF Missile Employment Facility at Eglin AFB, Fla., became operational in November 1958, and a joint ARDC-ADC force began testing IM-99A BOMARC's and training a missile unit at this site. The improved IM-99B was launched on schedule in May 1959, beginning its test-flight phase.

The Air Force is developing on schedule the air-transportable version of an air weapon control system for use outside the continental

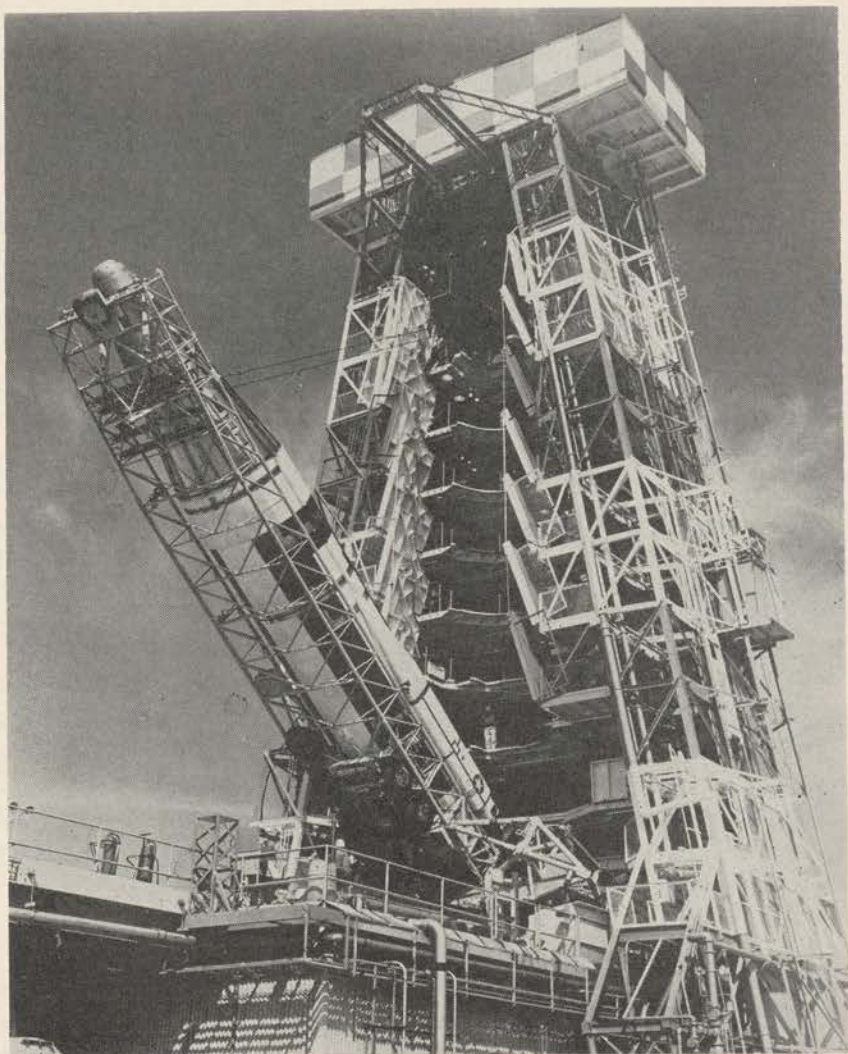


Figure 13. ATLAS rising into test firing position.

United States to control manned aircraft and surface-to-air missiles. The United States also recommended this system to NATO nations to help them cope with their air defense problems and improve their air traffic control system.

Tactical Air Weapons

The Air Force completed development and testing of the TM-76A MACE, which features the ATRAN (automatic terrain recognition and navigation) guidance system. This missile has been launched successfully from a hardened shelter at Holloman AFB, N. Mex. The

TM-76B, which contains an inertial guidance system, underwent flight tests in the corridor from Holloman to Wendover AFB, Utah. To succeed the MACE, development planners considered three possibilities: A tactical ballistic missile, a high-performance cruise missile with a speed of Mach 3, and a cruise missile that would be difficult for radar to detect.

The Air Force continued development of a fighter that would take off vertically or from very short runways and be able to operate for a limited time without requiring a large base complex. To help TAC's fighters survive air attack, the Air Force tested zero-length launching of F-100 aircraft. This technique should permit increased dispersal of fighters and possible use of hardened shelters.

Supporting Developments

Transport and Training Aircraft

The advanced C-130B Hercules made its first test flight in December 1958. This turboprop assault transport, designed to carry troops and supplies in and out of small fields under adverse conditions, can operate up to altitudes of 30,000 feet at a cruising speed of 345 miles per hour and has a range of 3,500 miles.

After the first flight of the supersonic T-38 in April 1958, flight-testing proceeded rapidly on this basic trainer. The first flight of the T-39 Sabreliner, which will be used for combat readiness training, took place in September 1958. To obtain this plane as quickly as possible, the Air Force authorized only those changes that would improve safety of flight. The Sabreliner will use the J-60 engine instead of the J-85 as originally planned.

Equipment

In February 1959 the Atomic Energy Commission let a contract to build an air-transportable nuclear power plant and to conduct service tests at Sundance, Wyo. A joint Air Force-AEC project, this plant will produce 1,000 kilowatts of electrical power, enough for even such remote locations as the DEW line sites.

A small lightweight liquid-oxygen generator is under development for use at forward airfields. This air-transportable unit, weighing about 4 tons, will supply enough oxygen for a squadron of fighters and light bombers. TAC plans to use this generator in the event of emergency deployment of its forces to oversea bases.

To refuel aircraft and missiles with clean, water-free fuel, the Air Force needs equipment that can detect and filter contaminants. The ice that forms in the fuel during flights of B-52's and KC-135's is dangerous to flying safety. Tests indicate that equipment using a new filter and separator principle can separate free and emulsified

water. Sixteen carts using this new process have been purchased for tests in the next fiscal year.

Nuclear Experiments

During August and September 1958 the Air Force participated in Project Argus, the detonation at altitudes of 300 miles over the South Atlantic of three nuclear weapons with comparatively low explosive power. These experiments confirmed that the three ionospheric nuclear bursts had generated intense radioactivity which was trapped within the earth's magnetic field. This created an artificial auroral glow and an arc-shaped electron field which migrated eastward, encircling the earth within a matter of hours. The doughnut-shaped radiation shell extended 4,000 miles from earth at its midpoint, and a few hundred miles from the globe at its northern and southern extremities.

A significant result of Project Argus showed that there was no fallout hazard because of the small yields involved and the high altitude of the bursts. These experiments have implications for the use of small nuclear warheads in defensive weapons shot into space.

An analysis of worldwide fallout data, presented to a congressional subcommittee in May 1959, revealed that it took longer for the radioactive debris produced by nuclear detonations to be deposited if these explosions took place near equatorial regions rather than in high latitudes. Since the atmosphere in the lower latitudes retains this material for a longer period, the levels of concentration of radioactivity were less in these areas.

Research

The Air Force conducts basic research in its own laboratories and by contract within the broad areas of propulsion, materials, electronics, geophysics, biosciences, and aeromechanics. An investigation of the solid state properties of matter will lead to better understanding of the nature of imperfections in solids, the interactions between them, their physical properties, and their effects on materials used in USAF weapons systems. Research in electromagnetic energy will increase knowledge of the electronic sciences, electronic and magnetic-field effects, and extraterrestrial and molecular phenomena. Such studies might lead to new military electronic and communication systems. New detection methods based on wave propagation and radiation may emerge as well as new techniques for communications in the upper atmosphere.

In applied research, scientists have discovered that it is possible to reduce the number of component parts of electronic equipment by literally growing certain solid-state materials into functional elec-

tronic components. The use of this technique may reduce the weight and size of equipment by as much as 90 percent.

Temperature extremes and weight are the basic problems in the field of materials. To develop materials capable of withstanding extremely high pressures, USAF scientists will experiment with pressures up to 100,000 times the air pressure at sea level. Ceramics will be improved for use in extremely high temperatures. Research is underway on polymers intended for use as adhesives and sealants against temperatures above 1,000° Fahrenheit. More extensive use of such materials as molybdenum, columbium, tungsten, and their alloys is being investigated. One rare metal, beryllium, is lighter than magnesium, has a melting point twice that of aluminum, and a stiffness exceeding that of stainless steel.

Encouraging progress has been made on silicon carbide crystals as semiconductors. These crystals, theoretically capable of operating at 700° Centigrade, promise to be the first truly high-temperature semiconductors.

A promising new technique for air defense uses focused coherent electromagnetic radiation to produce high-power densities at distant points in space. Byproducts of this technique might be improved antenna designs, new high-power sources, and improved knowledge of radiation control.

VIII. Procurement and Production of Materiel

Industrial Readiness

The Air Force desires contractors doing business with the Government to provide their own facilities whenever possible. Air Force policy requires that prime contractors and subcontractors who request Government assistance in building new facilities must furnish proof that their lower tier subcontractors cannot handle the work.

Where new or expanded facilities are an obvious necessity, the Air Force tries to make maximum use of idle USAF plants. In certain instances, industry cannot be expected to fully finance capital equipment, particularly during the development phase when specialized test facilities are needed that have no commercial use and there is no assurance that production will follow. When money has to be spent, the Air Force negotiates with the contractor to determine whether a combined Government-contractor purchase is possible.

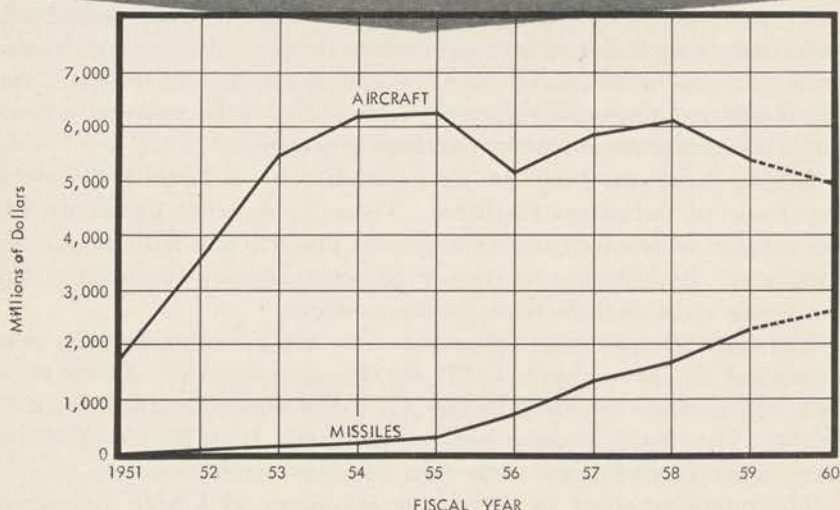
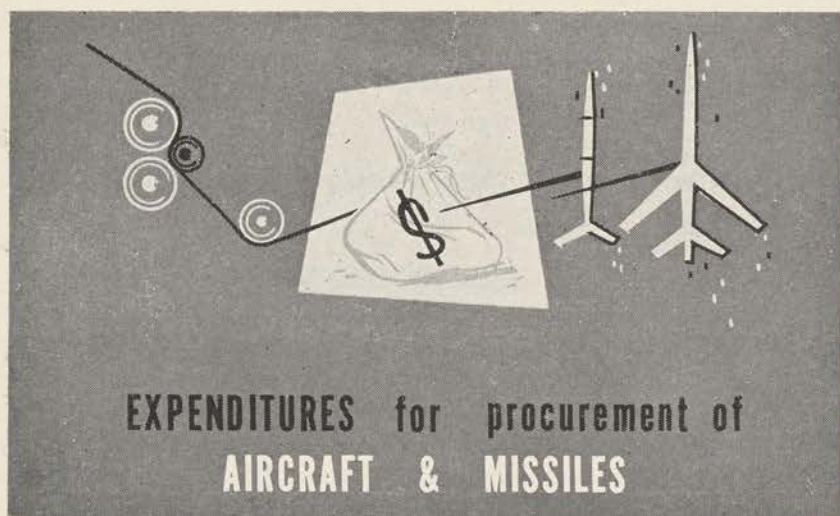
During fiscal year 1959 the Air Force directed \$94.4 million for the expansion of industrial facilities. These funds went primarily for the support of research and development projects and ballistic missile programs. By inducing contractors to expand their own facilities, the Air Force was able to decrease its expenditures.

Tax amortization cases referred to the Air Force during the year numbered 157, as compared to 174 for the previous year. At the same time, the number approved by the Air Force almost doubled, from 57 to 102. This sharp increase resulted primarily from USAF efforts to have contractors finance their own facilities expansion.

The intensive effort to shrink the inventory of USAF industrial facilities resulted in a continuing decline in the total number of machine tools owned by the Air Force. On June 30, 1959, this figure stood at about 88,900 with a dollar value of \$1.09 billion, as compared with 101,800 valued at \$1.16 billion 1 year earlier. The number in active use declined from 73,100 to 64,900.

Procurement Policies

USAF procurement experts helped draft Public Law 85-804, dated August 28, 1958, which reenacted on a permanent basis authority to grant relief to contractors for losses incurred in the performance of defense contracts. Four types of claims for relief may be made under this act—amendment of contracts without consideration due to essen-

*Figure 14*

tiality of the contractor to the national defense, amendment of contracts without consideration to correct inequitable Government action, amendment of contracts to correct mistakes, and formalization of informal commitments.

The Air Force adopted the two-step procedure as its standard method of procurement whenever practicable. Contractors first submit technical proposals without prices for review. Those with satisfactory proposals are given the opportunity to bid under normal advertising procedures, and the lowest bidder receives the award. By June 1959, 8 AMC procurement agencies had initiated 108 actions for

contracts, estimated at almost \$60 million, under this procedure.

Air Materiel Force, European Area, drew up a contract with NATO's Maintenance Supply Services Agency for about \$650,000 to meet MAP requirements for F-84 spare parts. This contract resulted in a U.S.-NATO agreement under which the military services will place contracts for future offshore MAP purchases through MSSA.

Large prime contractors were urged to give every opportunity to small concerns to become subcontractors or suppliers. Many prime contractors cooperated with the USAF small business program and kept a record of their actions on bids from small businessmen on each subcontract involving \$10,000 or more.

During fiscal year 1959 the Air Force placed with small business prime contracts amounting to \$919.9 million, the highest recorded for any year. This figure was an increase of 21.6 percent over the \$757 million in the previous year, and represented 63 percent of the value of all procurement on which small concerns were solicited and 69 percent on which they submitted bids.

Aircraft and Missile Production

During fiscal year 1959 the Air Force directed more than \$9.65 billion for new procurement of materiel—38 percent for new aircraft and spares, 22 percent for missiles, and 40 percent for modifications, industrial facilities, and components. As a result of program revisions, the Air Force recouped \$404.9 million during fiscal year 1959. Aircraft acceptances reached 99.7 percent of the final schedule for the period.

Although the ratio of expenditures on research and development substantially favored missiles over manned aircraft, missile production was still in its early stages. During fiscal year 1959, the Air Force was still spending four times as much for purchase of manned aircraft as missiles. The last B-52F was accepted, the first B-52G entered the inventory, and preproduction work began on the B-52H. Additional B-52's were purchased in order to maintain SAC's striking power while ICBM's were under development and testing. The Air Force bought fewer B-58 Hustlers in order to stay within budgetary limits and to permit incorporation of refinements in the airframe and in a new engine.

Developmental flight testing of the F-101B entered its final phase, and a peak production rate of 20 per month was reached. The last of the 166 RF-101's on contract was delivered in April 1959. The first F-105 came off the production line in February 1959. Production problems, which had slowed down deliveries, were largely resolved by the end of the year. The Air Force decided to limit procurement to a single-place version of the F-105.

Production of the KC-135 tanker, the C-133 heavy transport, and the C-130 medium transport proceeded on schedule. Substantial quantities of T-37 trainers were delivered, as well as several T-38 test aircraft.

