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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, 1959, to June 30, 1960

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DEPARTMENT OF DEFENSE

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Letter of Transmittal

THE SECRETARY OF DEFENSE
WASHINGTON

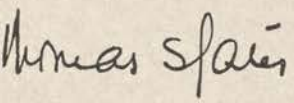
January 18, 1961

DEAR MR. PRESIDENT:

In compliance with Section 202(d) of the National Security Act of 1947, as amended, I submit the annual report of the Secretary of Defense, for fiscal year 1960, together with the reports of the Secretaries of the Army, Navy, and Air Force for the same period.

With great respect, I am

Faithfully yours,



THOMAS S. GATES, JR.

THE PRESIDENT
THE WHITE HOUSE

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Annual Report

of the

SECRETARY OF DEFENSE

July 1, 1959, to June 30, 1960

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I. The Armed Forces

During fiscal year 1960 the United States continued to maintain armed forces second to none. These forces successfully carried out their basic mission of insuring the security of the United States and deterring aggression.

The maintenance of an effective balance of these forces remained the objective of Department of Defense plans and programs—balance between general and limited war forces, between the requirements of the present and those of the future. This balance requires great judgment and constant review and is always controversial. Perfect balance is difficult to achieve. Nevertheless, all key civilian and military officials of the Department were in essential agreement on the decision reached during the past year.

While the multipurpose capabilities of many weapons and units make a clear distinction between general and limited war forces impossible, by far the larger part of available resources continued to be devoted to forces maintained primarily for limited war emergencies. At the same time, our retaliatory strategic forces achieved a readiness and striking power unequaled in their history.

Reflecting the impact of the current scientific revolution on weapons technology, the amount and proportion of resources spent on research and development have steadily risen, reaching $3.7 billion or 9 percent of the military expenditures in fiscal year 1960. The change in emphasis from aircraft to guided missiles continued—highlighted by the achievement of an operational capability for the intercontinental ATLAS in September 1959 and by bringing the development of the first POLARIS weapon system to near completion by the end of the fiscal year. Increased amounts of advanced weapons and equipment of all types were delivered to the active forces, including not only missiles but also supersonic aircraft, tanks, small arms, nuclear-powered ships, electronic equipment, and many other items. Programs for future weapon systems were accelerated whenever the progress in research made such acceleration practicable and the importance of the weapon to our security justified the additional cost.

The reserve establishment continued to grow in effectiveness as personnel policies, organization, and equipment were improved. Policies concerning the size and effective missions of various components were placed under further review.

ARMED FORCES
MILITARY PERSONNEL, DEPLOYMENT AND ALLOCATION
(THOUSANDS)

	AS OF 30 JUNE					
	ACTIVE DUTY PERSONNEL		DEPLOYMENT *		PERSONNEL IN OPERATING FORCE	
	1959	1960	1959	1960	1959	1960
DEPARTMENT OF DEFENSE	2,504	2,476	1,011	991	1,575	1,543
ARMY	862	873	343	347	545	562
NAVY	626	618	394	388	364	376
MARINE CORPS	176	171	42	42	109	101
AIR FORCE	840	815	232	214	557	531

* PERSONNEL ASSIGNED TO OVERSEAS BASES, ALASKA, HAWAII AND NAVY UNITS MOBILE AND AFLOAT

Figure 1

Our armed forces are today ready and prepared for all forms of military action. They are led by an officer corps of high capability, and both officers and enlisted men have an unequaled devotion to our national safety. Without the continued maintenance of such morale even the most glamorous new weapons will be ineffective.

Fiscal year 1960 represented another year marked primarily by the modernization of our armed forces. Military personnel strength, deployment, and the allocation of forces changed only slightly (see fig. 1).

Military personnel on active duty at the end of fiscal year 1960 totaled 2,476,000 as compared to 2,504,000 a year earlier. The reduction of 28,000 men reflects primarily the lower requirements resulting from the decrease in the number of Air Force wings and ships in the active Fleet. The changes in Army and Marine Corps year-end strengths are the result of recruiting policies to stay within the planned levels of 870,000 and 175,000, respectively.

Over 40 percent of our forces—991,000 men—were assigned on June 30, 1960, to oversea bases, to Alaska and Hawaii, or to afloat and mobile activities of the Navy. Practically all these men were under the operational command of unified and special commanders and organized for immediate action in case of emergency. These deployments included 39.7 percent of the Army, 62.8 percent of the Navy, 24.8 percent of the Marine Corps, and 26.2 percent of the Air Force. No changes of major significance in these deployments occurred during the year.

The percentage of personnel in the operating forces declined slightly during the year—62.9 percent to 62.3 percent. This decrease of 0.6 percentage points is largely accounted for by the heavier demand on the training facilities of the Air Force and the Marine Corps, caused by the larger number of first enlistments. A continuous effort is being made to reduce the number of personnel assigned to both the training and the supporting forces.

The Army

The modernization of equipment to improve firepower and mobility received primary emphasis in the Army during fiscal year 1960. The only organizational changes in the major forces structure were the elimination of one understrength training division and 4¾ air defense battalions and the addition of one battle group (see fig. 2).

REDSTONE, CORPORAL, and LACROSSE missiles, with ranges of about 200, 80, and 20 miles, respectively, were delivered in greatly increased quantities and provided substantial additional striking power with their dual capability of carrying nuclear as well as nonnuclear warheads. A new antitank missile, the wire-guided

ARMY

	AS OF 30 JUNE	
	1959	1960
MAJOR FORCES		
DIVISIONS	15	14
REGIMENTS/RCT'S	5	5
ARMORED COMBAT CMDS.	1	1
INFANTRY BRIGADES	2	2
BATTLE GROUPS	8	9
ARMY MISSILE CMDS.	4	4
AIR DEFENSE BATTALIONS	85	80 1/4
PERSONNEL		
ACTIVE DUTY	861,964	873,078
RESERVE COMP. (PAID STATUS)	749,600	763,562
NATIONAL GUARD	(399,427)	(401,765)
RESERVE	(350,173)	(361,797)
CIVILIAN	526,300	503,009
ACTIVE AIRCRAFT INVENTORY	5,199	5,493
HELICOPTERS	(2,357)	(2,633)
FIXED WING	(2,842)	(2,860)

Figure 2

SS–10, became operationally available during the year, increasing the defensive strength of infantry divisions.

In the small arms field, the 7.62-mm. rifle and machinegun, which are scheduled to replace eventually eight different weapons now in use, started to be delivered in quantity. The new arms are lighter, more effective, and more reliable than their predecessors and use the standard NATO cartridge. The interchangeability of ammunition with our allies and the reduction in the number of different weapons is expected to lower significantly the Army's logistical requirements.

Fiscal year 1960 also marked the first deliveries of the M–60 medium tank and the M–113 armored personnel carrier. The new tank—compared to its predecessor, the M–48—carries a more powerful gun, is lighter, and has a more efficient engine, using diesel fuel, and a greater operating range. The M–113 is an aluminum armored personnel carrier with less than half the weight of its predecessor and provides, therefore, pronounced advantages in range, speed, and gas consumption.

Additional tactical mobility was achieved by the Army with an increase of about 6 percent in its aircraft inventory—from 5,199 to 5,493 planes. New aircraft delivered to field units included the turbine-powered utility helicopter, the Iroquois.

The Army's antiaircraft missile strength improved as the HAWK became operational at the beginning of fiscal year 1960, giving the Army an effective defense against low-flying aircraft. The rapid replacement of NIKE-AJAX with NIKE-HERCULES battalions continued. The longer range and greater effectiveness of the nuclear-capable NIKE-HERCULES accounted primarily for the reduction in the number of regular Army air defense battalions from 85 to 80¼. In addition, the Army National Guard took over full responsibility for the continued operational readiness of 11 NIKE-AJAX battalions in the continental United States, bringing the total number of on-site battalions thus assigned to 13.

The Navy and Marine Corps

The commissioning of the first two POLARIS submarines—the *George Washington* on December 30, 1959, and the *Patrick Henry* on April 9, 1960—and the successful launching shortly after the close of the fiscal year of two POLARIS missiles from the submerged *George Washington* gave clear evidence that the POLARIS missile system would be operationally deployed as scheduled before the end of calendar year 1960.

The development of this radically new weapon system was accomplished within less than 4 years from the time that the Navy's

solid-propellant ballistic missile program was approved. With the ships authorized by the budget for fiscal year 1961, the POLARIS program included, in addition to the 2 submarines commissioned, authorization for the construction of 12 new submarines and the procurement of long leadtime components for 7 more. Four of these submarines are scheduled to be commissioned during fiscal year 1961 and will provide an increasingly effective addition to the deterring power of our armed forces.

Substantial progress was also made in other major naval programs, particularly in nuclear propulsion, guided missiles, modernization of aircraft, and antisubmarine warfare.

The main striking power of the Fleet continued to be centered around 14 attack carriers, including 4 *Forrestal*-type carriers. While the number of active warships was reduced from 386 to 376 during the fiscal year (see fig. 3), the additions included 5 nuclear-propelled submarines, bringing the total of such ships commissioned to 11. To the guided missile ship category, 8 ships were added—3 converted cruisers, 2 new frigates, and 3 nuclear-propelled submarines—increasing the number of guided missile ships serving with the Fleet on June 30, 1960, to 16. Additional new construction and modernization funded through fiscal year 1961 included 50 conventionally powered and armed ships, 38 nuclear-powered ships, and 65 guided missile ships, of which 14 will be nuclear-powered.

The 16 carrier air groups were strengthened, particularly by further deliveries of the improved all-weather version of the A4D Skyhawk light attack aircraft and of the F8U Crusader, the most widely used carrier fighter at the present time. New aircraft placed into production during the fiscal year included the A2F–1 Intruder, a light attack plane with greater range, endurance, and all-weather capabilities, and procurement continued for the A3J–1 Vigilante, a new heavy attack bomber, and the F4H–1 Phantom II, a supersonic, all-weather, twin-jet fighter.

The Navy's nuclear striking power at the close of the fiscal year consisted of the attack aircraft of the carrier air groups and five REGULUS I submarines, capable of destroying targets more than 500 miles distant. Aircraft, many of them equipped with SIDEWINDER and SPARROW III air-to-air missiles, continued to carry major responsibility for the air defense of the Fleet, but were increasingly supplemented by 12-mile TERRIER and 75-mile TALOS surface-to-air missiles. Additional deliveries of BULLPUP air-to-surface missiles reinforced the traditional ground support provided by naval ships and aircraft.

Greatly increased emphasis was placed on antisubmarine warfare during the year. The centralized command structure for all antisub-

NAVY

	AS OF 30 JUNE	
	1959	1960
MAJOR FORCES		
COMMISSIONED SHIPS	860	812
WARSHIPS	(386)	(376)
OTHER SHIPS	(474)	(436)
CARRIER AIR GROUPS	16	16
CARRIER ANTI-SUB. SQDNS.	22	31
PERSONNEL		
ACTIVE DUTY	626,340	617,984
RESERVE (PAID STATUS)	130,006	132,709
CIVILIAN	374,500	365,502
ACTIVE AIRCRAFT INVENTORY	9,649	8,863
JET AIRCRAFT PERCENTAGE	43%	43%
OPERATING	(7,562)	(6,562)
LOGISTICAL SUPPORT	(2,109)	(2,104)

MARINE CORPS

MAJOR FORCES		
DIVISIONS	3	3
AIRCRAFT WINGS	3	3
PERSONNEL		
ACTIVE DUTY	175,571	170,621
RESERVE (PAID STATUS)	46,416	46,470

Figure 3

marine activities established for the Atlantic Fleet in fiscal year 1959 was introduced into the Pacific Fleet. Accelerated progress in antisubmarine tactics was achieved by combining doctrine development, training, and operations—a concept originally tested in 1958 by Task Force Alfa. Detection ranges were extended by new sonars and sonobuoys and the Fleet's attack capabilities increased by an improved homing torpedo. The 22 antisubmarine air squadrons were reorganized into 11 air groups and the number of component squadrons increased to 31 by the activation of replacement units that provide the air groups with better trained personnel and increased combat readiness.

The Marine Corps continued to maintain three combat-ready divisions and three air wings—organized, trained, and equipped for rapid deployment to any trouble spot in the world. With a total personnel strength of 171,000 at the close of the fiscal year, the Marines were slightly below their programed strength of 175,000. Like the other military Services, the Marine Corps improved its combat capabilities by deliveries of additional modern weapons, including new attack and fighter aircraft; helicopters; SIDEWINDER, BULLPUP, and TERRIER missiles; and HONEST JOHN rockets. The first Marine HAWK surface-to-air missile battalion was activated during the fiscal year.

The Air Force

When the first ATLAS missile became operational in early September 1959, a major step was taken by the Air Force in shifting its retaliatory capability from aircraft to a mixed force of ballistic missiles and aircraft.

The approved Air Force program at the close of the fiscal year called for 13 ATLAS squadrons to be ready by December 1962. Starting in 1961 the first of 14 TITAN squadrons is scheduled to become operational. In 1963 these liquid-propelled intercontinental missiles will be joined by the first solid propellant MINUTEMAN, planned to be deployed initially in fixed hardened and dispersed emplacements.

The heavy bomber force continues to grow in effectiveness. During fiscal year 1960, an additional wing of B–52's was activated, while the number of B–47 medium bombers was reduced. Deliveries of the advanced model B–52G and a steady increase in the number of KC–135 jet tankers for aerial refueling lengthened the radius of action of the Strategic Air Command. In May 1960, the HOUND DOG, an air-to-surface 500-mile aerodynamic missile, became operationally available and by the end of the fiscal year two squadrons of B–52's were being equipped with this powerful

AIR FORCE

	AS OF 30 JUNE	
	1959	1960
MAJOR FORCES		
TOTAL WINGS	105	96
STRATEGIC	(43)	(40)
AIR DEFENSE	(27)	(23)
TACTICAL	(35)	(33)
PERSONNEL		
ACTIVE DUTY	840,028	814,752
RESERVE COMP. (PAID STATUS)	135,556	135,848
NATIONAL GUARD	(70,994)	(70,820)
RESERVE	(64,562)	(65,028)
CIVILIAN	364,094	354,928
ACTIVE AIRCRAFT INVENTORY	20,890	18,712
JET AIRCRAFT PERCENTAGE	66%	67%
OPERATING	(18,260)	(16,567)
NON-OPERATING	(2,630)	(2,145)

Figure 4

595308—61——2

new weapon system. The HOUND DOG enables manned bombers to attack heavily defended targets without direct exposure to enemy antiaircraft fire. The penetrating capability of these bombers was also enhanced with the successful operational tests in June 1960 of the QUAIL, an air-launched decoy. The long research and development effort on the aerodynamic SNARK was also completed during the year, when a SNARK squadron became operational.

In the air defense field, the Air Force's contribution was strengthened during the year as most of the subsonic F–86's and F–89's were replaced by supersonic F–101's and F–106's. Improved FALCON and SIDEWINDER air-to-air missiles and GENIE air-to-air rockets, equipped with nuclear warheads, increased the effectiveness of these fighter interceptors. An additional nuclear capability was introduced in September 1959 when the 200-mile BOMARC–A was placed in service; by June 1960, four squadrons had been declared operational.

The Tactical Air Force includes bomber, fighter, reconnaissance, and troop carrier aircraft and surface-to-surface missiles. While the supersonic F–100 continued to be the principal aircraft in tactical fighter squadrons, one wing was being converted to the new F–105, designed to provide more effective close air support to ground combat troops. Substantial progress was also made in reequipping MATADOR surface-to-surface missile squadrons with the longer range and more effective MACE–A, which became operational during the year. Increases in the number of transport aircraft, particularly of the C–130 Hercules assault troop carrier, improved our capability to lift men and materiel to distant trouble spots.

The adjustments in the Air Force wing structure and personnel strength during fiscal year 1960 reflected the impact of the introduction of these new and improved weapons. While the number of wings was reduced from 105 to 96 and military personnel from 840,000 to 815,000, the over-all striking power of the Air Force was greater at the close of the fiscal year than at the beginning (see fig. 4).

Major Missions and Deployment

The units organized, trained, and equipped by their respective military departments are assigned for operational command to eight unified and specified commands established by the Secretary of Defense—six unified commands for Alaska, Atlantic, Caribbean, Continental Air Defense, Europe, and Pacific and two specified commands for Strategic Air and the Eastern Atlantic and Mediterranean (see fig. 5). In general, the missions of these commands are focused on strategic, continental air defense, or limited war operations.

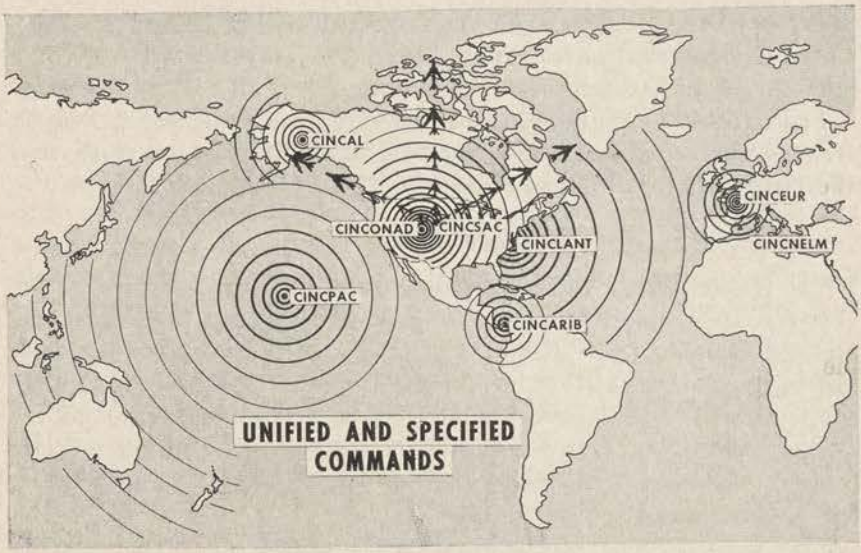

Figure 5

Strategic Forces

United States retaliatory capability remained centered during the fiscal year on the heavy and medium bombers of the Strategic Air Command (SAC), operating from bases in the United States, Europe, north Africa, and the Pacific and flown by thoroughly trained and expert crews. Strategic aircraft continued to be dispersed to additional airfields to provide increased readiness and protection, and about one-third of the combat strike force was placed on 15-minute ground-alert. In December 1959 steps were taken to procure the materiel and train the additional crews required for keeping a substantial part of the heavy bomber force on a continuous airborne alert, in case such an alert should become necessary.

During the fiscal year the first intercontinental missiles reinforced the strategic bombers—ATLAS ballistic missiles at Vandenberg Air Force Base, Calif., and SNARK aerodynamic missiles in Maine.

The enormous striking power of the strategic forces can be further increased in the event of a major war by numerous tactical aircraft capable of delivering nuclear weapons. The USAF Tactical Air Forces have over 1,000 aircraft with such a capability deployed overseas and about 200 naval attack planes are constantly on station with the Sixth and Seventh Fleets in the Mediterranean and the Far East.

To provide increased assurance of the effectiveness of all forces with retaliatory missions, improved procedures were being developed at

the close of the fiscal year for the continued review of target assignments, incorporated into a Single Integrated Operational Plan. This plan covers all forces assigned, including the POLARIS submarine.

The approved programs for the introduction of advanced weapon systems guarantee that our strategic units will remain a ready and effective retaliatory force in the years ahead.

Continental Air Defense

The responsibility for the air defense of the northern half of the Western Hemisphere has been assigned to the North American Air Defense Command (NORAD), a joint United States-Canadian headquarters, of which the Continental Air Defense Command (CONAD) constitutes the U.S. component. CONAD is a unified command, including Army, Navy and Air Force units, and exercises operational control over some of the Navy's early warning ships and aircraft in the Atlantic and Pacific.

The imminent shift in the air threat to our security from aircraft alone to ballistic missiles and aircraft led to a comprehensive review of our air defense programs in fiscal year 1960. As a result, elements of the defense against aerodynamic weapons, that would take excessive time and funds to complete, were cut back in favor of a more rapid modernization of available weapons and equipments. These adjustments brought a reduction in the programs for the BOMARC missile and the hardened "supercombat" centers for the Semi-Automatic Ground Environment (SAGE) system, and an acceleration in the modernization of the fighter interceptor forces and in the construction of the Ballistic Missile Early Warning System (BMEWS). At the same time the research effort to develop more advanced warning systems against ballistic missiles was strengthened. The revised program provides an earlier completion of defenses against aerodynamic weapons, but on a less extensive scale than previously planned.

The BMEWS program includes three widely dispersed, long-range radar stations, a central computer and display facility in the United States, and a communications network to link the separate elements. This system is capable of providing a 15-minute warning of a massive ballistic missile attack. The first ground station at Thule, Greenland, was nearly completed during the year and construction schedules for the other two stations at Clear, Alaska, and Fylingdales, England, were advanced.

The warning net against bomber attack was improved with the installation of additional "gap filler" radars and the modernization of radar and communication equipment for the Distant Early Warning (DEW) line, stretching from the Aleutians around the Arctic Circle

to the east coast of Canada, and the Mid-Canada line along the 55th parallel. The picket ships in the Pacific barrier, extending from the Aleutians to Midway, were withdrawn during the year, and sole responsibility for coverage was assigned to early warning aircraft.

Substantial progress was also made in the development of active defenses against air attack. The SAGE system for coordinating the operations of aircraft and missiles was extended from the northeastern section of the United States to the north central and northwestern sections, tripling the area covered by SAGE and greatly increasing the operational effectiveness of the advanced interceptors and BOMARC missiles delivered during the year. Also tied in with the SAGE system are the Army's MISSILE MASTERs, used to direct the fire of NIKE batteries providing the local defenses of important cities and air bases throughout the country. Four more MISSILE MASTERs were placed in operation during fiscal year 1960, for a total of five.

Tactical Forces

The great bulk of our armed forces, while carrying important missions in case of a general war, is available to counter local aggression. These forces have a nuclear and nonnuclear capability and are being equipped with the most modern weapons available. A large portion is assigned overseas, helping our allies to guard their frontiers, while units stationed at home are trained to move at short notice. The sea lanes essential for continued support are guarded by powerful naval forces, and substantial reserve components are available as reinforcements in case of need.

The tactical forces deployed are assigned to unified commands with responsibility for particular areas. The combat forces held in reserve for rapid deployment will be assigned to the unified commander in whose area the emergency develops.

Ground forces are provided by both the Army and Marine Corps. Eight Army divisions are stationed outside the continental United States—five in Europe with the forces of the North Atlantic Treaty Organization (NATO), two in Korea, and one in Hawaii. Supporting troops, including REDSTONE, CORPORAL, and LACROSSE missile and HONEST JOHN rocket battalions and NIKE antiaircraft missile batteries, are available at strategic locations to provide additional firepower and protection to ground combat units. The Strategic Army Corps (STRAC), composed of one infantry and two airborne divisions, together with strong supporting units, is stationed at home, prepared at all times to move out on short notice.

As for the Marines, one division-wing team is located in the Pacific, with units on Okinawa and Hawaii and with the Seventh Fleet;

another one is on the Pacific Coast in southern California; and the third one is in North Carolina, from where units are deployed to the Mediterranean and Atlantic Fleets.

The ships and aircraft of the Navy are organized into four powerful fleets. The First and Seventh Fleets, with eight attack carriers, stand guard in the Pacific and Far East, while the Second and Sixth Fleets, with six attack carriers, protect the Atlantic and the Mediterranean, respectively. Ships are rotated between Fleets on a regular schedule to keep about one-third of our naval strength at advanced positions and one-third near our own coasts, while the remaining one-third is in port for overhaul or is being used for training purposes.

Over one-half of the Air Force's tactical units are based in Europe and the Far East, responsive to the requirements of unified commanders. Those in the United States are organized under the Air Force's Tactical Air Command and are frequently rotated for short stays overseas. In case of emergency, the necessary units will be assigned to Composite Air Strike Forces for instant deployment.

II. Research and Development

The orderly adjustment to the impact of current revolutionary developments in science and technology on military weapon systems has presented a major challenge to our armed forces in recent years. To meet this challenge, research and development activities throughout the Defense establishment have been steadily expanded, and management controls have been strengthened to provide effective direction and prevent unnecessary duplication.

Fiscal year 1960 brought another marked increase in the military research and development effort. Obligations in this field reached a total of $5.8 billion, as compared to $5.4 billion during the preceding year. Of this year's total, $4.0 billion was provided by research and development appropriations, $1.5 billion by procurement funds, and $0.3 billion by military personnel and construction accounts for the direct support of research activities.

The effort devoted to improving missiles and missile defenses continued as the major field of research, receiving 39 percent of the research and development funds. Future changes in weapon systems are forecast by the increase during the last 2 fiscal years in the obligations for space projects from 9 to 11 percent and the decrease in aircraft development research from 12 to 8 percent. Obligations in other fields of research were at about the same level in fiscal year 1960 as the year before—13 percent for general research in the military sciences; 5 percent for ships and related equipment; 5 percent for ordnance, vehicles, and related items; 13 percent for other types of equipment; and 6 percent for program management (see fig. 6).

Authoritative and improved direction of research activities was provided by the Director of Defense Research and Engineering—a position authorized by the 1958 Reorganization Act and established early in calendar year 1959. The Director was given responsibility not only to supervise all research activities of the military departments but also to direct and control those that require centralized management. The Advanced Research Projects Agency (ARPA) was officially placed under his immediate control on Decmber 30, 1959.

RESEARCH AND DEVELOPMENT ACTIVITIES
OBLIGATIONS OF R&D FUNDS
(MILLIONS OF DOLLARS)

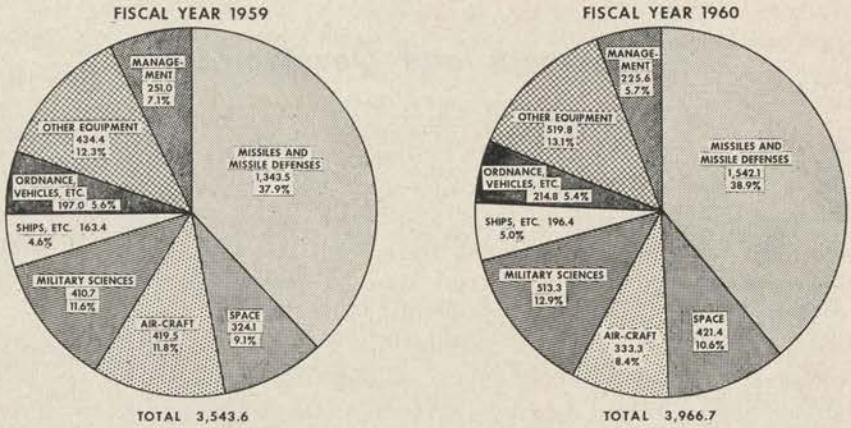

Figure 6

Military Space Technology

The effect on military activities of the recently achieved capability of man to probe outer space is important but still uncertain. Current military research is focused on the development of early warning, reconnaissance, navigation, and communication satellites and is exploring other possible uses of space.

In view of the unknown potential in this field, the direction and control of the military space effort was originally assigned to ARPA. The rapid progress made since 1958 permitted the progressive assignment of space projects to the military departments. In accordance with a plan announced in September 1959, the Air Force was given responsibility for the development, production, and launching of all military space boosters, and the development of payloads for specific satellites and supporting ground equipment was transferred to one of the military departments on the basis of primary interest and research capability.

In November 1959, the Air Force was assigned responsibility for three projects—DISCOVERER, MIDAS, and SAMOS. The objective of DISCOVERER is to test components, propulsion, and guidance systems to be used in other satellite projects and to develop techniques for the recovery of space capsules. Of the eight attempts made during the year to place DISCOVERER satellites into orbit, five were successful, but the recovery of the capsule was not achieved. The MIDAS project is aimed at developing an early warning satellite that will detect the launching of ballistic missiles. Two MIDAS

launchings were attempted during the year, with one being successful. SAMOS satellites are scheduled to be launched in fiscal year 1961 and should provide further information on the feasibility of reconnaissance from space.

Responsibility for the navigational satellite, TRANSIT, was transferred to the Navy in May 1960. Of the three TRANSIT shots attempted during the year, two were successful. One of these carried two satellites into orbit for the first time; the TRANSIT capsule provided data on the precise shape of the earth and its smaller companion measured the intensity of solar radiation.

Responsibility for communication satellites was transferred from ARPA to the Army after the close of the fiscal year. This transfer involved primarily COURIER, a delayed repeater communications system, and ADVENT, an active instantaneous relay system.

Altogether, Department of Defense agencies during fiscal year 1960 attempted 13 satellite launchings, of which 8 were successful—placing 9 satellites into orbit (see fig. 7). In addition, the Department of Defense participated in the space activities of the civilian National Aeronautics and Space Agency (NASA), which attempted eight additional satellite launchings and two space probes and succeeeded in orbiting four satellites and sending one capsule into interplanetary space. In summary, of the 23 space shots by the United States during the fiscal year, 13 were successful, placing 13 satellites into orbit and achieving 1 space probe.

The civilian space effort was further strengthened during the year with the transfer to NASA—proposed by the President on October 21, 1959—of the Development Operations Division of the Army Ballistic Missile Agency at Huntsville, Ala., including its SATURN project for the development of a rocket engine with a 1.5 million-pound thrust. The Defense establishment also assisted NASA by making boosters and launching and tracking facilities available for its satellite shots and space probes.

Progress was also made in improving satellite detection and tracking facilities, a joint responsibility of NASA and the Department of Defense. A more powerful transmitter was being constructed to extend the coverage of the military Space Surveillance Detection Net (SPASUR) that detects, identifies, and tracks silent satellites and feeds the information into the National Space Surveillance Control Center (SPACETRACK), a central point for analyzing such data from all sources. Central supervision and coordination of activities in this field were assigned in April 1960 to a special office reporting to the Director of Defense Research and Engineering, and plans were developed for the early transfer of the projects to the military departments—SPASUR to the Navy and SPACETRACK

MILITARY SATELLITES

FISCAL YEAR 1960

DATE	NAME	TYPE	TEST RESULTS
Aug. 13, 1959	DISCOVERER V	Recoverable Satellite	Achieved orbit but capsule not recovered; down Sept. 28, 1960.
Aug. 19, 1959	DISCOVERER VI	Recoverable Satellite	Achieved orbit but capsule not recovered; down Oct. 20, 1959.
Sep. 17, 1959	TRANSIT I-A	Navigation Satellite	Did not achieve orbit.
Nov. 7, 1959	DISCOVERER VII	Recoverable Satellite	Achieved orbit but capsule not recovered; down Nov. 26, 1959.
Nov. 20, 1959	DISCOVERER VIII	Recoverable Satellite	Achieved orbit but capsule not recovered; down Mar. 7, 1960.
Feb. 4, 1960	DISCOVERER IX	Recoverable Satellite	Did not achieve orbit.
Feb. 19, 1960	DISCOVERER X	Recoverable Satellite	Did not achieve orbit.
Feb. 26, 1960	MIDAS I	Warning Satellite	Did not achieve orbit.
Apr. 13, 1960	TRANSIT I-B	Navigation Satellite	Achieved orbit; indicated feasibility of navigational satellite system.
Apr. 15, 1960	DISCOVERER XI	Recoverable Satellite	Achieved orbit but capsule not recovered; down Apr. 26, 1960.
May 24, 1960	MIDAS II	Warning Satellite	Achieved orbit; transmitted infrared data.
Jun. 22, 1960	TRANSIT II-A	Navigation Satellite	Two satellites placed in orbit; one further demonstrated feasibility of navigational satellite system; second satellite measured solar radiation.
June 29, 1960	DISCOVERER XII	Recoverable Satellite	Did not achieve orbit.

Figure 7

to the Air Force—for the assignment of operational control to the North American Air Defense Command.

The Department of Defense and NASA continued their close association in developing equipment and techniques for human space travel. The X–15, a high-speed, high-altitude experimental manned aircraft developed by the Air Force, made six powered test flights during the year, reaching an altitude of more than 100,000 feet and a speed of Mach 3. The studies of Dyna-Soar, a glider vehicle designed for altitudes of several hundred thousand feet and speeds up to Mach 25, progressed sufficiently to justify the selection of a contractor. Manned space flight is the objective of Project MERCURY, a NASA activity undertaken with the cooperation and support of the Department of Defense.

Nuclear Developments

In the nuclear field, the Atomic Energy Commission (AEC) is responsible for research, development, and production of all nuclear weapons and power reactors. Agreement on specific projects is reached through the Military Liaison Committee to the AEC.

No nuclear weapons were tested during the fiscal year, in accordance with the voluntary suspension of such tests initiated by the United States in November 1958. In the meantime, theoretical studies, laboratory experiments, and simulation techniques were used to expand our knowledge of nuclear weapons effects. This work is coordinated by the Defense Atomic Support Agency with the assistance of the Department of Defense Weapons Effects Board, established in April 1960. The approval in October 1959 of an Armed Forces Radiobiology Research Institute is expected to expand the medical effort in this field.

The high altitude sampling program, initiated in 1957 to study the distribution of radioactive debris injected into the stratosphere by nuclear tests, was completed during the year. It involved the collection by U–2 aircraft of over 4,000 samples of the atmosphere at altitudes of about 70,000 feet from the Arctic to the Antarctic. The analysis of these samples makes possible predictions of worldwide fallout patterns in case such nuclear tests are resumed.

Increased emphasis was placed during the year on the development of technically more reliable detection systems for nuclear explosions, particularly those occurring underground or high in the atmosphere. This project was assigned to ARPA in September 1959.

The use of nuclear energy as a source of power was considerably expanded by the armed forces during the year.

Improved reactors were developed for naval ships, of which a total of 11, all submarines, had been commissioned by June 30, 1960. One

of these, the *Seawolf*, was temporarily withdrawn from service to substitute a water-cooled reactor for the original one using sodium. The nuclear-powered ships under construction include, in addition to submarines, the aircraft carrier *Enterprise*, the guided missile cruiser *Long Beach*, and the guided missile frigate *Bainbridge*.

On land, the construction of a stationary medium-power-range reactor at Fort Greely, Alaska, was nearly completed; it is based on the experience gained from a similar experimental and training reactor installed at Fort Belvoir, Va. These reactors provide about 1.7 megawatts of electricity and additional power for heating. Portable medium-power-range reactors have been scheduled for early installation at Sundance Air Force Station, Wyo., and Camp Century, Greenland; they are air-transportable and can be assembled within 90 days.

Still in the research and development stage are a number of advanced nuclear reactors for the propulsion of ships, for mobile use on land, and to provide a power source for instruments in satellites.

Research on nuclear propulsion for aircraft and missiles continued as a joint program of the Atomic Energy Commission and the Department of Defense. The Aircraft Nuclear Propulsion (ANP) project was again reviewed during the year, and it was concluded that further research on reactors still represented the primary prerequisite for the successful development of a militarily effective aircraft. Work progressed on both the direct- and indirect-cycle reactors under study for this project. The development of a nuclear-propelled ramjet missile, Project PLUTO, advanced through the early design stage. An experimental reactor for this project was built by the Atomic Energy Commission and will be tested during the coming fiscal year. The feasibility of propelling space vehicles by closely spaced nuclear explosions is being investigated under Project ORION.

Guided Missiles

Research in the guided missile field has been responsible for the greatest changes in weapons technology in recent years. Not only is nearly 40 percent of the research dollar being allocated to this field but, including procurement and construction directly associated with missile programs, about 13 percent of all Defense dollars—or about $5.2 billion—was appropriated for this purpose during fiscal year 1960.

At the close of the year, the number of missile systems operational or approved for development totaled 41. Of these, 23 were operationally available, with 9 entering into this category during fiscal year 1960. The rapid progress in this field is illustrated by the in-

creasing replacement of earlier missiles by more advanced versions, as for example NIKE-AJAX by NIKE-HERCULES and MATADOR by MACE and the introduction of numerous improved models without a change in nomenclature. This trend will continue at an accelerated rate as the 18 projects currently under development reach the operational stage. One project, the Navy's medium-range, air-to-surface CORVUS missile, was canceled.

Strategic Missiles

In view of the vital importance of maintaining an effective retaliatory force, the highest national priority continued to be assigned to the development of intercontinental ballistic missiles (ICBMs) and the POLARIS program.

The 5,500-nautical-mile ATLAS missile, which became operational in September 1959, was flight tested 30 times during the year, with 26 of these tests considered successful, 1 partially successful, and 3 unsuccessful. Among the successful tests was an ATLAS fired 7,800 nautical miles from Cape Canaveral to the Indian Ocean on May 20, 1960—the longest range yet achieved by an ICBM. Work on the advanced ATLAS-E missile, equipped with all-inertial instead of radio-inertial guidance, progressed as programed.

Development tests of the TITAN missile encountered difficulties during the early part of the fiscal year, but the cause of these malfunctions was discovered and the success of subsequent launchings brought the program back on schedule. Of the 13 TITAN tests during the year, 8 were classified as successful, 2 partially successful, and 3 unsuccessful. The TITAN, a true two-stage missile, is currently scheduled to carry a more powerful nuclear warhead than the ATLAS.

The three-stage, solid-fueled MINUTEMAN successfully passed most of the tests preliminary to the first free flight launchings. The results of the tethered silo launchings of the full-scale missile were so satisfactory that the number of tests in this phase of the program was reduced from 18 to 8. The test firing of the engines for the various stages of this missile proceeded essentially on schedule, and a preliminary evaluation of the railway mobility concept for MINUTEMAN was undertaken. Thus, increased assurance was provided that the MINUTEMAN, with its high degree of readiness, relatively small size, and capability for varied deployment, will represent a most significant addition to our deterrent power in the near future.

The POLARIS missile system, as indicated earlier, was close to operational availability on June 30, 1960. Of the 33 test flights attempted during the fiscal year, none was classified as unsuccessful;

STRATEGIC MISSILES

JUNE 30, 1960				
Type	Developing Service	Operationally Available	In Late Development	In Early Development
1,500-MILE IRBM	ARMY AIR FORCE	JUPITER THOR		
FLEET BALLISTIC MISSILE	NAVY		POLARIS	
5,500-MILE AERODYNAMIC	AIR FORCE	SNARK		
5,500-MILE ICBM	AIR FORCE	ATLAS	TITAN	MINUTEMAN
AIR-TO-SURFACE	AIR FORCE	HOUND DOG		SKYBOLT
AIR-LAUNCHED DECOY	AIR FORCE	QUAIL		

Figure 8

21 were considered successful and 12 partially successful. Improved POLARIS missiles, increasing both range and payload, are being developed. The POLARIS missile-submarine combination places this intermediate-range missile in the intercontinental missile category.

To assist our strategic bombers in penetrating enemy defenses, various long-range air-to-surface missiles have been under study for some years. The supersonic, 500-mile-range HOUND DOG missile was declared operational in May 1960; some components were being modified at the close of the year to improve future performance. Research continued on the SKYBOLT, an air-launched ballistic missile with a range of over 1,000 nautical miles. As noted earlier, an initial operational capability was achieved toward the end of the year for the air-launched decoy missile, the QUAIL.

Air Defense Missiles

Major emphasis in active air defense research continued to be placed on the development of weapons to counter enemy ballistic missiles. While further progress was made in this field, difficult scientific and technological problems remain to be resolved before an effective system will become available.

The NIKE-ZEUS effort is the program furthest advanced, and the highest national priority has been assigned to the development and full-scale test of this missile. Experimental models performed well in test flights during the year, and research and development to

AIR DEFENSE MISSILES

JUNE 30, 1960				
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	TYPHON
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 9

improve the system's capability to detect, track, identify, and intercept ballistic missiles continued at full speed. The decision to approve quantity production must await the results of these studies.

Other approaches to resolving the ballistic missile defense problem are being investigated through project DEFENDER, assigned to ARPA. This effort was sharply increased. The search for new answers includes the analysis of the phenomena associated with the boost, mid-course, and terminal phase of the ICBM flight pattern and the examination of techniques, other than those employed by NIKE-ZEUS, to find and destroy such missiles.

Research on missiles to counter airborne threats brought into operational use during the year the HAWK, particularly effective against low-flying aircraft, and the BOMARC-A, designed to destroy airborne targets at a distance of over 200 miles. Although the over-all BOMARC program was reduced, the development of BOMARC-B, with twice the range of the A model, continued satisfactorily, including the successful interception of a supersonic target.

Additional protection of combat troops against air attack is the objective of two Army projects started in fiscal year 1959—REDEYE, a shoulder-fired, bazooka-type weapon with an electronic homing device for defense against low-level aircraft, and MAULER, an all-weather guided missile system installed on a self-propelled chassis. Both projects advanced on schedule.

Progress was also made in improving the NIKE-HERCULES system. Particularly important was a test in which this air defense

system successfully acquired, tracked, and intercepted a CORPORAL surface-to-surface missile, thus promising increased effectiveness against supersonic targets with a small cross-section.

The air defense of the Fleet was improved with the delivery of improved TERRIER and TALOS missiles which have twice the range and altitude of the first models issued. The development of the TARTAR, a smaller surface-to-air missile for deployment on destroyers, progressed satisfactorily through the first test of a production model. The Navy also began research on the TYPHOON missile system, designed to provide antiaircraft and antimissile weapons that will greatly outperform TERRIER, TALOS, and TARTAR.

Advanced models of the three short-range air-to-air missiles currently operational—the FALCON, SIDEWINDER, and SPARROW III—were under development with the prospect of greatly increasing their speed, range, and effectiveness. The long-range, supersonic air-to-air EAGLE missile remained in the early development stage.

Tactical Missiles

In the tactical missile field, three new weapon systems—the SS–10, the LACROSSE, and the MACE—moved into the operationally available category during the year and good progress was made in the development of other advanced weapons.

After thorough tests, the Army purchased the French-developed wire-guided SS–10 missile as an antitank weapon to be used by front-line troops. Improved models of the SS–10—the SS–11 and SS–12—and the German-developed COBRA were being evaluated with a view toward eventual selection of a single, man-portable system to be used by all our ground combat forces. Still in the early development stage is the SHILLELAGH, which is being designed for use with future armored assault vehicles and will fire either command-guided antitank missiles or conventional 152-mm. ammunition, whichever is appropriate for the tactical mission at hand.

The effectiveness of close tactical support was improved with the delivery of substantial numbers of LACROSSE missiles, which were first issued to troops in June 1959 and became fully operational in January 1960. As a possible future replacement for LACROSSE and for existing short-range rockets, the Army started the MISSILE A project, which has as its objective the development of a simpler and less expensive weapon system. Still in the feasibility-study stage was MISSILE B with a somewhat greater range.

To replace the liquid-fuel CORPORAL and REDSTONE missiles, with respective ranges of about 75 and 200 miles, the solid-fuel SERGEANT and PERSHING were under development. After the

TACTICAL MISSILES

JUNE 30, 1960				
Type	Developing Service	Operationally Available	In Late Development	In Early Development
CLOSE-IN SUPPORT OF GROUND TROOPS	ARMY			SHILLELAGH
ANTI-TANK	ARMY MARINE CORPS	SS-10	COBRA	
SURFACE-TO-SURFACE, SHORT RANGE	ARMY ARMY	LACROSSE		MISSILE A MISSILE B
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 AIR FORCE	MATADOR MACE		
SHIP-TO-SHORE, LONG RANGE	NAVY	REGULUS I		
AIR-TO-SURFACE, SHORT RANGE	NAVY	BULLPUP		
ANTI- SUBMARINE MISSILE	NAVY		ASROC	SUBROC

Figure 10

problems encountered in the SERGEANT program early in the year were resolved, research and engineering firings were resumed. The PERSHING entered the propulsion test flight stage, and the five flights attempted were successful.

Moving into the production stage was the MACE-B, an improved version of the 600-mile MACE-A which became operational during the year. The new model of this aerodynamic missile will have a range close to that of such intermediate-range ballistic missiles (IRBMs) as JUPITER and THOR.

The air-to-surface guided missile, the BULLPUP, demonstrated outstanding reliability in its operational employment with Navy units. An advanced model, designed particularly for Air Force use, is under development.

To improve our antisubmarine warfare capabilities, the Navy is developing two new missile systems—the ASROC to be launched from surface ships and the SUBROC for firing from submerged submarines. ASROC will combine a solid-fuel rocket with an acoustic homing torpedo, while SUBROC will provide a complete torpedo-missile system. The missile-boosters in ASROC and SUBROC greatly increase the range at which the enemy can be brought under attack. The Navy began the evaluation of prototype ASROC missiles during the year and successfully completed the first flight test of the SUBROC system.

Rockets

In the rocket field, work continued on the LITTLE JOHN designed as a helicopter-transportable weapon to replace the heavier

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HONEST JOHN. The development of a more accurate version of the HONEST JOHN with greater range was nearly completed.

A significant addition to the firepower of infantry and armored units will be provided by DAVY CROCKETT, which is being designed to fire either high-explosive or nuclear rounds. Two launcher systems are under development—one to be mounted on a vehicle and a lighter one to be hand-carried.

Work also continued on the development of other lightweight rocket launchers for various types of conventional ammunition. These launchers are designed for transportation by helicopter and will provide increased mobility to Army and Marine units.

Aircraft

With the increase in strategic and tactical missile programs, the extensive aircraft development effort of earlier years has been gradually reduced, but numerous significant projects continue to be pursued.

In the strategic bomber field, the medium-range B–58, the first bomber capable of traveling at supersonic speeds, was undergoing final evaluation tests and should become operational soon. The latest model of the B–52, the B–52H, was placed into production and, with its new turbofan engine, will provide a further range increase of 15 percent.

As the result of a review of the B–70 program, the plans for this supersonic heavy bomber were changed in December 1959 from the original weapon system concept to the development of an experimental Mach 3 aircraft. Work on the critical bombing navigation system and other subsystems of the B–70 was continued, however, although on a reduced scale, to provide time for collecting additional data bearing on the need for this type of bomber in the years ahead when ICBMs will have been deployed in quantity.

A reevaluation of the entire air defense program brought, among other adjustments, the cancellation of the F–108 program for a long-range Mach 3 fighter. This change was accompanied by greater emphasis on programs for strengthening the intercept capabilities of existing aircraft. An improved model of the F–105, a supersonic, all-weather tactical fighter, started to be delivered in the latter half of the fiscal year.

Future increases in naval striking power were foreshadowed by the delivery of the first test models of the A3J Vigilante and the A2F Intruder—the first a heavy attack aircraft with greater speed and combat altitude than its predecessors and the latter a light attack aircraft with greatly increased range. The final evaluation of the F4H Phantom II, a supersonic, all-weather fighter with a high combat ceiling, was nearly completed at the close of the year.

Improved detection of enemy aircraft was provided with the first deliveries to the Fleet of the new WF–2 early warning plane, a more advanced version of which, the W2F, is under development. The detection of submarines will be facilitated with the delivery in the near future of the first all-weather helicopter, the HSS–2; also under development is a new land-based turboprop patrol plane, the P3V–1, which will replace the Neptune developed during World War II. For air rescue operations a new turbine-powered helicopter is being procured.

As for Army aviation, two fixed-wing aircraft—the Mohawk for observation purposes and the Caribou, a tactical transport—were passing through final evaluation tests at the close of the fiscal year. The Chinook, a heavy transport helicopter capable of carrying a 2- to 3-ton payload, was in the early development stage. Design studies were initiated for a light observation helicopter to be available in about 5 years.

To increase airlift capabilities, the Air Force has placed under development an improved model of the Hercules turboprop assault transport, the C–130C. Requirements analysis and technical feasibility studies were completed for the SOR 182, a new long-range all-jet cargo aircraft designed to meet the criteria of civilian air transport as well as those for strategic airlift.

To reduce future requirements for hard-surface runways and increase tactical mobility, all Services are cooperating in feasibility studies for the development of short-take-off-and-landing (STOL) and of vertical-take-off-and-landing (VTOL) fighter and transport aircraft.

Other Research Activities

The ever-broadening impact of science and technology on military operations has expanded the research and development effort of the armed forces into practically all fields of human knowledge. Any new discovery or development may have a profound effect on national security. Consequently, research activities have been closely monitored, the search for new ideas encouraged, and applied research projects initiated whenever the objectives appear to justify the cost.

Basic research, adding to our fund of fundamental scientific knowledge, is the key to all future progress. Obligations by the Department of Defense in support of basic research during fiscal year 1960 amounted to $185 million. Of this total, $102 million was allocated to the physical sciences proper, $40 million to engineering, $29 million to the life sciences, $9 million to the mathematical sciences, and $5 million to psychological research. Special emphasis was placed dur-

ing the year on research in propellant chemistry and the development of interdisciplinary centers devoted to the "materials sciences."

The support of oceanography was greatly increased with the expectation that it might yield valuable information contributing to antisubmarine warfare. Our knowledge of the northern seas was furthered by the submerged trip of the submarine *Sargo* to the North Pole and back, the first winter passage of any ship, and military funds and personnel contributed to the scientific explorations on the Antarctic continent.

The development of more effective devices for the early detection of hostile air, sea, and ground activities has been a major research objective of the Department of Defense for some years. Considerable progress was made in this effort during the year.

More powerful radars, greatly extending the range of earlier models, are being introduced into our air defense systems. Projects under study include radar techniques reaching beyond the horizon; developments in the amplification of microwaves (Maser); the miniaturization and microminiaturization of electronic components; improvements in photography, optics, and infrared detection; and new methods to identify friend or foe (IFF). Our own advances in electronic countermeasures have been paralleled by programs to counter the effects of such jamming techniques if employed by the enemy.

Maximum urgency was placed on the discovery of more effective means for the detection of submarines. New sonars and sonobuoys with considerably greater range and accuracy were developed. Experiments to extend the range of these acoustic devices still further brought encouraging results, as did the investigations of nonacoustic means for detecting submarines. Research in this field, however, remains a close race between improvements in detection systems and increases in the submarine's ability to escape detection, particularly by noise reductions.

The rapidity with which combat operations might have to be initiated has placed a premium on instantaneous, secure communications to any part of the globe. Existing systems were considerably improved and expanded during the year, and further advances are expected as the result of placing the point-to-point, long-distance communications systems of the military departments under a single Defense Communications Agency. The feasibility of a moon bounce communications system was publicly demonstrated in January 1960; the work on communications satellites has been noted earlier.

Other applied research and development projects covered practically all remaining military activities. Ship construction was being advanced by the design of more advanced submarines and amphibious vessels and by experimentation with hydrofoil boats. More versatile

vehicles of many types were under development to increase the mobility of ground forces. New methods for increasing the efficiency of high explosives were being studied as well as the feasibility of new chemical and biological agents and the means for defense against such agents.

The Weapons Systems Evaluation Group (WSEG), created in 1948, has the responsibility for providing comprehensive, objective, and independent analyses and evaluation of present and future weapons systems and analyzing the effects of new developments on combat operations. WSEG, with a staff of about 85, obtains its assignments from the Director of Defense Research and Engineering and the Joint Chiefs of Staff. It relies for the research and analysis connected with these assignments on about 100 civilian scientists and technicians drawn from the Institute for Defense Analysis (IDA), which also provides essential administrative support. During fiscal year 1960 $3.4 million was obligated to support this work.

The membership of IDA, a nonprofit organization, was increased from five to eight major universities during the year. IDA also provided a staff of about 50 technicians to assist ARPA in its effort to direct research into fields most promising for the acquisition of new knowledge important to our future military security. Obligations under ARPA contracts with IDA totaled $2.5 million for the fiscal year.

III. The Defense Budget

The Defense budget reflects in financial terms the programs, plans, and policies of the Department of Defense. It is based on military requirements evaluated in the light of the current national and international situation and possible future developments. Its formulation involves many difficult judgments, but in its final form it represents the consensus of the executive and legislative branches of our Government on the effort required for the maintenance of effective armed forces in the years ahead.

In planning its budgets, the Department of Defense has sought to meet the threats of general and limited war, now and in the future, at a level of effort that can be sustained for many years—or indefinitely, if necessary. In accordance with these objectives, the Defense budget has provided our armed forces with the capability to counter local aggression as well as to retaliate decisively in case of nuclear attack. Defense programs have been carefully balanced between the forces-in-being, the procurement of new weapons and equipment, and the research effort essential to our future security.

The achievement of this over-all balance has become an ever more difficult problem. The accelerating pace of change in military technology demands virtually continuous review of the Defense program and budget. Individual projects with considerable merit when considered by themselves frequently assume a vastly different character in the total balance sheet. The appealing simplicity of a single strategy or an "ultimate weapon" has to be matched against the continued need for flexibility in response. In all cases, the determining factor must remain the development of ready armed forces properly trained, equipped, and deployed to meet the full range of possible enemy actions. The budgets for fiscal years 1960 and 1961 reflected this objective and provided a military establishment ready to counter any form of aggression.

The Fiscal Year 1960 Budget

In the summer of 1959 the Congress approved for fiscal year 1960 $40.6 billion in new obligational authority for the military functions of the Department of Defense—$39.2 billion in August in the Department of Defense Appropriation Act and $1.4 billion in September in

the Military Construction Appropriation Act. With the addition of transfers from revolving funds and other special accounts, the new obligational availability for the fiscal year totaled $41.1 billion.

The amounts available for expenditure, consisting of the unexpended balances from previous fiscal years and the new appropriations of $41.1 billion, came to a total of $72.2 billion.

Net expenditures during fiscal year 1960 amounted to $41.2 billion—about the same as for the preceding year. While the fiscal year 1960 expenditures included substantially higher amounts for Research, Development, Test, and Evaluation, these increases were offset by reductions in expenditures in most of the other budget categories.

The fiscal year 1960 budget reflected the new budget format and changed appropriation structure recommended in the budget message for that year. These changes were intended to facilitate the consideration of the Defense Department budget by the Congress on a more uniform basis than in past years.

The 1960 arrangement, while retaining Service identification, emphasized budget categories rather than the organizational aspects of the Department of Defense. All appropriations were grouped under five main categories: Military Personnel; Operation and Maintenance; Procurement; Research, Development, Test, and Evaluation; and Military Construction. A sixth grouping covered the revolving and management funds of the Department of Defense.

In addition, changes were made in the content of some of the individual appropriations. For example, a clearer distinction was made between Procurement on the one hand and Research, Development, Test, and Evaluation on the other, resulting in decreases in the Procurement appropriations and corresponding increases in the more comprehensive Research, Development, Test, and Evaluation category. To the extent that amounts associated with development, test, and evaluation remained in the Procurement appropriation, they were identified separately.

The changes in language and the changes in structure of the budget for fiscal year 1960 neither increased nor decreased the authority of the Secretary of Defense over the utilization of appropriations for the military functions administered by the Department of Defense.

On the basis of the new functional titles, expenditures in 1960 for Military Personnel—including active forces, reserve forces, and retired pay—amounted to $11.7 billion. Operation and Maintenance—the day-to-day operating costs of the Department's activities and installations—accounted for $10.2 billion. Procurement expenditures for aircraft, missiles, ships, tanks, guns, ammunition, and other major items of equipment came to $14.3 billion. Expenditures for

DEPARTMENT OF DEFENSE EXPENDITURES FOR MILITARY FUNCTIONS

FISCAL YEARS 1953-1961

(BILLIONS OF DOLLARS)

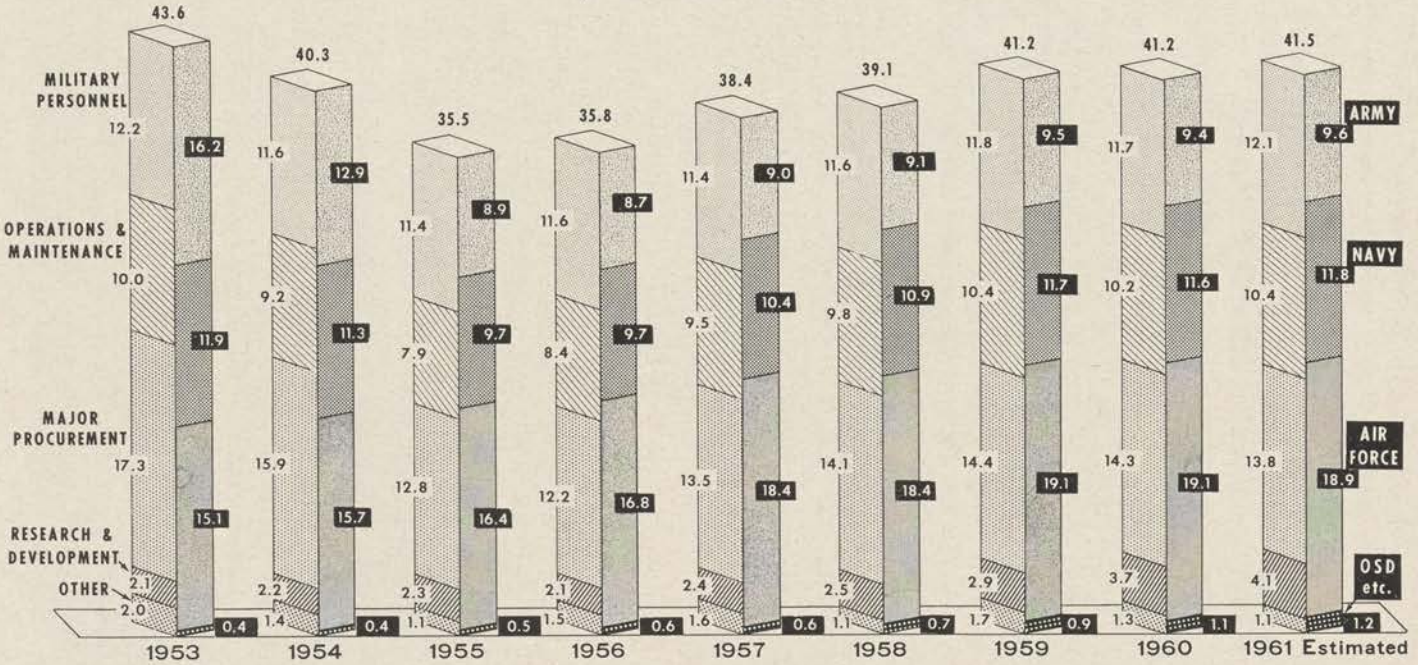

Figure 11

the newly enlarged budget grouping of Research, Development, Test, and Evaluation totaled $3.7 billion; on a comparable basis, that was nearly $0.9 billion more than in 1959. Construction expenditures—for both active and reserve forces—were $1.6 billion (see fig. 11).

An excess of receipts over expenditures in the revolving and management funds of the Department—amounting to some $0.4 billion—was taken as a deduction against the expenditures in the five main budget categories and served to reduce net expenditures for fiscal year 1960 to $41.2 billion.

Summarized in terms of organizational components, expenditures in fiscal year 1960 totaled $9.4 billion for the Army; $11.6 billion for the Navy; $19.1 billion for the Air Force; and $1.1 billion for the Office of the Secretary of Defense, the Joint Chiefs of Staff, and inter-Service activities—principally pay for retired personnel.

The balance of unobligated funds rose during fiscal year 1960 despite 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 $7.5 billion at the beginning of the year and $8.6 billion at the end of the year. The rise of about a billion dollars resulted primarily from an unanticipated shortfall from the Department's planned obligational program for 1960, thus serving to increase the unobligated balance carried over into fiscal year 1961.

Unexpended balances, however, declined somewhat during fiscal year 1960—from $31.6 billion to $30.7 billion.

The Fiscal Year 1961 Budget

A review of the international situation, the state of military technology, and the general economic and fiscal situation in the fall of 1959 made it appear that the 1960 level of expenditures—then estimated at $41.1 billion—would be a reasonable point of departure for the preparation of the 1961 Defense budget.

In order to assist in bringing major issues into focus, the military departments were asked to use, for the development of their "basic budgets," planning objectives aggregating somewhat less than the 1960 level and to include in these "basic budgets" the hard core of top priority requirements. In addition, they were requested to submit an "addendum" of up to $500 million above the 1960 level. This "addendum" was to highlight, regardless of past individual Service funding levels, other high priority projects or promising developments that could not be accommodated in the basic budgets. Defense agencies, however, were not precluded from submitting items over and above these limits,

and the Army, the Air Force, and the Advanced Research Projects Agency made such submittals.

Budget requests totaling $43.9 billion in new obligational authority and $42.6 billion in net expenditures were submitted. These were carefully reviewed in the Office of the Secretary of Defense, program by program, on a Defense-wide, across-the-board basis. A special effort was made to assure the participation in this review of all the principal officials of the Department of Defense—particularly the Director of Defense Research and Engineering, the Secretaries of the military departments, and the Chiefs of Staff, both as Service chiefs and in their corporate capacity as the Joint Chiefs of Staff. In accordance with established procedures, the development of the budget was closely followed by representatives of the Bureau of the Budget. The major issues were discussed with the President, and the final budget request was reviewed in the National Security Council.

The only change in the 1961 budget structure was a realignment of the Navy Procurement appropriations paralleling the consolidation of the Bureau of Aeronautics and the Bureau of Ordnance into the new Bureau of Naval Weapons. The 1961 budget also carried a step farther the effort begun in 1960 to differentiate more clearly between procurement for "operational, general service use, or added to inventory upon delivery" and for "research, development, test, and evaluation."

The President's 1961 budget, submitted to the Congress on January 18, 1960, proposed a total of $40.9 billion in new obligational availability for the Department of Defense—$40.5 billion in new obligational authority and $0.4 billion in transfers from the Department's revolving funds in lieu of new appropriations. Expenditures for fiscal year 1961 were estimated at $41.0 billion.

Obligations for active forces personnel were estimated at $10,776 million—an increase of $155 million over 1960 and $107 million over 1959. A steady rise in the cost per military man during recent years has tended to offset the savings achieved through lower manpower levels. This trend is expected to continue in 1961 with the average cost per man rising to about $4,330, as compared to $4,255 in 1960 and $4,160 in 1959.

A planned reduction of 10 percent in Army National Guard and Army Reserve strength lowered estimated military personnel costs for the reserve components in 1961 to $612 million—$67 million less than for the current fiscal year and $13 million less than for 1959.

With the average number of persons receiving retired pay estimated at 272,000 for 1961, as compared to 244,000 in 1960 and 223,000 in 1959, obligations for Retired Pay rose to $799 million—an increase

in direct obligations of $91 million over 1960 and $164 million over 1959.

Obligations for Operation and Maintenance in 1961 were estimated at $10,527 million—$227 million more than in 1960 and $395 million more than in 1959. Although military man-years, the number of active ships and aircraft, and steaming and flying hours continued to decline gradually from 1959 to 1961, increasing unit costs, associated with the growing complexity and higher performance of the new weapons and equipment, continued to offset savings achieved through lower activity levels and more efficient management.

A total of $14,364 million in direct obligations was budgeted for the purchase of major items of equipment in 1961. Of this total, $6,013 million was for the procurement of some 1,500 aircraft—633 for the Air Force, 658 for the Navy, and 219 for the Army. Both the number of aircraft and the planned obligations were slightly higher than for 1960, but well below the level of 1959. Included in the 1961 request were additional quantities of the improved B–52H intercontinental jet bomber, the B–58 supersonic medium jet bomber, and the associated KC–135 jet tankers, as well as F–105 fighter-bombers for air support of the ground forces and C–130 transports for tactical airlift.