ICBM production progress met expectations. The IRBM program was adjusted to reflect agreements being negotiated with other nations on sites and control of forces. The Air Force canceled production of the air-to-surface GAM-63 RASCAL and the SM-73 GOOSE decoy missile in favor of more advanced weapon systems. Production schedules were cut back on both the SM-62 SNARK air-breathing missile and on the GAM-72 QUAIL diversionary missile because of reductions in funds.

After a review of air defense requirements by the Secretary of Defense and the Congress, the Air Force cut BOMARC production goals by about 50 percent.

The GAR-1 and GAR-2 FALCON programs were reduced during the year because of changes in the deployment of fighter aircraft and the development of improved types of guided rockets, including the advanced GAR-11 FALCON. Fighters equipped with the GAR-11, still under development, will have a nuclear capability.

The TM-76 MACE program also underwent a complete review by the Secretary of Defense. Flight failures, which indicated the need for engineering changes, and significant additional expenditures dictated a reduction in the size of this program. At the close of the year, the MACE was again under thorough study.

Engine production for aircraft and air-breathing missiles during fiscal year 1959 totaled 4,546, including 4,039 jets, 351 turboprops, 155 ramjets, and 1 reciprocating engine. This total was 968 less than that of the previous year, primarily because of a reduction in the number of aircraft engine spares. No major engine production problem was encountered during the year. The value of aircraft engines in the USAF inventory totals about \$6.5 billion.

During fiscal year 1959, AMC received \$893.1 million for communication and electronic equipment. Development and production of electronic countermeasures for use in the B-52 and certain reconnaissance vehicles advanced from the stage of individual items to subsystems.

Military Assistance Program

During the past decade the USAF Military Assistance Program (MAP) has enabled many friendly countries to establish wholly new air forces and to modernize and reequip existing air units. The advent of THOR missiles and the delivery of Century fighters will further strengthen some of these air forces.

The major avenues of USAF military assistance are grant-aid and mutual security military sales. In fiscal year 1959, 36 of the 38 countries eligible for grant-aid received either equipment or training benefits. Under a provision of the Mutual Security Act of 1954, six additional countries are eligible to receive a form of grant-aid by which contingency funds may be used at the discretion of the President. Of the 66 nations eligible to purchase materiel or training spaces for their respective air forces, 50 took advantage of this opportunity.

Of the \$7.9 billion in the USAF program during the past 10 years, \$7.05 billion, or 89 percent, has been expended. About \$4.34 billion, or 61 percent of all grant-aid deliveries, went to NATO countries. Of the remainder, \$1.3 billion was furnished to the Far East, \$279 million to Spain and Yugoslavia, \$123 million to countries in the Middle East not belonging to NATO, and \$128 million to Latin America. The remaining funds went for programs which did not apply specifically to a particular country.

Of the \$7.05 billion expended, aircraft and missile deliveries accounted for nearly \$4.4 billion, or more than 64 percent. An additional \$1.4 billion went for supporting equipment, while services, including training assistance, exceeded \$978 million. Nearly 13,000 aircraft have been supplied to the recipient nations.

Of the 236 squadrons equipped under military assistance programs, 178 had combat jets and 58 supporting aircraft. More than 120 jet units, or 68 percent, were located in the NATO countries. During fiscal year 1959, MAP-supported aircraft flew about 1,055,000 hours, 71 percent in jet aircraft. F-84's, including RF-84F's, accounted for 42 percent of all jet flying hours.

USAF Military Assistance Program as of June 30 Each Year

Fiscal year	Program	Cumulative program	Deliveries	Cumulative deliveries
1950	\$204.2	\$204.2	\$17.4	\$17.4
1951	1,851.8	2,056.0	171.8	189.2
1952	1,350.0	3,406.0	372.4	561.6
1953	1,340.8	4,746.8	912.2	1,473.8
1954	789.4	5,536.1	694.7	2,168.6
1955	938.9	6,475.0	737.2	2,905.7
1956	5.6	6,480.6	1,331.5	4,237.2
1957	370.1	6,850.7	958.1	5,195.3
1958	388.6	7,239.3	1,060.5	6,255.8
1959	663.8	7,903.2	797.6	7,053.4

Figure 15

MAP training in the proper use and maintenance of equipment was primarily conducted under Air Force auspices, although some nations were assisted in setting up their own programs. MAP countries have used almost 67,000 training spaces since the program began. More than 3,000 pilots and thousands of specialists and technicians have graduated from MAP training courses. The knowledge and skills they acquired contributed substantially to the military and economic well-being of their countries.

IX. Logistical Services

The USAF logistical system met the tests of the Lebanon and Taiwan crises of 1958, on both occasions supporting combat squadrons halfway around the world with great speed and flexibility. Installations of the Air Materiel Command (AMC) serviced the combat aircraft on a round-the-clock alert.

These experiences emphasized the importance of logistics in successful operations. As weapons systems tended toward the complex, the Air Force stressed simplicity of the supply system. To this end, operational commands were resupplied directly, thereby eliminating the need for oversea depots. By using data-processing techniques and automation to an increasing extent, the Air Force sought to effect a closer gearing of spare parts replenishment to the need in an era of rapidly changing weapons systems. Advanced methods of logistic supply at the San Bernardino Air Materiel Area to support the ballistic missile program will be reflected in an improved system.

The Air Force worked to eliminate duplication of effort that occurs when each service attempts to provide for all its own logistical needs. Cross-servicing is difficult because each service has its own D-day mission, and therefore its own method for supporting combat forces. USAF planners participated in several joint appraisals to coordinate logistical systems such as motor vehicle management, aeronautical depot maintenance, and surplus property disposition.

Supply and Services

The tense international situation dictated greater emphasis on support for tactical units. Air Materiel Command realigned repair schedules, authorized overtime, purchased more equipment having a short leadtime, and took immediate action to insure that flyaway kits for selected units were fully supplied. The improved support for F-101's, KB-50's, and C-130's was particularly noteworthy.

The Air Force reduced expenditures for spare parts. The Air Force achieved this reduction by buying fewer initial spares, deferring the purchase of a significant portion until a later date, thus gaining more experience on which to base requirements. During the year, 20 percent of the flyaway cost of aircraft went for initial spares as compared with 23.5 for the previous year.

Secondly, the cost of spares was cut beginning in August 1958 by taking into consideration the age of individual components in computing requirements for high-value spares having a long service life. A distinction was made between a 6-month-old aircraft and a 3-year-old one in computing the number of equipment failures per 1,000 flying-hours.

Medium-scale electronic data-processing equipment was installed at four SAC and two ADC bases. The electronic inventory control system permitted transactions to be processed as they occurred and records kept up to date. This system also enabled logistics commanders to locate interchangeable assets immediately and to set in motion automatic replenishment. By continuous adjustment of stock levels, automatic notification of excesses, and weapon system accounting, the Air Force supply system is being brought up to date to meet the demands of the combat forces while at the same time permitting the dollar value of the base inventory to be reduced.

During fiscal year 1959 the Air Force declared property, which originally cost \$2.9 billion, as excess or surplus to its needs and succeeded in disposing of 92 percent of this property. The value of disposals was far greater than for the previous year (\$1.89 billion) because a large number of propeller-driven aircraft became excess and because the surplus property disposal program increased in effectiveness.

The screening, sale, and disposal of surplus USAF aircraft within the United States was centralized at Davis-Monthan AFB, Ariz. All B-36's were flown to this base where items were reclaimed if they could be used in operational aircraft. The last B-36 was retired from SAC in February 1959.

The Air Force realizes substantial economies by permitting USAF bases to purchase directly from nearby business enterprises. The General Services Administration supplied 10 percent of the 164,000 items authorized for base procurement (formerly known as local purchase), at a cost to the Air Force of \$291.4 million.

The USAF supply system significantly reduced the rate of aircraft out of commission for parts (AOCP) to 3.3 percent in June 1959 as compared with 5.6 a year earlier.

The Air Force succeeded in meeting the objectives and schedules of the Federal Cataloging Program. All USAF logistical records, reports, and transactions now identify materiel in terms of Federal stock numbers. By June 30, 1959, the Air Force had 1,719,725 line items of supply identified by these numbers.

Maintenance

The rising cost of maintaining new and complex weapons systems was affected by a sandwich type of metal construction for aircraft

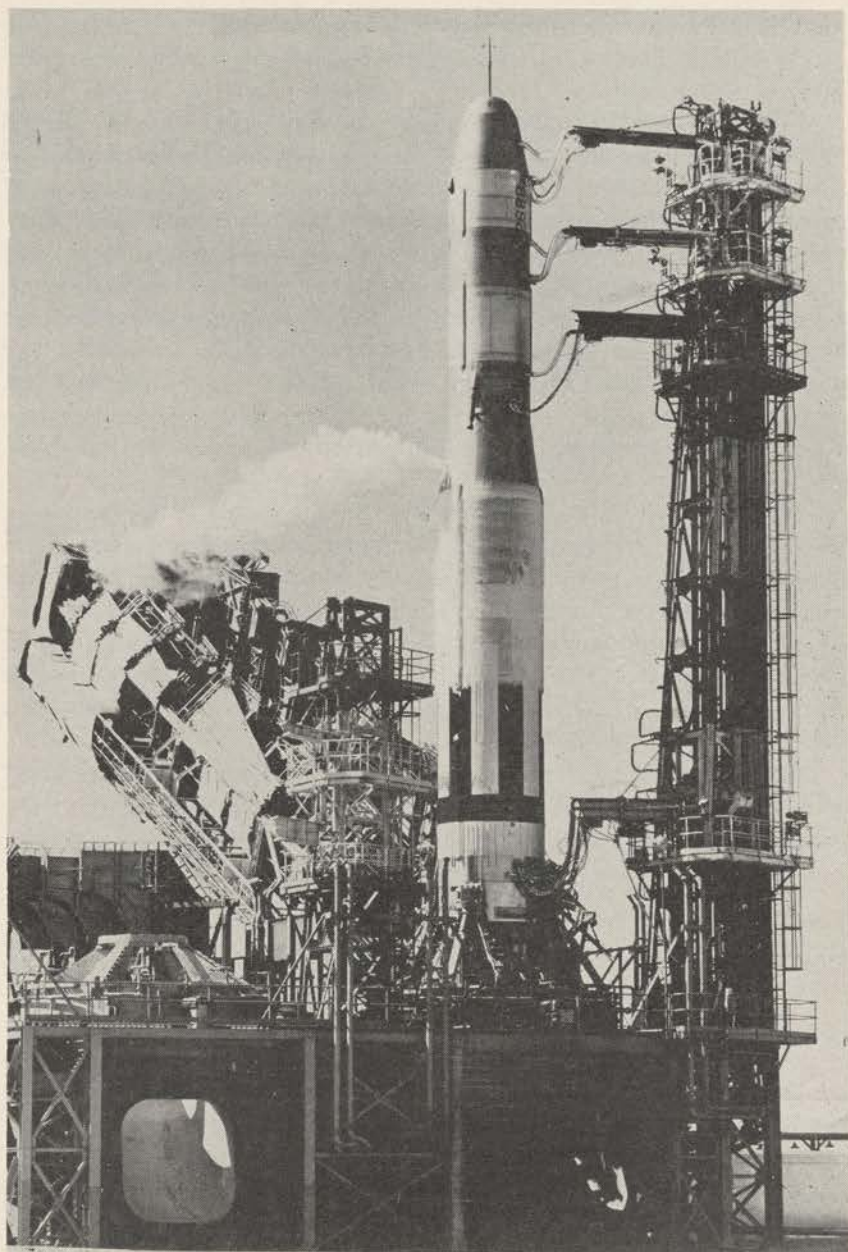


Figure 16. TITAN being readied for test.

skin used by the Air Force to combat the sonic fatigue of metal caused by the blast and sound from the jet exhaust. Specifically, the increased weight and wind pressures have been found to create metal fatigue in B-47's, causing accidents and groundings for repair. It

has been found necessary to make more frequent and closer inspections of the critical parts of aircraft structures to locate weaknesses that could cause accidents.

Maintenance and modification cost the Air Force more than \$1.3 billion, about 9 percent more than the previous year. Nearly half of this cost, \$627 million, was expended on aircraft modernization, most of it to purchase kits from manufacturers. Depot maintenance policy followed certain basic guidelines. USAF facilities handled work most vital to emergency war plans. About \$60 million was authorized during this period to hire civilian contract technicians to assist at air bases. Maintenance work totaling \$325 million that the Air Force could not handle itself was turned over to contractors. Other maintenance was done by the Army or the Navy through cross-service agreements. AMC, however, directed, approved, and controlled all depot maintenance.

The rising cost of maintenance led the Air Force to focus greater effort in design improvements in new weapons systems that would reduce requirements for tools and test equipment. The Air Force package contracted for 114 aircraft maintenance docks, increased the use of basic maintenance building plans, and required prefabricated steel construction. The possibility of prefabricating structures for the maintenance of missiles and ground support equipment also was studied.

The operational readiness rate of USAF fighters rose significantly between January and May 1959 although TAC and ADC were converting to new aircraft during this period and were faced with problems typical of initial operations.

Transportation

In estimating the airlift that would be needed in the event of war, USAF transportation experts first computed requirements for inter-theater airlift and sealift. These requirements, plus several comprehensive studies of the size and composition of the MATS fleet, became the basis for many decisions pertaining to the procurement of transport aircraft.

During the year, two additional USAF bases began using commercial pipelines to obtain aviation fuel, bringing to 18 the total number receiving this service. The pipeline companies proposed this service for five additional USAF bases and considered its financial feasibility for eight others. These facilities, provided at no cost to the Government, saved about \$3.3 million in transportation costs and eliminated the need for storing 1,100,000 barrels of fuel.

The Air Force planned to make maximum use of a direct reservation system for the air movement of military and civilian personnel and their dependents to oversea areas. In August 1958 the system

was extended to include dependents unaccompanied by their sponsors who were en route to Alaska, Hawaii, the Caribbean, the Azores, and eastern Canada and Greenland. The direct reservation system, plus maximum movement by air, saved the Air Force an estimated 1,100,000 man-days and \$3.5 million in transportation costs during fiscal year 1959.

The United States and Canada agreed in the spring of 1959 that Canadian commercial carriers would transport civilians and supplies supporting U.S. military projects within Canada whenever it is practicable and economical to do so. Previously, agreements on this subject between the two countries had applied only to support of DEW line operations.

X. Management

Comptroller Service to Management

The Air Force sought to maintain the combat integrity of its manned aircraft forces while simultaneously expanding budgetary commitments to missile weapons systems just emerging from the research and development stages. The resultant strain upon the fiscal structure of the Department placed the greatest stress upon the USAF Comptroller organization to achieve the utmost economy in routine operations. To assure the availability of funds for the most critical needs, the Air Force expanded the use of electronic reporting and accounting procedures.

Finance Controls

The establishment of a uniform system of general ledger accounts permitted standardization of the accounts structure for all USAF appropriated and revolving funds. A financial reporting system was developed to improve the quality of financial data and provide a means of identifying, controlling, and reconciling differences between fund and cash reports. Financial procedures applicable to reports of survey, working capital funds, the Military Assistance Program, and air attaché offices were also refined.

To correct a lack of adequate evaluation of contractors' cost proposals, the Air Force called for increased audit assistance to procurement officials reviewing and analyzing these proposals. Because of savings and other gains that could be derived from increased audit coverage of procurement, the Comptroller recommended an increase in the number of contract auditors.

The Air Force reached agreement with the Army and Navy on increased coordination in several types of auditing. Agencies outside of the Defense Department, including the newly formed Federal Aviation Agency and the National Aeronautics and Space Administration, made an increasing number of requests for contract audit assistance from the military departments.

Reporting

The Comptroller continued to push actively the establishment of integrated reporting systems to provide the commander and his staff with accurate and timely planning data. A great need existed for augmenting the conventional punchcard accounting machine equip-

ment with electronic data-processing equipment and reliable high-speed data transmission systems. Medium- or large-scale electronic data-processing systems had been installed at 101 USAF installations by the end of June 1959.

Full-scale electronic data-processing systems are in operation at selected Air Force bases on an experimental basis. Vandenberg AFB, Calif., was chosen as a model for missile operations, and Bolling AFB, D.C., for command-base operations.