Obligations for missiles in fiscal year 1961 were expected to total $3.8 billion. Of this amount, approximately $2.2 billion was programed for the four main strategic missiles—ATLAS, TITAN, MINUTEMAN, and POLARIS—as compared to $1.6 billion in 1960 and $1.3 billion in 1959. Including Research, Development, Test, and Evaluation and Military Construction—and in the case of POLARIS, the cost of the submarines—the total amount programed for these four systems rose from about $2.4 billion in 1959 to about $3.4 billion in 1961, an increase of over 40 percent. In addition, a wide variety of other air defense, air-to-surface, and tactical missiles was planned for purchase in 1961.

The obligations planned for ships came to $1,740 million—substantially above the level of 1960, but $106 million less than in 1959. The 1961 shipbuilding program submitted to the Congress in January 1960 provided for 20 new ship starts and 15 conversions or modernizations, including 1 conventionally powered attack carrier, 3 guided missile frigates, 2 guided missile destroyers, 3 POLARIS submarines, 3 other nuclear-powered attack submarines, 8 miscellaneous vessels, 1 conversion, and major modernization for 14 destroyers.

Obligations estimated for the "Other" procurement category rose to $2,806 million in fiscal year 1961, as compared to $2,624 million in 1960 and $2,248 million in 1959. The steady upward trend reflects the increasing emphasis being placed on electronic and communica-

tions equipment and Army modernization—the two main items in this category.

A total of $4.0 billion was allocated to Research, Development, Test, and Evaluation. This figure was $4.3 billion in 1960 and $3.5 billion in 1959. Some major aircraft and missile development projects nearing the completion of their test and evaluation phase were kept in the Procurement appropriation where they were identified as separate budget activities. If these amounts were added to the regular allocations for research, development, test, and evaluation activities, the total would aggregate $5.3 billion in 1961 as compared to $5.8 billion in 1960 and $5.1 billion in 1959.

Obligations for military construction in 1961 were estimated at $1,382 million. This was $115 million less than the amount planned for 1960 and $366 million less than for 1959.

It was clearly indicated at the time the 1961 Defense budget was first presented to the Congress that the rapid progress in military technology was making exact and relatively constant budget estimates for the various Defense programs increasingly difficult. As the result of technical advances, programs which looked promising only a short time before could quickly become marginal in importance, thus compelling the Department of Defense to terminate some programs or to shift available resources from older to newer ones.

The continuous review of the entire Defense program during the early months of 1960 soon made it clear that certain changes in the January budget were highly desirable. Accordingly, on April 6, 1960, appropriate budget revisions were proposed to the Congress. Generally speaking, these adjustments involved a redirection of the continental air defense program to complete more speedily a less elaborate program of defense against manned bombers while shifting emphasis to ballistic missile defense programs. The Air Force intercontinental ballistic missile and space programs were also augmented. The changes in the Navy involved an increase in the procurement of long leadtime items for the POLARIS program and a reduction in the attack submarine program.

On May 12, 1960, still other changes were proposed to the Senate, involving principally the application of additional funds for Army modernization, antisubmarine warfare, and airlift aircraft.

Final Congressional action on the 1961 Defense budget was completed early in July 1960. A total of $41.4 billion was appropriated, composed of $41.0 billion in new obligational authority and $0.4 billion in transfers from the Department's revolving funds in lieu of new appropriations. The total of $41.4 billion was about $0.5 billion more than the amount requested by the President in January.

Within these totals, considerable shifts in the allocation of resources

had been made since January—some at the request of the executive branch and others initiated by the Congress. In view of these changes and the tense international situation, the entire Defense program was again reviewed to make certain that the additional amounts provided would be expended to assure at the same time the greatest immediate strength and the continued orderly development of properly balanced armed forces. In accordance with these criteria, substantial portions of the new funds were allocated to provide additional Army modernization, an increase in the POLARIS program, greater support for the B–70, more transport aircraft, accelerated work on SAMOS, and still greater emphasis on antisubmarine warfare.

Financial Management

More effective controls over financial operations continued to be achieved through the progressive modernization of the programing, budgeting, accounting, reporting, and auditing practices of the Department of Defense. These innovations are being made as part of the Government-wide Joint Financial Management Improvement Program and include actions designed to promote the expansion of accrual accounting systems and of monetary accounting for property, the simplification of the budget structure, and the development of more accurate and useful financial reports. These steps are increasing the financial data available to Defense management officials at all levels, thus facilitating more effective direction of departmental activities.

The Department's program for financial management improvement is keyed to the major subdivisions of the Department of Defense budget. An integrated system of budgeting, programing, accounting, and reporting is being established for each of these subdivisions.

Work is furthest along in the Operations and Maintenance area. In May 1959 a directive was issued establishing a phased program for the introduction of new procedures to govern activities financed by Operations and Maintenance funds. This plan was carried out on schedule during fiscal year 1960. A uniform budget program structure for this appropriation title was drawn up, and uniform budget activity accounts, which form the subsections of the budget program structure, were being developed. Concurrently with these developments, training materials were prepared to acquaint Defense personnel with the principles and techniques on which the new procedures are based.

Parallel steps will be taken to improve financial management and control over the other major appropriation categories. During fiscal year 1960, a directive extending the improvement program to Military Construction funds was drafted, and fact-finding studies, preliminary

to the issuance of similar directives, were nearly completed for the Military Personnel category and well along for the Research and Development and the Procurement appropriation categories.

Further improvements were also made in the management of revolving working capital funds. There are two types of such funds—industrial funds to finance industrial- and commercial-type activities, and stock funds to facilitate financial control over supplies for which there is a recurring demand. Both types of capital funds utilize accrual accounting systems.

A single, uniform reporting system for industrial fund accounts was established during the year. The new reports will facilitate the review of the financial operations of industrial fund activities and assist in determining appropriate financial controls. A total of 61 activities, including printing plants, arsenals, laundries, and the Single Manager agencies for ocean transportation and airlift services, were operating under industrial fund charters during the year—or two more than during the preceding year. The Army operated 24 of these, the Navy 34, and the Air Force 3. Industrial fund inventories of raw materials, supplies, and work in progress were reduced during the year, from $336 million on June 30, 1959, to $294 million on June 30, 1960. Sales rose to a total of $2.6 billion—an increase of $0.2 billion over the preceding year.

Working capital stock funds have become an increasingly effective tool for the improved management of supply operations. A supply activity operating under a stock fund issues supplies to a using organization and charges the cost to the appropriated funds of the consumer. These appropriated funds are credited to the stock fund and used to replenish inventories as needed. Better management has resulted in a steady reduction in inventory levels, thus generating excess cash balances in the stock funds of the Department. These balances have been utilized in lieu of new appropriations or returned to the Treasury, as directed by the Congress. Through such transfers and rescissions, it has been possible to reduce stock funds by $4.9 billion since 1953, with $0.4 billion contributed during fiscal year 1960. Stock fund inventories on June 30, 1960, amounted to $7.7 billion, including excess stocks. The Army, with responsibility for such major categories as clothing and textiles for the entire Department of Defense, managed 63 percent of the stock fund inventories, the Navy 32 percent, and the Air Force 5 percent. Naval ordnance repair items, valued at $0.2 billion, were placed under stock funds during the year.

Flexibility in supply operations was also increased. Regulations were issued providing for the transfer of excess materiel between the military Services without reimbursements from appropriated funds in order to encourage the fuller utilization of available stocks within the

Department of Defense. Instructions to govern the return of unneeded supplies from the consuming agency to stock fund inventories were revised to facilitate accounting and funding operations. Uniform pricing policies and financial inventory accounting requirements were established for machine tools and other plant equipment owned by the military departments; these new policies provide the basis for determining reasonable and equitable rentals when this equipment is loaned to defense contractors.

The Department continued to evaluate and modernize its auditing procedures. A new plan for more effective auditing of contracts was developed and tested, assigning to a single auditing agency the responsibility for reviewing all matters concerning a single contractor, even though that contractor may operate several plants at a number of locations. This system provides contractors with greater assurance of uniform and consistent audits. The internal audit programs of the Department were also being reevaluated to assure more comprehensive coverage; special emphasis was placed during the year on procurement and supply management functions.

IV. Management

Fiscal year 1960 marked the first full year of operations under the Defense Reorganization Act of 1958. The experience gained endorsed the basic organizational concepts of the new legislation. The current Department of Defense structure provides the necessary management authority for effective direction as well as the flexibility to make prompt adjustments in line with changes in weapons technology and in the international situation.

The organizational problem of the armed forces since World War II has been created primarily by the conflicting demands of the varied threats to our security, on the one hand, and of the impact of the continuous and increasingly rapid scientific revolution of our age, on the other.

The immediate threat to our security requires that our armed forces be in a state of readiness at all times to counter aggression in whatever form it may occur. Since major reorganizations, no matter how well conceived, upset the effectiveness of any organization for a considerable time, changes introduced too quickly would be unwise. Moreover, the varied threats with which we are confronted, ranging from massive nuclear attack to small local aggression, caution against overemphasis on any single strategy.

At the same time, however, the continuous scientific revolution is inexorably calling for adjustments in strategy and tactics as well as in management procedures. There is no perfect organization under these circumstances. Our primary need is flexibility.

These two prerequisites—constant readiness and flexibility—are being met by the current organization of the Department of Defense. Any large and complex organization is always subject to improvement and work should continue toward this end. However, the Secretary of Defense has extensive authority and can make many improvements administratively—without the need for new legislation.

Organizational Concepts

Three major principles have shaped the organizational evolution of our armed forces since the end of World War II:

> First, that—as the President stated in his message to the Congress in April 1958—"separate ground, sea, and air warfare is gone forever." This means that "strategic and tactical planning must be completely unified, combat forces organized into unified commands, each equipped with the most efficient weapons systems that science can develop, singly led and prepared to fight as one, regardless of Service."
>
> Secondly, that the best way to provide the forces for this unified effort remains the pattern of the traditional military departments—the Army, Navy, and Air Force—responsible for the effective management of the vast administrative, training, and logistical functions of the armed forces.
>
> And finally, that a Secretary of Defense, acting as the President's agent, be responsible for the effective and efficient direction of the military effort—assisted by the Deputy Secretary of Defense (his alter ego), the Secretaries of the military departments (his principal agents for management), the Joint Chiefs of Staff (his military advisers), and the key officials in the Office of the Secretary of Defense (his civilian advisers in specialized fields).

In accordance with these principles, the Secretary of Defense has been given full direction, authority, and control over the entire Defense establishment. He exercises his powers through two command lines: One for the operational direction of the armed forces running through the Joint Chiefs of Staff to the unified and specified commands and the other for the direction of support activities running to the military departments. Under the existing management concept, major policy and program decisions are made at the top, while the direction of operational activities is decentralized (see fig. 12).

The Secretary of Defense

Successive reorganizations have increased the authority of the Secretary of Defense to such a degree that today the only statutory limitations on his powers under the National Security Act are:

> First, that he shall not merge the military departments.
>
> Secondly, that he shall not establish a single Chief of Staff, an over-all armed forces general staff, or any military staff other than the Joint Chiefs of Staff.
>
> Thirdly, that the statutory functions of the military Services shall not be changed without careful Congressional

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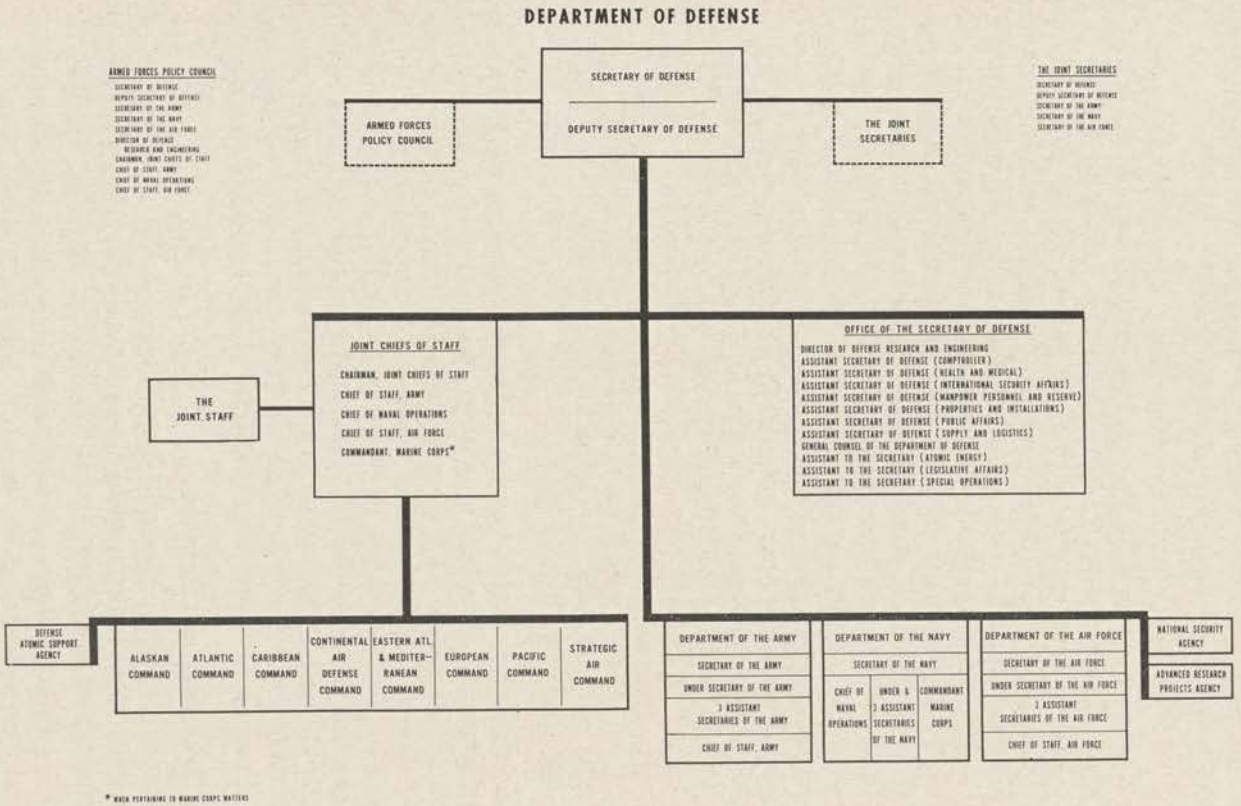


Figure 12. Organization Chart.

review—excepting, however, from this prior careful review "the development and operational use of new weapons or weapons systems" and "any supply or service activity common to more than one military department."

And finally, if it is a limitation, that a Secretary of a military department and a member of the Joint Chiefs of Staff may present to the Congress, on his own initiative, any recommendation he may deem proper. This provision has not been used since it was established in 1949.

Within these limitations, the authority of the Secretary of Defense is today beyond legal challenge. No function of the Defense establishment is to be carried out independent of this authority. Further statutory increases of the Secretary's powers would be of little or no significance.

In carrying out his responsibilities, the Secretary's concern is focused on three major areas—the effective direction of the operational forces, the allocation of resources, and the efficient management of these resources. Each of these areas involves different procedures in reaching decisions as well as different roles for the principal advisory groups to the Secretary of Defense. In each case, however, the final decision is his, subject to the approval of the President and, in certain cases, of the Congress.

The Direction of the Armed Forces

The effective direction of the armed forces requires not only that adequate plans be prepared for possible emergencies but also that clear command authority exists to put such plans into effect without any delay.

In this area, the Joint Chiefs of Staff constitute the key element, having been assigned by law the responsibility for preparing strategic plans and providing for the strategic direction of the armed forces, subject to the authority and direction of the President and the Secretary of Defense. These functions have been carried out with increased efficiency under the 1958 Reorganization Act.

The unique contribution of the Joint Chiefs of Staff system is that it provides for the careful consideration of alternative courses of action before recommendations are made to the Secretary of Defense. In case different points of view on major issues persist, they can be fully presented to civilian authority for final resolution. Bringing together the judgment of the Chairman of the Joint Chiefs and of the chief military officers of the four Services assures that strategic plans and military advice are based on a thorough and broad review of all

relevant factors. In this area, off-the-cuff conclusions are as undesirable as lengthy delays.

During the past year, the existing procedures to expedite action were further improved with the establishment in December 1959 of regular meetings of the Secretary of Defense with the Joint Chiefs of Staff. These sessions have greatly facilitated the formulation of military advice as well as subsequent decision by civilian authority and have promoted an increasingly closer relationship between the chief civilian and military officials of the Department. By having his military advisers express their individual views in the presence of each other, the Secretary obtains a clearer understanding of the problem, and each of the military chiefs is assured that his judgment is given full consideration. Above all, this simple procedure has greatly speeded up the decision-making process throughout the Defense establishment.

One of the important results of the meetings of the Secretary of Defense with the Joint Chiefs of Staff has been the establishment shortly after the close of the fiscal year of a special staff group to provide centrally directed operational planning for all elements of our strategic retaliatory force. This group, headed by a Director of Strategic Target Planning, will be responsible, under the policy control and direction of the Joint Chiefs of Staff, for the development and continued review of a Single Integrated Operational Plan covering the target assignments of the weapon carriers of all forces committed by the unified and specified commanders.

The Joint Staff, enlarged from 210 to a maximum of 400 officers in 1958, is operating with increased effectiveness. Officers of all Services are objectively developing Defense-wide solutions to military problems and demonstrating that a truly joint effort of the various Services is as feasible in Washington as in the field.

The new chain of command for the operational direction of the armed forces, running from the President and the Secretary of Defense through the Joint Chiefs of Staff to the unified and specified commanders, is increasingly proving its value as an efficient mechanism for central direction and quick and authoritative decisions. With established procedures kept under constant review, it is believed that the provisions made for top-level emergency action, the "full operational command" assigned to the unified commanders in 1959, and the traditional military command structure of the operational forces provide the command authority required for instantaneous action.

Thus, the current Joint Chiefs of Staff organization is keyed to rapid decisions in the operational area and to thoroughly considered

actions for the planning and advisory functions of the Joint Chiefs. These differing procedures, subject to further refinement in the years ahead, are essential for the effective direction of our armed forces.

The Allocation of Resources

The proper distribution of men and materiel to counter effectively the threats of general and local war now and in the future has been the major Defense problem for many years. This task involves decisions that not only affect our military security but also have a profound impact on our foreign policy and domestic economy. Such decisions cannot be based on military requirements alone. They must be reached within the broad framework of our national goals and policies and, therefore, become the final responsibility of civilian authority.

The current organization of the Department of Defense provides that the allocation of resources is determined, subject to the guidance and approval of the President, by the Secretary of Defense with full military advice.

The Joint Chiefs of Staff role in this process has been increased with the implementation of the 1958 Reorganization Act. Through the Joint Programs Office, the Joint Chiefs receive the budget submissions of all the military departments, the preliminary revisions recommended as a result of a review by the Secretary's civilian assistants, and the comments of the military departments on these revisions. In addition, they are familiar with the requirements of the unified commanders, receiving the views of these commanders on the force requirements submitted by the component commanders of unified commands. Thus, the Joint Chiefs of Staff have available full information on the total budget picture and are able to assist the Secretary in his final determination from an over-all rather than a purely Service point of view.

This military advice is supplemented by the views of the Secretary's civilian assistants, particularly the Director of Defense Research and Engineering and the Assistant Secretary of Defense (Comptroller). The former contributes scientific and technological considerations to the final judgments on proposed research and development programs, while the latter, by the nature of his assignment, must emphasize the cost factors and the effect of the military programs on the national economy. Other civilian assistants comment on specific programs affecting their particular field of responsibility, such as manpower, supply, and installations.

With this military and civilian assistance, the Secretary of Defense is able to probe deeply into the budget submissions of the military de-

partments, which are responsible for the difficult and painstaking task of translating the military requirements of the Services into fiscal requirements.

While advice on most of the proposed budget items is unanimous, the budget review brings out the conflicting views existing on some major programs. Established procedures enable the Secretary of Defense to hear all sides and realistically weigh alternative courses. They place upon him the task for recommending the most effective allocation of available resources to the President and the Congress. This responsibility is vested in the Secretary and cannot be delegated.

In this area, as in strategic planning, careful consideration of all relevant factors is more important than rapidity of decision.

The Management of Resources

The efficient management of available resources is a never-ending function. The size of the Defense operation, human frailty, and constantly changing requirements have created major problems in the past and will continue to do so in the future. However, utmost economy in operations is not only a continuing responsibility of every public servant, but the ever rising cost of defense has made such economy increasingly vital to our national security.

In the Department of Defense the achievement of economy is complicated by the fact that combat effectiveness is the ultimate goal and that economy must not be achieved at the expense of military readiness. This fact is readily understood when the organization of combat units is reviewed but sometimes overlooked in the field of logistics, although the effectiveness of combat forces is directly dependent on the effectiveness of logistic support. To maintain the effectiveness of both, it is essential that management improvements be introduced at the operational level gradually—step by step, in orderly sequence.

During fiscal year 1960, considerable progress was made in the management of resources throughout the Department of Defense by following these principles. This report and those of the Secretaries of the military departments relate the major steps taken. Particularly noteworthy from a Defense-wide point of view was the establishment of four new Single Managers for common supply items, of the Defense Communications Agency for the control of all long-haul communications facilities, and of central supervision for the test ranges, tracking stations, and other technical facilities used in missile and space programs. Among the management studies initiated were a review of intelligence operations, the practicability of additional Single Managers, the development of closer State-Defense relations through the exchange of personnel, and the development of greater

uniformity in the officer promotion, retirement, and retention practices of the various military Services.

These and similar actions constitute part of a continuing Defense program aimed at the double objective of maintaining military effectiveness while promoting greater efficiency. Future actions in this area must be based as in the past on careful prior planning to make certain that the ability of our armed forces to counter aggression is not harmed by proposed organizational changes, no matter how well conceived.

The Organization of the Armed Forces

The current Defense organization provides for the development of ground, naval, and air forces in separate military departments and the amalgamation of these forces in the field under a single commander. This basic pattern proved its value in World War II and since then has demonstrated its ability to absorb the impact of the present revolution in weapons technology.

It is a pattern that has preserved the justified pride of the military Services in their historic achievements and encouraged their determination to excel in the future. While the weapons revolution created inevitable stresses and strains, Service competition has been a major factor speeding the rapid modernization of our combat forces. To dismantle the existing pattern without compelling reason would be a tremendous loss to the armed forces and the Nation.

One of the primary purposes of the 1958 Reorganization Act has been to assist the Secretary of Defense in keeping Service competition within reasonable limits. He was specifically charged with assigning or reassigning the development and operational use of new weapon systems and with organizing common supply and service activities to eliminate duplication and to provide more effective, efficient, and economical administration. Under these authorities, several important determinations regarding new weapons were made during the past year and numerous steps were taken and additional ones planned to improve the management of resources. The administrative tools to effect further improvements are available.

Most of the criticism of the Defense organization in recent years has been directed less against the existing structure than against the decisions made by responsible officials. Many of these decisions were difficult to reach, and alternative courses were often discarded with great reluctance. Still, it is most doubtful that different decisions would have been reached under a different organizational framework. Reorganizations do not resolve substantive problems.

The current organizational pattern provides for quick command decisions for combat operations and well-considered decisions for the

approval of plans, policies, and programs. It helps to assure that the resolution of major problems is made by civilian authority and in the light of all existing alternatives. The preservation of these advantages is essential for the maintenance of effective and efficient armed forces.

Organization is not an end in itself, but only a means to an end—and a limited means at best, for the caliber of people determines the effectiveness of any organization. In these circumstances, "unification of purpose," rather than "unification of things," remains the ultimate goal of the Department of Defense.

V. Manpower

The modernization of our armed forces has been accompanied by greatly increased requirements for experienced and technically trained personnel. To meet this requirement, the Department of Defense has developed personnel policies to maintain a relatively stable force structure, to make quality of performance a key to retention in service, and to create career patterns and a professional environment inducive to high morale.

The implementation of these policies is a long-range task. Fiscal year 1960 was marked by a gradual rise in the quality and experience level of military personnel, helped along by the modern compensation and career management systems approved by the Congress in 1958. The principles of the Reserve Forces Act of 1955 and increased deliveries of modern weapons continued to contribute to the readiness of the reserve establishment. Additional legislation to meet special problems in the active and reserve forces was approved or under active consideration. Working conditions for civilian personnel were further improved, particularly for those overseas.

The many measures taken have established a sound foundation for an effective Defense personnel system. They are based on the belief that the quality and morale of the individual military man and his civilian counterpart are fundamental factors in the effectiveness of our armed forces. This belief must remain the guiding principle for whatever adjustments the rapidly changing conditions of warfare will make necessary.

The Active Forces

The problem of attracting and retaining the best qualified officers and enlisted men continued to receive major attention in fiscal year 1960.

Most encouraging progress was made in meeting the requirement for more junior officers. The retention rate for officers commissioned through the Reserve Officers' Training Corps (ROTC) rose from 28.1 percent in fiscal year 1959 to 32.9 in fiscal year 1960. This gain was particularly significant since the ROTC program provides about 40 percent of the new officers who enter the armed forces each year. Despite the general improvement, however, some shortages continue to exist in specialized fields, particularly in engineering and science.

To induce still more junior reserve officers to stay on active duty, legislation was proposed to require the military departments to offer contracts for a stipulated number of years to reserve officers upon completion of 2 years of service. In addition, the legislation would have substantially increased lump-sum payments upon completion of a contract or upon release to inactive duty, whether voluntary or involuntary. The bills passed by the House and the Senate on this subject included major differences which were not resolved before adjournment, and the Department of Defense subsequently initiated studies for a compromise proposal to be submitted to the next Congress.

Effective career management in the middle grades of the officer corps has been hampered for some time by the large number of officers commissioned during World War II. This "hump" problem has seriously affected the promotion of junior officers and created an imbalance in the entire officer structure, particularly in the Navy and the Air Force. Legislation passed by the Congress in the late summer of 1959 helped to ease this situation. Public Law 86–155, approved on August 11, 1959, authorized the Navy and Marine Corps to prescribe the early retirement of commanders and captains, or their Marine Corps equivalent, who no longer had any chance for further promotion. About 1,100 Navy and Marine Corps officers were retired or scheduled for retirement under the provisions of this law during fiscal year 1960. Public Law 86–355, approved on September 21, 1959, granted a temporary increase of 3,000 in the authorized number of Air Force majors in order to permit immediate promotions while the selective retirement of Reserve majors was carried out in an orderly manner. Shortly after the close of the fiscal year, the Congress gave broad permanent authority to all the military Services to retire officers in the grades of colonel and lieutenant colonel or captain and commanders who have been twice passed over for promotion. These measures will greatly assist the military Services in the immediate years ahead to reestablish normal career opportunities and improve still further the quality of our officer corps.

Rapidly changing weapons technology has posed a major career personnel management problem in the case of aeronautically rated career officers, particularly among those with 15 to 20 years of service, in which group the number available has come to exceed requirements. While no longer needed on flight status, most of the affected officers possess skills which require their continued retention in the Services. To resolve this situation by arbitrarily removing these officers from flight status, accompanied by substantial pay losses, would have a serious adverse effect upon the attractiveness of a career in military aviation and disrupt the operating efficiency of the armed forces. At the close of the year, the Department was considering a legislative pro-

posal to provide a financial adjustment for rated career officers affected by the changing force structure.

Of great importance to future career management will be the results of the review of the Officers Personnel Act of 1947 initiated by the Department of Defense on May 23, 1960. This study was undertaken to provide greater uniformity among the Services in officer promotion, retention, and retirement by eliminating unjustifiable disparities in personnel laws and policies. Some steps in this direction had been taken in recent years, such as the elimination in November 1959 of Navy and Marine Corps authority for advancement on the retired list—so-called "tombstone" promotions. The current comprehensive review is expected to provide an equitable career pattern for all the military Services.

The efforts of the military Services to develop a more balanced enlisted force, in terms of skill and experience, continued to produce encouraging results. Occupational manning levels at the lower enlisted grades were generally improved, partly through retraining from the less critical skill categories. Career personnel shortages continued, however, in a number of highly technical skills.

Voluntary enlistments increased by 15,000 during the year—from 309,000 in fiscal year 1959 to 324,000 in 1960—and inductions through the Selective Service System were reduced by 21,000—from 111,000 to 90,000. Selective Service legislation, however, remained a key factor in stimulating voluntary enlistments and meeting the personnel requirements of the Army.

The reenlistment rate for regular personnel—computed on the basis of normal completion of term of service rather than as in previous years, on the date of reenlistment or separation—dropped to 26.2 percent in fiscal year 1960 from the post-Korean high of 30.1 percent reached in fiscal year 1959. The 1960 decline appeared to be due in large part to tightened controls over reenlistment in the Air Force and Marine Corps. Personnel in the more technical skills, such as electronics maintenance, continued to reenlist at substantially lower rates than in other specialities.

The proficiency pay program, established in 1958, is expected to help to counter this trend. During fiscal year 1960, the number of men holding the P1 rating, which grants an additional $30 per month, increased from 47,000 to 146,000, and a further expansion to over 200,000 is planned for the next fiscal year. Almost 70 percent of the 1960 P1 ratings were assigned to electronics specialists, other technicians, and mechanics and repairmen, over 20 percent to ground combat personnel, and the remaining 10 percent to other skill groups such as crafts, services, and administrative personnel. The first

awards of the P2 rating, carrying additional pay of $60 per month, will be made in fiscal year 1961.

Additional reenlistment incentive is being provided regular career personnel by the new grades of E8 and E9 for noncommissioned officers. On June 30, 1960, a total of 18,900 men were holding the E8 grade—an increase of 8,300 during the fiscal year—and the highest enlisted grade of E9 was held by almost 4,300 men, 2,900 more than a year earlier. As a result of these promotions, the E8's accounted for 0.9 percent of total enlisted strength, and the E9's for about 0.2 percent. Current plans call for advancing 2.0 percent of enlisted personnel to the E8 rating by 1963 and 1.0 percent to the E9 level.

Although this year's reenlistment rate was below the 1958 and 1959 levels, it remained substantially higher than the rates prevailing in the early 1950's. Most of this improvement can be ascribed to the incentive programs introduced in recent years. It is believed that the continued orderly development of these programs will continue to provide the best means for meeting the increasing requirement for more experienced and skilled enlisted personnel.

The recruitment of women for military service was greatly helped by the activities of the Defense Advisory Committee on Women in the Services (DACOWITS). This committee of 50 prominent civic and professional women leaders keeps the public informed of military career opportunities for women through the issuance of pamphlets, films, and posters and through local contacts with civic organizations, educational institutions, and news media. The group has concerned itself particularly with improving the training, housing, and general welfare of Service women. The results of the work of the DACOWITS are reflected in the high reenlistment rate for women, which compares favorably with that for enlisted men.

On June 30, 1960, the women components had a strength of 31,700, or about 100 less than on June 30, 1959. Of these, 12,500 were serving in the Army, 9,700 in the Navy and Marine Corps, and 9,500 in the Air Force. Almost 11,000 women were officers, including 8,800 nurses and medical specialists, and 20,700 were serving in the enlisted ranks.

The high degree of success of the armed forces in achieving racial integration during the past decade is documented by the absence of any major incidents. Within the established policy of equal treatment regardless of race or color, Negro officers and enlisted men enjoy the same job opportunities as other military personnel and persistent efforts to improve community relations are reducing "off-base" barriers. Noteworthy in this respect has been the recent integration of "off-base" schools, attended solely by children of military personnel, in Arkansas, Florida, and Tennessee.

Family Housing

In line with the over-all program to retain experienced and skilled personnel, the Department of Defense has for some years emphasized measures to meet the most urgent family housing requirements of military personnel. Substantial progress has been made in this field.