Electronic Analysis Procedures

The Chief of Staff established a Data Development Advisory Group in November 1958 to devise an electronic data-processing system for providing management with timely and related data and for performing administrative procedures.

Work continued on the improvement and further development of techniques for applying electronic computer procedures to problems in planning, programing, and costing. Portions of the USAF war planning documents were prepared by mechanical procedures. Application of such procedures to aspects of the Military Assistance Program is saving time and permitting greater concentration on program analysis.

Although the Air Force must continue to budget and account for its fiscal resources by appropriation, project, and object class, more and more planning and operating decisions are being made on a weapon system basis. During the past year it developed improved techniques for estimating weapon and support system costs. These estimates presented decision makers with information on financial implications of long-range plans, alternate force and equipping schedules, and major changes in existing programs. Frequently the cost of a number of force structures must be computed before the optimum force becomes apparent. For this reason the Air Force developed a procedure employing a high-speed electronic computer to estimate the cost of force structures by weapon system.

Inspector General Activities

The Inspector General maintained a continuous surveillance of all major USAF activities, with special emphasis in the fields of flight safety, security, and military law enforcement. At the end of the year, the Inspector General became responsible for all USAF safety activities, on the ground as well as in the air.

Inspection

Inspections and surveys throughout the year stressed the adequacy of weapons in the field, the utilization of equipment, materiel, and manpower, and the timeliness of actions needed to keep the Air Force

in proper readiness. For example, careful scrutiny of the B-47 as a weapon carrier revealed a structural weakness that required modification of the entire B-47 fleet.

Inspections of the military personnel program covered airman on-the-job training, individual training in ballistic missiles, training in military fundamentals, officer flying training, and various other officer training programs. Inspectors followed up previous survey efforts to assure correction of deficiencies and reviewed the entire personnel field, seeking ways of improving quality of officers and airmen.

Special inspections were conducted in the following areas: Airborne early warning and control, airlift, oversea air defenses, weapon delivery by combat aircraft, segments of SAGE, the proposed use of USAFR troop carrier wings, the role of the Civil Air Patrol, procedures for the assignment of personnel to ballistic missile activities, tactical fighter, aircrew training, medical care, and the influence of the chaplaincy, the maintenance of aircraft and ground support equipment, the management of motor vehicles, packing and crating, supply procedures, oversea funding, and product improvement.

Procurement inspection continued to be a major field of activity. There was scrutiny of such matters as production and introduction of specific new weapons systems, MATS airlift contracts, functions of the administrative contracting officer, financial assistance to contractors, ARDC procurement, and contractor and subcontractor purchasing.

Security

The Air Force sought to simplify and improve its security processes during the year by consolidating basic directives and preparing a manual to guide persons having varied security duties and responsibilities. The Air Force participated in a joint service undertaking that resulted in better industrial security policies.

The Air Force processed 338,000 personnel clearances under improved procedures and investigated cases of alleged sabotage, espionage, and subversion, as well as suspected bribery and fraud. Pay and allowance investigations resulted in significant savings.

Flight Safety

The USAF flight safety effort deserves substantial credit for the record low major accident rate of 9.7 per 100,000 hours for fiscal year 1959. A new low of 9.4 was attained during the second half of the fiscal year, a decline from 11 for the comparable period the preceding year. Midair collisions dropped 34 percent from the previous year, and none involved civilian aircraft. The reduction in the accident rate for jet fighters and trainers was particularly noteworthy. The cost of destroyed and damaged aircraft was less than

prevention, was presented to the U.S. Air Force on April 15, 1959. This was the ninth consecutive year the Air Force had received the award, a record not approached by any other Federal agency. The award was made in recognition of the reduction of ground accident rates in the Air Force during 1958 as compared to 1956 and 1957. The categories covered included on-duty and off-duty fatalities and injuries to military personnel, on-duty fatalities and injuries to civilian employees, accidents involving Government-owned vehicles, and accident costs per capita. During this period annual reductions as high as 25 percent were made.

The Air Force continued to emphasize traffic safety, particularly through driver education. The Air Photographic and Charting Service prepared a motion picture, "A Nightmare for the Bold," which was specifically designed to bring about maximum identification of USAF drivers with the characters and scenes depicted. The film is expected to create a psychological reaction of lasting effect. By the end of 1959 practically all airmen under 25 years of age will have received the 10-hour driver improvement course required for this group by USAF regulation. For this reason, the Air Force is considering incorporation of the course in the basic military training program at Lackland AFB rather than offering it at individual bases.

Two IRBM weapon system conferences were conducted to review safety problems of the THOR and JUPITER from manufacture through operational launching. Presentations covered such matters as missile ground support equipment, reentry vehicle, missile movement, personnel selection, and training. It is planned to conduct such safety reviews for each SAC missile system less than 6 months before its operational date.

Military Law Enforcement

Provost marshals paid particular attention to off-duty driving safety. In preparation for commanders was a guide aimed at reducing accidents. A point assessment system was established to discourage moving-traffic violations, and closer coordination was achieved with civilian law enforcement agencies.

Administrative Services

The Air Force has made major improvements in paperwork management during the year. A new simplified standard format for written communication, initiated in April 1959, is expected to reduce correspondence costs. Since the Air Force writes an estimated 55 million letters annually, the savings will be significant. In authorizing and encouraging the use of office symbols and other abbreviations for addresses, the Air Force expected to save a great deal of

time and take a long stride toward the goal of simple, standardized written communications.

Improvement continued also in the delivery of small high-priority supply items. Deliveries direct to addressees instead of through normal depot channels reduced transit time significantly. The Air Force moved 14,500 tons of AMC supply parcels in this fashion—a 20-percent increase over the previous year. The resulting faster delivery saves money because reduced pipeline time makes possible reduction in certain supply inventories. The setting up of special postal systems to support specific USAF operations and missions continued. For example, direct, expedited pouch service was instituted between missile installations in Florida and California, and between California and England. The timeworn "mail call" system of handling personal mail has been replaced by consolidated mailrooms at 115 USAF installations, with more scheduled. Each mailroom consolidates several unit mailrooms, with attendant savings in men, money, and material.

The time required to distribute Air Force publications and forms was reduced by the opening in February 1959 of the contractor-operated Air Force Publications Distribution Center in Washington, D.C. The establishment of this new facility was a major operation, for it involved the phaseout of Wilkins Air Force Station, Ohio, which had handled the work, the training of center employees, and the integration of large quantities of work data into a modern electronic data-processing system. Publications can now be distributed more quickly because of the nearness of the center to the departmental procurement and printing sources and because distribution can be made directly to oversea bases rather than to oversea supply centers.

The Air Force standardized procedures for the control of classified documents and other important records. This program improved the control of important documents and reduced the number of forms used in their handling.

XI. Budget

The Air Force budget for fiscal year 1959, as approved by the President and presented to the Congress, totaled \$18.044 billion in new obligational authority, including \$1.15 billion for military construction. Amendments totaling \$622 million raised the Air Force request to \$18.666 billion. Congress appropriated funds in excess of the request for certain items, adding \$90 million for MINUTEMAN, \$48 million for HOUND DOG, \$55.6 million for KC-135 tankers, and \$140 million for strategic airlift aircraft. The amount initially appropriated for fiscal year 1959 was \$18.672 billion, or \$6 million above the amended Presidential budget.

Additional funds for the Air Force were made available in a supplemental appropriation act approved in May 1959. In February the President had approved a supplemental request of almost \$28 million to the "Military Personnel" account to cover items that had not been budgeted for, including the cost of maintaining a higher level of active-duty strength during the Lebanon and Taiwan crises of the previous summer; increased payments for commuted rations, subsistence, dependency allowances, and service by grade; and additional costs resulting from the Social Security Amendments of 1958. In March the President approved another supplemental appropriation request of almost \$81 million to cover salary increases for classified civilian employees. Congress actually appropriated a total of only \$95 million in response to the two requests—almost \$14 million less than asked for. This brought the total appropriation for fiscal year 1959 to \$18.767 billion, almost \$1,000 million more than the amount provided by Congress for fiscal year 1958.

With \$18.767 billion in new obligational authority, approximately \$4.180 billion in unobligated funds from previous years, anticipated reimbursements of \$946.1 million, and fund transfers, the Air Force had nearly \$23.858 billion available for obligation in fiscal year 1959, as compared with \$23.886 billion available for obligation in fiscal year 1958. The following table summarizes the amounts made available by direct appropriations and by fund transfers:

*Amount Available for Obligation by the Air Force During Fiscal Year 1959—
as of June 30, 1959*

	<i>In millions</i>
Department of Defense Appropriation Act, 1959, Public Law 85-724	\$17,877.6
Supplemental Appropriation Act, 1959, Public Law 85-852	^a 794.6
Second Supplemental Appropriation Act, 1959, Public Law 86-30	95.1
Total new obligational authority enacted	^b 18,767.3
Unobligated balance of prior-year programs	4,179.5
Recoveries of prior obligations	20.3
Transfer from "Aircraft, Missiles, and Related Procurement" to NASA, ARPA, and DOD	-64.0
Transfer from "Procurement Other Than Aircraft and Missiles" to "DOD Emergency Fund"	-18.5
Transfer from "Operation and Maintenance" to DOD and OSD	-0.5
Transfer from "DOD Emergency Fund" to AF Research and Development	28.3
Anticipated reimbursements	946.1

Total available for obligation during fiscal year 1959 23,858.4

^a Represents total military construction including \$9.6 million for the Air National Guard.

^b Represents nearest rounded figure.

Actual obligations for fiscal year 1959 amounted to \$20.278 billion. Net expenditures came to \$19.084 billion, an increase from \$18.435 billion in fiscal year 1958. The following table summarizes both accounts under principal fund categories:

USAF Actual Obligations and Net Expenditures for Fiscal Year 1959

	<i>(In millions)</i>	
	<i>Actual obligations</i>	<i>Net expenditures</i>
Aircraft, Missiles, and Related Procurement	\$7,446.6	\$7,102.0
Procurement Other Than Aircraft and Missiles	2,150.1	1,532.5
Military Construction	1,079.5	1,127.6
Operation and Maintenance	4,474.7	4,194.5
Military Personnel	4,013.7	3,975.6
Research and Development	816.6	813.3
Reserve Personnel	48.2	47.4
Air National Guard	249.0	278.9
Preparation for Sale or Salvage of Military Property		1.4
Miscellaneous		18.8
TOTAL	^a 20,278.3	^a 19,084.2

^a Represents nearest rounded figure.

The Air Force underestimated the cost of increased basic military pay and quarters allowances, thus incurring deficiencies of \$17 million and \$45 million for fiscal years 1958 and 1959, respectively. An anticipated deficiency of \$55 million for fiscal year 1960 was covered

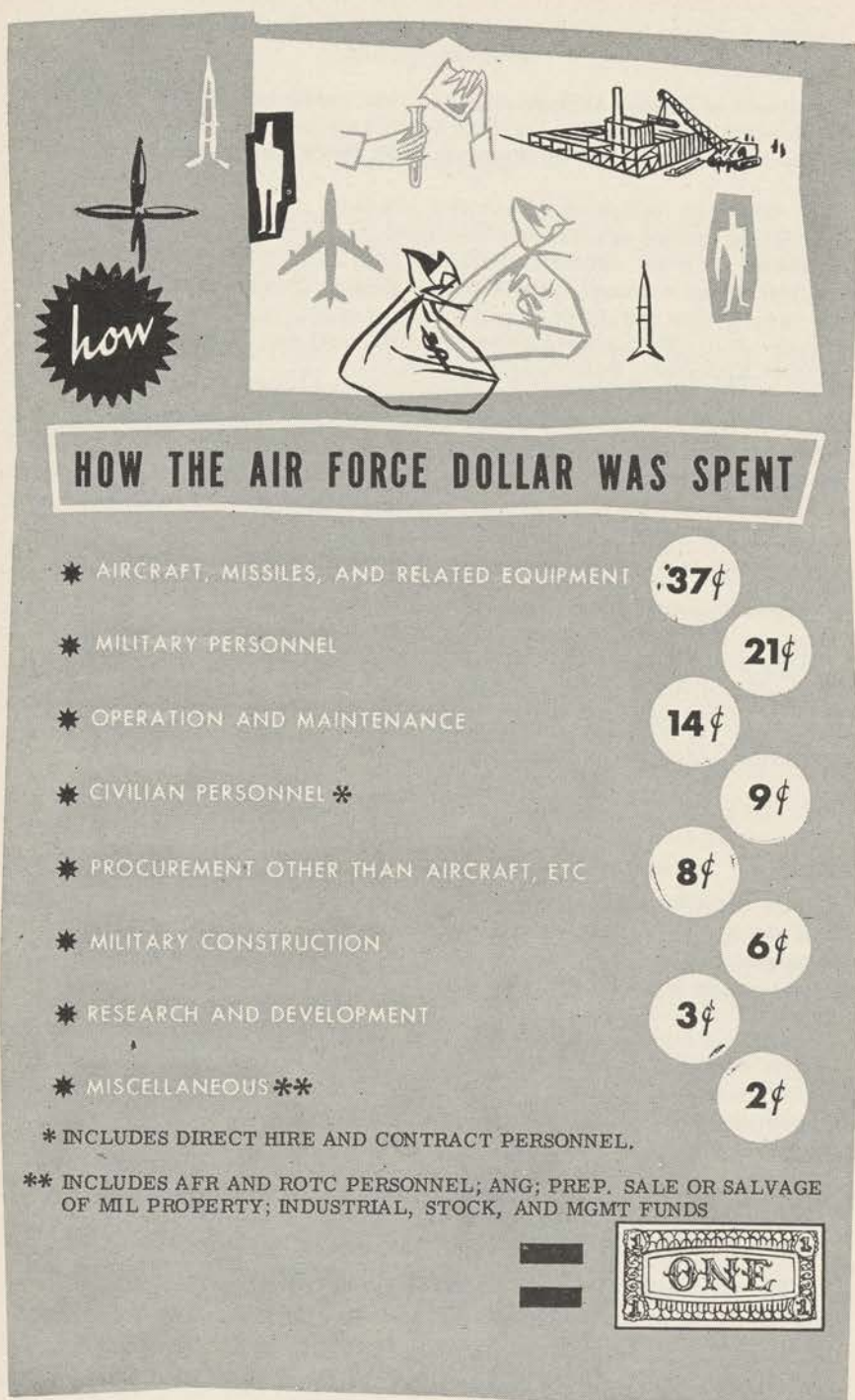
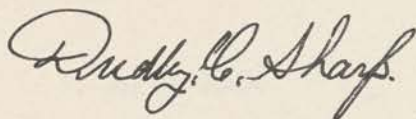


Figure 18

by a proposed amendment to the USAF budget granting the Secretary of Defense authority to transfer not more than \$55 million to the Military Personnel account from other Air Force accounts. No action was taken on the deficiencies for the two previous fiscal years, pending completion of a study on improved methods of estimating the requirements.

The President's proposed Air Force budget for fiscal year 1960 totaled \$18.682 billion, including \$915 million for military construction. Expenditures were estimated at \$18.675 billion. In accordance with a new Department of Defense policy, the proposed budget reflected a change in format and appropriation structure. Appropriations were grouped under five main functional headings: Military Personnel; Operation and Maintenance; Procurement; Research, Development, Test, and Evaluation; and Military Construction. This new arrangement, also adopted by the Army, Navy, and Department of Defense, was expected to facilitate the presentation of the annual military budgets to the Congress.

A handwritten signature in dark ink, reading "Dudley C. Sharp". The signature is written in a cursive style with a large, stylized initial "D".

DUDLEY C. SHARP,
Secretary of the Air Force.

APPENDIX

TABLE 1. OBLIGATIONS AND OBLIGATIONAL AVAILABILITY OF CURRENT GENERAL AND SPECIAL FUND APPROPRIATIONS, BY APPROPRIATION TITLE

(Excluding working, revolving, and expired general and special fund appropriations)

FISCAL YEAR 1959

[Thousands of dollars]

Department and appropriation	Amounts available for obligation fiscal year 1959							Unobligated balances as of 30 June 1959						
	Unobligated balance brought forward July 1, 1958	New obligational availability			Other transfers	Reimbursements	Recoveries of prior year obligations	Total fiscal year 1959	Total obligation for fiscal year 1959	Balance of apportionment and funds otherwise available	Reserves	Other unobligated balance	Total preclosing balance	Unobligated balance available fiscal year 1960
		Congressional appropriations	Transfers	Total										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
DEPARTMENT OF DEFENSE:														
General Fund Accounts:														
All Appropriations Other Than Military Construction	6,689,999,393,888,207		385,414,402,273,621		-25,579,264,586,860		157,933,497,741,834	42,969,520,490,085	1,933,893					
Special Fund Accounts	605		-605											
Subtotal	6,689,999,393,888,812		384,809,402,273,621		-25,579,264,586,860		157,933,497,741,834	42,969,520,490,085	1,933,893					
Military Construction—Active Forces	1,156,581	1,330,000	28,065	1,358,065		12,791	39,261	2,566,699	1,702,088	825,470	38,903	239	864,611	864,611
Military Construction—Reserve Forces	56,982	14,250		14,250			1	71,233	49,522	15,527	6,183	1	21,711	21,711
TOTAL—DEPARTMENT OF DEFENSE	7,903,562,412,233,062		412,874,416,459,936		-25,579,268,653		197,195,523,779,766	44,721,139,574,082	1,978,979			-64,434,765,827	7,469,346	

[illegible]

MILITARY FUNCTIONS

OBLIGATIONS

TABLE 1. OBLIGATIONS AND OBLIGATIONAL AVAILABILITY OF CURRENT GENERAL AND SPECIAL FUND APPROPRIATIONS, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1959—Continued

[Thousands of dollars]

Department and appropriation	Amounts available for obligation fiscal year 1959							Unobligated balances as of 30 June 1959						
	Unobligated balance brought forward July 1, 1958	New obligation availability			Other transfers	Reimbursements	Recoveries of prior year obligations	Total obligation for fiscal year 1959	Balance of apportionment and funds otherwise available	Reserves	Other unobligated balance	Total preclosing balance	Unobligated balance available fiscal year 1960	
		Congressional appropriations	Transfers	Total										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
DEPARTMENT OF THE ARMY—Continued														
Military Construction.....	114,878	230,000		230,000		4,794		349,673	244,609	108,270		-3,206	105,064	105,064
Military Construction, Army Reserve Forces.....	44,517	6,250		6,250		1		50,768	38,702	6,384	5,681	1	12,066	12,066
TOTAL—DEPARTMENT OF THE ARMY	700,023	9,288,556	467,616	9,756,173		1,255,068	19,335	11,730,622	10,860,505	353,452	393,121	123,543	870,117	798,559
DEPARTMENT OF THE NAVY:														
Military Personnel.....		2,420,618	135,000	2,555,618		26,788		2,582,406	2,581,796	7,204		-6,594	610	
Reserve Personnel.....		90,098	-2,000	88,098		120		88,218	85,424	2,674	132	-12	2,794	
Navy Personnel, General Expenses.....	4,217	87,941		87,941		4,624		96,782	93,179	2,364		1,239	3,603	3,175
Military Personnel, Marine Corps.....		635,692	25,000	660,692		7,156		667,848	634,742	5,258	28,396	-548	33,106	51
Reserve Personnel, Marine Corps.....		23,760		23,760		466		24,226	23,599	802		-175	628	
Marine Corps Procurement.....	258,016	25,000		25,000		5,582	39,596	38,194	170,974	86,026	52,445	18,749	157,220	157,220
Marine Corps Troops and Facilities.....	3,733	173,117	-158	172,959		13,207		189,899	179,170	3,190	943	6,596	10,730	7,517
Aircraft and Related Procurement.....	1,464,697	2,033,795		2,033,795	-38	54,494	73,458	3,626,406	2,182,147	1,291,353	154,992	-2,086	1,444,259	1,444,259
Aircraft and Facilities.....	10,000	856,181		856,181		30,423		896,604	887,229	13,376		-4,001	9,375	1,467

Shipbuilding and Conversion.....	994,258	2,069,400				118,977	3,182,635	2,082,001	481,810	609,241	9,583,110,634
Ships and Facilities.....	7,313	799,408				25,705	832,426	822,201	9,076		1,144 10,220 8,098
Procurement of Ordnance and Ammunition.....	44,341	602,535				59,795	706,671	625,159	83,331		-1,818 81,512 81,512
Ordnance and Facilities.....	314	153,949				12,662	166,925	165,710	2,158		-943 1,215
Medical Care.....		97,698				23,400	121,098	118,305	3,070		-277 2,703
Civil Engineering.....	1,758	129,118				27,830	158,706	155,255	7,802		-4,351 3,451 3,374
Research and Development.....	10,229	830,779				19,091	899,508	854,532	48,811		-3,836 44,975 44,975
Service-Wide Supply and Finance.....	390	325,135				16,561	333,829	333,323	460		46 506 299
Service-Wide Operations.....		124,404				5,656	137,264	135,165	2,147		-47 2,009
Naval Petroleum Reserves.....		1,683				28	1,711	1,696	15		
Ships' Stores Profit.....											
Subtotal.....	2,790,267	11,480,310				452,598	113,053	15,041,358	12,131,613	2,050,927	12,670 2,409,745 2,852,581
Military Construction.....	139,102	295,000				2,495	18,977	455,574	345,889	110,190	-505 109,685 109,685
Military Construction, Naval Reserve Forces.....	12,464	8,000				1		20,465	10,820	9,142	503 9,045 9,045
TOTAL-DEPARTMENT OF THE NAVY	2,550,833	11,783,310				455,053	132,031	15,517,397	12,488,322	2,170,25	12,165 3,029,075 2,971,911
DEPARTMENT OF THE AIR FORCE:											
Aircraft, Missiles and Related Procurement.....	2,757,870	6,643,475				291,507		9,028,912	7,446,589	1,869,011	510,975 -197,653 2,182,323 2,182,323
and Missiles.....	438,344	2,220,020				217,807	2,857,731	2,150,056	584,661	145,119	-22,105 707,675 707,675
Operation and Maintenance.....	8,025	4,119,525				332,219	4,479,285	4,474,082	12,816		-8,214 4,603 4,603
Military Personnel.....	3,941,801	3,941,801				28,595	3,970,396	4,013,631	-42,485		-781 -43,265 -43,265
Research and Development.....	72,672	751,829				49,511	902,171	816,639	48,181	15,000	22,351 85,532 85,532
Reserve Personnel.....		53,746				359	54,105	48,157	3,214	2,400	334 5,948
Air National Guard.....		251,881				496	252,376	248,998	3,332		46 3,378
Subtotal.....	3,276,911	17,982,277				940,612	22,144,977	19,198,782	2,478,731	673,494	-206,031 2,946,194 2,936,808
Military Construction.....	902,001	785,000				5,502	20,284	1,713,387	595,400	38,903	-498 633,895 633,895
TOTAL-DEPARTMENT OF THE AIR FORCE	4,179,512	18,767,277				946,114	20,284	23,853,364	20,278,275	3,074,222	-206,529 3,580,089 3,570,763

SOURCE: DD Form 1176.

Note. Amounts will not necessarily add to totals due to rounding.

EXPENDITURES

DEPARTMENT OF DEFENSE

MILITARY FUNCTIONS

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE
FISCAL YEAR 1959
[Thousands of dollars]

Department and appropriation	Amounts available for expenditure fiscal year 1959							Total expenditures for fiscal year 1959	Unobligated balance withdrawn (-) or reserved (+) per Public Law 708	Total unexpended balance carried into fiscal year 1960	Gross unpaid obligations carried into fiscal year 1960 ^a
	New obligational availability			Other transfers	Total fiscal year 1959						
	Unexpended balance carried into fiscal year 1959	Congressional appropriations	Transfers			Total					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DEPARTMENT OF DEFENSE:											
General Fund Accounts.....	26,657,349	39,891,272	385,413	40,276,686	-82,541	66,851,493	39,979,340	26,872,154	-291,993	26,580,161	22,732,844
Special Fund Accounts.....	5,875	320	-605	-285		5,590	4,653	936		936	936
Management Funds.....	537,148					537,148	-429,433	966,581	-2,164	964,417	795,807
Stock Funds.....	1,292,561				-520,000	772,561	-308,190	1,080,751		1,080,751	N A
Industrial Funds.....	434,959				-23,000	411,959	49,111	362,849		362,849	N A
Other Revolving Funds.....	106,675		57,000	57,000	-1,200	162,475	17,560	144,915		144,915	37,173
Consolidated Working Funds.....	6,026				2	6,027	-1	6,029	-11	6,018	3,416
Subtotal.....	29,040,594	39,891,592	441,809	40,333,400	-626,740	68,747,255	39,313,039	29,434,215	-294,168	29,140,048	23,570,176
Military Construction—Active Forces.....	2,935,488	1,330,000	28,065	1,358,065		4,293,553	1,891,780	2,431,773	-163	2,431,610	1,567,549
Military Construction—Reserve Forces.....	106,803	14,250		14,250		121,053	57,889	63,164	(*)	63,164	41,454
Total—Distributed on DD Form 1176.....	32,082,885	41,235,842	469,874	41,705,715	-626,740	73,161,860	41,232,708	31,929,153	-294,331	31,634,822	25,179,178
Undistributed.....											N A
Nonclassified Items.....	3,106	-2,780	-535,000	-537,780	601,198	66,525		66,525	-66,525		N A
TOTAL—DEPARTMENT OF DEFENSE.....	32,085,991	41,233,062	-65,126	41,167,936	-25,541	73,228,385	41,232,708	31,995,677	-360,856	31,634,822	N A

MILITARY FUNCTIONS

EXPENDITURES

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued
FISCAL YEAR 1959—Continued

[Thousands of dollars]

Department and appropriation	Amounts available for expenditure fiscal year 1959						Total expenditures for fiscal year 1959	Preclosing unexpended balance June 30, 1959	Unobligated balance withdrawn (-) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1960	Gross unpaid obligations carried into fiscal year 1960 ^a
	Unexpended balance carried into fiscal year 1959	New obligational availability			Other transfers	Total fiscal year 1959					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DEPARTMENT OF THE ARMY:											
General Fund Accounts:											
Military Personnel.....	125,049	3,175,961	375,000	3,550,961		3,676,010	3,394,384	281,626	-54,747	226,878	262,824
Operation and Maintenance.....	860,977	3,117,238	-4,019	3,113,219	-9,000	3,965,196	3,187,325	777,870	-50,706	727,165	824,377
Procurement of Equipment and Missiles.....	2,090,953	1,699,338	42,210	1,741,548		3,802,501	1,626,740	2,175,761		2,175,761	2,741,016
Reserve Personnel.....	25,609	222,759		222,759		248,368	203,313	45,055	-9,553	35,502	35,502
Army National Guard.....	57,901	356,158		356,158		414,059	351,775	62,284	-5,298	56,986	56,986
Research and Development.....	337,735	507,345	54,426	561,771		899,506	539,117	360,389	(*)	360,389	363,681
Promotion of Rifle Practice.....	100	300		300		400	262	138	-27	111	111
Operation and Maintenance—Alaska Communication System.....	1,123	5,067	605	6,272		7,395	5,931	1,464	-208	1,256	636
Construction—Alaska Communication System.....	896					896	251	615		615	
Miscellaneous "M" Accounts for Discontinued Appropriation Titles ^b	1,582					1,582	2,049	-468	+1,457	989	989
Special Fund Accounts:											
Preparation for Sale or Salvage of Military Property.....	2,478	-45		-45		2,432	2,188	244		244	244

Appropriated Receipts, Alaska Com- munication System		-605		-404	2,730	-3,134	7,025
Management Fund	-404	605					
Business Enterprise Accounts:							
Stock Fund	685,540		-375,000	260,540	-266,280	526,820	N A
Industrial Fund	186,047			186,047	-573	186,020	N A
Other Revolving Funds: Defense Housing	883		\$ -750	133	-296	430	105
Consolidated Working Funds	5,895		a 2	5,897	-8	5,905 (*)	3,303
Subtotal	4,332,334	9,055,326	9,522,942	13,470,528	9,048,910	4,421,619	4,207,399
Military Construction	468,311	230,000	230,000	698,311	374,149	324,162	219,134
Military Construction, Army Reserve Forces	84,147	6,250	6,250	90,397	44,512	45,885 (*)	33,820
Total—Distributed on DDForm 1176	4,884,792	9,291,576	9,759,192	14,259,236	9,467,571	4,791,665	4,550,352
Undistributed							N A
Nonreclassified Items	3,065	-3,020	-378,020	384,748	9,794	9,794	-9,794
TOTAL—DEPARTMENT OF THE ARMY	4,887,857	9,288,556	9,381,173	14,263,030	9,467,571	4,801,459	N A
DEPARTMENT OF THE NAVY: General Fund Accounts:							
Military Personnel, Navy	66,543	2,420,618	2,555,618	2,610,161	2,549,986	60,175	47,600
Reserve Personnel, Navy	14,465	90,068	88,068	102,563	83,019	19,543	16,078
Navy Personnel, General Expenses	11,401	87,941	87,941	90,342	87,998	11,343	13,081
Military Personnel, Marine Corps	19,686	635,692	660,692	677,378	623,577	53,801	23,471
Reserve Personnel, Marine Corps	3,200	23,760	23,760	26,960	23,537	3,423	3,376
Marine Corps Procurement	566,916	25,000	25,000	591,910	156,088	435,822	293,059
Marine Corps Troops and Facilities.	42,724	173,117	172,959	215,683	172,220	43,463	38,496
Aircraft and Related Procurement	4,305,529	2,033,795	2,033,795	6,339,287	2,441,985	3,897,301	2,626,826
Aircraft and Facilities	280,894	856,181	856,181	1,137,082	881,358	255,723	246,123
Shipbuilding and Conversion	3,400,991	2,069,400	2,069,400	5,530,391	1,837,199	3,693,191	2,679,218
Ships and Facilities	206,032	799,408	799,408	1,005,440	804,779	200,661	206,630
Procurement of Ordnance and Am- munition	319,598	607,535	602,535	922,133	529,258	392,875	424,485

See footnotes at end of table.

Management Fund.....	521, 296								521, 296	-439, 364	960, 660	-72	960, 587	782, 663
Business Enterprise Accounts:														
Navy Stock Fund.....	356, 330										234, 936		234, 936	NA
Marine Corps Stock Fund.....	52, 626										42, 937		42, 937	NA
Industrial Fund.....	166, 800										133, 503		133, 503	NA
Other Revolving Funds:														
Laundry Service, Naval Academy.....	108										72		72	20
Naval Working Fund.....	14, 175										12, 088		12, 088	4, 198
Defense Housing.....	831										426		426	178
Consolidated Working Fund.....														
Subtotal.....	10, 884, 598	11, 480, 276	196, 198	11, 676, 474	-177, 450				22, 383, 622	11, 388, 943	10, 994, 679	-92, 835	10, 901, 844	7, 927, 216
Military Construction.....	482, 518	295, 000		295, 000					777, 518	325, 929	451, 589		451, 589	341, 904
Military Construction, Naval Reserve Forces.....	22, 656	8, 000		8, 000					30, 656	13, 377	17, 279		17, 279	7, 634
Total—Distributed on DD Form 1176.....														
Undistributed.....	11, 389, 772	11, 783, 276	196, 198	11, 979, 474	-177, 450				23, 191, 797	11, 728, 249	11, 463, 548	-92, 835	11, 370, 713	8, 276, 754
Nonclassified Items.....	41	34	-160, 000	-159, 966	177, 450				17, 525		17, 525	-17, 525		NA
TOTAL—DEPARTMENT OF THE NAVY	11, 389, 813	11, 783, 310	36, 198	11, 819, 509					23, 209, 322	11, 728, 249	11, 481, 073	-110, 360	11, 370, 713	NA
DEPARTMENT OF THE AIR FORCE:														
General Fund accounts:														
Aircraft, Missiles, and Related Procurement.....	9, 513, 417	6, 643, 475	-64, 000	6, 579, 475					16, 062, 892	7, 102, 046	8, 990, 845		8, 990, 845	7, 159, 521
Procurement other than Aircraft and Missiles.....	2, 019, 817	2, 220, 020	-18, 500	2, 201, 520					4, 221, 337	1, 532, 519	2, 088, 817		2, 088, 817	2, 361, 813
Operation and Maintenance.....	1, 018, 971	4, 119, 525	-484	4, 119, 041					5, 115, 013	4, 194, 519	920, 494	-12, 881	907, 613	995, 578
Military Personnel.....	101, 330	3, 941, 801		3, 941, 801					4, 035, 131	3, 975, 639	59, 493	-4, 313	55, 180	116, 692
Research and Development.....	490, 914	751, 829	28, 330	780, 159	-170				1, 270, 903	813, 272	457, 632		457, 632	407, 962
Reserve Personnel.....	6, 506	53, 746		53, 746					60, 252	47, 419	12, 832	-6, 255	6, 577	6, 650
Air National Guard.....	87, 790	251, 881		251, 881					339, 671	278, 941	60, 730	-6, 101	54, 629	54, 635
Miscellaneous "M" Accounts for Discontinued Appropriation Titles ^d														
	184								184	167	17	-11	7	7

See footnotes at end of table.