New construction during fiscal year 1960 raised to 361,000 the number of quarters controlled by the military Services—a net gain of 30,000 during the year. An additional 24,000 units were under construction. Major requirements have now been met, and most future construction will be in response to changes in weapons technology and the need for housing at small and isolated installations. Maximum reliance is being placed upon private housing resources in communities adjacent to military installations.

Practically all of the new housing that became available during the year was constructed under the Capehart program—projects built by private contractors under federally insured mortgages for operation by the military Services as public quarters. About 30,800 Capehart units were completed during 1960, bringing to 66,500 the total number that has been finished. Another 22,800 units were under construction, of which 9,200 were started in fiscal year 1960. An additional 26,000 units have been authorized, for a total Capehart program of 115,300, a net increase of 6,600 during the year (see fig. 13).

About 4,500 housing units originally constructed for private operation by private contractors under federally insured mortgages—Wherry projects—were acquired by the military departments during fiscal year 1960, in accordance with legislation passed by the Congress in 1956. These acquisitions brought to 62,400 the number of Wherry units incorporated into military holdings; 20,000 were still operated by private owners. Money from revolving funds is being used to rehabilitate and improve some 52,400 Wherry units now under military control.

Military family housing overseas has been provided in recent years primarily through the surplus commodity and rental guaranty programs. Under the surplus commodity program, funds are generated through the sale or barter of surplus agricultural products and supplemented as necessary by appropriated funds for items not available in foreign countries. Some 8,200 housing units financed in this manner had been completed and 1,100 were under construction on June 30, 1960. Only 700 new units were placed under contract during the fiscal year, partially because improving economic conditions in areas where U.S. troops are stationed reduced the market for surplus commodities. Under the rental guaranty program, foreign builders

CAPEHART FAMILY HOUSING PROGRAM

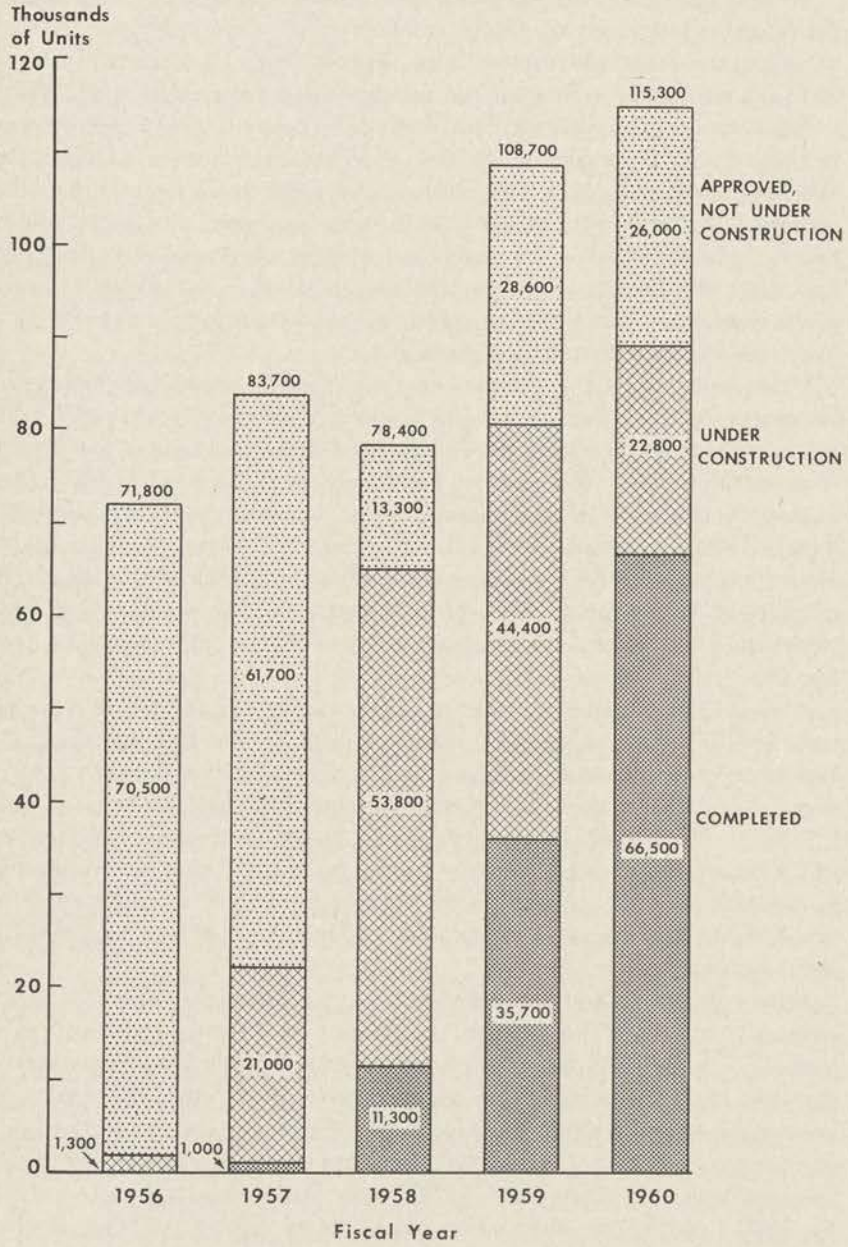


Figure 13

are assured of a specific level of rental income for a period of years as an incentive to build private housing for U.S. military personnel and their families. The construction of 5,600 units has been made possible by such guarantees.

Military family housing also included 121,000 units built on military bases with appropriated funds or foreign currencies available to U.S. forces, and 5,800 units of off-base housing leased from private owners by the military Services. In addition, there were 72,000 substandard units, consisting of old public quarters, converted structures, trailers, and rental housing. The inadequate public quarters in this category—totaling nearly 48,000—are being reviewed to determine those units that should be rehabilitated, converted to other uses, sold, or demolished. Various types of rental housing are also being screened for similar purposes. These studies should bring the vast majority of the militarily controlled housing to at least the minimum standards established for public quarters.

Dependents' Medical Care

Adequate medical protection for dependents of military personnel has made an important contribution to higher morale, particularly in recent years. While military hospitals and dispensaries have long been open to dependents of Service personnel, many families had been unable to avail theemselves of this care until 1956 because of distance from the nearest military installation, overcrowded conditions, or lack of specialized treatment facilities. The supplementary medical care program for dependents established in that year extended the coverage to treatment received from civilian sources. In October 1958 the scope of the program was restricted to assure optimum utilization of military hospitals and to keep expenditures within the limits set by the Congress (see fig. 14).

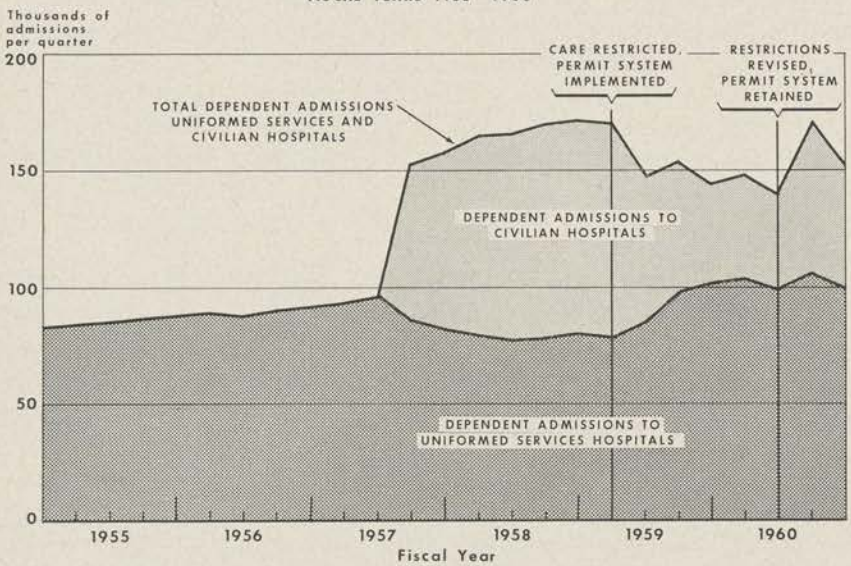
This change brought admissions of dependents to military hospitals to a level more nearly consistent with the efficient operation of these facilities, but also created unusual hardships for some families. The Medicare program was carefully reviewed in 1959 and on January 1, 1960, treatment by civilian sources was restored for four types of cases—emergency treatment for minor injuries, initial hospitalization for acute emotional disorders, nonemergency surgical care, and certain pre- and post-hospitalization tests and procedures. The requirement that dependents obtain a Medicare permit from a military facility for treatment by a civilian source was retained.

A total of 300,000 claims from civilian physicians, amounting to $26.7 million, was paid from fiscal year 1960 funds by the Department of Defense for medical treatment of dependents, as compared to 491,000 claims for $40.0 million during the preceding year. A parallel

reduction occurred in payments to civilian hospitals which decreased from $38.1 million for 306,000 claims charged to fiscal year 1959 funds to $31.1 million for 204,000 claims paid with 1960 funds. With the Medicare program designed primarily to provide protection to dependents residing apart from their sponsors—families separated by oversea duty or assignment to isolated posts—it is noteworthy that 53.2 percent of the cases financed by the program involved this group.

MEDICAL CARE FOR DEPENDENTS – IMPACT OF MEDICARE PROGRAM

FISCAL YEARS 1955 – 1960



Note: The above statistics include dependents not only of the military Services of the Department of Defense, but also of other "uniformed Services" covered by the Medicare program -- the Coast Guard, the Coast and Geodetic Survey, and the Public Health Service. The latter group accounts for about 2 percent of the totals.

Figure 14

Information and Education

Off-duty education programs assist members of the armed forces to acquire training, skills, and knowledge to further their careers. These programs, in which participation is voluntary, include correspondence courses and classroom instruction and had an enrollment of more than 500,000 in fiscal year 1960.

The U.S. Armed Forces Institute (USAFI) with headquarters at Madison, Wis., is responsible for the major part of this service. Its 200 college and high school level correspondence courses were taken by 118,000 military personnel and off-duty study groups using USAFI texts enrolled 157,000. The total enrollment of 275,000 represented an increase of 48,000 over the previous year. Participation

in correspondence courses prepared and administered by 44 American universities under USAFI contracts decreased slightly—from 11,400 in fiscal year 1959 to 9,400 in 1960.

In addition, off-duty formal classroom work was offered on or near military installations at home and abroad by some 350 universities and colleges and 150 secondary schools. More than 220,000 applications were received for this type of instruction during the year.

The Department of Defense also sponsors an extensive troop information program to keep members of the armed forces abreast of the latest national and international developments. During fiscal year 1960 the Office of Armed Forces Information and Education prepared and distributed over 4,900,000 pamphlets, 500,000 posters, 22,000 fact sheets, 20 motion pictures, and 2,100,000 reprints of articles from commercial publications. Some 200 armed forces radio outlets were furnished over 3,000 hours of radio programs, and 33 television stations received 2,600 hours of kinescopes. Most of this material was made available by commercial sources, with the Department preparing only one-sixth of the total.

The troop information program placed special emphasis during the year on encouraging military personnel and their dependents to register and vote in the forthcoming Presidential primaries and elections. Information on the requirements for voting by absentee ballot was widely disseminated. In addition, the Department continued to work closely with State governments to assure that all military and civilian personnel away from home would have an opportunity to exercise their franchise as electors.

Health

The continued improvement in the health of the active forces is reflected in the progressively lower hospital admission and noneffectiveness rates in recent years. Admissions of Service personnel to hospitals fell from an average of 288 per 1,000 in fiscal year 1959 to 274 in 1960, and the proportion of the armed forces in hospitals from 0.94 percent to 0.88. The noneffectiveness rate for the year averaged 10.96 per 1,000—a decline of 0.49 per 1,000 from the fiscal year 1959 rate.

In the field of medical personnel, encouraging progress was made in increasing the proportion of regular officers. The medical corps of the three military departments included 4,923 regulars on June 30, 1960, out of a total strength of 10,321 officers, or 47.7 percent as compared to 46.0 percent at the close of the preceding year. The proportion of regular dental officers rose from 39.5 percent to 40.4 percent—2,041 regulars in a total strength of 5,055. This trend,

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fostered by the Medical and Dental Officers Career Incentive Act of 1956, is providing greater continuity in medical and dental personnel and establishing a broader base for wartime expansion.

The remaining requirements for physicians and dentists were met during fiscal year 1960 through voluntary recruitment. Established programs offer reserve commissions to senior medical and dental students in the military Service of their choice. Interns are also given the option of requesting deferment to complete residency training in a medical speciality required by the armed forces rather than being called to active duty upon completion of internship. Since these choices were first made available in 1954, about 11,000 physicians have been commissioned as reserve officers, of whom 6,500 volunteered for immediate active duty and 4,500 requested deferment for residency study. On June 30, 1960, almost 2,400 physicians were on deferred status; they will begin active duty at the rate of about 700 per year. While this program has been very effective in filling military needs for specialists, only about half the required number of students applied this year for immediate active duty as general practitioners. To remedy this shortage it may become necessary during fiscal year 1961 to use the Selective Service System for recruiting physicians for the first time since February 1957.

Senior medical students are also eligible to apply for reserve commissions to complete their medical training on active duty and subsequently serve 3 years as physicians with the armed forces. Some 365 students were commissioned under this arrangement during fiscal year 1960, about the same number as during the preceding year. A similar program for senior dental students was discontinued this year.

The joint use of medical facilities and personnel by the three military departments continued to increase. Cross-servicing of patients among the military Services rose during the year from 10.1 to 11.4 percent for active duty military personnel and from 18.7 to 18.9 percent for dependents. Plans were well advanced for designating certain major hospitals with specialized facilities and staffs to serve as regional referral centers for all patients needing such treatment regardless of Service affiliation. This formal assignment of responsibility should increase cross-servicing of patients in the years ahead and contribute to the better utilization of specialists and specialized treatment facilities.

The military Services completed the construction of four new permanent hospitals in the United States during fiscal year 1960. Special attention was given to combating the recent trend toward higher costs in hospital construction. Some remedial measures were adopted and, as the result of a comprehensive study, additional controls will be established in the near future.

Procedures for the procurement and distribution of medical supplies were further improved during fiscal year 1960 by the Military Medical Supply Agency, one of the Single Manager logistical support agencies of the Department of Defense. Overhead expenses were reduced by relocating the agency's offices, permitting the consolidation of some administrative functions and the elimination of 67 personnel spaces. One storage depot was placed on a partial maintenance status, handling only equipment little used in peacetime and requiring minimum surveillance. By placing wholesale stocks of serum albumin, derived from blood plasma, in refrigerated storage the shelf life of this item was doubled; this action should save about $16 million during the next 10 years.

As part of the preparation for emergency operations, standard lists of material for the treatment of military personnel in the event of nuclear attack were brought up to date, and 18,000 special emergency packs—each to serve 100 men—were assembled; the remaining requirement for 9,000 packs will be filled during the coming fiscal year. New and improved medical supplies and equipment for field use were developed, such as disposable hospital linens, plastic instruments that conserve scarce surgical steels, aluminum field beds and lightweight collapsible litters, and an aluminum field sterilizer that is 70 percent lighter and less bulky than the current model.

The Department of Defense also continued to support strongly the Medical Education for National Defense program, which keeps faculties of medical colleges advised on the latest developments in planning for medical care in the event of a major disaster. The number of schools participating in this program was increased during the year by 15 to a total of 71, and 11 more will join during the coming year. Faculty members and administrators of these schools attended four symposia on disaster medicine during the year and also visited military medical installations.

The Reserve Forces

During fiscal year 1960 the reserve components of the armed forces further improved their readiness for rapid mobilization. Modern materiel was delivered in increased quantities, and the provisions of the Reserve Forces Act of 1955 continued to contribute to the development of a more effective reserve establishment. Since the approval of this act, the proportion of Ready Reservists with basic training has risen from less than 50 percent to 95 percent. The availability of the Ready Reserve for active service on short notice is being assured by the continuous screening of personnel to eliminate those who might be unable to respond to sudden orders.

On June 30, 1960, the Department of Defense reserve components had a total personnel strength of 4,367,000, including the 220,000 Ready Reservists on extended active duty. Total strength declined by 234,000 during the year, with most of the decrease occurring in the Standby Reserve. The over-all reduction resulted in part from improved reenlistment rates in the active forces, thus reducing the input into the reserves at a time when large numbers of reservists had completed their tours of obligated reserve service.

The Ready Reserve, excluding reservists on extended active duty, totaled 2,418,000 on June 30, 1960—38,000 less than at the close of the preceding year. Almost 1,079,000 of these reservists were receiving pay for regular participation in drills or for training on active duty—an increase of 17,000 during the year. The Ready Reserve continued to benefit from special enlistment programs which provide 3 to 6 months of active duty for basic training out of 8 years of reserve participation. Since August 1955, a total of 439,000 men have entered these programs and 356,000 completed training and rejoined local reserve units. During fiscal year 1960, 121,000 recruits began and 101,000 completed their active duty training tours.

The Standby Reserve includes previously trained personnel who are not currently required to participate in regular drills. They could be called to active service in the event of war or a national emergency declared by the Congress. During fiscal year 1960, this group decreased by 185,000, or from 1,770,000 to 1,585,000.

The Retired Reserve increased by 16,000 during the year and totaled 144,000 on June 30, 1960.

Department of Defense proposals to reduce the Army National Guard from 400,000 to 360,000 and Army reservists on drill-pay status from 300,000 to 270,000 were not approved by the Congress, and these reserve components maintained their higher strength levels. The conversion to the pentomic tables of organization, adopted previously for regular Army divisions, was completed for the 37 reserve combat divisions—27 in the Army National Guard and 10 in the Army Reserve. The Army National Guard also manned 52 on-site NIKE air defense artillery batteries in 11 areas on an "around-the-clock" basis.

Under the Navy's Selected Reserve program, initiated in February 1958, most reservists on drill-pay status were being organized and trained to augment the fleet immediately upon the outbreak of hostilities. The Selected Reserve was manning 36 destroyer-type ships and 21 fleet-size antisubmarine warfare air squadrons at the close of fiscal year 1960. Other Selected Reservists were being trained in units to bring ships of the active fleet and the shore establishment up to wartime strength. Realistic training and the delivery of more modern equipment, including medium tanks and jet aircraft, improved the

readiness of the 225 ground and 86 aviation units of the Marine Corps reserve.

The Air National Guard continued to maintain 24 tactical flying wings—all squadrons of which have now been converted to jet aircraft—plus 16 flying support and 116 ground support units. A total of 22 Air National Guard squadrons have been assigned to augment our continental air defenses, with 6 squadrons providing around-the-clock readiness and the other 16 being available 14 hours a day. The Air Force Reserve organization included 14 medium troop carrier wings, 1 assault troop carrier wing, and 5 flying support and 52 ground support units. The responsibility for training and inspecting Air Force Ready Reserve units began to be shifted from the Continental Air Command to the major air commands that would have operational control of these units in case of war.

Expenditures for the reserve components totaled $1.0 billion during fiscal year 1960—$0.6 billion for the Army National Guard and Army Reserve, $0.1 billion for the Navy and Marine Corps Reserve, and $0.3 billion for the Air National Guard and Air Force Reserve.

Civilian Personnel

In accordance with established policies to keep the civilian work force at a minimum consistent with efficient operation, a reduction of 42,000 Defense employees was achieved during fiscal year 1960, decreasing civilian employment by 3.3 percent or from 1,267,000 to 1,225,000. Including this reduction, 541,000 fewer civilians were employed by the Department of Defense than on June 30, 1953—a decrease of 31 percent (see fig. 15). Additional reviews of staffing requirements, particularly those for departmental headquarters, were initiated at the close of the fiscal year.

The 1,225,000 civilian employees of the Department on June 30, 1960, included 500,000 salaried Civil Service employees, 547,000 "blue collar" workers paid according to local hourly rates established by wage boards, and 178,000 foreign nationals hired under contractual arrangements with friendly governments. Over 95 percent of these foreign nationals were located in France, Germany, Japan, and Korea. The 1960 decrease of 42,000 in employment involved 8,000 salaried employees, 23,000 "blue collar" workers, and 11,000 contract-hire foreign nationals.

The problem of equitable employment conditions overseas was given special attention during the year. At the request of the Department of Defense, the Congress enacted two new laws in this field shortly after the close of the year. The first of these provided reemployment rights in the United States to career personnel accepting transfers to oversea posts. Under this authority an employee is granted rights to

DEPARTMENT OF DEFENSE CIVILIAN EMPLOYMENT

1953 - 1960

(IN THOUSANDS)

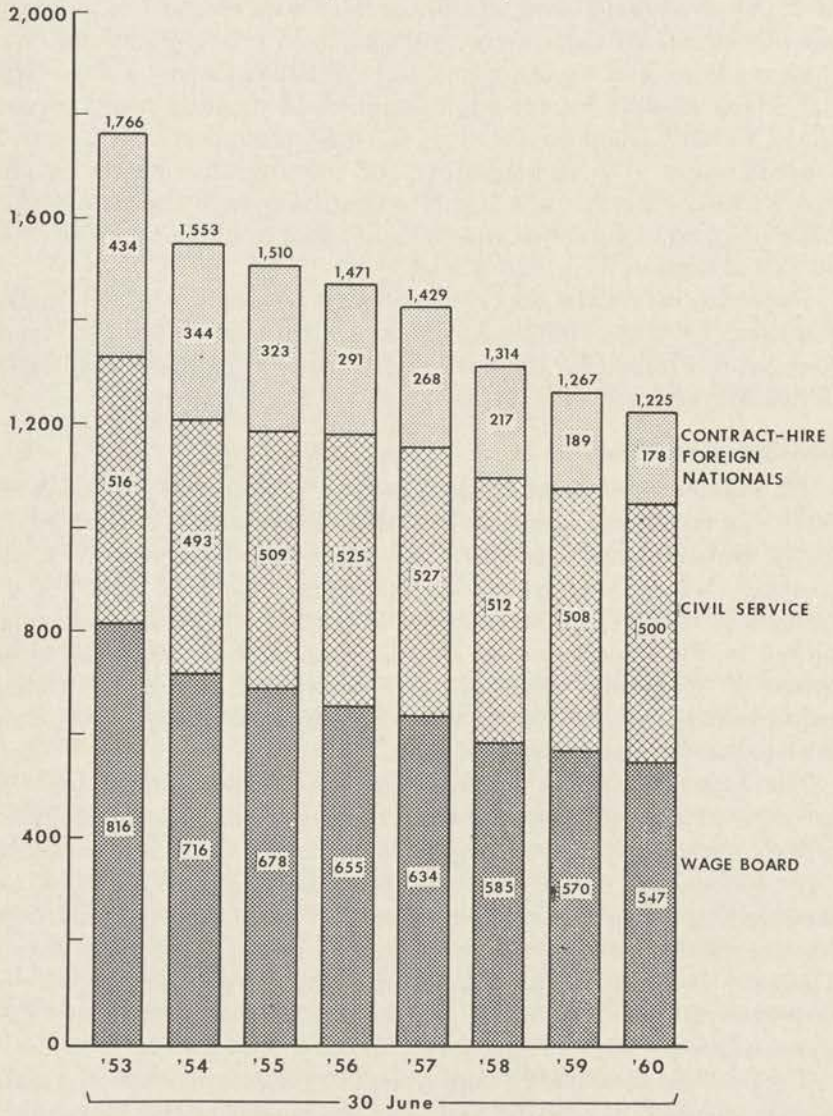


Figure 15

return either to the same position he vacated to go overseas or to an equivalent one in the same geographical area. These guarantees were designed to facilitate the rotation of key personnel between positions at home and abroad. The second new law, the Overseas Differentials and Allowances Act, improved and standardized such payments for oversea employees of Federal agencies, not covered by the Foreign Service Act. It authorized quarters allowances, cost-of-living allowances, differentials for hardship posts, the storage of household goods, payments for maintenance of official residences by chief representatives, transportation of private motor vehicles, and regular home leave. Although some of these special forms of compensation have been available to oversea employees of the Department of Defense, the new law for the first time granted allowances for temporary lodging abroad, the storage of household goods in the United States, the transportation of private motor vehicles when required in connection with the performance of official duties, and home leave after 2 years' continuous oversea service, computed at a rate not to exceed 1 week of leave for each 4 months of duty.

The 6,000 teachers in the 226 elementary and 58 secondary schools operated abroad by the Department for the education of children of Service families were also given more attractive working conditions. The Overseas Teachers Pay and Personnel Practices Act, approved on July 17, 1959, and effective in January 1960, transferred this small but important group of employees from the regular Civil Service work schedule to a program patterned after that prevalent in U.S. schools.

Direct-hire employees at home as well as overseas became eligible for coverage under the Federal Employees Health Insurance program that became effective in July 1960. With this program the Federal Government assumed responsibility for the first time for part of the expense of providing health insurance for its workers—a practice increasingly followed by private industry.

While measures to improve conditions of employment represented one approach to the problem of recruiting and retaining high quality personnel, another effort has been centered on the programs for the career development and training of employees. Under authority of the Government Employees Training Act of 1958 all the military Services made extensive use of Federal and private training facilities—including Service schools, colleges, and universities—to help civilian employees develop needed skills and improve their efficiency.

The number of inventions and suggestions for improved operations submitted by employees of the Department of Defense showed a sharp increase during fiscal year 1960. A total of 278,000 suggestions were received, as compared to 255,000 during the preceding year, and 75,000

of these were accepted—an increase of 7,000 over 1959. The first-year savings resulting from these proposals were estimated at $61.3 million. Cash awards totaling $2.2 million were paid to the employees who made these contributions to greater efficiency. In addition, 49,000 civilian employees were awarded $7.5 million for sustained superior performance of their duties, and 3,100 received $0.3 million for special acts or services. Total savings through the incentives awards program in fiscal year 1960 were estimated at $131.5 million—$32.5 million more than during the preceding year.

Security Policy

The personnel security program of the Department of Defense covers by necessity not only civilian employees and members of the armed forces but also defense contractors and their workers engaged in classified projects. The program is designed to protect military secrets from disclosure to hostile powers without establishing unreasonable or unwarranted limitations on the liberties of U.S. citizens.

During fiscal year 1960 the policies and procedures directed toward these objectives continued to be carefully reexamined. Particular attention was given to the security program for industrial personnel, first established in 1942, in view of the Supreme Court decision of June 29, 1959, in the case of Greene versus McElroy.

The points raised by this decision were covered in Executive Order 10865, issued on February 20, 1960, which prescribed revised security standards and procedures for defense contractors and their employees. Under this order, persons denied access to classified data must be afforded an opportunity to respond to the detailed statement of reasons for denial and to cross-examine individuals who made adverse statements on disputed questions of fact. Although limited exceptions were authorized to protect confidential information, in all such cases final decisions adverse to the applicant may be made only by the head of an executive department or agency, based on his personal review of the facts.

Instructions to carry out the terms of this order were approved by the Secretary of Defense shortly after the close of the fiscal year. The new regulations provide for a screening board to review the record of all cases referred to it. This board will either grant access to classified information or prepare a statement of reasons for denial, to be forwarded to the applicant. Applicants who desire a hearing may appear personally before field boards located in New York City, Washington, D.C., and San Francisco, where the Government's evidence will be submitted in the presence of the applicant, except for matters specifically exempted by the terms of the Executive order. The field boards will make findings of fact, and their recommenda-

tions will be reviewed by a central board which will permit the applicant or his attorney to present further written or oral argument if he so desires. Final decision will be made by the central board or by the Secretary of Defense, as appropriate under terms of the new Executive order. These procedures, while recognizing the requirement to restrict access to classified information in the interest of national defense, provide increased protection to the individuals involved.

The use of the Department of Defense Industrial Security Program has been expanded to meet the needs of the National Aeronautics and Space Administration, the Federal Aviation Agency, the General Services Administration, and the Department of Commerce, thus making it unnecessary for those agencies to develop separate programs to meet their respective needs.

Other developments in the field of industrial security included a revision of the Security Requirements Check List reducing the number of classified items and the level of classification. The new list should save time and money for both the contractors and the Government. The industrial security agreement with Canada was also expanded during the year to cover the exchange of information on the security status of firms located in one country but operating subsidiaries in the other, in order to permit security clearance of subsidiary plants without a duplicating investigation of their parent company. The same sort of information will also be exchanged with regard to individuals employed on classified work. These exchanges should simplify and expedite the placing of classified defense contracts.

Further steps were taken by the Department to reduce the volume of classified documents in its files. New instructions were issued to require the automatic downgrading and the declassification of all classified material within 12 years, except for extremely sensitive documents. The exempted records will be downgraded from Top Secret to Secret to Confidential at 12-year intervals, but will not be automatically declassified. All other documents will be downgraded at 3-year intervals and automatically declassified after 12 years. This procedure is an extension of the action taken during the preceding fiscal year concerning documents originated prior to January 1, 1946. Considerable savings in storage and handling costs will accrue as a result of the new standards.

VI. Weapons, Equipment, and Facilities

The increased coordination and integration of military logistic support activities during recent years has resulted in greatly improved utilization of resources.

Building on the Federal Catalog program, which provides a common supply language for all the military Services, the Department developed new organizational patterns to facilitate inter-Service cooperation in logistics, such as the Single Manager system and the Armed Forces Supply Support Center. Standardization programs reduced the number of items in the supply system. Storage facilities and distribution systems were consolidated, and the interchange of supply assets was increased, resulting in substantial reductions in inventories and in storage and personnel requirements. The enormous problem confronting the Department of Defense is illustrated by the size of the military inventories which, at the close of the fiscal year, were valued at $120.2 billion—$68.1 billion for arms and equipment issued for use, $42.0 billion for items in the supply system, and $10.1 billion for production machinery, industrial fund accounts, and surplus property.

Real property holdings of the military departments, with an acquisition cost of $34.4 billion, were kept under continuous review to assure optimum utilization of available resources and minimize the need for new acquisitions. Installations found surplus to mobilization requirements were sold or transferred to other Government agencies .

Recently approved programs have removed many deficiencies, produced tangible economies, and laid a sound foundation for the future.

The Single Managers

The Single Manager system for controlling logistical service and supply activities common to all the military departments was extended during this fiscal year to four additional commodity classes—automotive, construction, industrial, and general supplies. These new assignments increased to 11 the number of Single Manager agencies established since 1956.

Delegation to the Secretary of the Army of responsibility for general supplies and to the Secretary of the Navy for industrial supplies was made on November 6, 1959. The further designation of the

Secretary of the Army as Single Manager for automotive and for construction supplies followed on May 11, 1960. As a first step, a total of about 1,200,000 items are being screened to identify those items that can profitably be controlled centrally by the new Single Managers, those that should be procured by the General Services Administration for the Department of Defense, those that are better bought locally by using organizations, and those so essential to operations that control should remain vested in the individual military Services. Current inventories of these commodities are estimated at $3.2 billion and annual usage rates at $1.1 billion.

The new Military General Supply Agency, expected to be fully operational about July 1, 1961, will be responsible for handtools, furniture, and other "housekeeping" items, for certain types of materials-handling equipment and of photographic supplies, and for several classes of fabricated goods. Over 100,000 supply items are currently included in these categories. The Military Industrial Supply Agency, which will become operational at a later date, has been assigned hardware, nuts and bolts, paint, metal bars and shapes, bearings, rope, chain, cable, tackle, and related supplies—over 600,000 separate items. The charters under which these two new agencies will operate were approved shortly after the close of this fiscal year.

About 253,000 items, including tires and tubes, vehicle components, engines, engine accessories, and turbines will be handled by the new Single Manager for automotive supplies. Operating responsibility for controlling these repair components and parts will be discharged by the Army's Ordnance Tank Automotive Command, which already purchases almost all vehicles for the military Services under a single department procurement assignment. The construction supply classes selected for screening by the fourth new Single Manager agency encompass about 208,000 different items, including a large number of "end-items," or assembled units, the management of which may need to be retained by the military Services rather than being assumed by the Military Construction Supply Agency.

Studies were initiated during fiscal year 1960 to determine the feasibility of a Single Manager for electrical and electronic items and to develop a single integrated distribution system and uniform operating procedures for all the commodity Single Managers.

The four Single Manager agencies for common supplies established in 1956 and 1957—subsistence and clothing and textiles under the Secretary of the Army, medical supplies and petroleum under the Secretary of the Navy—reported aggregate savings in operating costs during fiscal year 1960 of nearly $20 million. The consolidation of functions and inventories by these Single Managers has permitted the elimination of over 900 personnel spaces, the closing of more than 5

million square feet of storage space, and the reduction of stocks on hand by $420 million since the establishment of these agencies.

More effective utilization of resources with fewer personnel and at less cost has also been achieved by the three Single Managers for common services—the Military Traffic Management Agency (MTMA) in the Department of the Army, the Military Sea Transportation Service (MSTS) in the Department of the Navy, and the Military Air Transport Service (MATS) in the Department of the Air Force.

MTMA is responsible for the effective and economical management of the freight and passenger transportation services required by all the military departments within the continental United States. During fiscal year 1960, the agency arranged for transportation costing $511 million. Operating with a staff of 975—as compared to the 1,300 persons who were authorized when each military Service arranged for its own transportation—administrative overhead expenses amounted to only $6.6 million or about 1.3 percent. Through rate negotiations, utilization of in-transit stopover privileges, reassignment of export shipments to the most favorable ports, annual passenger agreements, and group movements, the agency achieved economies of $42.2 million during fiscal year 1960 as compared to $30.0 million during the preceding year. In addition to its daily operations, MTMA has had an important role in developing plans for the movement of military traffic in the event of limited or general war.

MSTS, established to provide ocean transportation for all the military Services, operates a nucleus fleet of Government-owned vessels and arranges with commercial shippers for the bulk of the sealift requirements of the Department of Defense. Passenger traffic was 20 percent lower in fiscal year 1960 than in the preceding year, and cargo tonnage and petroleum shipments each 12 percent lower, with a resulting 13 percent reduction in operating expenses—$358.6 million as compared to $414.0 million. Of this year's expenses, $265.9 million, or 74 percent, was paid for services rendered by common carriers, private shipyards, and other commercial interests. The nucleus fleet was reduced from 151 ships to 115 and personnel from 12,031 to 10,087 in keeping with lower sealift requirements.

Following Presidential approval in February 1960 of a comprehensive study of the war and peacetime roles of MATS, this Single Manager agency began to reorient its airlift operations. Greater emphasis will henceforth be placed on the modernization and maintenance of the MATS fleet and facilities in readiness for vital wartime military missions. Commercial carriers will be encouraged to provide more of the routine peacetime airlift support. To this end, new long-term contracting procedures were being developed that will provide greater stability of operations for private firms and improved

continuity of service for the Department of Defense. During fiscal year 1960, commercial carriers flew 259 million ton-miles for MATS, as compared to 232 million ton-miles during the preceding year, and were paid $64.1 million, or $6.3 million less than in 1959, as the result of more favorable contracts concluded by the Department of Defense. Total industrial fund expenses incurred by MATS amounted to $275.6 million.

Contract Policies

Constant improvement in contracting procedures is vital to the efficient management of the Department of Defense, since nearly 40 percent of expenditures is allocated to the purchase of goods, services, and construction. A major difficulty in this area has been the fact that costs cannot be predicted with reasonable accuracy in many research, development, and construction activities for major weapon systems. Moreover, formal advertising procedures are not suitable to much of this procurement, and small business firms cannot be employed extensively as prime contractors. The Department has taken numerous steps in recent years to reduce the impact of these difficulties and during fiscal year 1960 issued further instructions designed to assure fair and reasonable charges to the Government and an equitable distribution of contracts to small business.

The principles for determining allowable costs were revised on November 2, 1959. This revision of the Armed Services Procurement Regulation is applicable not only to cost-reimbursement contracts but also to fixed-price type contracts whenever an evaluation of costs is necessary for the establishment of a fair price. Thus, the new guidelines facilitate the selection of the proper type of contract to be used, since costs will be measured alike under all types of contracts. The revised policies were permissive until July 1, 1960, when they became mandatory. The instructions governing the negotiation of prices were also extensively rewritten, including a new requirement for prime contractors and subcontractors to certify that the most current, accurate, and complete cost data have been used as a basis for negotiation.

To assure further that the Government secures a reasonable price and that small business firms receive an equitable share of awards decisions of prime contractors to manufacture components themselves or to subcontract for them are being given an increasingly detailed review. In addition, the former voluntary subcontracting program was made mandatory for all firms awarded prime contracts of more than $1 million having substantial possibilities for subcontracting. Policies governing the use of Government industrial facilities by private contractors were amended during the year, particularly to

prevent any unfair competitive advantage accruing to a firm utilizing such facilities.

The wider use of consolidated purchasing assignments, whereby a single military department acts as the contracting agent in filling the needs of all the armed forces for a particular commodity, has also contributed to more economical procurement operations. Responsibility for single department procurement of electron tubes was assigned to the Air Force during the year, bringing to 32 the number of such single department procurement assignments. Similar consolidated procurement actions are taken by the Single Manager agencies, the General Services Administration under the interdepartmental procurement program for common commercial items, and by the military departments under the 63 plant cognizance assignments for aircraft and aircraft componets.

Military procurement actions during fiscal year 1960 totaled 7,061,000 with a net value of $23.7 billion, about $1.6 billion less than during the preceding year. Most of this decrease was accounted for by smaller awards for manned aircraft, services, construction, oversea procurement, and fuels and lubricants that were offset only in part by increased procurement of missile systems and electronics and communication equipment (see fig. 16). Almost 90 percent of the procurement actions represented awards to business firms in the United States, totaling $21.3 billion—including almost $17.3 billion for weapons and supplies, $1.3 billion for services, $1.2 billion for construction, and $1.5 billion in more than 5,400,000 small purchases each less than $10,000 in value and not reported by category. The remaining $2.4 billion in awards was comprised of $1.2 billion for work outside the United States, $0.8 billion in intragovernmental transactions, and $0.4 billion in contracts with educational and other nonprofit institutions.

Of the $21.3 billion in procurement actions for work by business firms in the United States, $14.8 billion or 69.5 percent was for major hard goods, such as aircraft, missiles, and ships; $1.3 billion or 6.2 percent was for services; and $5.2 billion or 24.3 percent was for soft goods (such as subsistence and textiles), for construction, and for small purchases.

Excluding intragovernmental transactions, 84 percent of the awards by value were made by competitive methods. Formal advertising and other types of price competition—including open market purchases of not more than $2,500 each—accounted for 30 percent of this total and awards placed as a result of design or technical competition for 54 percent. On about 13 percent of the awards there was no competition, mainly because of the existence of patent rights or other proprietary interests restricted the procurement to a single source. The competitive status of nearly 3 percent of the awards was not reported.

PROCUREMENT TRENDS
MAJOR HARD GOODS CATEGORIES
VALUE OF AWARDS
1955 - 1960

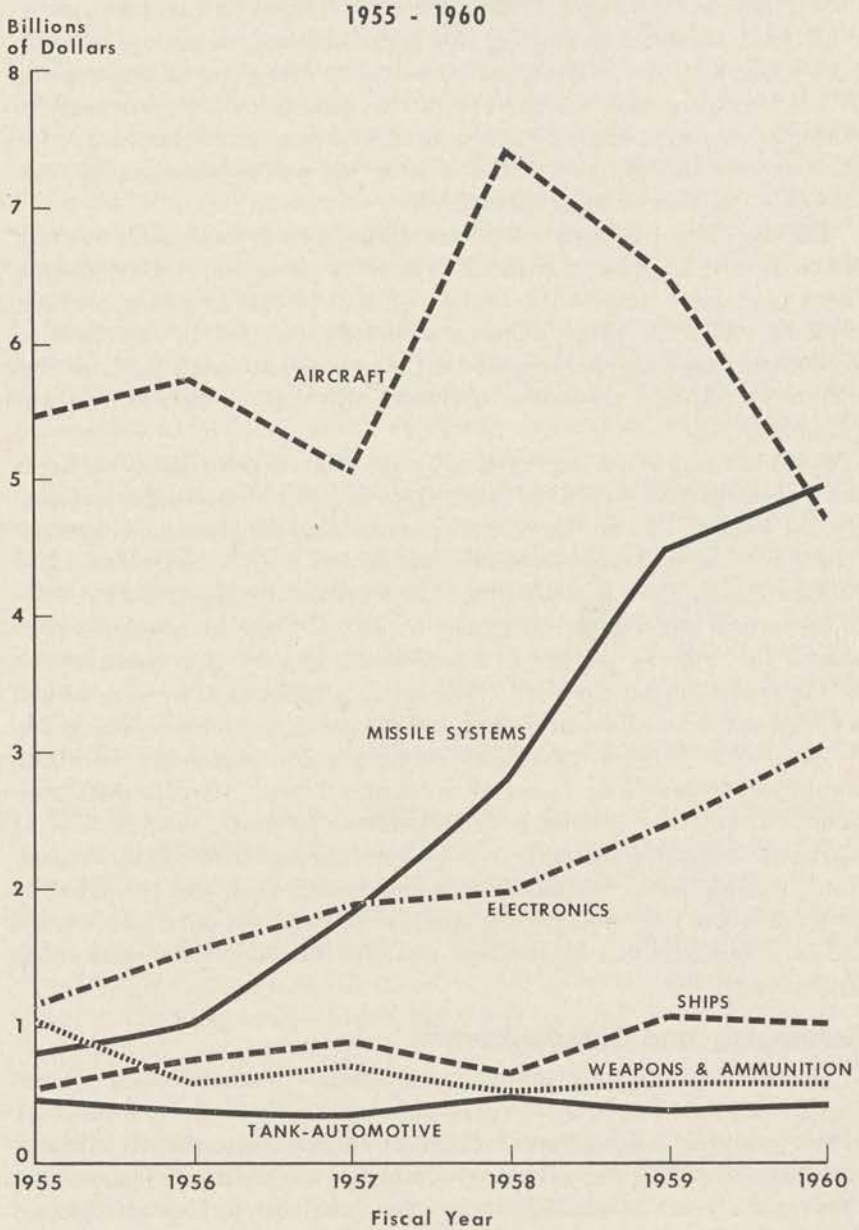


Figure 16

Prime contracts awarded to small business totaled $3.4 billion during fiscal year 1960, about $0.3 billion less than in 1959. With fewer procurement actions, the amount of business considered to fall within the potential productive capacity of small business firms declined from $6.0 billion in 1959 to $5.9 billion in 1960. Small business was somewhat less successful in bidding this year than last, receiving 58.2 percent instead of 63.1 of the awards that were within its total potential. While receiving only 4.3 percent of the awards to U.S. business for major hard goods, small firms obtained 21.4 percent of the awards for services and 48.7 percent of the awards for soft goods, construction, and small actions of less than $10,000.

The emphasis placed on subcontracting kept the total small business share of military procurement at a level of about $7.0 billion during fiscal year 1960, despite the decline of $0.3 billion in prime contract awards. The 293 large prime contractors enrolled in the Defense subcontracting program reported disbursements to small firms of $3.6 billion for subcontract work—over $0.2 billion more than during the preceding year.

With the reduction during fiscal year 1960 in the number of areas with a substantial surplus of labor from 264 to 153, contracts awarded by the Department to firms in such areas also declined considerably. These awards, including set-asides and tie-bid preferences, totaled $2.0 billion during 1960 as compared to $9.3 billion during 1959.

Inspection procedures, designed to assure that the products purchased for military use are of the requisite quality, also continued to be improved during the year. New control specifications were placed into effect for missiles and missile components, particularly electronic components. Higher personnel standards for inspectors handling complicated technical materiel were developed. Handbooks were issued to provide guidance to inspection personnel on the use of statistical sampling methods in initial testing and in verifying inspections by suppliers. Increased economy in this area was provided by expanding the interchange of inspection services not only between the military departments themselves but also between them and other Federal agencies.

Cataloging and Standardization

The Federal Catalog system, maintained by the Armed Forces Supply Support Center, has proved an increasingly useful tool for more effective supply management. During the past year special emphasis was placed on helping inventory managers to eliminate those items that have been designated under the Accelerated Item Reduction program as no longer required by the military Services. In addition, substantial progress was made in assigning freight rate classification

codes to supply items, making possible considerable economics in transportation costs; a total of 1,132,000 items—out of an estimated potential of over 2,000,000—have been given such rate codes since the start of the program in February 1959.

On June 30, 1960, over 3,678,000 different active supply items were identified in the Federal Catalog. Of this total, 3,568,000 items were used by the Department of Defense, including 36,000 common items in general usage throughout the Federal Government. The remaining 110,000 identifications covered equipment stocked only by civilian agencies. During fiscal year 1960, 570,000 new items were added to the catalog largely as the result of the development of new weapon systems and of improvements in older equipment. Over 390,000 listings were eliminated from the catalog during the year, for a net increase of 180,000 items.

The direct wire transmission net linking the automatic data-processing system of the central catalog office with inventory control points was expanded during the year to include 12 more field installations, for a total of 36. This equipment has greatly reduced the time required for all supply actions.

The first phase of the Accelerated Item Reduction program was almost completed during the year. Data on 99 percent of defense items in the Federal Catalog were obtained, providing information on how each item is managed, procured, and stocked and permitting its classification as standard, limited standard, or nonstandard. In the course of this work, 147,000 items were designated for elimination. Phase II of the program, to improve further the quality of catalog data, and Phase III, to reduce the varieties of items through nontechnical evaluation, were proceeding on schedule at the close of the year.

The Defense standardization program—based on a technical rather than on a nontechnical evaluation of items—aims to reduce the inventory by the consolidation of specifications and requirements. The review of specifications during fiscal year 1960 made possible the replacement of 206 overlapping or duplicating military specifications by 105 new ones and, as the result of obtaining agreement among the military Services on standard requirement, 90,472 items were declared nonstandard, i.e., no further procurement will be made after current stocks are exhausted. Examples of this year's accomplishments included the reduction of 742 different types of electrical wire and cable stocked by the military Services to 166 types, of 3,900 roller bearings to 585, and of 110 bulldozer and grader blades to 6. Since the standardization program was established in 1952, 1,174 specifications and 1,027,800 items have been eliminated or designated for elimination by

595308—61——6

these procedures. Special efforts were made during the year to enlist the active participation of private industry in this program, particularly with regard to the development of new weapons and equipment.

Inventory Control, Storage, Maintenance, and Disposal

More realistic requirement computations, improved inter-Service cooperation, and modernized surplus disposal procedures have made it possible to reduce military inventories to significantly lower levels and at the same time improve the effectiveness of logistic support. The degree of success in this effort is reflected in the reduction during the past 3 years of $10.5 billion in the value of supply system inventories, excluding excess stocks.

Further progress was made during fiscal year 1960 in adjusting mobilization reserves to the constantly changing military requirements. Formal instructions were issued in June 1960 to govern the selection by the military departments of the items to be procured and retained as reserve. The new criteria considerably reduce the range of items and lower the authorized stock levels.

To promote the greater utilization of available supply assets, a directive issued in June 1960 prescribed that items in excess of requirements be transferred between departments without reimbursement from appropriated funds. This new procedure provides an additional incentive for a military department to screen carefully the excess stocks of another department before initiating regular procurement actions. In addition, the screening of excess supplies against new requirements was accelerated by the use of electronic data-processing equipment and Federal Catalog files. Since March 1, 1960, excess items with an acquisition cost of less than $3,000 have been screened concurrently by the military Services and Federal civilian agencies in the regional area in which the items are located and screening time has been reduced from 165 to 75 days. Items with an acquisition cost exceeding $3,000 are reported to the Armed Forces Supply Support Center for screening against worldwide military requirements and then to the General Services Administration for screening against the needs of civilian agencies; for these items screening time has been reduced from 160 to 120 days.

The lower inventories and the better utilization of assets also made possible a substantial reduction in military storage facilities. During the last 5 fiscal years, Department of Defense holdings have been reduced by 37.7 million square feet of covered storage space in the United States—from 370.1 million to 332.4 million. Almost 11.0 million square feet of this reduction was achieved during fiscal year 1960. Greater efficiency was also obtained through cross-servicing

operations, which were in effect on June 30, 1960, for approximately 5.9 million square feet of military storage space—with 1.2 million being cross-serviced between the military departments, and an additional 4.7 million involving the military departments and other Federal agencies. These totals do not include 9.0 million square feet of covered and 20.3 million square feet of open space made available by the military departments to the General Services Administration for the stockpile of strategic materials.

In the field of materiel maintenance, new instructions were issued shortly after the close of the year encouraging the use of commercial resources wherever practicable. Under the new policy, tactical units remain self-sufficient, while at the depot level the military departments will maintain an in-house capability, but not necessarily at full capacity. The new instructions recognize the need for contractor maintenance during the introduction of new weapons and equipment into military use and the fact that the augmentation of military maintenance capabilities by commercial sources is vital to the defense effort.

When excess supply items cannot be used by any military department or Federal agency, they are declared surplus and become available for disposal to nonprofit organizations or private groups and individuals. The planning for streamlining the procedures for surplus disposal was completed, and early in fiscal year 1961 315 regional surplus sales offices will be consolidated into 35 offices. A central sales information office will also be established to maintain a national list of bidders and to prepare and distribute sales catalogs for all regional offices. These new organizational arrangements should improve buyer-seller relations and lower overhead costs.

The Department of Defense carried over into fiscal year 1960 excess and surplus property amounting to $4.2 billion, after adjustments. During the year, $8.5 billion of additional personal property was declared excess or surplus, thus making property valued at $12.7 billion available for disposal. The Department of Defense reutilized or disposed of property with a value of $8.2 billion, leaving a year-end inventory of $4.5 billion—of which $2.1 billion represented excess property still in process of being screened for possible use within the Department or other Federal agencies and the remaining $2.4 billion was the value of surplus property being processed for disposal.

The fiscal year 1960 disposals of $8.2 billion in personal property included $1.6 billion reutilized within the Department of Defense, including the Military Assistance Program; $0.2 billion transferred to other Federal agencies; $0.3 billion donated to States, educational institutions, and other nonprofit organizations; $2.4 billion sold as usable property; $3.6 billion designated for sale as scrap; and $0.1 billion destroyed or abandoned. In addition to the $8.2 billion in

disposals, excess supplies worth $0.4 billion were exchanged between the military departments before being officially placed into the Department of Defense disposal system.

The return on these transactions is difficult to compute, since the valuation is based on acquisition costs or standard prices rather than on current value including depreciation for wear and tear and obsolescence. The market value of much of the materiel reutilized within the Department, transferred to other Federal agencies, and donated to nonprofit agencies is probably not far below the book value. The returns on usable property sold to the public varies greatly with the type of product and the market demand and averages about 5 percent of the original price, while surplus property sold for scrap purposes yields less than 2 cents on the dollar. Almost $0.2 billion was obtained through such sales in fiscal year 1960.

Communications

The development of a modern, integrated communications system to meet present and future needs of the military Services economically, efficiently, and effectively was significantly advanced with the establishment of the Defense Communications Agency in May 1960.

The creation of the agency came as the result of studies initiated in March 1959 in response to new telecommunications policy objectives established by the Secretary of Defense. Alternative methods of accomplishing these objectives were carefully evaluated during the fiscal year by the military departments, the Joint Chiefs of Staff, and the Office of the Secretary of Defense. The plan adopted provided for a Defense Communications Agency responsible to the Secretary of Defense through the Joint Chiefs of Staff for the operational control and supervision of all long-haul, point-to-point communications facilities of the military departments. The agency is scheduled to assume full operational responsibility in fiscal year 1961.

The facilities to be integrated into a single Defense Communications System carry an annual traffic of 63 million messages, control 6,532,000 channel miles and 489,000 long-range radio voice channels, and represent an investment of about $2.0 billion. Annual costs are estimated at $0.6 billion and 25,000 people are required for operations and maintenance. These facilities link the Washington headquarters with major commands all over the world and carry command and control messages, intelligence reports, and weather, logistics, and administrative information. The system does not include tactical communications and other communication facilities that are primarily local in character.

The new organization will facilitate the elimination of unnecessary duplication and uneconomical utilization of existing facilities—prob-

lems that have been of concern to the Congress and the Department of Defense for some time. Centralized control will permit the standardization of equipment and operations, assure prompt and dependable communications with the increased capability for alternate routings, and, in general, provide greater flexibility and efficiency to worldwide military communications.

Mobilization Planning

Department of Defense planning for the continued logistic support of the armed forces in the event of war is carried out under policies established by the Office of Civil and Defense Mobilization (OCDM). The Department participates in programs for maintaining industrial productive capacity and for operating a priorities and allocations system.

Mobilization planning was expanded during fiscal year 1960 to include many key subcontractors producing essential components of military equipment previously not covered by the Defense Industrial Readiness Planning program. The military departments designated representatives to serve on eight regional Civil and Defense Mobilization Boards, established by OCDM, to provide local plans for the continuation or resumption of production in case of a nuclear attack. The Department of Defense continued its sponsorship of the National Resources Evaluation Center maintained by OCDM and established a Department of Defense Damage Assessment Center. This new agency, operating under policy guidance from the Joint Chiefs of Staff, is oriented to military problems and will prepare advance vulnerability studies and assess worldwide damage to armed forces resources if such an attack were to occur.

The National Priorities and Allocation system has been established not only to assist in keeping on schedule the current development of our most important new weapon systems but also to assure the most effective utilization of the Nation's industrial capacity in time of war. The national regulations for carrying out these objectives were revised and simplified during the year, and the Department of Defense priorities and allocations manuals were amended accordingly. Through the priorities system delays to military production were held to a minimum during the 116-day steel strike from July 15 to November 7, 1959, and the subsequent period of adjustment. The Department processed 743 requests for special assistance in obtaining materials, components, and production equipment to overcome delays in the completion of defense contracts during the past year.

Assistance to private firms for projects that enlarge the mobilization base has been available under two programs—rapid tax amortization privileges and federally guaranteed loans. Authority for rapid tax

writeoffs expired on December 31, 1959. During the final 6 months of this program, the Department of Defense commented on 197 amortization requests for plant expansion, and OCDM certified 188 in the amount of $78.2 million—$16.5 million less than during fiscal year 1959. The Department also processed 17 requests for loans, of which 11 were guaranteed totaling $58.1 million—$41.3 million less than during the preceding year, when 34 loans were approved. In line with the voluntary program for the dispersal of industry away from military installations and congested urban areas, 210 inquiries were submitted by private firms and other Government agencies; 121 of the new plants met established standards.

The National Industrial Plant Reserve (NIPR) of the General Services Administration and the plant reserves of the three military departments consist of industrial facilities originally constructed by the Government and still retaining potential mobilization value. The number of plants in the NIPR was further reduced during the year from 24 to 13, of which 10 are privately owned subject to recapture and 3 are operated under lease or contract. Changing requirements in weapon systems and strategy have been largely responsible for the decrease in the NIPR. The plant reserves of the Department of Defense included 384 facilities on June 30, 1960, valued at an acquisition cost of $6.2 billion, as compared to 387 plants with a value of $5.9 billion at the close of the preceding fiscal year. During 1960, 224 of the departmental reserve plants were being operated by contractors and 68 by the Government; 70 were in standby status; and 22 had been declared excess but had not yet been transferred to the General Services Administration for disposal.

As for reserve machine tools and other production equipment, the National Industrial Equipment Reserve (NIER) of the General Services Administration administered 6,000 pieces on June 30, 1960, as compared to 4,000 a year earlier, while the central Department of Defense inventory included 56,400 pieces—25,200 less than at the end of the preceding year. The major part of this substantial reduction is attributable to the termination of central control for various categories of equipment and reassigning administrative responsibility to the military departments. In addition, 5,300 pieces were shipped for use by military contractors and military production facilities.

Properties and Installations

The rapid modernization of our armed forces has had a major impact on real property management as on all other activities of the Department of Defense. New weapons have created substantial additional requirements for operational, training, and support facilities and at the same time increased greatly the rate of obsolescence for

many existing installations. By the continuous review of new requirements and current holdings, the Department has aimed to limit the acquisition of new holdings to a minimum and, at the same time, to accelerate the disposal of excess property.

The real property holdings of the Department of Defense increased during fiscal year 1960 by $2.3 billion and 200,000 acres. The acquisition cost of all holdings was $32.0 billion on June 30, 1960, as compared to $29.7 billion a year earlier, and the acreage controlled by the military departments rose from 31.3 million acres to 31.5 million. Work in place under construction contracts not fully completed amounted to an additional $2.4 billion.

The 1960 increase was the result of the high priority placed on the rapid construction of operational as well as testing facilities for the major new weapon systems. These projects included new bases for ATLAS and TITAN missile squadrons, stations for the Ballistic Missile Early Warning System (BMEWS), testing sites for NIKE-ZEUS, and supporting facilities for POLARIS. Further progress was also made in completing additional air defense missile sites and SAGE control centers as well as in providing the runways, taxistrips, and support facilities to permit greater dispersal and shorter reaction time for the Strategic Air Command.

The Congress appropriated $1.4 billion for the military construction programs for fiscal year 1960. Obligations during the year totaled $1.4 billion and expenditures $1.6 billion—about $0.3 billion less for each category than in fiscal year 1959. Closer management controls made possible a reduction of $0.3 billion in unexpended construction funds—from $2.5 billion to $2.2 billion. Shortly after the close of the fiscal year, the Congress made available $1.0 billion in new funds, with about one-third of the total assigned to ballistic missile facilities.

The high cost of current construction has placed new emphasis on the development of cost-saving designs and the establishment of uniform construction standards and criteria. Technical studies were made of types of missile silos and control centers to achieve maximum protection at lowest cost for these "hardened" facilities. Construction criteria applicable to general purpose facilities common to all the military Services—such as family housing, hospitals, barracks, mess halls, cold storage facilities, and the like—continued to be revised as necessary to promote more economical practices. A new uniform system for reporting maintenance costs was placed in effect in March 1960 to provide the necessary data for more effective controls.

Real property holdings of the Department of Defense are subject to continuous screening to identify installations suitable to meeting new requirements and eliminate those no longer needed. Transfers between the military departments completed during the year involved

DEPARTMENT OF DEFENSE
REAL PROPERTY HOLDINGS
JUNE 30, 1960

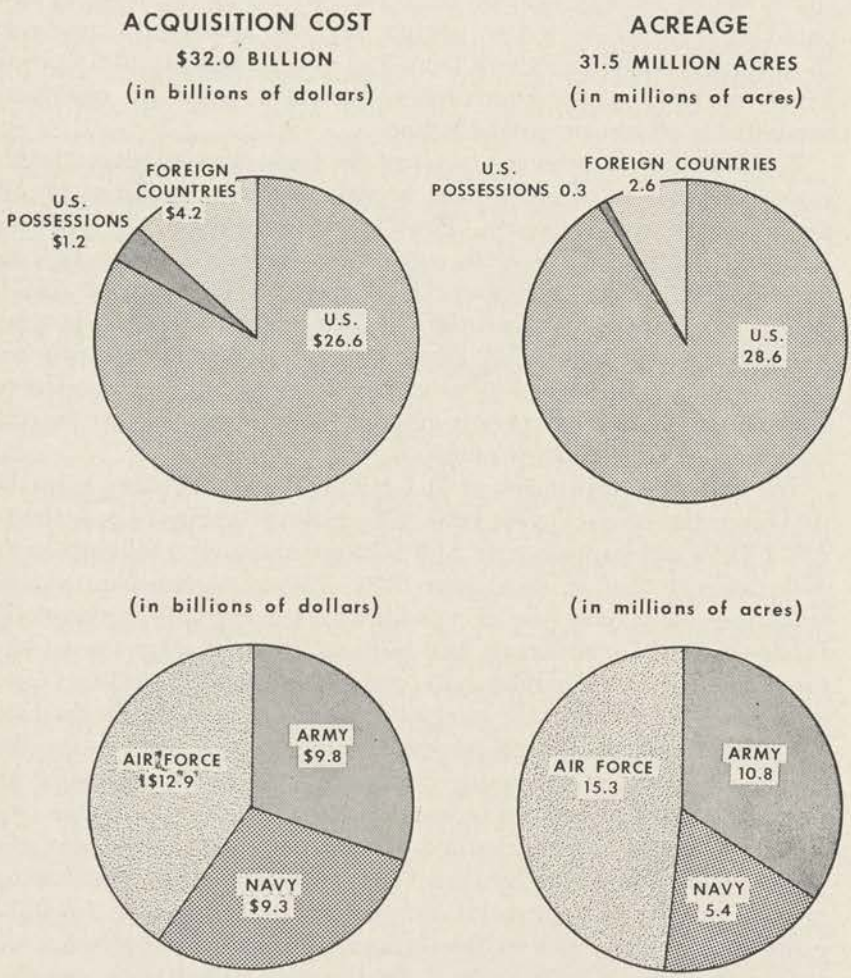


Figure 17

400,000 acres of public domain land with an indeterminate value and 10,000 acres of other types of holdings worth $32 million, including improvements. Real property holdings identified as excess to military requirements by the 1960 review included all or parts of 188 installations representing an acquisition cost of $741 million. In contrast, the

1959 review had involved only 62 installations and property valued at $298 million. To comply with the provisions of the Hawaiian Statehood Act, a special review of Defense holdings in this new state was initiated to facilitate the orderly disposition of real estate not essential to the needs of the military Services.

Of the total real property holdings of the Department of Defense, those in the United States accounted for about 83 percent of the acquisition costs and almost 91 percent of the acreage. As for the military departments, the Air Force with its extensive requirements for airfields and missile sites controlled by far the largest share—40 percent in terms of the acquisition cost and nearly 49 percent in terms of acreage. (See fig. 17.) About 23 percent of the total Defense land holdings was owned outright, 55 percent was acquired from the public domain, 8 percent represented rights in foreign countries, and the remaining 14 percent included leases, easements, and other temporary use arrangements.