MILITARY FUNCTIONS

EXPENDITURES

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued

[Thousands of dollars]

[illegible]

Nonclassified Items			206		39, 206		39, 206		-39, 206		NA
TOTAL—DEPARTMENT OF THE AIR FORCE	15, 515, 694	18, 767, 277	-54, 654	18, 712, 623	-170	34, 228, 147	19, 084, 169	15, 143, 978	-70, 868	15, 073, 110	NA

Source: DD Form 1176.

Note. Amounts will not necessarily add to totals due to rounding.

NA—Not Applicable.

* Less than \$500.

^a Represents restoration of amount written off on 30 June 1958 and reappropriated in fiscal year 1959.

^b Signal Service; Dept. of the Air Force Prior Years, Ordnance Service and Supplies; Expediting Production; Expenses, Army of the Philippines; Seacoast Defenses; Claims of Officers, Enlisted Men, and Nurses of the Army for Destruction of Private Property.

^c IRNV: Construction and Machinery; Construction of Ships; IRNV: Armor, Armament and Ammunition; Ordnance for New Construction; Facilities; Public Works, Bureau of Yards and Docks; Research; Naval Petroleum Reserves, # 4.

^d Special Procurement.

^e Replacement of Personal Property Sold.

^f Includes \$3,065,000 appropriated to 1958 account.

^g Represents capital transfer from Revolving Fund to Treasury Receipt account.

^h Amounts in this column are gross, i.e., inclusive of reimbursements receivable and anticipated, and thus may exceed cash unexpended balances in column.

ⁱ Represents adjustments to prior year appropriations as follows:

	Army	Navy	Air Force
Preparation for Sale or Salvage of Military Property, 1958	-34, 721	+40, 873	-23, 821
Preparation for Sale or Salvage of Military Property, 1957	-1, 000	-74, 199	-172, 719
Preparation for Sale or Salvage of Military Property, Prior Years	-9, 614	-1, 046	-9, 098
Total	-45, 334	-34, 372	-205, 638

CIVIL FUNCTIONS

DEPARTMENT OF DEFENSE

OBLIGATIONS

TABLE 3. OBLIGATIONS AND OBLIGATIONAL AVAILABILITY OF CURRENT GENERAL APPROPRIATIONS, BY APPROPRIATION TITLE

(Excluding working, revolving, and special funds and expired general appropriations)

FISCAL YEAR 1959

[Thousands of dollars]

Appropriation	Amounts available for obligation fiscal year 1959					Obligations fiscal year 1959	Unobligated balance as of 30 Jun 1959		
	Unobligated balance carried into fiscal year 1959	New obligational availability		Reimbursements	Total fiscal year 1959		Total pre-closing balance	Expired balance withdrawn June 30, 1959	Unobligated balance available fiscal year 1960
		Congressional appropriations	Transfers						
DEPARTMENT OF DEFENSE—TOTAL	81,173	826,430		826,430	2,645	910,248	83,095	—170	82,926
DEPARTMENT OF THE ARMY:									
Corps of Engineers:									
Flood Control, Mississippi River and Tributaries	10	67,811		67,811	184	68,004	1,270		1,270
General Investigations	2,107	10,189		10,189	2	12,297	1,634		1,634
Construction, General	61,934	608,247		608,247	1,286	671,467	62,402		62,402
Operation and Maintenance, General	3,499	114,521		114,521	1,113	119,133	3,877		3,877
General Expenses		12,735		12,735	33	12,768	34	—34	
Hydraulic Mining in California, Debris Fund	18	18		18		36	15		15
Niagara Remedial Works	158				15	173	158		158
Maintenance and Operation of Dams and Other Improvements of Navigable Waters	152	152		152		305	152		152
United States Section, St. Lawrence River Joint Board of Engineers		100		100	1	101	73	—73	
Payments to State Flood Control Act, 1954	1,403	1,504		1,504		2,907	1,435		1,435
Claims, Lake of the Woods Flood Damage		244		244		244			
TOTAL—CORPS OF ENGINEERS	69,280	815,520		815,520	2,634	887,434	71,050	—107	70,943

Salaries and Expenses, Cometerial Expenses.....	7,450	7,450	6	7,456	7,441	16	-16	11,450
Payments to Chalmers, Disaster at Texas City, Texas.....	11,026			11,026	176	11,450		11,450
Construction of Power Systems, Ryukyu Islands.....	266			266	86	180		180
Construction of Water System, Ryukyu Islands.....	600			600	246	354		354
Administration, Ryukyu Islands.....	2,800		5	2,805	2,819	46	-46	
TOTAL—DEPARTMENT OF THE ARMY.....	81,173	826,430	2,645	910,248	827,153	83,095	-170	82,926
DEPARTMENT OF THE NAVY.....								
DEPARTMENT OF THE AIR FORCE.....								

Note. Amounts will not necessarily add to totals due to rounding.

TABLE 4. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE
FISCAL YEAR 1959
[Thousands of dollars]

Appropriation	Amounts available for expenditure fiscal year 1959						Expenditures fiscal year 1959	Preclos- ing unex- pended balance	Unobli- gated bal- ance with- drawn (—) or restored (+) per Public Law 798	Total unex- pended bal- ance carried into fiscal year 1960	Gross un- paid obliga- tions car- ried into fiscal year 1960
	Unex- pended bal- ance carried into fiscal year 1959	New obligatory availability		Other transfers	Total fiscal year 1959						
		Congres- sional ap- propriations	Transfers								
DEPARTMENT OF DEFENSE—TOTAL	240,123	826,451		826,451	1	1,066,575	780,439	286,136	—339	285,797	190,721
DEPARTMENT OF THE ARMY:											
Corps of Engineers:											
Flood Control, Mississippi River and Tributaries	18,483	67,811		67,811		86,294	73,178	13,116		13,116	12,016
General Investigations	3,386	10,189		10,189		13,574	10,865	2,709		2,709	1,076
Construction, General	145,839	608,247		608,247		754,085	562,953	191,132		191,132	128,806
Operation and Maintenance, General	17,060	114,521		114,521		131,581	113,576	18,005		18,005	14,257
General Expenses	905	12,735		12,735		13,640	12,880	759	—45	714	719
Hydraulic Mining in California, Debris Fund	18	18		18		36	21	15		15	1
Niagara Remedial Works	158					158	2	155		155	2
Maintenance and Operation of Dams and Other Improvements of Navigable Waters	152	152		152		305	152	152		152	
United States Section, St. Lawrence River											
Joint Board of Engineers	7	100		100	1	108	32	75	—73	2	2
Payments to State Flood Control Act, 1954	1,463	1,504		1,504		2,907	1,472	1,435		1,435	
Claims, Lake of the Woods, Flood Damage		244		244	(*)	244	244	244		244	
Revolving Fund	27,683					27,683	3,413	24,271		24,271	32,266
TOTAL—CORPS OF ENGINEERS	215,093	815,520		815,520	1	1,030,614	778,788	251,826	—118	251,708	189,144

Salaries and Expenses, Cemeterial Expenses.....	699	7,450	7,450	7,450	7,283	866	-22	844	844
Entombment of Unknown Americans of World War II and Korea.....	1	1	1	1	1	1			
Civilian Relief in Korea.....	27	27	27	27	-99	126	-99	27	27
Payments to Claimants, Disaster at Texas City, Texas.....	11,626				11,626	11,450		11,450	
Defense Production Guarantees.....	2,272				2,272	2,787		2,787	
Construction of Power Systems, Ryukyu Islands.....	1,400				1,400	314		314	134
Construction of Water System, Ryukyu Islands.....		600	600	600	7	593		593	239
Administration, Ryukyu Islands.....	259	2,800	2,800	2,800	2,688	432	-100	331	331
TOTAL-DEPARTMENT OF THE ARMY.....	231,433	826,430	826,430	826,430	789,477	268,393	-333	268,054	190,720
DEPARTMENT OF THE NAVY:									
Defense Production Guarantees.....	867				867	9,062		9,062	
DEPARTMENT OF THE AIR FORCE:									
Defense Production Guarantees.....	7,798				7,798	8,662		8,662	
Wildlife Conservation, etc., Eglin Field Reservation.....	19	21	21	21	40	19		19	1
TOTAL-DEPARTMENT OF THE AIR FORCE.....	7,817	21	21	21	-842	8,680		8,680	1

Note. Amounts will not necessarily add to totals due to rounding.

*Less than \$500.

TABLE 5. MILITARY ASSISTANCE PROGRAM
OBLIGATIONS/RESERVATIONS
BY BUDGET ACTIVITY

[Millions of dollars]

Major classification	Obligations/Reservations		
	Fiscal years 1950-58	Fiscal year 1959	Total as of June 30, 1959
TOTAL	\$23,769.7	\$1,527.2	\$25,296.9
Equipment and Supplies.....	19,666.4	1,006.8	20,673.2
Accessorial Charges.....	1,025.0	165.3	1,190.3
Training.....	480.1	88.5	568.6
Facilities Assistance.....	80.0	2.4	82.4
Development of Advance Design Weapons.....	135.6	45.5	181.1
Infrastructure.....	577.6	90.0	667.5
Administrative Expenses.....	252.7	23.2	275.9
International Military Headquarters.....	35.0	7.6	42.6
Other Services.....	1,517.3	97.9	1,615.2

Note. Includes "Common Use Item" appropriation administered by International Cooperation Administration. Includes \$15.0 million allocated to MAP from the President's Contingency Fund. Includes reimbursements of \$56.1 million. Amounts will not necessarily add to totals due to rounding.

TABLE 6. MILITARY ASSISTANCE PROGRAM
EXPENDITURES BY BUDGET ACTIVITY

[Millions of dollars]

Major classification	Expenditures		
	Fiscal years 1950-58	Fiscal year 1959	Total as of June 30, 1959
Total	\$20,417.9	\$2,368.1	\$22,786.0
Equipment and Supplies.....	16,850.7	1,848.4	18,699.2
Accessorial Charges.....	1,002.4	157.7	1,160.1
Training.....	435.2	74.5	509.7
Facilities Assistance.....	37.0	18.1	55.0
Development of Advance Design Weapons.....	71.9	38.7	110.6
Infrastructure.....	452.2	54.6	506.8
Administrative Expenses.....	244.7	24.6	269.4
International Military Headquarters.....	31.4	6.6	38.0
Other Services.....	1,292.4	144.8	1,437.2

Note. Includes "Common Use Item" appropriation administered by International Cooperation Administration. Includes reimbursements of \$56.1 million. Amounts will not necessarily add to totals due to rounding.

TABLE 7. MILITARY ASSISTANCE PROGRAM
OBLIGATIONS/RESERVATIONS AND EXPENDITURES
BY DEPARTMENT OF DEFENSE AGENCY
AND OTHER AGENCIES

[Millions of dollars]

	Obligated or reserved		Expended	
	Total as of June 30, 1958	Total as of June 30, 1959	Total as of June 30, 1958	Total as of June 30, 1959
TOTAL	\$23,769.7	\$25,296.9	\$20,417.9	\$22,786.0
Army.....	12,253.3	12,796.2	10,739.6	11,711.5
Navy.....	2,629.7	2,921.2	2,182.3	2,441.6
Air Force.....	6,906.1	7,469.8	5,740.9	6,773.5
OSD.....	868.5	988.9	660.9	753.5
Other Agencies.....	1,112.1	1,120.8	1,094.1	1,105.9

Note. Includes "Common Use Item" appropriation administered by International Cooperation Administration. Includes \$15.0 million allocated to MAP from the President's Contingency Fund. Includes reimbursements of \$56.1 million. Amounts will not necessarily add to totals due to rounding.

TABLE 8. ACTIVE DUTY MILITARY PERSONNEL

Date	Total, Department of Defense	Army	Navy	Marine Corps	Air Force
TOTALS					
June 30, 1958.....	2,600,581	898,925	641,005	189,495	871,156
July 31.....	2,604,242	898,580	643,138	190,894	871,630
Aug. 31.....	2,604,628	897,524	647,215	190,990	868,899
Sept. 30.....	2,598,015	900,440	643,452	188,885	865,238
Oct. 31.....	2,596,654	901,793	640,293	189,424	865,144
Nov. 30.....	2,590,086	900,604	639,022	189,061	861,399
Dec. 31.....	2,565,923	890,769	634,739	187,741	852,674
Jan. 31, 1959.....	2,561,318	889,046	635,207	185,393	851,672
Feb. 28.....	2,550,154	886,361	634,702	183,635	845,456
Mar. 31.....	2,538,110	879,332	631,930	181,975	844,873
Apr. 30.....	2,518,048	873,032	628,418	174,709	841,889
May 31.....	2,505,699	865,732	624,937	175,154	839,876
June 30.....	2,504,310	861,964	626,340	175,571	840,435
OFFICERS					
June 30, 1958.....	325,956	104,716	71,560	16,741	132,939
July 31.....	325,273	104,590	70,880	16,713	133,090
Aug. 31.....	324,722	103,813	71,144	16,447	133,318
Sept. 30.....	324,282	103,382	70,622	16,283	133,995
Oct. 31.....	324,251	103,162	70,719	16,192	134,178
Nov. 30.....	322,881	102,540	70,438	16,127	133,776
Dec. 31.....	322,158	101,992	70,416	16,342	133,408
Jan. 31, 1959.....	321,747	102,123	70,221	16,255	133,148
Feb. 28.....	320,940	102,020	69,951	16,166	132,803
Mar. 31.....	320,422	101,952	69,881	16,005	132,584
Apr. 30.....	319,474	102,091	69,484	15,959	131,940
May 31.....	318,437	101,681	69,313	15,974	131,469
June 30.....	319,152	101,690	69,795	16,065	131,602
ENLISTED					
June 30, 1958.....	2,264,506	792,508	563,506	172,754	735,738
July 31.....	2,267,977	791,488	566,251	174,181	736,057
Aug. 31.....	2,268,715	791,207	569,890	174,543	733,075
Sept. 30.....	2,262,490	794,576	566,657	172,602	728,655
Oct. 31.....	2,261,840	796,165	564,070	173,232	728,373
Nov. 30.....	2,256,279	795,611	562,804	172,934	724,930
Dec. 31.....	2,233,049	786,337	559,017	171,399	716,296
Jan. 31, 1959.....	2,228,023	784,551	558,750	169,138	715,584
Feb. 28.....	2,217,562	781,976	558,713	167,469	709,404
Mar. 31.....	2,205,752	775,017	556,054	165,970	708,711
Apr. 30.....	2,187,481	768,580	553,807	158,750	706,344
May 31.....	2,175,850	761,691	550,392	159,180	704,587
June 30.....	2,174,728	758,458	552,221	159,506	704,543
OFFICER CANDIDATES¹					
June 30, 1958.....	10,119	1,701	5,939	-----	2,479
July 31.....	10,992	2,502	6,007	-----	2,483
Aug. 31.....	11,191	2,504	6,181	-----	2,506
Sept. 30.....	11,243	2,482	6,173	-----	2,588
Oct. 31.....	10,563	2,466	5,504	-----	2,593
Nov. 30.....	10,926	2,453	5,780	-----	2,693
Dec. 31.....	10,716	2,440	5,306	-----	2,970
Jan. 31, 1959.....	11,548	2,372	6,236	-----	2,940
Feb. 28.....	11,652	2,365	6,038	-----	3,249
Mar. 31.....	11,936	2,363	5,995	-----	3,578
Apr. 30.....	11,033	2,361	5,127	-----	3,605
May 31.....	11,412	2,360	5,232	-----	3,820
June 30.....	10,430	1,816	4,324	-----	4,290

¹ Consists of cadets, U.S. Military Academy (Army); midshipmen, U.S. Naval Academy, aviation cadets, and enlisted officer candidates (Navy); and cadets, U.S. Air Force Academy, and aviation cadets, including enlisted aviation students (Air Force).

TABLE 9. RESERVE COMPONENTS PERSONNEL

[Excludes personnel on extended active duty]

	June 30, 1958		June 30, 1959	
	Total enrollment	Drill pay and 3-6 month trainees ^a	Total enrollment	Drill pay and 3-6 month trainees ^a
TOTAL—DEPARTMENT OF DEFENSE	4,022,061	985,030	4,354,005	1,006,588
DEPARTMENT OF THE ARMY	2,476,967	689,100	2,686,586	713,600
National Guard.....	^b 442,369	394,329	^b 404,036	399,427
<i>Officers</i>	42,755	37,942	40,156	37,884
<i>Enlisted</i>	399,614	356,387	363,880	361,543
Army Reserve.....	2,034,598	294,771	2,282,550	314,173
<i>Officers</i>	227,620	53,329	244,809	50,945
<i>Enlisted</i>	1,806,978	241,442	2,037,741	263,228
DEPARTMENT OF THE NAVY	976,139	175,833	1,043,657	165,230
Naval Reserve.....	674,763	129,761	727,727	120,371
<i>Officers</i>	184,760	26,513	181,454	25,454
<i>Enlisted</i>	^c 490,003	103,248	^c 546,273	94,917
Marine Corps Reserve.....	301,376	^d 46,072	315,930	44,859
<i>Officers</i>	25,192	4,143	23,845	3,537
<i>Enlisted</i>	276,184	^d 41,929	292,085	41,322
DEPARTMENT OF THE AIR FORCE	568,955	120,097	623,762	127,758
Air National Guard.....	69,995	69,995	70,994	70,994
<i>Officers</i>	8,354	8,354	8,473	8,473
<i>Enlisted</i>	61,641	61,641	62,521	62,521
Air Force Reserve.....	498,960	50,102	552,768	56,764
<i>Officers</i>	133,686	19,572	134,389	21,209
<i>Enlisted</i>	365,274	30,530	418,379	35,555

^a Reserves authorized drill pay for inactive duty training, plus reserves undergoing 3 to 6 months' active duty for training.

^b Includes Inactive National Guard.

^c Includes Regular NROTC and Merchant Marine midshipmen.

^d Revised.

TABLE 10. CIVILIAN PERSONNEL

Date	Total, Department of Defense	Department of the Army	Department of the Navy	Department of the Air Force	Other Department of Defense activities
A. DIRECT HIRE EMPLOYEES ^a					
1958					
June 30.....	1,097,095	415,914	363,729	315,806	1,646
July 31.....	1,097,961	417,082	364,050	315,205	1,624
Aug. 31.....	1,097,377	417,168	363,695	314,894	1,620
Sept. 30.....	1,093,003	415,284	361,211	314,878	1,630
Oct. 31.....	1,094,123	415,326	360,791	316,368	1,638
Nov. 30.....	1,092,413	413,341	360,382	317,039	1,651
Dec. 31.....	1,088,489	409,564	360,272	316,997	1,650
1959					
Jan. 31.....	1,083,935	407,206	359,011	316,063	1,655
Feb. 28.....	1,078,109	405,395	355,857	315,183	1,674
Mar. 31.....	1,075,548	403,837	355,114	314,913	1,684
Apr. 30.....	1,074,662	404,321	354,486	314,144	1,711
May 31.....	1,073,874	404,416	354,326	313,414	1,718
June 30.....	1,078,178	405,848	357,108	313,466	1,756
B. CONTRACT HIRE PERSONNEL (OVERSEAS SUPPORT) ^b					
1958					
June 30.....	216,695	142,090	17,722	56,883	-----
July 31.....	212,101	139,739	17,680	54,682	-----
Aug. 31.....	211,670	139,939	17,606	54,125	-----
Sept. 30.....	208,315	135,043	17,649	55,623	-----
Oct. 31.....	205,712	132,968	17,510	55,234	-----
Nov. 30.....	203,410	130,786	17,528	55,096	-----
Dec. 31.....	200,309	128,514	17,534	54,261	-----
1959					
Jan. 31.....	197,073	125,764	17,654	53,655	-----
Feb. 28.....	195,413	124,863	17,545	53,005	-----
Mar. 31.....	192,727	122,512	17,493	52,722	-----
Apr. 30.....	191,300	121,744	17,398	52,158	-----
May 31.....	190,163	121,194	17,267	51,702	-----
June 30.....	188,472	120,452	17,392	50,628	-----

^a Total paid employees (full-time, part-time, and intermittent) as reported officially to the Civil Service Commission. Includes employment charged to the Military Assistance Program and to Civil Functions.

^b Foreign nationals supporting the armed forces in certain overseas areas under contracts or agreements with foreign governments.

TABLE 11. PERSONNEL
OFFICE OF THE SECRETARY OF DEFENSE AND JOINT CHIEFS OF STAFF

	June 30, 1958		Aug. 31		Oct. 31		Dec. 31		Feb. 28, 1959		Apr. 30		June 30	
	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military
OFFICE OF THE SECRETARY OF DEFENSE ^a	1,287	382	1,248	372	1,227	385	1,219	384	1,217	390	1,223	387	1,262	393
Office of the Secretary ^b	162	46	150	46	150	46	149	47	146	44	147	44	144	46
Director of Defense Research and Engineering	190	67	189	65	187	68	189	68	190	70	193	72	203	80
Assistant Secretary (Comptroller)	161	4	161	4	160	5	162	5	162	4	160	3	165	3
Assistant Secretary (Health and Medical)	11	11	11	9	11	8	11	8	11	9	11	8	11	8
Assistant Secretary (International Security Affairs)	206	93	208	88	207	93	199	92	200	93	204	92	206	97
Assistant Secretary (Manpower, Personnel and Reserve)	84	47	86	47	86	45	88	46	85	49	86	47	84	46
Assistant Secretary (Properties and Installations)	63		63		63		62		62		62		61	
Assistant Secretary (Public Affairs)	72	47	76	52	75	57	77	58	74	59	74	59	78	57
Assistant Secretary (Supply and Logistics)	216	18	181	19	186	19	182	17	183	16	181	16	186	14
General Counsel	57	1	56	1	56	1	57		58		59		58	
Assistant to the Secretary (Atomic Energy)	12	21	12	16	13	17	11	16	13	16	13	17	13	16
Assistant to the Secretary (Legislative Affairs)	8	5	7	4	7	5	7	6	7	8	9	8	9	7
Assistant to the Secretary (Special Operations)	12	6	12	7	13	6	13	6	14	7	13	7	13	6
Special Programs	33	16	36	14	13	15	12	15	12	15	11	14	31	13

TABLE 11 PERSONNEL—Continued

OFFICE OF THE SECRETARY OF DEFENSE AND JOINT CHIEFS OF STAFF—Continued

	June 30, 1958		Aug. 31		Oct. 31		Dec. 31		Feb. 28, 1959		Apr. 30		June 30	
	Civil-ian	Mili-tary	Civil-ian	Mili-tary	Civil-ian	Mili-tary	Civil-ian	Mili-tary	Civil-ian	Mili-tary	Civil-ian	Mili-tary	Civil-ian	Mili-tary
JOINT CHIEFS OF STAFF ORGANIZATION														
Office of the Chairman.....	201	328	220	348	241	465	263	514	283	565	297	573	303	594
Joint Staff.....	10	9	10	9	9	9	9	9	8	9	9	8	10	8
Other Joint Chiefs of Staff Activities.....	103	221	87	232	87	334	95	364	127	411	100	412	173	430
	88	98	123	107	145	122	159	141	148	145	128	153	120	156
OTHER ACTIVITIES^c														
Advanced Research Projects Agency.....	115	76	115	75	118	78	116	78	119	77	124	82	139	82
Standing Group, North Atlantic Treaty Organization.....	24	4	25	5	29	7	29	7	30	8	34	12	48	13
U.S. Court of Military Appeals.....	37	72	38	70	40	71	39	71	42	69	41	70	42	69
Interdepartmental Activities.....	42	43	43	43	43	41	41	41	40	41	41	41	41	41
	12	9	9	9	6	7	7	7	7	7	8	8	8	8
TOTAL, FULL-TIME PERSONNEL														
Intermittent Consultants.....	1,603	785	1,583	795	1,586	928	1,598	976	1,619	1,032	1,644	1,042	1,704	1,069
	43	37	37	37	52	52	58	58	55	67	67	67	52	52
TOTAL PERSONNEL	1,646	786	1,620	795	1,638	928	1,656	976	1,674	1,032	1,711	1,042	1,756	1,069

^a Detail has been revised to provide comparability with data for June 30, 1959.

^b Includes Offices of the Deputy Secretary and Administrative Secretary, and the Administrative Office of the Secretary.

^c Includes activities receiving administrative support from the Office of the Secretary of Defense.

INDEX

	Page
Accounting. (See Fiscal matters.)	
ADIZ (Air Defense Identification Zone)	298
Advanced Research Projects Agency (ARPA)	18, 21, 24, 38, 253, 334, 385
Air Force Academy	304, 311
Air Force Control Center	290
Air Force, Department of the. (See also Reserve Forces Policy Board.)	
Budget	358, 364
Actual obligations and net expenditures, fiscal year 1959	359
Amount available for obligation, fiscal year 1959	359
Fiscal year 1960	361
Supplemental appropriations	358
Combat forces	290
Air defense	297
ADIZ	298
Air defense master plan	298
CADIN (Continental Air Defense Integration, North)	298
SAGE	297
Strategic Air Command (SAC)	3
Warning network	297
Military Air Transport Service (MATS)	299
Air Photographic and Charting Service	301
Air Rescue Service	300
Airways and Air Communications Service	301
Air Weather Service	300
Industrial Fund for Airlift Service	300
Operation DEEP FREEZE	300
Strategic Air Command (SAC)	293
Tactical Air Command (TAC)	295
CASF Bravo	295
CASF X-Ray Tango	296
Health and welfare	317
Air Force hospitals	319
American Hospital Association accreditation	320
Construction	319
Chaplains	323
Dependent school population	317
Dependents' medical care	320
Medicare	321
Restrictions	320
Health in the Air Force	319
Daily noneffective ratio of personnel	319
Death rate	319
Judge Advocate General	324
Medical personnel	317
Incentive pay	318
Residency deferment program	318
Special programs	318
Training courses	318

Air Force, Department of the—Continued

Health and welfare—Continued	Page
Medical research.....	321
Aero Medical Laboratory.....	321
Arctic Aeromedical Laboratory.....	322
School of Aviation Medicine.....	323
Medical service.....	317
Installations.....	326
Active major installations, U.S. and foreign (table).....	328
Base maintenance.....	330
Construction Review Panel.....	330
Construction.....	327
BMEWS sites.....	327
BOMARC bases.....	327
ICBM facilities.....	327
SAGE facilities.....	327
Family housing.....	329
Capehart projects.....	329
New units completed (tables).....	330
Wherry program.....	329
Programs.....	326
Authorizations.....	326
Inactivation of facilities.....	326
Introduction.....	287
Logistical services.....	347
Maintenance.....	348
Supply and services.....	347
Transportation.....	350
Management.....	352
Administrative services.....	356
Comptroller service to management.....	352
Electronic analysis procedures.....	353
Finance controls.....	352
Reporting.....	352
Inspector General activities.....	353
Flight safety.....	354
Worldwide USAF Flying Safety Officers' Conference.....	355
Ground safety.....	355
National Safety Council's Award of Honor.....	355
Inspection.....	353
Special inspections.....	354
Military law enforcement.....	356
Security.....	354
Manpower and manpower objectives.....	302
Military training.....	308
Flying training.....	308
Hours required.....	308
Navigators.....	309
Survival training.....	309

Air Force, Department of the—Continued

	Page
Military training—Continued	
Operation SWIFTLIFT	316
Professional education	310
Air Force Academy	311
Air Force Extension Course Institute	312
Air Force Reserve Officers Training Corps (AFROTC)	310
Air University	312
Officer Training School	311
Reserve forces	312
Air Force Reserve	312
Aircraft inventory	313
Air National Guard	312
Aircraft inventory	313
Technical training	309
Personnel, civilian	305, 384
Award for employment of physically handicapped	306
Federal merit promotion program	306
Foreign nationals	305
Incentive award program	307
Joint inspection agreement	306
Merit system for employees in Panama Canal Zone	306
Reductions	302
Turnover rate	305
Personnel, military	302, 382
Changes in airman structure	303
Personnel quality control program	304
Proficiency pay plan	303
Officer corps	304
Air Force Academy	304
Reductions	303
Reserve	58, 97, 104, 312, 383
Women in the Air Force	304
Officer Training School	305
Procurement and production of materiel	341
Aircraft and missile production	343
Industrial readiness	341
Military Assistance Program (MAP)	344
Procurement policies	341
Research and development	332
Appropriation	332
Astronautics	334
Basic and applied research	339
Mutual Weapons Development Program	334
Supporting developments	338
Equipment	338
Nuclear experiments	339
Fallout data	339
Project Argus	339
Transport and training aircraft	338

Air Force, Department of the—Continued	
Research and development—Continued	Page
Weapon development.....	335
Air defense weapons.....	336
BMEWS.....	336
BOMARC.....	336
Strategic air weapons.....	335
ATLAS.....	335
Bombers.....	336
HOUND DOG.....	336
MINUTEMAN.....	335
QUAIL.....	336
TITAN.....	335
Tactical air weapons.....	337
MACE.....	337
Vertical take-off fighter.....	338
Air Force Extension Course Institute.....	312
Air Force Reserve.....	58, 97, 104, 312, 383
Air Materiel Command.....	347
Air National Guard.....	58, 97, 103, 308, 312, 383
Air Photographic and Charting Service.....	301
Air Rescue Service.....	300
Air Training Command.....	295
Air University.....	312
Airways and Air Communications Service.....	301
ANZUS.....	92
Armed Forces Policy Council.....	40, 45
Armed Forces Staff College.....	127
Armed Forces Supply Support Center.....	2, 65, 73, 258
Army Audit Agency.....	191
Army, Department of the. (See also Reserve Forces Policy Board.)	
Budget and funds.....	198, 364
Direct obligations.....	200
Funds versus requirements.....	200
New appropriation structure.....	198
New obligational authority.....	200
Civil works: water resources development.....	185
Appropriations.....	185
Assignment of new responsibilities.....	190
Beach erosion control.....	189
Flood control.....	187
Reservoirs and protection projects placed in operation.....	187
Hurricane protection.....	189
Hydroelectric power.....	188
Investigations.....	190
Local water supply.....	188
Lock and dam replacement.....	186
Navigation projects.....	186
Progress in fiscal year 1959.....	185
Recreation.....	189
Conclusion.....	203
Introduction.....	113