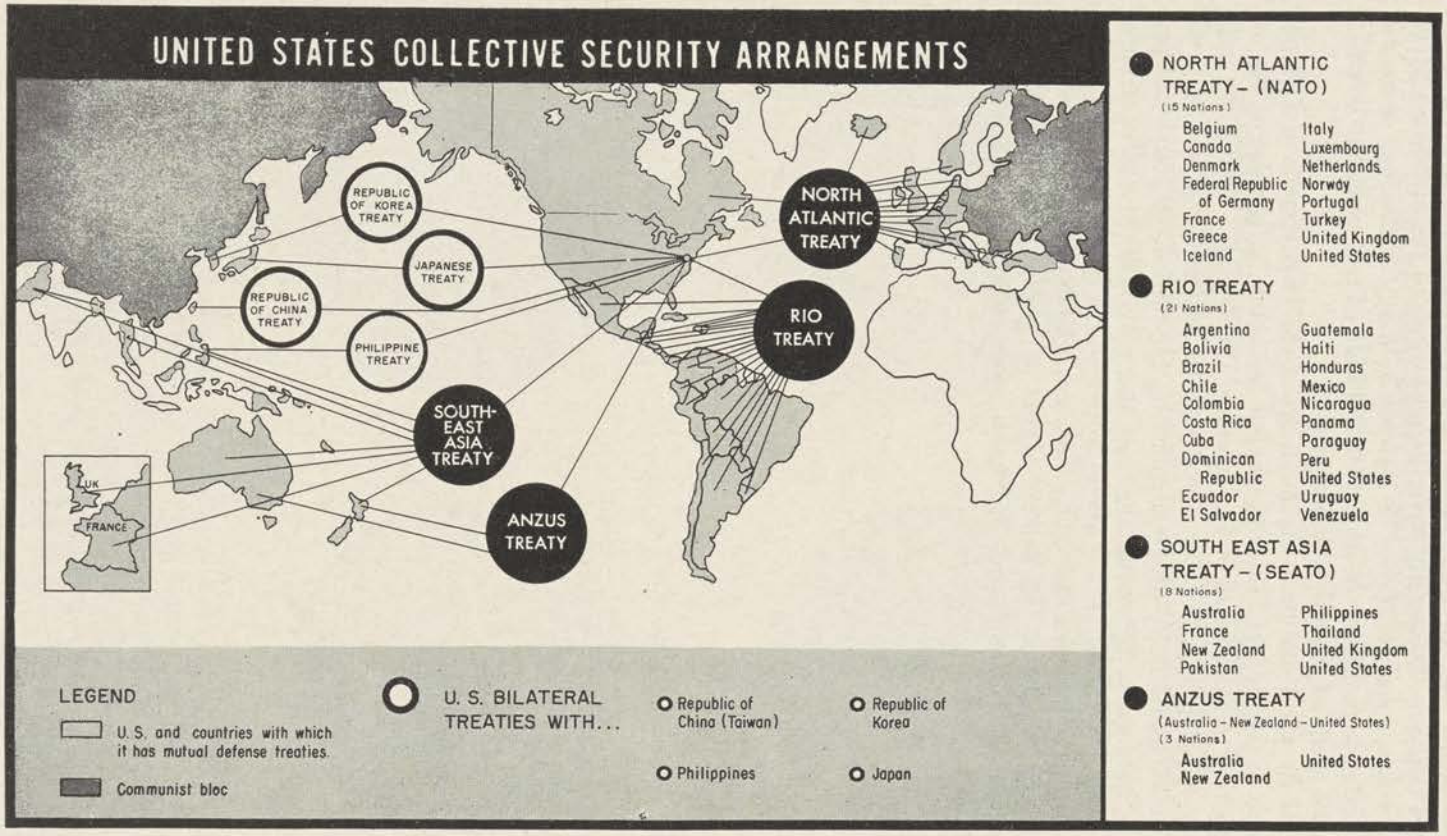

UNITED STATES COLLECTIVE SECURITY ARRANGEMENTS
REPUBLIC OF KOREA TREATY
JAPANESE TREATY
REPUBLIC OF CHINA TREATY
PHILIPPINE TREATY
SOUTH-EAST ASIA TREATY
ANZUS TREATY
NORTH ATLANTIC TREATY
RIO TREATY
UK
FRANCE
LEGEND
U. S. and countries with which it has mutual defense treaties
Communist bloc
U. S. BILATERAL TREATIES WITH...
Republic of China (Taiwan)
Republic of Korea
Philippines
Japan
NORTH ATLANTIC TREATY – (NATO)
(15 Nations)
Belgium
Canada
Denmark
Federal Republic of Germany
France
Greece
Iceland
Italy
Luxembourg
Netherlands
Norway
Portugal
Turkey
United Kingdom
United States
RIO TREATY
(21 Nations)
Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominican Republic
Ecuador
El Salvador
Guatemala
Haiti
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
United States
Uruguay
Venezuela
SOUTH EAST ASIA TREATY – (SEATO)
(8 Nations)
Australia
France
New Zealand
Pakistan
Philippines
Thailand
United Kingdom
United States
ANZUS TREATY
(Australia – New Zealand – United States)
(3 Nations)
Australia
New Zealand
United States

Figure 18

VII. Collective Security

The basic assumption underlying the U.S. Military Assistance Program is that the security of the free world is indivisible. Action that strengthens any part strengthens the whole. To this end, the United States has assisted friendly countries in maintaining forces essential for their self-defense and has joined regional collective security organizations in Europe, Asia, and Latin America to provide additional protection against Communist aggression.

The events of the past year clearly indicated the continuing need for United States support of these collective security arrangements. The Soviet Union intensified its efforts to intimidate the people of West Berlin. Communist efforts to control newly independent and uncommitted nations increased. In Africa, Asia, and Latin America, the Communist bloc continued to exploit the rising demands for rapid political and economic advancement as a means to impose Communist domination.

These threatening actions impelled the United States to strengthen its own armed forces and continue the programs for military assistance. Without protection against aggression and subversion, the successful implementation of long-range economic and political reforms would become impossible. The U.S. Military Assistance Program has been a key factor in providing this protection.

Free world military cooperation has also improved our own defense posture. The 42 nations to whom we are linked through multilateral and bilateral collective defense treaties (see fig. 18) constitute a vast reservoir of fighting strength. Many allies have made available to us bases and facilities for the strategic deployment of defensive forces, for advance warning and interception of airborne attack on the United States, and for logistic support. Without such facilities, our first line of defense would of necessity be at home.

We and our allies have built a defense far stronger than could have been provided if the funds for military assistance had been applied to U.S. forces alone. Military assistance forms an essential part of our national strategy.

Military Assistance

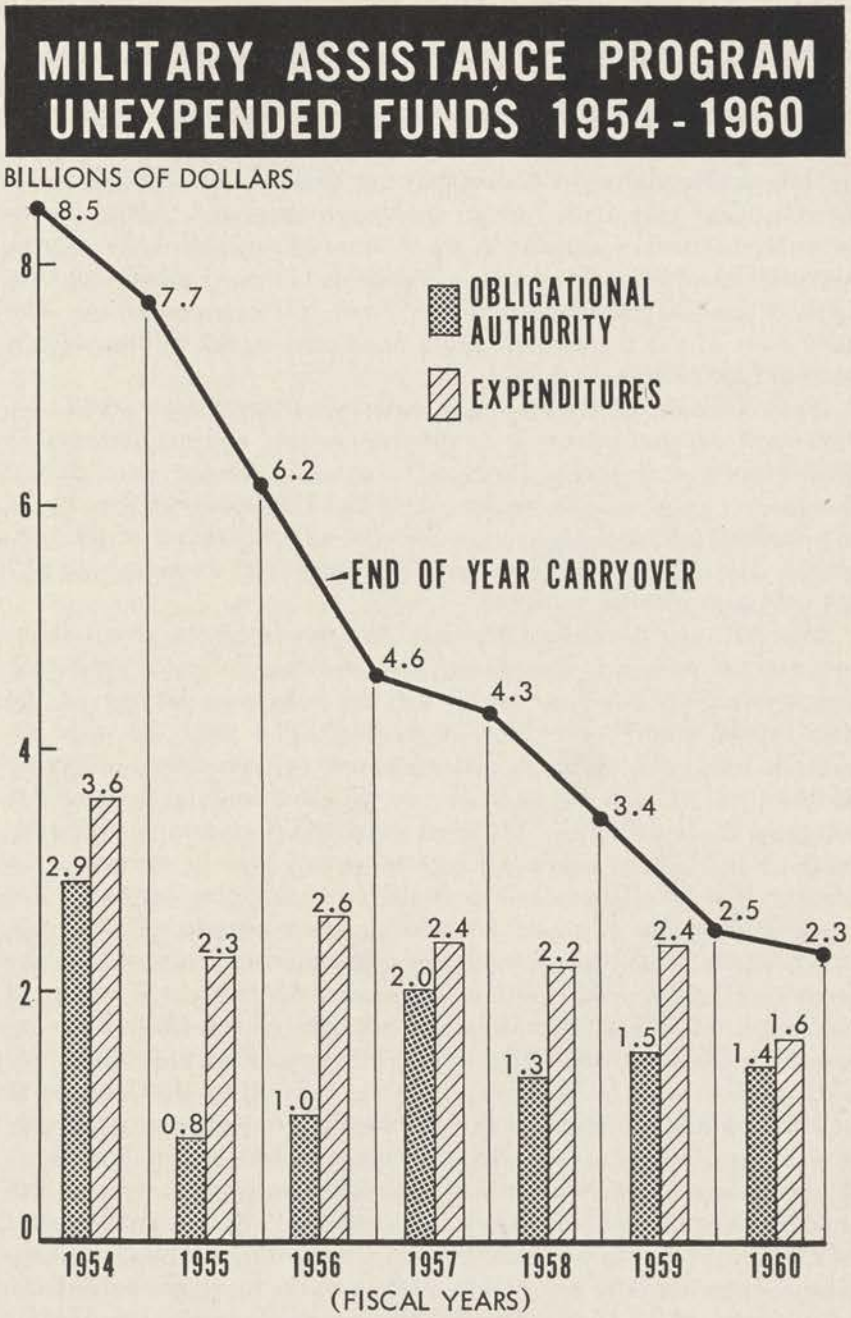
Organizational arrangements and procedures for administering the Military Assistance Program were streamlined and strengthened during the year both at Washington and in the field. These changes carried out suggestions made during the preceding year by the President's Committee to Study the U.S. Military Assistance Program—the so-called Draper Committee. Recognizing that year-by-year authorizations were not contributing to efficiency, the committee emphasized the need for long-range planning and proposed the adoption of new operating procedures.

The major recommendations of the committee were carried out during the year. A Director of Military Assistance was appointed within the Office of International Security Affairs to supervise all aspects of the Department of Defense Military Assistance Program. Responsibility was assigned to unified commands for integrating the military assistance programs of individual countries into comprehensive regional programs, closely coordinated with the planning for U.S. forces. Joint State and Defense Mutual Security Objective Plans were developed to provide common guidance for military assistance and economic aid activities. These measures have improved the planning and programing process and provided increased efficiency and effectiveness to program management.

Since 1950, the Congress has appropriated a total of $28.2 billion for military assistance, of which $26.7 billion has been available for obligation after net adjustments of $1.5 billion for transfers, lapsed accounts, and reimbursements. At the close of fiscal year 1960, all but $51 million of the available funds had been obligated or reserved for obligation.

Military assistance expenditures during fiscal year 1960 amounted to $1.6 billion, for a total of $24.4 billion since 1950. Unexpended balances on hand, which had reached $8.5 billion at the end of fiscal year 1953, were further reduced by this year's program—from $2.5 billion at the beginning of the year to $2.3 billion at its close (see fig. 19).

The procurement of military weapons, ammunition, equipment, and supplies accounted for by far the largest part of the expenditures—$1.1 billion during fiscal year 1960 and $19.8 billion since 1950. In addition, materiel excess to the requirements of U.S. forces and valued at an acquisition cost of about $1.7 billion has been made available to our allies without reimbursement from military assistance funds, except for rehabilitation charges. The cost of packing, crating, handling, and transporting new and excess materiel amounted to $130 million in fiscal year 1960 and reached a total of $1.3 billion for the period since 1950.



NOTE: Obligational authority represents appropriations adjusted for transfers, reimbursements, and rescissions.

Figure 19

Increased emphasis was placed on training foreign military personnel in the proper use and maintenance of U.S. equipment and in the organizational, tactical, and logistic doctrine used by modern forces. Learning and working side by side has enabled U.S. and allied personnel to establish personal bonds of friendship and gain greater understanding of each other's national outlook and objectives. During fiscal year 1960, foreign personnel completed 18,900 courses of study in Service schools in the United States and 4,600 courses abroad, and additional training was provided in many allied countries by U.S. mobile training teams and other training personnel. The 1960 costs of the training program amounted to $82 million—for a total of $592 million since 1950.

The remainder of 1960 military assistance expenditures—$282 million—was devoted primarily to the construction and maintenance of joint bases and facilities, U.S. participation in foreign research and production programs, the payment of the U.S. share of the cost of maintaining allied headquarters, and the administration of the program. Expenditures for these purposes since 1950 accounted for $2.7 billion (see appendix, table 6).

The Military Assistance Program has provided the essential increment in weapons, equipment, and training without which the maintenance of effective forces for the collective defense of the free world would have been impossible. The need for this assistance continues, although major changes are constantly occurring in the type of materiel and services required and in the amounts allocated to specific allies. In fiscal year 1960, for example, countries in the Far East area received for the second year in succession the largest share of military assistance deliveries, supplanting our European allies, many of whom have become increasingly self-sufficient.

While the vital contribution made by military assistance to the security of the United States as well as of the free world is beyond challenge, differences of opinion on the size of the effort have increased in recent years. The President's request of $1.6 billion for military assistance in fiscal year 1960 was reduced by the Congress to $1.3 billion and for fiscal year 1961 the Congress appropriated only $1.8 billion instead of the $2.0 billion proposed by the President. These reductions have necessarily curtailed existing programs and made it more difficult to meet new requirements. With over 80 percent of the military assistance funds being expended in the United States, the program has only a very minor effect on the international balance of payments of the United States. The increased security provided by our military assistance continues to outweigh its cost many times over.

Europe

Neither the dangers confronting Western Europe nor the need for building up regional defenses decreased during fiscal year 1960. The Soviet Union rejected Western proposals for the reunification of Germany and demanded the withdrawal of western forces from West Berlin, threatening to conclude a unilateral settlement with the East German regime. The stalemate failed to be resolved by the Foreign Ministers Conference at Geneva during the summer of 1959, and the Paris meeting of the Heads of Government in May 1960 was broken up by the Communists, using as a pretext the flight of a U–2 reconnaissance aircraft over the Soviet Union.

These developments emphasized the importance of the NATO alliance as the primary means for maintaining the security of Western Europe. Backed by the retaliatory striking power of the U.S. Strategic Air Command and the British Bomber Command, NATO tactical units provided a strong balanced force to resist any overt aggression. Although protracted military operations in Algeria continued to divert French units from their NATO deployments during the year, the common defense remained assured by the increased contribution of the Federal Republic of Germany. On June 30, 1960, the German armed forces included about 250,000 men; seven German divisions had been assigned to NATO commands and five more were being activated and trained for NATO missions, while additional strength was being provided by German air and naval units.

The modernization of NATO forces continued to receive primary attention during the year as new missiles, aircraft, and other weapons were introduced in substantial numbers. While the United States, through bilateral agreements with individual countries and multilateral NATO agreements, has played a major role in this transition, NATO countries also accepted greater responsibility than ever before for meeting their own defense requirements. Total defense expenditures by the European NATO members, which had climbed from $12.2 billion in calendar year 1958 to $13.6 billion in 1959, rose to $14.4 billion in 1960.

Significant progress was made by the United Kingdom and Italy in the deployment of U.S. intermediate-range ballistic missiles, for which the host countries constructed the required facilities, while the United States through the Military Assistance Program provided the missiles, ground support, and training required by allied personnel. In accordance wih a bilateral agreement signed by the United Kingdom and the United States, the delivery of the original unit equipment for four squadrons of THOR missiles was completed during the year. By June 30, 1960, over 1,200 British personnel had been

trained in the operation and maintenance of the new weapon system, and all four IRBM squadrons had been fully manned by Royal Air Force crews. Training and construction for the JUPITER missiles to be installed on Italian bases proceeded on schedule. Arrangements were also completed during the year for British participation in the development and possible future production of the SKYBOLT, a proposed 1,000-mile, air-to-ground ballistic missile.

As for tactical missiles and rockets, the U.S. forces stationed in Europe are equipped with the latest operational models of weapon systems produced in the United States, while allied forces have available not only missiles of their own manufacture but also have been provided through the Military Assistance Program with such U.S. weapons as HONEST JOHN rockets, NIKE air defense missiles, CORPORAL surface-to-surface missiles, and SIDEWINDER air-to-air missiles.

Further modernization is being facilitated through the jointly financed Weapons Production Program, to which the United States has contributed about 10 percent of the resources required for plant facilities, including in some cases specialized engineering services, tools, and equipment. Five European NATO members have joined to produce HAWK ground-to-air missiles in Europe, and eight are participating in the production of SIDEWINDER missiles. Arrangements were also made for the joint financing of facilities to produce in Europe the F–104 aircraft and the advanced Mark 44 naval torpedo. As a result of these four projects, approximately $1.0 billion of work will be given to U.S. business, including orders for tools, electronic test equipment, engineering services, licenses, and components. Estimated payments of this type to U.S. industry in calendar year 1961 should total $0.2 billion.

NATO research and development activities are being accelerated through the Mutual Weapons Development Program (MWDP), which in fiscal year 1960 supported about 175 active projects. Nearly 60 of these were in the production and field testing stage. This cost-sharing program, established in 1954, has made a major contribution to focusing European technical capabilities on current defense needs. MWDP also finances much of the cost of the NATO Antisubmarine Research Center at La Spezia, Italy, which operates under the direction of the Supreme Allied Commander, Atlantic. In April 1960, the NATO Council initiated a "20 Projects Exercise" for the purpose of evaluating specific weapon systems for multilateral research, development, and production.

A major joint NATO effort has been devoted to constructing the military installations required for effective military operations, such as airfields, communications networks, oil distribution and storage

facilities, naval bases, missile sites, early warning radar, and headquarters. Construction costing $2.6 billion had been authorized for this purpose by NATO since the start of the program and $1.5 billion had been expended by the close of the fiscal year. The United States had contributed $589 million to this infrastructure program—or about 39 percent of expenditures—including $83 million in fiscal year 1960.

Joint logistic activities are supervised by the NATO Maintenance Supply Service Agency, created in 1958. A major expansion of its activities occurred in March 1960 when a NATO supply center was established at Chateauroux France, to provide NATO-wide logistical support for five types of aircraft, selected missile systems, and communication equipment. Other types of materiel will be added to this list as more experience with this new supply channel is obtained.

The readiness of NATO forces was tested during the year by various field maneuvers and command post exercises. Perhaps the most extensive of these exercises was SIDESTEP, a NATO-wide test of naval logistics plans. Involving active participation of NATO and national military headquarters, national shipping authorities, and the NATO Planning Board for Ocean Shipping, the exercise provided valuable experience in the implementation of plans for the wartime control and protection of shipping. The principal troop maneuver in fiscal year 1960 was WINTERSHIELD, a U.S. sponsored exercise in which Belgian and German troops participated. The operations involved over 50,000 troops and tested modern operational doctrine.

Apart from our NATO contribution, the United States has been providing military assistance to Spain in accordance with an agreement that made possible the location of joint U.S.-Spanish air and naval bases on the Iberian Peninsula. These bases were fully operational during fiscal year 1960. Military assistance, including excess stocks, delivered to Spain in 1960 amounted to $50.3 million. Spare parts and maintenance equipment continued to be purchased from the United States by Yugoslavia for materiel furnished some years ago under a military assistance agreement terminated by mutual consent in December 1958.

The Middle East and Africa

The Central Treaty Organization (CENTO), composed of Iran, Pakistan, Turkey, and the United Kingdom, provides the mechanism for coordinating the defense of the Middle East against Communist aggression. While the United States is not a member of the alliance, it has been associated with many of the CENTO projects. In the military area, the United States is a member of the military committee and is represented on the Combined Military Planning Staff as well

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as on the Permanent Military Deputies Group, which was created in January 1960 to oversee the work of the staff planners. In addition, the United States has played an active role in several CENTO military training exercises and helped to improve local defenses through bilateral military assistance agreements.

Turkey, as an active member of both NATO and CENTO, provides the geographic link between these organizations and, through the maintenance of substantial security forces backed by an inflexible determination to safeguard its independence, represents a major deterrent to aggression in the area. The Turkish contribution to collective security was not affected by the assumption of governmental powers by the Turkish armed forces on May 27, 1960. U.S. military assistance to Turkey in fiscal year 1960 involved weapons and equipment in considerable quantities, including HONEST JOHN rockets and NIKE air defense missiles as well as extensive assistance in training activities.

Progress continued to be made during the year in improving the combat effectiveness of Iranian forces. Newly activated training centers became fully operational, and military units were brought to higher manpower levels. The complete replacement of earlier models of fighter aircraft with F–86F's will mark an important step in the modernization of the Iranian Air Force.

The eastern flank of the CENTO area is guarded by Pakistan, which is also a member of the Southeast Asia Treaty Organization (SEATO) and the recipient of extensive U.S. military assistance under a bilateral agreement concluded in 1954. The 1960 program included additional materiel for force maintenance and improvement of Pakistani ground, naval, and air units. The training of military personnel was continued with particular emphasis on supply and maintenance activities.

Some military assistance—involving equipment or training assistance—was also provided to the armed forces of Afghanistan, Jordan, Lebanon, and Saudi Arabia in accordance with special bilateral arrangements.

The rapid movement of African countries toward full independence has been creating new security problems for this strategically important continent. In fiscal year 1960 the number of independent states in Africa expanded from 10 to 15, and another 12 were scheduled to obtain their freedom in fiscal year 1961. With the Communist bloc exploiting the inevitable uncertainties of the transition period, the United States has been ready to provide to the new governments, as it has to the older ones, essential assistance for the maintenance of their independence.

During fiscal year 1960, established military assistance programs continued in effect for Ethiopia, Liberia, and Libya. Training for Sudanese military personnel was provided in the United States, and Tunisia continued to receive a small amount of military assistance. Morocco and the United States agreed, at the time of the President's visit to Morocco in December 1959, that U.S. airbases in this country would be vacated by the end of calendar year 1963. A small military aid program was initiated during fiscal year 1960 and substantial emergency relief was also provided to the people of Agadir, Morocco, in March 1960 when their town was virtually destroyed by a severe earthquake.

Asia and the Pacific

In the Far East, the United States continued during fiscal year 1960 to give its assistance to friendly countries in their struggles against unrelenting Communist pressure. This assistance was rendered in accordance with the provisions of regional and bilateral defense agreements of many years' standing.

The Southeast Asia Treaty Organization—including Pakistan, Thailand, the Philippines, Australia, New Zealand, France, the United Kingdom, and the United States—was established in 1954 to coordinate and strengthen collective defenses in its area. Not having, like NATO, a peacetime military headquarters with units directly assigned, SEATO relies for its defense on the mobile striking forces of its members. Military plans for the coordination of these forces are developed by the SEATO Military Planning Office, operating under the direction of the SEATO Military Advisers.

Two major joint training exercises were held during fiscal year 1960 to improve the effectiveness of member nations in carrying out joint operations. In January and February 1960, Australian, British, Thai, and United States units participated in Exercise TEAMWORK II, an amphibious reconnaissance maneuver off the coast of Thailand. Subsequently, in April and May, more than 60 ships, over 100 airplanes, and thousands of men from all eight SEATO countries took part in Exercise SEA LION, the largest naval training maneuver of SEATO to date. The exercise started in Manila Bay and in the Gulf of Thailand, continued with a rendezvous in the South China Sea, and was concluded at Singapore.

Throughout the year, SEATO followed developments in Laos with particular attention. At the request of the Royal Laotian Government, United States technicians, in conjunction with the local French Military Mission, assisted in the training of native troops in the use of U.S. military equipment.

U.S. military assistance also continued to be extended to Thailand, Vietnam, and Cambodia. Shipments to Thailand included additional jet fighters and weapons and equipment to further the standardization program of the Thai forces. The Vietnamese armed forces were strengthened by a recent reorganization of Army units, expansion of antiguerrilla warfare capabilities, and substantial deliveries of U.S. equipment. Military supplies continued to be delivered to Cambodia in accordance with established agreements.

Through bilateral defense treaties, the United States has pledged itself to the defense of the Republic of China, Japan, Korea, and the Philippines, and military assistance agreements have been concluded with these countries in support of these treaties.

The forces of the Republic of China, under continuous Communist harassment on the islands of Quemoy and Matsu, were substantially strengthened during fiscal year 1960 by the delivery of additional military equipment. The Chinese Army streamlined its combat units, and the personnel thus released was transferred to newly created combat and supporting forces. Additional amphibious craft and improvements in the shore establishment increased the effectiveness of the Chinese Navy. As for the Chinese Air Force, the continuing delivery of F–100's and SIDEWINDER missiles was supplemented at the close of the fiscal year with the first shipment of F–104's to offset the possible use of MIG–19 jets by the Chinese Communists.

During fiscal year 1960, small arms, artillery, transport vehicles, and spare parts of many types were provided to the Philippine Army. The United States also assisted in the maintenance of naval ships and the training of pilots in the use of jet aircraft and of SIDEWINDER missiles.

The vigilance of the Korean armed forces against Communist aggression continued undiminished, despite the changes in the government brought about by popular pressure in April 1960. The Korean Army, trained in U.S. military doctrine and equipped with U.S. materiel, guarded more than 90 percent of the positions along the demilitarized zone. Logistic support considerably improved during the year, particularly through the establishment of more accurate inventories. Intensive training programs of jet combat and maintenance crews were continued.

The increased role of Japan in world affairs was reflected in the revision of the 1950 mutual security treaty, which had been concluded at a time when Japan was entirely dependent on the United States for its security. Since Japanese Self-Defense Forces assumed responsibility for many defense missions during the intervening years, it was mutually agreed that the new relationship between the two countries

should be recognized by a formal statement reflecting the sovereign equality of Japan and the United States. The revised treaty was signed in January 1960 and became effective on June 23, although violently opposed by some Japanese minority groups. The transfer of the U.S. air communications and warning network in Japan to Japanese forces was completed during the year, and military assistance was increasingly shifted from the delivery of military materiel to cost-sharing arrangements increasing Japan's own production capabilities for modern weapons and equipment.

In addition to their common membership in SEATO, Australia, New Zealand, and the United States are linked by the ANZUS pact, a separate mutual defense agreement. The three countries continued their close and effective military collaboration during fiscal year 1960, including further discussions concerning the standardization of weapons.

Western Hemisphere

The framework for Western Hemisphere security is provided by the Inter-American Treaty of Reciprocal Assistance concluded at Rio de Janeiro in 1947. Under this treaty, the American republics, including the United States, participate in the work of the Inter-American Defense Board, which is charged with preparing and keeping up-to-date the joint defense plans of the signatories.

Under the guidance established by these plans, the United States provided military assistance totaling over $48 million to Latin American countries during fiscal year 1960. This total included $43 million charged to appropriated funds and $5 million in excess stocks. The aid involved the delivery of materiel to units having hemisphere defense missions, the training of almost 2,500 students in military Service schools in the United States and the Panama Canal Zone, the rehabilitation of naval vessels being loaned to Latin American republics, and credit for the purchase of military equipment in the United States.

In addition, U.S. armed forces maintained military advisory and training missions in 18 Latin American countries and facilitated the direct purchase of military equipment to strengthen Western Hemisphere security. Such direct purchases amounted to $10 million in fiscal year 1960.

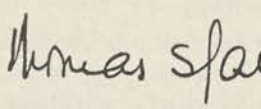
Close cooperation between the republics of the Western Hemisphere has become increasingly important in view of the new interventionist policies followed by the Communist bloc. The rising tensions in the Caribbean area during the past year illustrated the dangers to the new world inherent in these policies. Military assistance is helping to

counter these dangers by contributing to the establishment of more effective defenses, the training of personnel in current military concepts and in the use of modern equipment, and the development of closer ties between military forces dedicated to a common objective.

As in previous years, the United States extended its help to Latin American countries struck by natural disasters. In the spring of 1960, emergency supplies, helicopters, and life rafts were rushed by aircraft and ship to flooded areas in northeastern Brazil. In late May, when Chile was rocked by earthquakes, two 400-bed Army field hospitals and 540 medical personnel were immediately dispatched by air to help the victims, and additional relief was supplied in the following weeks by the Army, Navy, and Air Force. The good neighbor policy of the United States was also reflected in the visits of naval ships to South American ports in February and March 1960.

To the north, the close relationship between Canada and the United States continued to provide increased security to both countries. The Canada-United States Ministerial Committee on Joint Defense, established in 1958, and the Permanent Joint Board on Defense, which has been in existence since 1940, bring Canadian and United States authorities together to consider common problems in the defense field. The continental defense forces of Canada and the United States are operating under the single direction of the North American Air Defense Command, and the regional interests of both countries in NATO are being coordinated by the Canada-United States Regional Planning Group.

In support of the common effort, integrated military programs were carried out with increased effectiveness during the year. Particular attention was devoted to the logistic field to promote closer coordination of military production activities and the standardization of components and end-products. The agreement concerning cooperation on the use of atomic energy for mutual defense purposes, approved in the spring of 1959, has permitted Canadian forces to share with the United States classified information on military reactors and the employment of and defense against nuclear weapons. The continuing work of joint agencies and the daily cooperation of Canadian and U.S. military personnel assure that common problems will receive prompt solutions mutually beneficial to both countries.



THOMAS S. GATES, JR.,

Secretary of Defense.

Annual Report

of the

RESERVE FORCES POLICY BOARD

July 1, 1959, to June 30, 1960

ANNUAL REPORT
of the
RESERVE FORCES POLICY BOARD
June 30, 1960

Section 171(a)–1, title 5, U.S. Code, stipulates that the Reserve Forces Policy Board render an annual report as a chapter of the Secretary of Defense report on the status of the reserve programs of the Department of Defense. Accordingly, the following report for the period July 1, 1959–June 30, 1960, is submitted.

The Reserve Forces Policy Board met on three occasions during the reporting period for the purpose of reexamining and studying pertinent aspects of the reserve components programs. As a result, recommendations pertaining to current policy and legislative matters affecting the reserve forces were forwarded to the Secretary of Defense, with other matters being held pending future developments, evaluation, and study. Members of the Board and the Board's staff made on-site and on-board visits to reserve activities and facilities and attended conferences of the various reserve associations to obtain factual information to be used in the discharge of their duties to the Secretary of Defense.

Changes in Board membership occurred on July 1, 1959, when Maj. Gen. Ralph A. Palladino, USAR, replaced Rear Adm. Irving M. McQuiston, USNR, and Rear Adm. Herman Reich, USNR, replaced Rear Adm. Leon J. Jacobi, USNR. On August 3, 1959, the Honorable Dudley C. Sharp replaced the Honorable Malcolm A. MacIntyre who resigned as Under Secretary of the Air Force. On November 18, 1959, Maj. Gen. James E. Rudder, USAR, replaced Maj. Gen. Frederick M. Warren, USAR. On March 10, 1960, Rear Adm. Henry J. Wuensch, USCG, replaced Rear Adm. Richard M. Ross, USCG. On March 26, 1960, Maj. Gen. Earle M. Jones, NGUS, replaced Maj. Gen. Carl L. Phinney, NGUS. On March 31, 1960, Dr. Joseph V. Charyk, Under Secretary of the Air Force, replaced the Honorable Dudley C. Sharp. On May 12, 1960, Brig. Gen. William W. Spruance, ANGUS, and Brig. Gen. John H. Foster, USAFR, replaced Maj. Gen. Stanford W. Gregory, ANGUS, and Maj. Gen. Theron B. Herndon, USAFR, respectively. On May 26, 1960, Brig. Gen. William T. Fairbourn, USMC, replaced Rear Adm. Robert T. S. Keith, USN.

General

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. It is intended that this report reflect the actual mobilization potential and readiness of the reserve components versus their assigned mission.

Personnel

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

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

The 5 years' operation under the provisions of the Reserve Forces Act of 1955, during which time varying degrees of reorganization were effected, has enabled the reserve components to show a continual increase in their training readiness principally because units are freed from conducting basic individual training and thereby are permitted to progress to unit training.

Implementation of the provisions of this act as it pertains to screening and utilization of obligors and the control of enlistments has resulted in qualitative improvements in the reserve establishment to a degree beyond that ever before achieved.