Army, Department of the—Continued	Page
Logistics	133
Construction, military	140
Domestic	141
Housing	141
MISSILE MASTER	141
NIKE-HERCULES facilities	141
NIKE-ZEUS projects	141
Overseas	141
Wherry housing	142
Management	133
Combat materiel readiness, improvement of	135
Field stock control system	139
Maintenance of equipment	140
Engineer objectives	140
Maintenance of facilities	139
Materiel planning for war	134
Production plants	134
Reserve stocks	134
Small business firms	134
Procurement deliveries	135
Project MASS results	138
Storage and distribution	137
Inventories, reduction of	137
Medicine	143
Disease noneffective rate	143
Medicare	145
Hospital admission rates	145
Restrictive changes	145
Neuropsychiatry	144
Hospital admission rates	145
Walter Reed Army Institute of Research	144
Office of Special Assistant to the Surgeon General for Com- bat Development	148
Preventive	143
Poliomyelitis, vaccination against made mandatory	143
Professional medical training programs	144
Research and development	146
Artificial kidney	146
Electrogoniometer	146
Energy value of food	146
Fluorescent antibody techniques	146
Griseofulvin, antibiotic	146
Measurement of water in body	146
Prophylactic use of gamma globulin	146
Space medicine	147
Flight by two monkeys, facts established by	147
Management	191
Areas of management emphasis	195
Army Audit Agency	195
Automatic data-processing systems (ADPS)	194
Command management system	191

Army, Department of the—Continued

Management—Continued	Page
Improvement program	191
Camp Irwin, Calif.	192
Fort Knox, Ky.	192
Fort Ord, Calif.	192
Japan	192
Martin Army Hospital	193
Ohio River Division, Corps of Engineers	193
Training	193
College courses	194
Finance School, Ft. Benjamin Harrison, Ind.	193
Rock Island Arsenal, Rock Island, Ill.	193
U.S. Army Management School, Ft. Belvoir, Va.	193
Work simplification	194
Manpower and personnel management	149
Medicine. (<i>See under</i> Logistics.)	
Personnel, civilian	161, 384
Canal Zone merit system and pay plans	163
Career programs	103
Development	162
Executive	162
Professional	162
Merit promotion program	162
Mobilization planning for civilian employees	164
Civilian manpower requirements established	164
Civilian personnel regulations modified	165
Preemergency actions delineated	164
Salary and wage administration	163
Strength	161
Suggestion program	164
Personnel, military	149, 382
Army Career Option Group	152
Distribution (table)	152
Enlisted management program	155
Evaluation system	155
New grades	155
Permanent promotions	156
Proficiency pay	155
Enlistments and reenlistments	150
General educational development	157
Measures to decrease personnel movement	154
Morale	157
New techniques for assignment of enlisted personnel	154
Preinduction aptitude screening	151
Problems	159
Punitive confinement	158
Disciplinary barracks closed	158
Reduction in number of prisoners	158
Strength	150
Utilization	152
Women's Army Corps	156

Army, Department of the—Continued

Manpower and personnel management—Continued

Page

Reserve components	57, 97, 101, 160, 383
Army National Guard	99, 160
Army Reserve	101, 160
Reserve Officers Training Corps	161
Safety	165
Aviation safety program	165
Decline in accidents	165
Nuclear	165
Projected losses	165
Operations	115
Air defense	122
HAWK	123
MISSILE MASTER	123
NIKE	122
NIKE-ZEUS	123
Deployment of forces	115
Europe	116
Lebanon	118
Pacific	117
Ready forces overseas	115
Other forces overseas	117
Ready forces within the United States	118
Ready Reserve	121
Mapping	130
Army Map Service	131
Inter-American Geodetic Survey	131
National Aeronautics and Space Agency	132
Military Assistance Program	129
Research and development	166
Basic	167
Army Mathematics Research Center	168
Environmental Sciences Division	168
Combat surveillance	180
Communications	179
Human factors research program	184
"In-house" research	167
Ablation nose cone	167
Missile firepower	171
LA CROSSE	171
LITTLE JOHN	171
MAULER	174
MISSILE A	173
MISSILE B	173
NIKE-ZEUS	171
PERSHING	171
REDEYE	173
SERGEANT	171
Mobility	174
Air	178
Amphibians	177
LARC-5 lighter	177
T-116 cargo carrier	177

Army, Department of the—Continued	
Research and development—Continued	
Mobility—Continued	Page
Combat vehicles	174
M-60 tank	175
M-113 personnel carrier	175
Self-propelled airborne carriage for heavy artillery	175
Self-propelled carriage for 105-mm. howitzer	175
Fighting Vehicles Research and Development Establishment	174
Fuels	177
Automatic pipe-welding machine	178
Collapsible rubber fuel tank	177
Rolling fluid transporters	177
Logistical ground mobility	175
Fork-lift machine	177
Off-road cargo carrier	177
Soils Trafficability Research Facility	174
Nuclear	181
Atomic Power	181
Principal projects	168
Ammunition	170
Chemical shells and rockets	170
Claymore	169
Grenade launcher	170
Incapacitating agents	170
New small arms family	169
Recoilless rifle, 90-mm	170
Reduction of "leadtime"	166
JUPITER	166
Space	182
Explorer IV	182
Future plans in space	183
Monkeys Able and Baker	183
Pioneer III	182
Pioneer IV	182
Saturn	183
Training	124
Alaska	125
Europe	124
Field exercises and maneuvers	127
Foreign nationals	129
Pacific	125
Panama Canal Zone	125
Replacements	126
Reserve components	128
School	127
United States	126
Army Map Service	130
Army Medical Service	143
Army Medical Service Research and Development Command	146
Army Military Academy Preparatory School	311
Army National Guard	56, 58, 97, 99, 128, 160
Army Reserve	57, 97, 101, 160, 383

Atomic Energy Commission.....	24, 25, 181, 263, 318, 323, 338
BMEWS (Ballistic Missile Early Warning System).....	336
Bureau of Medicine and Surgery.....	282
Bureau of Naval Weapons.....	279
Bureau of Ordnance.....	282
Bureau of Ships.....	221
Bureau of Supplies and Accounts.....	221
Bureau of the Budget.....	33, 303
CADIN (Continental Air Defense Integration, North).....	298
California Institute of Technology.....	270
Central Treaty Organization (CENTO).....	89, 130
Civilian components:	
Air Force.....	305, 384
Army.....	161, 384
Defense.....	61, 385
Navy.....	274, 384
Civil Reserve Air Fleet (CRAF).....	69
Civil Service Commission.....	162, 165, 274, 275, 306
Columbia University.....	268
Committee of Oceanography.....	268
CONAD (Continental Air Defense Command).....	7
Cordiner Committee.....	47, 62, 230
Defense Advisory Committee on Women in the Services.....	51
Defense Atomic Support Agency (DASA).....	24, 37, 127
Defense, Department of. (For tables see Appendix p. 364.) (See also Reserve Forces Policy Board.)	
Armed forces.....	3
Continental defense.....	5
Air Force, regular.....	5
Continental Air Defense Command (CONAD).....	7
North American Air Defense Command (NORAD).....	7
Semi-Automatic Ground Environment System (SAGE).....	7
Warning systems.....	5, 6
Deployment of, by percentage.....	3
General purpose forces.....	7
Air Force.....	10
Army.....	9
Marine Corps.....	9
Navy.....	9
Military services.....	3, 8
Personnel and striking power.....	3, 381
Air Force.....	10, 11, 381
Army.....	9, 381
Marine Corps.....	10, 381
Navy.....	9, 10, 381
Retaliatory forces.....	3
Unified and specified commands (fig. 1).....	4
Budget.....	28, 364
Expenditures for military functions (fig. 8).....	30, 368
Financial management.....	32
Fiscal year 1959.....	29, 364
Fiscal year 1960.....	31

Defense, Department of—Continued	Page
Conclusion.....	95
Introduction.....	1
Management.....	35
Joint Chiefs of Staff.....	41
Personnel employed.....	42, 44
Reorganization of.....	41
Military departments.....	45
Responsibilities of.....	45
Office of the Secretary of Defense.....	37
Assistant Secretaries of Defense, assignments of.....	38
Director of Defense Research and Engineering, duties of.....	37, 38
Major OSD officials, functions of.....	38, 39
Personnel employed.....	41
Organizational concepts.....	35
DOD Directive 5100.1.....	35
Unified and specified commands.....	44
Manpower.....	3, 47
Active forces.....	47
Dependents' medical care.....	52
Enlisted personnel.....	48
Experience level of personnel.....	49
Promotions and awards.....	48
Reenlistments.....	49
Family housing.....	53
Capehart program.....	54
Oversea units.....	54
Wherry units.....	54
Information and education programs.....	51
Office of Armed Forces Information and Education.....	52
U.S. Armed Forces Institute (USAFI).....	51
Medical facilities and supply.....	56
Medical personnel.....	55
Officer personnel.....	50
Personnel levels.....	47
Women in the military services.....	51
Civilian personnel.....	61, 385
Incentive programs.....	61, 63
Oversea teachers.....	62
Professional and scientific personnel.....	62
Salaries and wages.....	62
Training.....	61
Health.....	54
Hospital admission rates.....	55
Medical facilities and supply.....	56
Medical personnel.....	55
Reserve forces.....	56, 383
Financial support and construction.....	59
Organization.....	56
Personnel and training.....	58

Defense, Department of—Continued	Page
Mutual security	79
Asia and the Pacific	90
ANZUS	92
Japan	92
Korea	92
Republic of China	91
SEATO	92
Europe	84
NATO forces	84
Atomic energy agreements	85
Bases and facilities	86
Exercises	88
Modernization	85
Supreme Allied Commander, Europe (SACEUR)	87
NATO Maintenance Supply Services Agency	86
Other countries	86
Middle East and Africa	88
Military assistance	79
Allied industrial capacity expanded	83
Appropriation for next fiscal year	84
Draper Committee	84
Expenditures	81
Funds, status of	81
Research and development of advanced weapons	83
Training	81
Western Hemisphere	93
Brazil	93
Canada	94
Latin American nations	93
Organization of American States (OAS)	93
Panama	93
Research and development	12
Guided missiles	12
Air defense missiles	16
Obligations, programed	12
Strategic missiles	14
Tactical missiles	18
Military space technology	21
Argus	22
Beacon	22
Centaur	21
Discoverer	22
Dyna-Soar	22
Explorer	22
Midas	22
Notus	22
Pioneer	22
Score	22
Sentry	22

Defense, Department of—Continued

Research and development—Continued

Military space technology—Continued

Page

Tiros	21
Transit	22
Vanguard	22
X-15 plane	22
Nuclear weapons and nuclear reactors	24
Argus experiment	24
Nuclear submarines	25
Nuclear surface ships	25
Operation Hardtack	24
Obligations, programed	12, 26
Other research activities	25
Air Force	25
Army	26
Navy	26
Rockets	20
Weapons, equipment, and facilities	64
Mobilization planning	75
National Industrial Equipment Reserve (NIER)	76
National Industrial Plant Reserve (NIPR)	75
National Priorities and Allocation System	76
Office of Civil and Defense Mobilization	75
Properties and installations	76
Ballistic Missile Early Warning System	77
Disposal of real property	77
Transfer of facilities	77
Supply management	64
Armed Forces Supply Support Center	65
Cataloging and standardization	69
Accelerated Item Reduction (AIR) Program	69
Standardization program	70
Inventory control, storage, distribution, and disposal	73
Armed Forces Supply Support Center	73
Defense Materiel Utilization System	73
Surplus Sales Information Office	74
Procurement	70
Small Business Administration	72
Single managers	65
Cheatham Annex Cold Storage Facility	67
Civil Reserve Air Fleet (CRAF)	69
Military Air Transport Service (MATS)	68
Military Clothing and Textile Supply Agency	67
Military Medical Supply Agency	67
Military Petroleum Supply Agency	67
Military Sea Transportation Service (MSTS)	68
Military Subsistence Supply Agency	67
Military Traffic Management Agency (MTMA)	68
Defense Public Affairs Council	40
DEW line	5, 94, 216, 297, 327, 351
Draper Committee	84

Exercises:	Page
Banyan Tree.....	128
Big Deal.....	210
Caribou Creek.....	128
Crescent Hinge.....	210
Dark Cloud.....	59, 127
Dark Cloud/Pine Cone II.....	312
Dawn Breeze IV.....	88
Dry Hills.....	128
Fairwind IV.....	88
Free Play.....	124
Logex 59.....	128
New Broom IX.....	88
Rocky Shoals.....	127
Saddle-Up.....	91
Sharp Squall III.....	88
Tally Ho.....	88
Topweight.....	88, 210
White Cloud.....	127
Federal Aviation Agency.....	352
Fiscal matters (<i>see</i> Tables in Appendix p. 364):	
Air Force.....	358
Army.....	198
Defense.....	28, 59
Navy.....	277
Fleet Marine Forces.....	226
General Accounting Office.....	259
General Services Administration.....	75, 348
House Committee on Appropriations.....	259
Hydrographic Office.....	222
Industrial College of the Armed Forces.....	127
Industrial Fund for Airlift Services.....	300
Institute for Defense Analyses.....	27
Inter-American Geodetic Survey.....	132
Inter-American Treaty of Reciprocal Assistance of 1947.....	93
International Geophysical Year.....	268, 269
International Hydrographic Bureau.....	222
International Passamaquoddy Engineering Board.....	190
John Towers Field.....	261
Joint Chiefs of Staff.....	26, 41, 290, 295, 301, 386
Legislative references:	
Atomic Energy Act of 1954.....	85
Classification Act of 1959.....	61
Department of Defense Appropriation Act, 1959 (P. L. 85-724).....	359
Department of Defense Reorganization Act of 1958.....	35, 37, 290
Government Employees Training Act of 1958.....	61, 275, 305
Medical and Dental Officers Career Incentive Act.....	55
Military Construction Authorization Act for 1960.....	54
Military Pay Act of 1958.....	303
Mutual Security Act of 1954.....	345
National Aeronautics and Space Act of 1958.....	290
National Defense Act of 1950.....	107
National Defense Facilities Act.....	108

Legislative references—Continued

	Page
National Housing Act.....	54
National Security Act.....	32
Overseas Teachers Pay and Personnel Practices Act.....	62
Public Law 85-241.....	141
Public Law 85-422.....	155
Public Law 85-564.....	151
Public Law 85-804.....	341
Public Law 85-872.....	275
Reserve Forces Act of 1955.....	58, 99
Reserve Officers Personnel Act.....	99
Second Supplemental Appropriation Act, 1959 (P. L. 86-30).....	359
Supplemental Appropriation Act, 1959 (P. L. 85-852).....	359
Universal Military Training and Service Act.....	49, 58
Marine Corps Reserve.....	57, 97, 103, 230
Marine Corps, the United States. (<i>See</i> under Navy, Department of the.)	
Medicare.....	145
Mid-Canada line.....	297
Military Air Transport Service (MATS).....	68, 299
Military Assistance Program (MAP).....	83, 89, 129, 345, 380, 381
Military Clothing and Textile Supply Agency.....	67
Military Medical Supply Agency.....	67
Military Petroleum Supply Agency.....	67
Military Sea Transportation Service (MSTS).....	68, 221
Military Subsistence Supply Agency.....	67
Military Traffic Management Agency (MTMA).....	68
Missiles:	
ATLAS.....	4, 31, 76, 294, 334, 335
BOMARC A.....	7, 18, 336, 344
BOMARC B.....	7, 18
BULLPUP.....	10, 20, 214, 296
CORPORAL.....	20
CORVUS.....	20
DART.....	12, 20, 31
EAGLE.....	18, 215, 265
FALCON.....	11, 18
GOOSE.....	12, 31, 344
HAWK.....	9, 18, 20, 123, 229
HOUND DOG.....	16, 31, 294, 336, 358
JUPITER.....	14, 22, 147, 166, 294
LACROSSE.....	9, 20, 171
MATADOR/MACE.....	11, 20, 296
MAULER.....	12, 18, 174
MINUTEMAN.....	16, 31, 335, 358
MISSILE A.....	173
MISSILE B.....	173
NAVAHO.....	16
NIKE-AJAX.....	7, 16, 122
NIKE-HERCULES.....	7, 9, 18, 115, 118, 141
NIKE-ZEUS.....	18, 31, 123, 141, 171
PERSHING.....	20, 31, 171
POLARIS.....	14, 31, 77, 215, 220, 223, 240, 249, 260, 278
QUAIL.....	16, 294, 336, 344