Personnel

Ready Reserve (not on active duty)

	June 30, 1958		June 30, 1959		June 30, 1960	
	Total	Drill-pay status [a]	Total	Drill-pay status [a]	Total	Drill-pay status [a]
Army National Guard	[b] 442, 369	372, 921	[b] 404, 036	370, 354	[b] 401, 765	367, 840
Officers	42, 755	37, 942	40, 156	37, 884	37, 142	37, 142
Enlisted	399, 614	334, 979	363, 880	332, 470	364, 623	330, 698
Army Reserve	955, 462	272, 683	1, 008, 837	298, 642	1, 024, 549	276, 992
Officers	157, 825	49, 584	167, 486	47, 365	168, 209	47, 697
Enlisted	797, 637	223, 099	841, 351	251, 277	856, 340	229, 295
Naval Reserve	530, 440	129, 632	541, 036	120, 350	503, 020	120, 232
Officers	82, 408	26, 513	81, 442	25, 454	82, 991	26, 092
Enlisted	[c] 448, 032	103, 119	[c] 459, 594	94, 896	[c] 420, 029	94, 140
Marine Corps Reserve	215, 749	42, 735	204, 876	42, 356	208, 939	41, 562
Officers	13, 434	4, 143	13, 421	3, 537	13, 996	3, 568
Enlisted	202, 315	38, 592	191, 455	38, 819	[c] 194, 943	37, 994
Air National Guard	69, 995	64, 611	70, 994	67, 620	70, 820	68, 021
Officers	8, 354	8, 354	8, 473	8, 473	8, 570	8, 570
Enlisted	61, 641	56, 257	62, 521	59, 147	62, 250	59, 451
Air Force Reserve	214, 809	48, 287	225, 819	54, 744	202, 506	56, 425
Officers	42, 819	19, 522	42, 382	21, 209	40, 542	21, 543
Enlisted	171, 990	28, 765	183, 437	33, 535	161, 964	34, 882

[a] Excludes personnel undergoing 3–6 month active duty training.
[b] Includes Inactive National Guard.
[c] Includes officer candidates.

Figure 1

The process of screening Ready Reservists during fiscal year 1960 involved the review of 1,887,484 records. The Services report that of the 528,453 released, 358,298 were transferred to the Standby Reserve and 170,155 discharged from reserve status. The process is keeping the Ready Reserve fully manned with qualified, available personnel and removing all nonready or excess personnel.

Summary of 3–6 month active duty reserve training programs, fiscal year 1960

(Data cumulative from 10 August 1955)

	Actual			Planned
	30 Jun 1959	31 May 1960	30 Jun 1960	30 Jun 1961[a]
ENLISTED				
Army National Guard:				
Enlistments	136, 361	199, 497	205, 491	202, 861
Entered AD Training	119, 755	176, 273	183, 358	182, 755
Completed AD Training	85, 529	140, 515	140, 637	140, 829
Army Reserve:				
Enlistments	139, 680	175, 300	177, 712	179, 480
Entered AD Training	137, 127	170, 457	173, 904	172, 927
Completed AD Training	119, 569	145, 650	145, 885	147, 757
Naval Reserve:				
Enlistments	884	n.a.	n.a.	2, 670
Entered AD Training	850	[c] 1, 080	[c] 1, 088	1, 136
Completed AD Training	828	[c] 985	[c] 1, 026	1, 106
Marine Corps Reserve:				
Enlistments	28, 752	35, 026	35, 981	36, 612
Entered AD Training	22, 064	29, 035	30, 380	30, 074
Completed AD Training	16, 404	23, 010	23, 267	22, 921
Air National Guard: [b]				
Enlistments	n.a.	n.a.	n.a.	n.a.
Entered AD Training [b]	29, 071	35, 857	37, 516	37, 571
Completed AD Training [b]	25, 697	33, 649	34, 333	34, 756
Air Force Reserve:				
Enlistments	10, 012	13, 029	13, 299	13, 427
Entered AD Training	9, 613	12, 625	12, 887	12, 993
Completed AD Training	7, 435	10, 737	10, 981	10, 995
OFFICERS				
Army Reserve:				
Entered AD Training	25, 141	30, 417	30, 681	31, 181
Completed AD Training	19, 993	25, 792	25, 864	25, 957
Air Force Reserve:				
Entered AD Training	159	224	224	309
Completed AD Training	153	216	216	153

[a] Revised plan data from Tables 1–D dated October-December 1959 agree with programs presented in President's Budget for fiscal year 1961.

[b] Includes "9-Week Basic" program.

[c] Estimated.

Note. n.a.—not applicable.

Figure 2

Reserve Officers Personnel Act

On the last day of this reporting period, the President signed into law as Public Law 86–559, Reserve Officers Personnel Act amendments which will effect changes in promotion and retention policies with respect to reserve commissioned officers of the armed forces. ROPA, as now amended, sets up a new pattern of accelerated promotions and forced attrition. Two undesirable provisions are

eliminated: (a) "The pusher clause," or the mandatory promotion system which caused a large number of reserve officers, especially in the Air Force, to be promoted to the grades of major and lieutenant colonel much earlier than was intended, thus creating overages in these grades, and (b) a procedure whereby 20-year reservists retired from active duty were subsequently assigned to the Ready Reserve enabling them, at a later date, to re-retire in a higher grade. The over-all effect of ROPA as now amended should prove very beneficial and revitalizing to the officer corps of the reserve components.

The Army National Guard

Reorganization of the Army National Guard under the new troop basis was completed early in the second quarter of fiscal year 1960, 1 year ahead of schedule. The consolidation of Special Forces Detachments and other troop basis changes have reduced the number of troop units from 4,497 on June 30, 1959, to 4,423 as of the end of this reporting period.

The cumulative total of Army National Guardsmen entering 6-months' training during fiscal year 1960 was 63,603. This was 603 in excess of the number programed. Since the beginning of the 6-months' training program, 183,358 Army National Guardsmen have entered training with 140,637 graduating. Attrition has been approximately 4.9 percent of the total input.

Total new Army National Guard enrollment in Army service schools for fiscal year 1960 was 8,132. This was 11 percent in excess of the 7,308 set as the fiscal year 1960 objective. The recent reorganization which necessitated branch changes has increased participation in these schools. New enrollments in Army area schools continued ahead of schedule due to the Army commanders' increased emphasis on Army National Guard participation, particularly in the NCO courses. Fiscal year 1960 enrollment was 1,425 against an objective of 600. In addition, during fiscal year 1960, approximately 31,000 officers and warrant officers were enrolled in extension courses administered by the Army service schools. One additional State Officer Candidate School was established during this reporting period, bringing the total to 43. These schools produced 1,112 second lieutenants during fiscal year 1960.

Annual general inspections were completed in 4,344 units during this reporting period. Of these, 4,307 were rated satisfactory or better. Less than 1 percent (0.9 percent) were rated unsatisfactory. During the preceding reporting period 0.5 percent of the units were rated unsatisfactory.

As of the closing date of this report, the Army National Guard has 52 NIKE-AJAX batteries, equivalent to 13 battalions, operational on sites in 11 of the Nation's key defense areas. Two additional NIKE-AJAX battalions had completed training at the U.S. Air Defense Center and were on-site, preparatory to becoming operational. In addition, one NIKE-HERCULES battalion had completed training at the U.S. Air Defense Center and was conducting unit training and maintaining a limited operational capability on temporary sites in Hawaii. The remaining units organized in the Army National Guard's 32 NIKE-AJAX and 2 NIKE-HERCULES battalions were in preparatory or school training phases of the program which will ultimately provide 82 firing batteries full-time in 16 defended areas.

Army National Guard aviation gained 10 percent, or 122 Army aviators, during this reporting period, making a cumulative total of 1,382. A shortage of 118 aviators below the 1,500 programed for fiscal year 1960 nevertheless existed, caused mainly by the lack of graduates from primary flight courses because of quota suspension in the second half of fiscal year 1959. The suspension was

necessitated by a change in location of the primary flight school. The 160,342 flying hours for fiscal year 1960 represents 100.2 percent program accomplishment. Aircraft flying hours were 19,610 greater than in fiscal year 1959.

Equipment (ARNG)

The Army National Guard received some new types of equipment during this reporting period. However, shortages in several areas continue to impair training. Aircraft and field maintenance tools sets remain in short supply, due to nonavailability in the Transportation Corps supply system. Receipt of a limited number of observation-type helicopters produced some increase in the aircraft inventory. Shortages of authorized and substitute signal items remain the most serious training equipment problem facing the Army National Guard, especially in those States to which new signal units have been allotted. Limited quantities of World War II radio relay and terminal electronic items were made available as substitutes for authorized communications equipment.

Other shortages which adversely affected training were in armed personnel carriers, recoilless rifles, self-propelled artillery, HONEST JOHN rockets, and certain types of wheeled vehicles.

Facilities (ARNG)

Under the provisions of the National Defense Facilities Act of 1950, as amended (as restated in sections 223–2233 of title 10, U.S.C.), the Army National Guard placed 128 armory projects under contract during this reporting period. This exceeded the fiscal year 1960 objective by 34 projects, and required an expenditure and/or obligation of Federal funds amounting to approximately $15.6 million.

Under the law, the Federal Government contributes up to 75 percent of the cost of construction calculated on the basis of approved criteria. Since 1952 when funds were first made available under the NDFA, Congress has appropriated a total of $143.18 million for the construction of armory and nonarmory facilities. The States have furnished more than $60 million as their contribution.

U.S. Army Reserve

During this reporting period substantial progress has been made by the U.S. Army Reserve toward attaining a state of readiness for their units and individuals that will assure minimum postmobilization training, and will permit their immediate commitment to action when necessary. The reorganization of U.S. Army Reserve units was completed in December 1959, one full year ahead of schedule, and resulted in about 5,400 World War II-type company-size units being converted to about 4,350 company-size units patterned to fit our modern pentomic Army. Although the reorganization resulted in a smaller number of units, the over-all strength remained the same and, as of the closing date of this report, has resulted in increased effectiveness.

In December 1959 the Secretary of the Army announced the establishment of the U.S. Army XIX Corps, bringing the total to 14 Army Corps Headquarters, located throughout the six Zone of Interior Army Commands. These Corps headquarters consolidated and replaced the headquarters of 49 military districts. The U.S. Army Corps Headquarters now have the responsibility for the administration of the personnel strength of the Army Reserve, totaling some 2,217,000 officers and enlisted men.

Approximately 98.5 percent of the U.S. Army Ready Reserve are well trained individuals, having had either a minimum of 6 months of active duty for train-

ing or 2 or more years of active duty training. Because such a high percentage of the Ready Reservists are basically trained, many U.S. Army Reserve units will be ready to be tested in platoon-level tactics during their annual active duty for training for fiscal year 1961. U.S. Army Reserve units are now required to conduct six multiple drills each year, of at least 8 hours duration, during their inactive duty training.

As of the end of fiscal year 1960, the need for technicians (administrative assistants, storekeepers, and maintenance personnel) continues to plague U.S. Army Reserve units. Against a recognized need for 5,100 such personnel, 3,046 had been authorized and 2,843 had been hired. The latter represents an increase of 450 technicians during fiscal year 1960.

During fiscal year 1960, 4,390 officers and 442 enlisted men trained at Army service schools in courses varying in length from 2 weeks to several months.

To test the effectiveness of the Ready Reserve Mobilization Reinforcement System, Exercise READY FREDDY was conducted during July and August 1959. Some 3,000 reservists of the Reinforcement Pool, to satisfy their required summer training, were assigned to selected USAR units in the First Army, the 28th Infantry Division (ARNGUS) in Second Army, and the 4th Infantry Division of the Sixth Army. Exercise objectives were: (1) To evaluate the ability of the Ready Reserve Mobilization System to function properly during an emergency, (2) to provide realistic training in mobilization procedures, and (3) to identify problem areas and recommend corrective action. The results of the test showed: (1) Certain administrative weaknesses, most of which have been corrected, (2) the Army concept of mobilization usage of individual reinforcement is sound, and (3) the need for decentralized testing of the system during calendar year 1960, which is now being accomplished.

Equipment (USAR)

During this reporting period authorized individual clothing and equipment for assigned personnel of U.S. Army Reserve Troop Program units reached an average of about 77 percent of allowance. This clothing and equipment includes items common to all individuals regardless of service. In this group the class A uniform items stand at about 95 percent. TOE equipment is about 41 percent of actual allowance. This includes the major hardware items such as weapons and vehicles. Organizational equipment and clothing, items which fall in the category of field or combat essentials, are about 80 percent issued on an over-all basis.

The supply goal for fiscal year 1960 was to achieve an over-all average of 30 percent of authorized TOE equipment and 100 percent of authorized individual and organizational clothing and equipment issued. The percentage goal for TOE equipment was approached, however the figure attained, does not represent nor indicate that the distribution of equipment is in accord with unit priorities. This situation exists primarily as a result of the reorganization of the U.S. Army Reserve Troop Program. Progress was made toward adjusting assets so that available equipment will be utilized to first equip the higher priority units. The U.S. Continental Army Command has developed and published organization and equipment guides which, when implemented, should provide a more realistic yardstick than a predetermined percentage to measure the adequacy of the equipment stock position.

The majority of the U.S. Army Reserve units can now conduct platoon-level basic unit training with the quantities of equipment on hand. Maintenance of all levels continues to be a pressing problem.

Facilities (USAR)

Under the authority of section 133, title 10, U.S.C. (formerly Public Law 783, as amended) each reserve component is set forth by name as to authorization for construction of facilities for the administration and training of the reserve components of the armed forces.

The total requirement for reserve centers for the U.S. Army Reserve has been established at 1,103. As of the closing date of this report, 446 centers had been built or were under construction, leaving a balance of 657 to be constructed in future years.

The rated personnel capacity of the 446 reserve centers is approximately 162,000, accommodating 54 percent of the total authorized drill pay strength of 300,000 Ready Reservists.

The Naval Reserve

During this reporting period the state of training and readiness of the Naval Reserve have continued to show improvement. The key factor in achieving this progress was the leadership exercised by the active duty officers responsible for Naval Reserve training and by inactive duty reservists engaged in the training programs.

During fiscal year 1960 the Ready Reserve was maintained near the 530,000 ceiling imposed by the Secretary of Defense. Adequate numbers in the Ready Reserve will be available throughout fiscal year 1961. However, starting in fiscal year 1962 with the concurrent expiration of obligated service of 6- and 8-year obligors, it is estimated that enlisted Ready Reserve strength will decline.

The Selected Reserve established in 1958 continues to be the most significant element of the Naval Reserve. Selected Reserve forces of personnel with assigned ships and aircraft are available for immediate assignment to the active forces when needed.

The training of Ready Reservists assigned to the Selected Reserve billets is designed to achieve individual and unit readiness to a degree insuring over-all maximum responsiveness to emergency or war requirements. Selected Reserve personnel in drill pay status totaled 120,232 on June 30, 1960, and during each of the last 8 months of this reporting period showed an average gain of 875 men over the preceding month. Plans for fiscal years 1961–62 contemplate continued growth toward the total of 135,000 presently authorized by the Secretary of Defense to be in drill-pay status. Attainment of this strength will provide the following elements within the Selected Reserve: (1) An antisubmarine warfare component to man and deploy 44 ASW ships and 27 ASW squadrons; (2) a mine warfare component to man 11 minesweepers for harbor defense; (3) a fleet augmentation component for immediate assignment to ships and aviation units of the active fleet to bring these elements to full war strength; (4) a fleet support activities component to activate or augment activities which directly support the fleet; (5) a shore establishment component to activate or augment activities and functions of the shore establishment vital to fleet support, security, and mobilization processing; and (6) a program support component to provide specialized services to Naval and Marine Corps Reserve programs. The Selected Reserve will also contain 117,000 reservists in nondrill-pay status who are being preselected to man reactivated reserve fleet ships and to provide additional fleet and shore establishment support. Total Selected Reserve planned in drill-pay and nondrill-pay status is 252,000.

Major emphasis in the Naval Selected Air Reserve has continued to be in the field of antisubmarine warfare, and in the continued development of a capability

to respond to fleet requirements for trained squadrons, with aircraft, in either a limited emergency or full mobilization. This capability is in being and, within the limitation of the aircraft assigned, can be instantly responsive to fleet requirements for long-range patrol (VP), inshore patrol (VS), and for helicopter ASW squadrons to immediately assume operational tasks.

The ASW capability of the Selected Naval Air Reserve is balanced by a strong capability in the area of fleet tactical support and by a jet fighter and light jet attack capability. The Commander-in-Chief, Pacific Fleet, stated that the integration of the Selected Air Reserve squadrons in fleet operations and training along the west coast during the past 2 years was one of the most significant single operational program achievements in ASW during this time span.

Equipment (USNR)

The nature of shipboard and shore station facilities makes issuance of equipment on an individual basis unnecessary, therefore Naval Reservists are not supplied with equipment other than uniforms to accompany them on mobilization. Equipment for training is assigned to training centers and facilities. Over-all, this equipment is not as modern as similar equipment in the newer ships of the Fleet but does serve to demonstrate the basic principles and functions involved and is adequate for training. The equipment presently being utilized at electronic installations is urgently in need of modernization and although effort is being made in that direction, the progress is very slow because of budgetary limitations. The greatest need for modern electronic equipment is in the ASW field.

Facilities (USNR)

A continuing program is maintained which enumerates the facilities requirements of the Naval Reserve for 5 years in advance. These requirements consist of replacement of inadequate and overage training facilities, and the rehabilitation of facilities where it is indicated that such action is feasible and desirable from an economic viewpoint. At present there are 141 Naval Reserve training centers, 160 Naval and Marine Corps reserve training centers, 15 Naval Reserve training facilities, 137 Naval Reserve electronic facilities, and 9 Naval Reserve communications stations. Effort has continued during fiscal year 1960 toward replacing and modernizing some of the older and more inadequate training centers. In this category fall World War II converted temporary barracks, World War II surplus metal buildings, and wooden buildings, all of which have exceeded their life expectancy and will require more maintenance expenditures and eventual replacement as rapidly as such a program can be funded.

The Marine Corps Reserve

The objectives of the Marine Corps Reserve are to maintain in the Organized Reserve (drill-pay status) sufficient numbers to meet the first month's mobilization requirement of the Fleet Marine Force, and to maintain in the Volunteer Reserve (nondrill-pay status) the personnel required to meet the balance of the M+6-month requirement.

To enhance the position from which these objectives can be achieved the Marine Corps Reserve reorganized its Organized Reserve in November 1959 to more closely parallel their counterparts in the regular establishment. They have since completed one annual training period and are now receiving the last of their organic equipment. Further, the requirement imposed on all units to conduct multiple drills has materially increased training time. The multiple drills consist of a minimum of two successive 4-hour periods. The former single drill

permitted a drill period as short as 2 hours. Finally, all members of the Organized Reserve who have been assigned a physical risk classification have been screened. Individuals with a questionable mobilization potential have been removed.

During this reporting period the Marine Corps Reserve maintained sufficient trained personnel to meet initial mobilization requirements. All officers have completed a tour of active duty, and about 180,000 enlisted reservists are eligible for immediate deployment overseas. However, the decline in the enlisted strength which began in 1959 will continue through 1963. This decline in strength will render the Marine Corps Reserve unable to meet the currently projected mobilization requirements. Manpower guidelines have been raised in order to permit the Organized Reserve to meet the M+1-month requirement of the Fleet Marine Force. Deficiencies in planned mobilization requirements, though small, continue to be a problem.

During fiscal year 1960 a new high of 82.8 percent was achieved in the drill attendance. However, the resulting additional costs necessitated, for the third consecutive year, a reduction in the number of paid drills from 48 to 45.

Availability of funds remained the limiting factor in reaching desired training goals for the Volunteer Reserve.

Equipment (USMCR)

During fiscal year 1960 the status of unit and individual equipment of the Ground Reserves continued to be satisfactory. Unit manning levels, which are necessary due to personnel ceilings imposed, have largely eliminated the need for maintaining full allowances of unit equipment on hand; however, full allowances are available for requisition when required to support training. The increased amount of field training made possible by utilization of the multiple drill created a greater requirement for the issuance of organizational equipment to units. Previously this type of equipment had been maintained in pools for issue to units as needed.

Token allowances of modern equipment were received during this reporting period. In this category fell the Ontos self-propelled 106-mm. antitank weapon and the 106-mm. recoilless rifle.

Individual equipment and the over-all supply status for the aviation component of the Marine Corps Reserve are considered to be satisfactory. The 12 air reserve control squadrons are operating the same type of equipment as used by the regular Fleet Marine Force squadrons. The majority of fighter and attack squadrons are equipped with jet aircraft. In most cases these aircraft are not the latest types, but at least they permit a satisfactory level of flight training to be maintained.

The very low percentage of availability of suitable helicopters continued to restrict the training of reserve helicopter squadrons, and limited their participation in air-ground exercises.

Facilities (USMCR)

As of the end of fiscal year 1960 the Marine Corps Reserve occupied a total of 226 facilities as opposed to 228 a year ago. Adhering closely to the policy of joint utilization as specified by the National Defense Facilities Act of 1950, occupancy of the 226 facilities is shared as follows: 159 joint Naval and Marine Corps Reserve training centers, 2 joint Army and Marine Corps Reserve training centers, 1 joint Air Force and Marine Corps Reserve training center, and 2

Armed Forces Reserve training centers (serving all of the reserve components). Of the remainder, 45 are federally owned Marine Corps Reserve training centers, and 17 are commercially leased. Five commercial leases were terminated during fiscal year 1960.

During this reporting period improvements were made to training centers to provide more adequate facilities for the accomplishment of training. These improvements include (a) construction of four indoor rifle ranges, (b) construction of one artillery equipment maintenance shed, (c) alteration to nine existing training centers to increase the training potentials of the available space, (d) paving of six drill/vehicle parking areas, (e) completion of six new training centers to replace inadequate installations (of these, five were constructed jointly with the Naval Reserve), and (f) the construction of a Marine Corps wing to an existing Naval Reserve training center to allow the return of high priority space to the Department of the Army.

Marine Aviation Reserve units are based at naval air stations and receive logistical support from the Navy. The facilities available and used in fiscal year 1960 were adequate.

Air National Guard

The Air National Guard made important improvements in readiness during fiscal year 1960 in spite of extensive aircraft conversions and mission changes. In February 1960 the Secretary of the Air Force approved a plan for revised management of the reserve forces. This plan provides for closer peacetime integration of units of the reserve forces into the active establishment than ever before. This was accomplished by transferring the responsibility for supervision of training and inspection of Air National Guard and Air Force Reserve flying and certain other units from Continental Air Command to the major air commands that would command the units in a national emergency. The plan also calls for reservists to assume a large share of the responsibility for managing the reserve program. Execution of this plan causes no change in the relationship of the Air National Guard to the States or to the National Guard Bureau.

As of the closing date of this report, the 546 units of the Air National Guard were organized into 24 tactical flying wings and 104 nonflying support units, including communications, aircraft control and warning, tactical control, and weather units. The tactical flying wings include 22 combat wings (11 fighter-interceptor, 7 tactical fighter, and 4 tactical reconnaissance) and 2 air transport wings (heavy). Other Air National Guard flying units include 1 aeromedical transport group with 5 aeromedical transport squadrons (light), 4 troop carrier squadrons (medium), and 1 air transport squadron (medium).

This period was marked by the relatively large number of conversions to higher performance aircraft, the continued decline in the aircraft accident rate, and the shift to a more balanced over-all force. Six fighter squadrons were converted to heavy transport, bringing the C–97 type aircraft into the Air National Guard for the first time.

During the 1960 fiscal year, 20 Air National Guard squadrons participated in the Air Defense Alert Programs by maintaining 5-minute runway alert schedules to investigate unidentified and potentially hostile aircraft. Alert coverage was performed by 7 squadrons on a 24-hour schedule and by 13 squadrons on a 14-hour daylight schedule. All of the squadrons except one in Hawaii were located in the continental United States. In addition, four aircraft control and warning squadrons of the Air National Guard continued their round the clock participation in the active air defense network of the Nation. Two of the squadrons provided

the sole radar air defense in Hawaii and the other two were located in the continental United States.

During this reporting period the Air National Guard met its flying training objectives although poor flying weather in January and February as well as aircraft conversions held the total number of flying hours to 442,101 or 97.1% of the number programed. During the year the aircraft accident rate dropped to a new low for the fifth consecutive year as the Air National Guard recorded only 11.7 major aircraft accidents per 100,000 flying hours.

A high rate of utilization of Air Force service schools continued as a total of 11,312 Air National Guardsmen completed courses offered by these schools. Continued use was also made of supplemental training exercises such as tactical mission employment to further individual and unit readiness.

A new communication-electronics force structure was established during this year in order to make possible a more realistic alignment with USAF requirements. The old structure was changed by deleting one tactical control group and adding one communication group and four GEEIA (Ground Electronics Engineering Installation Agency) units. GEEIA units were formerly AACS E&I (Air ways and Air Communications Service, Engineering and Installation) squadrons and CC (Communications Construction) squadrons, and are now placed under Headquarters GEEIA of the Air Materiel Command. The new structure will total 75 units, including a detachment at a location within the same State as its parent squadron.

At the end of the 1960 fiscal year the Air National Guard had on hand 87 percent of its training mission equipment. Although this represents a drop of 3 percent from last year, the decrease is to be considered small in view of the many aircraft conversions and mission changes which occurred during the year. No significant curtailment of flying due to equipment shortages was evident. However, a limited number of jet engine field maintenance items and special testing equipment were in short supply and as of the closing date of this reporting period were on procurement. Communications-electronics and warning units had 80 percent of their authorized unit mission equipment. A significant amount of communications-electronic equipment was added to the Air National Guard inventory from other Air Force components, and most units either received additional equipment or had existing assets modernized.

The Air National Guard is now almost 100 percent equipped with first line aircraft. Included in the new aircraft are F–100's, F–102's, and F–104's. The C–97 aircraft of the six new heavy transport squadrons are the first four-engine aircraft ever received by the Air Guard.

On June 30, 1960, the Air National Guard was assigned 2,269 of its 2,447 authorized aircraft. The jet aircraft inventory of 2,010 consisted of 1,566 fighters, 218 trainers, and 226 reconnaissance aircraft. Propeller-driven aircraft totaled 259.

Facilities (ANG)

At the close of the 1960 fiscal year, the Air National Guard was utilizing 93 flying fields and 41 nonflying installations. Of the 93 flying fields, 74 are located on municipal or State airfields, 1 is on a private airfield, 1 belongs to the Air Modernization Board (Atlantic City, N.J.), and 17 are located on Air Force and Navy bases. A total of 38 of the flying fields are used jointly with other reserve components.

During this reporting period a total of $11,453,802 in Federal funds were obligated for the construction of new Air National Guard facilities. Among the construction projects placed under contract were six runways to meet the re-

quired runway lengths for high-performance aircraft. Two aircraft control and warning buildings were placed under contract in order to insure operational capability of the flying support unit. The remaining obligations provided for the construction of five hangars, two apron expansions, two runway overruns, two engine build-up shops, one control tower, one general purpose shop, one automotive maintenance shop, one runway barrier, and one paint, oil, and dope storage building. In addition, advanced planning was authorized for future projects including the design of two runway extensions, three runway overruns, two apron expansions, one control tower, one taxiway expansion, the rehabilitation of one apron and one runway, and complete new facilities at one base.

Also during the year, $2,882,482 in major repairs and modification funds were obligated for 442 projects at 107 installations. The projects were the result of requirements for more complete equipment, for establishing more efficient methods of operation, and for repairing or modifying aging facilities.

U.S. Air Force Reserve

At the close of fiscal year 1960, units of the Air Force Reserve included 14 troop carrier wings (medium), one troop carrier wing (assault), 5 air rescue squadrons, and some 56 nonflying support units including medical, communications, air terminal, aerial port, and censorship types.

The Air Force Reserve troop carrier units' readiness was, and still is, the highest it has ever been in peacetime. An over-all summary of the capabilities of the 45 assigned squadrons indicate that 43 are operationally ready. Most of the units had arrived at such a degree of capability they had been assigned specific D-day tasks. All other units had been assigned more general D-day missions. Periodic readiness tests confirm that these units can assume their wartime tasks. Additionally, unannounced tests conducted to determine their reaction time demonstrated that within 3 hours 50 to 80 percent of the total combat capability can be assembled. This response is well above the criteria established by the Air Force for the type of mission assigned.

During this period a thorough study of the Air Force Reserve air terminal squadrons program was completed. As a result, 13 of these squadrons have been discontinued at their present location and 12 reorganized as units and redesignated at other locations. The mission of an air terminal squadron is to process passengers, cargo, and mail for air transportation. Realistic training for this type of unit could only be obtained at flying bases of the Air Force Reserve troop carrier units and the active Air Force. Consequently, effective in June 1960, these air terminal squadrons were relocated at flying locations throughout the United States.

The first oversea ferrying of aircraft by reserve force crews took place in June 1960 with the delivery of 21 C–119's to India. All schedules were met and crews were reported to have performed in a professional manner throughout the operation. The Indian Defense Minister, Indian Air Force, and United States officials in India were highly complimentary of the entire operation.

Over 100 Reserve instructors attended the Air Force Reserve academic instructors course at the Air University. Approximately the same number of personnel attended special Air Training Command exercises designed to improve the quality of technical instruction throughout the Air Reserve complex. During this period more than 4,000 officers and airmen attended active duty courses covering a wide range of technical and professional fields. Also there was a significant increase in enrollment in the Extension Course Institute (ECI) of the Air University. Over 60,000 Air Force Reserve officers and airmen participated in this type of training.

Policies and procedures by which Continental Air Command might program requirements for special tours of active duty for training were formalized, in Air Force Regulation 50–41, for the first time during fiscal year 1960. This regulation also authorizes major commands to request special tours as training needs arise which cannot be accomplished through other types of training.

Equipment (AFRes)

The Air Force Reserve troop carrier units obtained nearly all of the number of aircraft needed for their 45 squadrons. Over-all, as of the last day of this reporting period, of the 720 airplanes authorized, 667 were assigned and in a high state of combat readiness. The wings also possessed from 70 to 90 percent of their authorized equipment other than aircraft.

Facilities (AFRes)

During the 1960 fiscal year a total of $4 million was appropriated by Congress for the construction of operational facilities on Reserve flying bases. As of June 30, 1960, $3 million had been obligated and the remaining $1 million was expected to be obligated by the end of October 1960.

Flying facilities are jointly utilized with the other Services as far as possible in the interest of economy. As of the close of this reporting period, the joint utilization of flying facilities was as follows:

Number of bases	*Jointly used with*
17	Regular Air Force
3	Navy
17	Civil Aviation

There were 82 Air Reserve centers (nonflying) operational during this period, where technical nonflying training is conducted. There were six facilities constructed in areas where Reserve participation and high rent cost warranted such action. The remaining 76 centers were located in either Government-owned or leased facilities. Additional construction of this type of facility will depend on comparisons of construction costs with available adequate commercial or Government-owned facilities to determine which is in the best interest of the Government, provided participation meets the prerequisites for such construction.

Every effort is being made to reduce the cost of leased facilities for Air Reserve center training. Continuous screening is being effected by the Continental Air Command in order to relocate Air Reserve center units to air bases, Army and Navy installations, and other more desirable facilities. Also, at many locations, an appreciable amount of leased space has been and is being declared excess in order to effect maximum utilization of classroom and administrative space. This action was initiated as a result of revised leasing criteria contained in a Department of Defense directive published in September 1959.

Reserve Officers Training Corps Program

The mission of the Reserve Officers Training Corps program is to provide junior officers for the active forces and their respective reserve components. The Reserve Forces Policy Board, through its Advisory Panel on ROTC Affairs, continually examines and studies this program. Based on the results of these studies, the Board makes pertinent recommendations to the Secretary of Defense on policy and legislation affecting the ROTC program.

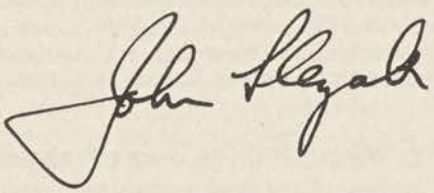
The Advisory Panel on ROTC Affairs is composed of seven civilian educators appointed by the Chairman, Reserve Forces Policy Board, who participate as individual advisors to the Board and not as representatives of any organization.