Missiles—Continued	Page
RASCAL	12, 31, 344
REDEYE	12, 18, 20, 173, 229
REDSTONE	9, 20
REGULUS	10, 20, 209, 239
REGULUS II	12, 16, 31, 241
SERGEANT	20, 171
SHILLELAGH	12, 20
SIDEWINDER	10, 18, 20, 215, 228, 252, 296
SKYBOLT	12, 16
SNARK	16, 294
SPARROW III	10, 18, 20, 215, 216
SUBROC	20, 251
TALOS	10, 18, 20, 215, 241, 250
TARTAR	18, 215, 241, 251
TERRIER	10, 18, 20, 215, 231, 241, 251
THOR	14, 294, 344
TITAN	14, 31, 76, 335
TRITON	16
MISSILE MASTER	123, 141
MSTS (Military Sea Transportation Service)	221
Mutual security	79, 129, 345
National Academy of Sciences	268
National Aeronautics and Space Administration (NASA)	21, 182, 247, 334, 352
National Industrial Equipment Reserve (NIER)	76
National Industrial Plant Reserve (NIPR)	75
National Research Council	268
National Security Agency	37
National War College	127
NATO	5, 83, 84, 116, 129, 277, 343, 386
NATO Maintenance Supply Services Agency	86
Nautical Almanac Office	222
Naval Academy	261
Naval Electronics Laboratory	216
Naval Medical Center	261
Naval Observatory	222
Naval Preparatory School	311
Naval Reserve	97, 102, 238, 383
Naval ships. (See also Nuclear submarines and under Department of the Navy, Design and construction of ships) :	
Agor	244
Albany	241
Bainbridge	241
Barbero	209
Barry	242
Blandy	212
Boston	215
Boxer	220, 227, 228, 229
Canberra	215
Charles F. Adams	241
Claude Jones	242
Compass Island	220
Constellation	239

Naval ships—Continued	Page
<i>Coral Sea</i>	239
<i>Edisto</i>	213
<i>Enterprise</i>	214
<i>Essex</i>	211, 283
<i>Farragut</i>	241
<i>Forrestal</i>	211, 214
<i>Forrest Sherman</i>	242
<i>Francis Marion</i>	243
<i>Galveston</i>	215, 242
<i>Glacier</i>	213
<i>Grayback</i>	239
<i>Growler</i>	239
<i>Gyatt</i>	215
<i>Helena</i>	213
<i>Independence</i>	214
<i>Iwo Jima</i>	219, 243
<i>Kitty Hawk</i>	239
<i>Kleinsmith</i>	212
<i>Lexington</i>	211
<i>Long Beach</i>	241
<i>Midway</i>	214
<i>Observation Island</i>	221
<i>Oriskany</i>	239
<i>Paul Revere</i>	243
<i>Princeton</i>	220, 227, 228
<i>Proteus</i>	240
<i>Randolph</i>	211
<i>Ranger</i>	214
<i>Roy O. Hale</i>	213
<i>Triton</i>	240
<i>Yorktown</i>	211
Navy Antisubmarine Warfare Committee.....	218
Navy, Department of the. (See also Reserve Forces Policy Board.)	
Business management.....	276
Automatic data processing.....	280
Financial management.....	277
Expenditures by purpose or function (table).....	278
Management improvement.....	281
Industrial operations.....	281
Program evaluation and review technique.....	281
Source data automation.....	281
Organization.....	279
Bureau of Naval Weapons established.....	279
Officer career specialization.....	280
Printing and publications.....	281
Procurement and contracting.....	276
Auction sale of surplus property.....	277
Reduction of contractor-operated plants in industrial re- serve.....	277
Small business contracts.....	276
Standardization agreements with NATO.....	277
Conclusion.....	283

Navy, Department of the—Continued	Page
Design and construction of ships	239
<i>Agor</i>	244
<i>Albany</i> (CG-10)	241
<i>Bainbridge</i> (DLGN-25)	241
<i>Barbel</i> (SS-580)	240
<i>Barry</i> (DD-933)	242
<i>Charles F. Adams</i> (DDG-2)	241
<i>Claude Jones</i>	242
<i>Constellation</i> (CVA-64)	239
<i>Coral Sea</i> (CVA-43)	239
<i>Enterprise</i> (CVAN-65)	239
<i>Ethan Allen</i> (SSBN-608)	240
<i>Farragut</i> (DLG-6)	241
<i>Forrestal</i>	239
<i>Forrest Sherman</i>	242
<i>Francis Marion</i> (APA-249)	243
<i>Galveston</i> (CLG-3)	242
<i>George Washington</i> (SSBN-598)	16, 219, 240
<i>Grayback</i> (SSG-574)	239
<i>Growler</i> (SSG-577)	239
<i>Halibut</i> (SSGN-587)	240
<i>Independence</i> (CVA-62)	239
<i>Iwo Jima</i> (LPH-2)	243
<i>Kitty Hawk</i> (CVA-63)	239
<i>Long Beach</i> (CGN-9)	241
Minesweeper, Special (MSS)	244
<i>Oriskany</i> (CVA-34)	239
<i>Paul Revere</i> (APA-248)	243
<i>Proteus</i> (AS-19)	240
<i>Sargo</i> (SSN-583)	240
<i>Seawolf</i>	240
<i>Skate</i> (SSN-578)	240
<i>Skipjack</i> (SSN-585)	240
<i>Swordfish</i> (SSN-579)	240
<i>Thresher</i> (SSN-593)	241
<i>Triton</i> (SSRN-586)	240
Design and procurement of aircraft	246
Flight safety	247
Mark IV full pressure space suit	247
New models	246
Reduction in procurement	246
Introduction	207
Marine Corps, the United States	226
Employment of forces	226
Landing force research and development	229
Objectives	227
Operations and training	227
Personnel	230, 381
Enlisted programs	231
Officer programs	230
Strength levels	230
Reserve	57, 97, 106, 229, 383
Supporting establishment	231

Navy, Department of the—Continued	Page
Medical and dental service	254
Aviation medicine	255
Dental care	255
Research	257
Health of personnel	254
Death rate	254
Hospital patients	254
Infectious hepatitis	254
Respiratory infections	254
Venereal disease	254
Medical facilities	255
Medical research	256
Blood bank	257
Ionizing radiation	257
JUPITER flight	256
Mercury project, pressure suit	257
Psycho-physiological testing and training	257
Rotating room	257
Submarine medicine	256
Navy, the United States:	
Communications support	223
Hydrographic Office	222
Material readiness	223
Material condition	223
Military improvements	224
Mobilization posture	224
Naval Observatory	222
Operational readiness and capability	214
Air defense	215
Air offense	214
Amphibious forces	219
Antisubmarine warfare	216
Fleet ballistic missile system	220
Harbor defense	220
Mine warfare	220
Submarine warfare	218
Operations, naval	209
Employment of forces	209
Seventh Fleet	209
Sixth Fleet	209
Exercises, large-scale	210
BIG DEAL	210
CRESCENT HINGE	210
TOP WEIGHT	210
Operations, special	210
Antarctic	212
Attacked aircraft	213
Evacuation from Nicaro, Cuba	212
HARDTACK	212
Humanitarian	213
INLAND SEAS	213

Navy, Department of the—Continued

Navy, the United States—Continued

Operations, naval—Continued

Operations, special—Continued

	Page
Lebanon.....	209
Submarine.....	212
Taiwan.....	209
Transatlantic cable breaks.....	213
Virgin Islands inaugural.....	212
Support readiness and capability.....	221
Military Sea Transportation Service (MSTS).....	221
Personnel, civilian.....	274, 384
Employment.....	274
Campaign Forty suggestion program.....	274
New promotion plans.....	274
Reductions in force.....	275
Position classification and wage administration.....	275
Table showing graded and ungraded.....	274
Training.....	275
Personnel, naval.....	233, 382
Active duty strength.....	233
Discipline.....	238
Enlisted personnel.....	234
Promotions.....	235
Naval Reserve.....	97, 102, 238
Ready Reserve.....	238
Selected Reserve.....	238
Strength.....	238
Officer personnel.....	234
Promotions.....	235
Personnel research.....	237
Procurement of personnel.....	234
Training and education.....	236
Advanced weapons training.....	236
Foreign language study.....	236
Leadership schools.....	237
Medical and dental.....	236
Nuclear power training.....	237
Postgraduate program.....	236
Research.....	265
Basic.....	266
Biological sciences.....	269
Human disorientation device.....	269
Serum for burns.....	269
Ultrasonic waves for brain surgery.....	269
Chemical sciences.....	266
Boron in new forms.....	267
High temperature semiconductor.....	267
Perfluorobenzenes.....	266
Phosphides and silicides of transition metals.....	267
Synthetic fluoaluminate crystal.....	267

Navy, Department of the—Continued

Research—Continued

Basic—Continued

	Page
Earth sciences.....	268
Instrumented rockets.....	268
Lyman-alpha line of hydrogen light photographs.....	268
Maser (microwave amplification by stimulated emission).....	268
Minitrack observations on satellites.....	269
Oceanography.....	268
Electronic sciences.....	270
Color television developments.....	271
Ionosphere reflection radar.....	271
Radio signals reflected from moon.....	271
Radio-telescope facility.....	270
Space surveillance system.....	271
Energy conversion.....	272
Controlled thermonuclear reactions on a laboratory scale.....	272
Heat transfer by liquids.....	272
Engineering mechanics.....	271
General science.....	272
Coordinated Science Laboratory.....	272
Development problems.....	272
Digital computers in war game studies.....	273
LOKI rocket.....	273
Molecular magnetism.....	272
Nuclear techniques in nondestructive testing of large propellant grains.....	273
Transistor.....	273
Material sciences.....	270
Method for calculating relative stabilities of a given metal.....	270
Notch ductility test.....	270
Mathematical sciences.....	267
Automatic data processing.....	268
Logistics.....	267
Physical sciences.....	267
Project STRATOSCOPE.....	267
Ultrasonic techniques.....	267
Psychological sciences.....	270
Weapons and equipment.....	265
Assault landing craft.....	265
Close support artillery.....	265
Guided missiles:	
BULLPUP.....	265
CORVUS.....	265
EAGLE.....	265
SIDEWINDER 1C.....	265
SPARROW III.....	265
SUPER TALOS.....	265
Internal combustion catapult powerplant.....	265
Low altitude attack aircraft (A2F).....	265
Satellites.....	266
Submarine and related problems.....	266
Tactical data system network.....	265

Navy, Department of the—Continued	Page
Shore facilities	261
Construction	261
Domestic	261
Foreign	261
Housing	262
Capehart Act	263
Wherry Act	263
Maintenance	263
Planning and design	262
Real estate	262
Utilities	263
Supply	258
Accounting procedures	259
Aviation supply	259
Disposal program	258
Federal cataloging system	258
Research and development programs	260
Support operations consolidated	258
Transport of material	260
Weapons	249
Air weapons systems	252
20-mm. gun	252
SIDEWINDER	252
ZUNI	252
Fleet ballistic missile system	249
Missile submarine	250
POLARIS	249
Support	250
Other developments	252
Doppler techniques	253
Explosive compounds	253
Hazards of electromagnetic radiation (Hero Program)	253
Hybrid rocket motors	252
Power cartridge	252
Pyrotechnic device to resemble atomic burst	252
Satellite launching system	253
Pacific Missile Range	250
Surface weapons systems	250
TALOS	250
TARTAR	251
TERRIER	251
Underwater weapons systems	251
ASROC	251
ASTOR	251
Mark 44 torpedo	251
Submarine sonar	252
SUBROC	251
Navy Selected Reserve	57, 97, 238
NORAD (North American Air Defense Command)	7, 94
Nuclear submarines:	
<i>Ethan Allen</i>	240
<i>George Washington</i>	16, 219, 240
<i>Halibut</i>	240

Nuclear submarines—Continued

	Page
<i>Nautilus</i>	212, 219
<i>Sargo</i>	219, 240
<i>Seawolf</i>	212, 240
<i>Skate</i>	212, 219, 240
<i>Skipjack</i>	240
<i>Swordfish</i>	219, 240
<i>Thresher</i>	241
Office of Civil and Defense Mobilization.....	75
Office of Naval Material.....	259
Office of Naval Research.....	218, 268
Office of the Chief of Naval Operations.....	218, 279
Office of the Secretary of Defense.....	35, 37, 385
Operations:	
BIG DEAL.....	210
CRESCENT HINGE.....	210
DEEP FREEZE IV.....	212, 222, 300
HARDTACK.....	24, 212
INLAND SEAS.....	213
SWIFTLIFT.....	316
TOP WEIGHT.....	210
Organization of American States (OAS).....	93
Panama Canal Zone.....	163
Pine Tree line.....	297
President's Committee To Study the United States Military Assistance Program. (See Draper Committee.)	
Projects:	
Argus.....	339
Beacon.....	22
BETTY.....	132
Elimex.....	133, 137
MASS.....	133, 138
Mercury.....	247, 322, 334
Midas.....	22
Notus.....	22
Paydirt.....	164
Score.....	334
Sentry.....	22
Stratoscope.....	267
TENOC.....	268
Tiros.....	21
Transit.....	22
Vanguard.....	21
Reserve Forces Policy Board.....	97
Equipment.....	105
Air Force Reserve.....	106
Air National Guard.....	106
Army National Guard.....	105
Army Reserve.....	105
Marine Corps Reserve.....	106
Naval Reserve.....	106

Reserve Forces Policy Board—Continued	Page
Facilities	107
Air Force Reserve	109
Air National Guard	109
Army National Guard	107
Army Reserve	107
Marine Corps Reserve	109
Naval Reserve	108
General	97
Personnel	97
Air Force Reserve	104
Air National Guard	103
Army National Guard	99
Army Reserve	101
Marine Corps Reserve	103
Naval Reserve	102
Ready Reserve not on active duty (fig. 1)	98
Reserve Officers Personnel Act	99
Special 6 months active duty reserve training programs, actual and planned (fig. 2)	100
Rockets:	
AEROBEE-H1	269
ARCAS	268
ASROC	251
FALCON	344
GENIE	7, 21, 298
HONEST JOHN	9, 21
LITTLE JOHN	21, 171
LOKI	273
ZUNI	252
SAC (Strategic Air Command)	3, 25, 293
SAGE (Semi-Automatic Ground Environment system)	7, 297
School of Aviation Medicine	323
Selective Service System	152
Small Business Administration	72, 276
South East Asia Treaty Organization (SEATO)	91
STRAC (Strategic Army Corps)	8, 114, 115, 118, 153
Surplus Sales Information Office	74
Tables:	
Active duty military personnel	381
Active duty strength of Navy	233
Air Force active major installations	328
Air Force actual obligations and net expenditures, fiscal year 1959	359
Air Force family housing construction	330
Air Force reductions in manpower utilization	303
Allocation of funds for civil works, Army Corps of Engineers	185
Amounts available for obligation by Air Force fiscal year 1959	359
Army accidents, projected and actual	165
Broad areas of use of Army manpower at year-end strength	152
Civilian employees, Navy	274
Civilian personnel	384
Expenditures and expenditure availability, FY 1959 (civil functions)	378
Expenditures and expenditure availability, FY 1959 (military func- tions)	368

Tables—Continued	Page
Flood control projects placed in useful operation.....	187
Military Assistance Program expenditures by budget activity.....	380
Military Assistance Program obligations/reservations and expenditures	381
Military Assistance Program obligations/reservations by budget activity.....	380
Navy expenditures shown by broad purpose or function.....	278
Obligations and obligational availability of current general and special fund appropriations, FY 1959 (military functions).....	364
Obligations and obligational availability of current general appropriations, FY 1959 (civil functions).....	376
Reserve components personnel.....	383
Total personnel, Office of Secretary of Defense and Joint Chiefs of Staff	385
Tactical Air Command (TAC).....	295
University of Illinois.....	272
USAFE	295
WAF	304
Weapons Systems Evaluation Group (WSEG).....	26
Women's Army Corps.....	156