The present membership of the panel is as follows: Chairman, Dr. George C. S. Benson, President, Claremont Men's College, Claremont, Calif.; Dr. E. R. Durgin, Dean of Students, Brown University, Providence, R.I.; Dr. C. Clement French, President, Washington State University, Pullman, Wash.; Dr. A. N. Jorgensen, President, The University of Connecticut, Storrs, Conn.; Col. Charles B. Richmond, President, Kentucky Military Institute, Lyndon, Ky.; Dr. Robert W. Van Houten, President, Newark College of Engineering, Newark, N.J.; and the Rev. Robert W. Woodward, C.S.C., Director of Military Affairs, University of Notre Dame, Notre Dame, Ind.

During this reporting period the panel met three times and continued re-examination of the ROTC programs, to clarify objectives, and to determine areas where changes appear necessary to meet present trends and future requirements. In these meetings the panel developed 15 recommendations designed to provide greater flexibility in conducting ROTC programs and to achieve more efficient operation and higher quality training.

At its June 1960 meeting the Board was informed of these 15 recommendations and, following usual procedure, the Board Chairman sent them to the military department Secretary members of the Board for comment. Such comments were to be referred to the panel for consideration, after which the panel's recommendations, with any changes made in the light of the comments referred to, would come before the Board for action.

The panel hailed with enthusiasm the efforts by the Army and Air Force in proposing changes to their respective ROTC curricula so they might be more responsive to the requirements of a modern education, the pressure of time on the student, and the need for equitable academic credit. However, because of the widely divergent nature of the proposed changes, it was felt that, especially at 99 institutions which offer both Army and Air Force ROTC programs, inter-Service rivalries and inequities unfavorable to the ROTC program could develop. Further, the administrative difficulty created for the institutions concerned could be considerable. The panel, through the Chairman, Reserve Forces Policy Board, promptly called to the attention of the Secretary of Defense some of the problems that could possibly result if the proposed revised curricular changes were put into effect in their original concepts. As of the closing date of this report, action had been initiated at the Department of Defense and Service levels to align the programs of the Army and Air Force in order to make them as closely similar as practicable.



JOHN SLEZAK,
Chairman, Reserve Forces Policy Board.

Annual Report

of the

SECRETARY OF THE ARMY

July 1, 1959, to June 30, 1960

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I. Introduction

Over the past few years, the important role of the Army as an essential military foundation for supporting national policy has become more clearly understood by the Nation. In time of peace, America traditionally has been reluctant to support large military forces. However, in the uneasy peace of our times, the Nation willingly has supported a powerful Army and gives evidence of increasing recognition of the continuing need for strong and flexible joint military forces to counter the full spectrum of the Communist threat and to provide full support for its national policies.

The Army has made the most of this trust of the people and I am able to report that, in fiscal year 1960, the Army was qualitatively—in terms of its manpower, its equipment, its training, and its combat readiness—the strongest land force the Nation has ever had while not at war.

The Army's capabilities and progress in fiscal year 1960 can be assessed most effectively when viewed in the context of the developments and changes which have occurred over a period of several years. Therefore, this report summarizes Army progress since the Korean war, but with emphasis on fiscal year 1960 advances.

The civilian and military leaders of the Army are well aware that the strength of the Army must be evaluated both in broad terms of the interests and objectives of the United States and in terms of the Army's ability to carry out its assigned missions, particularly those involving sustained land combat against the forces of our potential enemies. So, in strengthening the Army over the past few years, we have attentively kept attuned to the worldwide commitments and needs of the Nation, and, at the same time, we have kept our eyes focused on the armed forces of the other world powers. We have been well aware of the massive Communist ground forces. We also have been aware of the Communists' pursuit of the latest developments in science and technology for military purposes, their willingness to expend vast resources to reequip their ground forces with the latest developments in weaponry, and their rapidly emerging capability to launch devastating thermonuclear attack against the continental United States.

During the post-Korean period, the Army has been characterized by forward movement and improvement. At no point along the line have we "dug in" or settled for the comfort or stability of a status quo. Constantly we have forged ahead, searching for new ideas and techniques, not only in the area of weapons, but also in the concepts of organizing and employing land forces, in personnel management, in training, and in logistics.

During this period, we have completely reorganized our divisions and supporting forces for modern warfare. We have provided a variety of missile organizations to support these troops with firepower of longer ranges and more explosive effects than ever before possessed by an army in the field. In striving for "One Army" in fact as well as in name, we have made great strides in more closely integrating our active and reserve forces. We have established a Strategic Army Corps here at home as the first priority element of our strategic reserves, ready instantly to reinforce our troops around the globe. We have provided a vast air defense system of extremely accurate and dependable NIKE missiles to protect the United States and our forces overseas. These and other notable actions have been taken since the end of the Korean war to make our combat forces more responsive to the needs of our times.

In logistics we have made considerable progress also: We have procured and issued to troops in significant quantities operational missiles (both surface-to-surface and surface-to-air), new models of recoilless rifles, personnel and weapons carriers, and communications equipment. In addition to this equipment now in the hands of troops, we have developed and have started equipping the Army with new models of light tactical aircraft and light transport aircraft, new lightweight rifles and machine guns, tank-launched bridges, and newer and better armored vehicles such as lightweight personnel carriers and new main battle tanks.

We have been given six Department of Defense Single Manager assignments through which we have become responsible for furnishing food; clothing; automotive, construction, and general supplies; and traffic management services to all of the military Services.

We have expanded research and development to include more basic research and additional research into tactical operations. By building Camp Century entirely under the snow in Greenland with the consent of Denmark, we have expanded and stabilized our Arctic research programs.

We have improved housing both for troops and dependents and have firmly programed housing improvements for the future. We instigated and refined Medicare, proficiency pay, 6-month reserve enlistments, and other programs for the benefit of personnel.

Also, we have constantly improved business management practices at every level throughout the Army to insure the most efficient use of resources for combat power.

It is true that, throughout this period of rebuilding and modernization, the Army, like the other Services, has had problems—some of them deep and difficult of solution. Among these are the problem of timely modernization of equipment; the problems of airlift, sealift, and tactical air support; the low manpower ceiling; the vexing and far-reaching difficulty of maintenance of equipment and plant; and the ever-present restrictions of budgetary pressures.

Some improvements have been made in many of these problem areas. However, more rapid improvements will be necessary in the future if the Army is to be prepared to carry out effectively its role in safeguarding national security. This is emphasized by world trends today, particularly by the so-called approaching nuclear parity or mutual nuclear deterrence which will tend increasingly to reduce the likelihood of general nuclear war and to force the power conflict increasingly to the limited war and cold war stages—stages in which the capabilities and roles of the land forces of the United States and its free world allies are of decisive importance.

Army forces constitute a major element of the Nation's capability to deter or to wage *all* forms of war. The flexibility and versatility of these forces offer a variety of military measures from which to select a course of action that is appropriate to the varied forms of aggression and at the same time is compatible with our national security interests.

During fiscal year 1960, some 40 percent of the total Army strength and more than half of the Army's operating forces have been poised overseas on the borders of freedom. These deployed forces, together with the Army's strategic reserve and the airlift and sealift which must be provided by the other Services to make it capable of rapid deployment, are an essential element of our forward strategy and constitute the backbone of our capabilities for limited war. They provide tangible evidence that any aggression will be met and dealt with immediately and that the United States and the free world cannot be blackmailed into accepting marginal or creeping aggression.

Army forces also play a major role in the deterrence of general war, and should a general war come, Army contributions would be vital in the retention of key areas overseas and in the defense of the continental United States. While effectiveness in the thermonuclear exchange of a general war is tremendously important, it is not conclusive. Whatever advantage might be gained initially would evaporate should the United States be unable to capitalize upon it. The Communists appear to visualize general war as a protracted struggle to the finish.

Under this concept, unless there exists a manifest ability to conduct a long general war, the United States deterrent might not be adequate, for a potential enemy might come to believe that he could recoup or counterbalance first phase losses through relatively unopposed conquest in the subsequent phase.

Though in this annual report of fiscal year 1960, I portray the Army as ready, strong, and modern, it must be constantly borne in mind that the true measure of its ability to perform assigned missions is how well it compares with the armed forces of our potential enemies. In this period of rapidly advancing science and technology, we cannot afford to stand still. The process of strengthening and modernizing our land forces not only must continue, but also must be accelerated in order that the Army may be capable of providing the required level of effective support of our national security policies.

II. Operations and Training

The principal operational missions of the Army in discharging its responsibilities in support of national policy are to maintain forces overseas capable of deterring or defeating aggression; to maintain highly mobile, combat-ready, strategic reserves to reinforce deployed forces or to meet other threats; to assist allied and other free world forces; to provide forces to assist in defending the United States against air attack; and to maintain strong combat-ready reserve forces and related facilities for rapid mobilization.

The following are among the most significant actions relating to operations and training which were taken by the Army during fiscal year 1960:

—providing continued support to Army forces deployed in strategic areas overseas which included six infantry divisions, two armored divisions, three armored cavalry regiments, six battle groups, one medium missile command, one air-transportable missile command, and various combat support units including surface-to-surface and surface-to-air missile battalions;

—strengthening the combat forces in the Caribbean area by increasing the number of battle groups from one to two;

—strengthening the combat forces in the Pacific area by the deployment of an airborne battle group to Okinawa, the activation of a logistical command on Okinawa, the deployment of a LACROSSE battalion to Korea, and a 15 percent increase in the authorized U.S. troop strength in the two U.S. divisions in Korea;

—training 195,000 replacements for the active Army and 100,000 enlisted trainees for the reserve components in the 3–6-month training program;

—conducting Exercise BANYAN TREE II, during which a reinforced airborne battle group was airlifted from North Carolina to Panama for a direct parachute assault on a simulated enemy objective in conjunction with forces from Latin American countries;

—airlifting 21,000 troops and 11,000 tons of equipment from the United States to and from Puerto Rico in Exercise PUERTO PINE/BIG SLAM; and

—deploying field hospitals and supporting units rapidly to Chile for assistance in earthquake disaster relief, and movement of an engineer company to Morocco to assist in earthquake recovery.

Deployment of Forces

Large-scale oversea deployments place American soldiers in the forefront of those United States and allied forces provided to deter and to wage war. These Army troops who patrolled the borders of the free world during the past year, together with the strategic reserves in the United States and the forces of the other Services, provided concrete evidence of the Nation's intent to implement its forward strategy. This strategy has undoubtedly been a significant element of our deterrent to both limited and general war. It was visible and unmistakable evidence of the willingness and ability of the United States to carry out its commitments to the free nations of the world.

The Army in Europe

United States Army, Europe (USAREUR) is a part of the United States European Command (EUCOM). EUCOM is a U.S. unified command whose responsibilities extend geographically from the northern tip of Norway to the eastern extremity of Pakistan. EUCOM has the task of welding together the assigned joint combat forces of the United States—Army, Navy, and Air Force—as part of the North Atlantic Treaty Organization (NATO) defensive alliance and of administering the military assistance program in this area.

A strong Army force with five divisions as its principal combat elements has been maintained in Europe since the end of the Korean war. During fiscal year 1960 Army combat ready forces in Germany continued to include three infantry divisions, two armored divisions, three armored cavalry regiments, two battle groups in West Berlin, surface-to-surface and surface-to-air missile battalions, and other supporting units.

In the northeastern plain of Italy between the Alps and the Adriatic Sea is the Southern European Task Force (SETAF) whose major combat element is a medium missile command. SETAF is a combined United States-Italian force in support of the North Atlantic Treaty Organization. Italy continued during fiscal year 1960 to man two HONEST JOHN missile battalions and other supporting units in SETAF.

At the end of fiscal year 1960 there were 3,500 United States civilians and 89,000 non-United States civilian employees in support of the United States Army, Europe.

The Army in the Pacific

The United States Army, Pacific (USARPAC) is the Army component of the Pacific Command (PACOM), a unified command. USARPAC has the responsibility of providing U.S. Army forces to PACOM and to the United Nations Command in Korea.

The number of U.S. Army divisions in the Pacific was reduced from eight at the end of the Korean war to three at the end of fiscal year 1960—two in Korea and one in Hawaii. However, the Army strengthened its forces in the Pacific during fiscal year 1960 by deploying an airborne battle group from the United States to Okinawa, by activating a logistical command on Okinawa, by deploying a LACROSSE battalion to Korea, and by increasing the authorized U.S. troop strength in the two U.S. divisions in Korea by 3,000 men.

In support of USARPAC there were approximately 7,900 United States civilians and approximately 53,000 non-United States civilian employees at the end of fiscal year 1960.

Other Army Oversea Forces

In Alaska two reinforced battle groups and two NIKE-HERCULES battalions were provided for the defense of the area at the end of fiscal year 1960.

In the Panama Canal Zone two battle groups and an air defense battalion were maintained for local security and defense of the area at the end of fiscal year 1960.

By agreement with Denmark a NIKE-HERCULES battalion and the Polar Research and Development Center were maintained in Greenland.

In support of United States Army, Alaska, there were 1,800 civilian employees at the end of fiscal year 1960, while there were 2,500 United States civilian and 2,600 non-United States civilian employees in support of United States Army, Caribbean.

The Strategic Army Force (STRAF)

The STRAF is that part of the Army normally located in the continental United States which is trained, equipped, and maintained for employment at the national level in accordance with current Army plans or approved emergency deployment schedules.

A major grouping of STRAF is the Strategic Army Corps (STRAC) which was organized in 1958 to provide quick ground support for U.S. Army forces in oversea areas and for the armies of the free world.

At the end of fiscal year 1960 these elements constituted the major forces in the STRAC: Headquarters XVIII Airborne Corps, the 101st

Airborne Division, the 4th Infantry Division, the 82nd Airborne Division, the 1st Logistics Command, the 2nd Infantry Brigade, two missile commands, and Combat Command "A" of the 1st Armored Division.

STRAC units are designed for quick movement against any kind of aggression around the world. The high level of combat readiness necessary 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 stabilize any combat situation.

To provide the degree of responsiveness required if STRAC is to be effective, it is essential that modern airlift and sealift be provided in sufficient quantities. This requires the airlift necessary to deploy strong combat forces by air to trouble spots worldwide within a matter of hours, to close a reinforced 2-division corps force anywhere on the Eurasian land mass within 2 to 4 weeks, and to continue buildup and support as required.

During fiscal year 1960 the Congress carefully reviewed the problem of available airlift and incorporated in the military appropriation act for fiscal year 1961 a separate airlift modernization account which included providing the Air Force with some $200 million for the procurement of appropriate strategic transport aircraft.

Air Defense

When the Korean war ended, guns and automatic weapons were used by the Army to provide air defense for both the continental United States and oversea forces. In December 1953 the Nation's first supersonic, surface-to-air guided missile—the NIKE-AJAX—was placed on site. Since that date the more than 1,000 guns then utilized in air defense have been withdrawn. In fact, considerable progress has been made in replacing the NIKE-AJAX with the second generation NIKE-HERCULES.

With the interjection of surface-to-air missiles into air defense systems, the Army undertook a project which involved much more than just developing missiles and radars. It also involved the establishment of administrative and logistical organizations to support these missile systems and the facilities needed in the training of competent missile men.

Organization of the Air Defense System

At the end of fiscal year 1960 the Army force structure included 264 NIKE batteries, 172 of which were NIKE-AJAX and 92 NIKE-HERCULES. These figures included 52 operational NIKE-AJAX batteries of the Army National Guard. Some 35,000 officers and en-

listed men manned these batteries and were deployed in defense of 23 vital areas consisting of about 250 communities in 30 States of the Union. Defenses varied in size, depending on the nature and importance of the areas to be protected. Some defenses had as few as 2 batteries while others had more than 20 batteries. A single Army air defense commander was provided at each defense area, directly responsible through the North American Air Defense Sector or Region to the Commander-in-Chief, North American Air Defense Command, in Colorado Springs, Colo.

Readiness of the Air Defense System

All defenses were manned 24 hours a day every day with frequent alert practices ranging in duration from 15 minutes to 3 hours. The combat effectiveness of NIKE defense units was maintained at a high level through air defense exercises, on-site training, and annual missile firings on the ranges of the Army Air Defense Center at Fort Bliss, Tex.

Program for Conversion to NIKE-HERCULES

NIKE-HERCULES, the second generation of the NIKE family, greatly exceeds the capacity of the AJAX. It can attack a target traveling at speeds of more than 2,000 miles an hour, has a range of more than 80 miles, and can reach altitudes well over 100,000 feet. The warhead of the missile can be either explosive or nuclear.

The first NIKE-HERCULES became operational on site in June 1958. Today, Army troops are manning NIKE-HERCULES in the United States (including Alaska), Western Europe, Okinawa, and Greenland. Other nations manning NIKE-HERCULES systems at the end of fiscal year 1960 were: Italy, Denmark, Norway, France, Belgium, Netherlands, West Germany, Turkey, Nationalist China, and Greece.

While original expansion plans for NIKE-HERCULES were somewhat curtailed, 29 NIKE-AJAX batteries were converted in the United States during fiscal year 1960. Nine additional batteries will be converted at present defense sites in fiscal year 1961 and 13 will be converted in fiscal year 1962. New NIKE-HERCULES defenses will be established at certain Strategic Air Command bases and various other installations both in the United States and overseas.

During the past year new developments have increased the effectiveness of the NIKE-HERCULES. Its mobility was improved by the adoption of a new "Ready Round" transport trailer. Also, an improved radar has considerably increased the system's effectiveness in combating smaller and faster targets. On June 1, 1960, under test conditions, the NIKE-HERCULES intercepted and destroyed a

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CORPORAL ballistic missile flying at more than 1,000 miles an hour. The new radar and the test against the CORPORAL confirmed earlier estimates that the NIKE-HERCULES has the additional technical capability to acquire and destroy enemy tactical missiles.

Employment of HAWK in Air Defense

HAWK, a homing missile which can destroy air vehicles traveling at supersonic speeds and from treetop level to approximately 60,000 feet, became operational during 1959. The first training unit was organized during that year.

Training facilities at the Air Defense School, Fort Bliss, Tex., and the Ordnance Guided Missiles School, Redstone Arsenal, Ala., were expanded during fiscal year 1960, and cadres for tactical units were in training at the end of the year. Early in fiscal year 1961, operational units will be deployed to Panama and to Korea.

The HAWK is the first surface-to-air missile system to employ the unique radars which provide its low altitude capability. From the mass of radar echoes reflected by ground objects, such as hills, buildings, trees, or vehicles, the HAWK acquisition radar picks out the echo from an aircraft. An illuminator radar tracks it automatically and the missile is launched, homing on reflected radar energy from the target. The system is highly mobile and can be emplaced rapidly.

Installation of MISSILE MASTER and MISSILE MONITOR

MISSILE MASTER is an automatic antiaircraft artillery fire distribution and direction system developed by the Army to integrate all elements of Army air defense in a defense area—from target detection to target destruction.

The first MISSILE MASTER system was placed in operation in fiscal year 1958 in the Washington-Baltimore defense area. Construction of nine additional systems was started in 1959, for completion by the end of calendar year 1960.

MISSILE MONITOR, designed to integrate air defense for NIKE and HAWK units assigned to tactical forces, was developed concurrently with MISSILE MASTER. The difference between the two systems is principally the mobility of the MISSILE MONITOR and its greater flexibility for Army air defense in the theater of operations. MISSILE MONITOR is now operational with Army forces overseas. Additional units are on order for early deployment.

MISSILE MASTER and MISSILE MONITOR combine speed, reliability, and flexibility. They link together all elements of Army air defense—from detection of an air invader to its destruction—and they will enable air defense commanders to make full use of missile system capabilities.

Development of NIKE-ZEUS

NIKE-ZEUS, the only antiballistic missile weapon system now under development and the only system which appears to be capable of operational deployment during the 1960–70 decade, is the logical progressive outgrowth of the Army's accomplishments in the field of surface-to-air missiles. (See fig. 1.) The greatest threats facing the Nation in the immediate future will be those of the intercontinental ballistic missile and the submarine-launched ballistic missile. The

Figure 1. NIKE-ZEUS anti-ICBM missile system.

NIKE-ZEUS is the only available key to active defense of the Nation against this swift-moving threat. NIKE-ZEUS will be a vital element in creating the strongest possible deterrent posture, and, in conjunction with a national civil defense program, provides the best assurance for national survival in the event of a nuclear exchange.

Army National Guard Participation in Active Air Defense Program

Since the Korean war the role of the U.S. Army National Guard in the air defense of the United States has increased in scope and importance. Prior to termination of the on-site gun program in October 1957, at which time 25 Army National Guard gun battalions were deployed in the continental United States and 1 in Hawaii, plans were made for transition of these units to the NIKE missile system.

The present on-site program of National Guard participation provides for 76 Army National Guard NIKE-AJAX missile batteries for the continental United States and 6 NIKE-HERCULES batteries for Hawaii by the end of fiscal year 1961. At the end of fiscal year 1960, 52 Army National Guard NIKE-AJAX batteries were on-site in the continental United States under operational control of active Army air defense commanders, and 4 Army National Guard NIKE-HERCULES batteries were being trained at two training sites in Hawaii pending completion of construction of tactical sites.

By using Army National Guard on-site air defense units, it is estimated that the active Army realizes a savings of $403,000 per year for each battalion. The 82 NIKE batteries programed for the Army National Guard on-site program for the United States at the end of fiscal year 1961 will also provide the active Army with a savings of 8,836 personnel spaces.

Disaster Aid

On May 25, 1960, the Army was ordered to move field hospitals to Chile by air for assistance in earthquake disaster relief. Two STRAC field hospitals and two helicopter ambulance detachments, plus supporting elements consisting of water purification, signal, and laundry units, were formed into Task Force Amigo. Airlift was provided by the U.S. Air Force. In spite of the great distance, weather conditions, limited capacity airfields en route, and destruction of railroads and roads in the disaster area, the first hospital became operational in Puerto Montt, Chile, on May 30, 1960. The other hospital, after arrival in the objective area, traveled south over 500 miles of badly damaged single track railroad and became operational at the city of Valdivia on May 31, 1960. The hospitals completed their mission by June 7, 1960, and United States personnel returned to their home sta-

tions. Hospital equipment was donated to Chile. The helicopter ambulance detachments completed their mission on June 17, 1960, and returned to the United States. (See fig. 2.)

Urgent requests from the Government of Morocco for assistance to victims of the Agadir earthquake resulted in the movement of an engineer company from United States Army, Europe, to the disaster areas in Morocco on March 3, 1960. This unit utilized its heavy equipment to clear access routes through rubble and to assist in rescuing trapped victims. Food, blankets, tentage, and other related items were also provided by USAREUR.

Figure 2. Army nurse treating Chilean earthquake victim.

Training in the United States

Replacement Training

During fiscal year 1960, 195,000 active Army replacements completed basic training in Army training centers and in units of the Strategic Army Force (STRAF). After completion of 8 weeks' basic training, the majority of the trainees were assigned to advanced individual training either in Army service schools or at Army training centers. A small percentage was assigned immediately to active Army units.

In the years since the Korean conflict, greater emphasis than ever before has been placed on finding means and methods to improve the training of the individual soldier and to reduce the leadtime which is necessary to bring him to a state of combat readiness and to maintain him in a ready posture. In addition to new training techniques developed within the Army, human research has been employed and techniques developed to apply what is known about human behavior for improving methods of military instruction. These combined efforts have reduced training time for some military and technical skills by as much as 40 percent. Over-all, the estimated time required to prepare a newly activated division for combat has, likewise, been reduced from the 10 to 12 months required in World War II and generally for the Korean war, to a period ranging from 7 to 10 months today, depending on whether soldiers sent to a division have already received individual training.

This has been achieved in spite of the involved training problems associated with new and complex weapons. The Army anticipates further progress in improving training methods, particularly as a result of human research. However, there is an irreducible minimum of time needed to prepare a soldier for combat. This emphasizes the need for well-trained men in the active Army and in the civilian components to be prepared for rapid deployment in the event of a sudden outbreak of hostilities.

Exercise BANYAN TREE II

BANYAN TREE II was a joint Army-Air Force-allied force exercise during fiscal year 1960 to demonstrate the ability to conduct a rapid reinforcement of the Caribbean Command in Panama with forces from the United States and from other American countries. Other nations represented were Brazil, Colombia, Panama, Peru, and Chile. Approximately 5,000 Army, Air Force, and allied personnel participated in the exercise, using 130 aircraft. The airborne assault itself was executed by 1,450 United States and allied troops.

BANYAN TREE II was the first field exercise in Panama in which

the tactical roles were assigned to ground and air units of other American republics. It was the second exercise in which U.S. Army troops have marshalled in the United States and executed a direct parachute assault on a simulated enemy objective overseas—in this instance almost 2,000 miles from home stations. BANYAN TREE II vividly demonstrated that forces from widely separated locations in the Western Hemisphere and representing six countries can be integrated and coordinated to apply military force in a specified objective area.

Exercise LITTLE BEAR

Exercise LITTLE BEAR, conducted in Alaska during the past year, provided unit and individual training in cold weather operations, enabled the operational testing of certain plans of STRAC units, and practiced reinforcement of the Alaskan Command. A reinforced battle group was airlifted from Fort Lewis, Wash., to Alaska, utilizing U.S. Air Force aircraft. This exercise proved to be an excellent means for training troops in tactics and techniques unique to cold weather operations. The extensive use of light helicopters to provide improved tactical air mobility and logistical support emphasized the great need for this type of mobility on a battlefield in primitive Arctic and sub-Arctic areas. Approximately 5,300 troops participated in the exercise. (See fig. 3.)

Figure 3. Field exercise in Alaska.

Exercise PUERTO PINE/BIG SLAM

Exercise PUERTO PINE/BIG SLAM was developed by the U.S. Army and the U.S. Air Force as a joint strategic airlift operation from the United States to Puerto Rico and return during the past fiscal year. This exercise was the largest peacetime airlift operation ever conducted. Approximately 21,000 U.S. Army troops and 11,000

tons of equipment and supplies—from 80 units and 29 Army stations—were airlifted from 14 Air Force bases in the United States. As a manifestation of the "One Army" concept, units involved in the exercise included an Army National Guard artillery battalion from Utah and an Army Reserve artillery battalion from Pennsylvania. Although both the STRAC and the organizations of the Air Force conducted the operation with superior skill and with an outstanding record for safety and continuity, Exercise PUERTO PINE/BIG SLAM highlighted the limitations of the presently available Air Force transport fleet to meet requirements for strategic airlift.

The following important lessons relating to STRAC operations in the future were drawn from this exercise: Exercises should include strategic air movement, staging for assault operations, and the conduct of airborne and airlanded assault operations in the objective area; Army units trained in accordance with current doctrine can assemble rapidly and effectively at locations other than their home stations; STRAC can integrate into a large joint force with minimum delay; and STRAC is in constant readiness to be deployed to a temperate or tropical part of the world without extensive special environmental training.

Army Schools

Since the Korean war, the Army service school system has been subjected to a continuing review to make it responsive to the changing requirements of the Army. A great many changes have been made both in officer and in enlisted men's schools affecting student requirements and quotas, curricula, and techniques. The most recent change came as a result of a reevaluation of officer education in the Army started in fiscal year 1959. Directly related to the officer career program, this fiscal year 1960 change provided for 8-week branch orientation courses in lieu of 16-week basic branch orientation courses for newly commissioned officers, and for the elimination of all company or battery officer courses.

During fiscal year 1960, 56,000 officers and 79,000 enlisted personnel from the active Army, reserve components, other Services, and allied countries attended Army service schools. Because of the need for highly trained personnel to man the modern and complex weapons of today's Army, the Army service school system is increasingly essential to the Army's training effort.

During fiscal year 1960, approximately 1,800 officers and enlisted personnel were trained in civilian institutions and industrial organizations. Such training is provided under the following circumstances: When the required training can be accomplished to meet desired standards at reduced cost to the Government; when comparable essen-

tial training is not available within the Army service school system; and when the expected retention of the individual in the Army justifies the cost of the training. Training in civilian schools, colleges, and universities and in commercial and industrial institutions is aimed specifically at Army needs and not at raising the general educational level of the Army, although it contributes to the latter as a derivative benefit.

Officials of the U.S. Military Academy, assisted by a committee of the Commission on Institutions of Higher Learning of Middle States Association of Colleges and Secondary Schools, recently completed a survey of the educational system of the Military Academy, and, as a result, introduced a number of changes in the Academy's curriculum in fiscal year 1960. Purely military training has been moved almost entirely into the summer training period, while being improved and made more realistic. In the summer period starting with the close of fiscal year 1960, for example, members of the class of 1961 were transported to Europe, where they were given the opportunity to serve as platoon leaders with combat elements of the Seventh Army.

The regular school year academic program at the Military Academy was revised to provide a broader base, in order to allow cadets of varying backgrounds, abilities, and desires to undertake courses best suited to their individual capabilities and motivations. Cadets who have studied standard university courses in prescribed subjects prior to entry into the Academy are now permitted to take related or advanced courses in the subject area, rather than to repeat the standard courses. Also, the policy of allowing cadets to progress at an accelerated pace in courses in which they are adept has been extended to include courses in mathematics, electricity, government, and civil engineering. Finally, in their last year, cadets are authorized to take three elective courses. Adjustments in the curriculum now provide courses which are about 60 percent pure or applied science and about 40 percent in the social sciences and the humanities. The total 4-year curriculum presently approximates 160 semester hours of a civilian college.

Army Aviation

Operations in the Korean war reemphasized the need for versatile light aircraft to perform various tasks in close conjunction with infantry, artillery, and armor forces. Since that time, development of new forms of air vehicles and developments in the organization and employment of Army forces in modern warfare have pointed increasingly to the need to exploit the unique capabilities of modern air vehicles to attain improved tactical mobility.

During fiscal year 1960, the aviation companies organic to the Army's divisions were reorganized to provide division commanders with a greater airlift capability for the conduct of air-mobile operations, that is, the use of organic air vehicles to move combat units wherever required in the combat zone, for the conduct of varied operational tasks.

The use of armed helicopters to perform ground reconnaissance and to conduct minor combat patrols was tested successfully during fiscal year 1960. (See fig. 4.) Studies were made analyzing the use of this form of air cavalry as an essential element of modern land warfare.

During fiscal year 1960 the active Army maintained 6,400 aviators supported by 12,000 enlisted mechanics. Aircraft—ranging from two-place observation planes to 3-ton transport aircraft—totaled 4,500. These were assigned to 53 company-size aviation units distributed throughout the Army.

Figure 4. Iroquois helicopter armed with SS–11 missiles.

Military Assistance to Allies

The forward strategy of the United States is strongly bolstered by the armies of the allies of the United States around the world. Free world ground forces supported by the Army represent 80 percent of the ground force strength of the free world.

United States military assistance to allied armies accomplished two vital functions. First, by equipping and training local forces

in those areas most vulnerable to Communist encroachment, a significant bulwark to aggression is created. During fiscal year 1960 the Army delivered over a half a billion dollars' worth of military materiel to allied nations. Second, the materiel and training assistance provided to national armies by the United States contributes greatly toward freeing the limited industrial capacity and strained fiscal resources of many struggling nations in underdeveloped areas. This serves to assist local governments in meeting the pressing requirements of their civilian economies and thus aids in the development of internal stability and strength.

The basic organizations for planning for the provision of military assistance to foreign countries are Military Assistance Advisory Groups (MAAGs) or Military Missions. In fiscal year 1960 the Army had 4,500 of its best-trained officers and men in these activities in more than 40 foreign countries—not only to aid in the deliveries of materiel, but also to train or arrange for training of members of foreign armies. This training includes both officers and enlisted men and ranges from basic tactical training to complex technical instruction. For example, in fiscal year 1960 6,300 foreign students were trained in Army schools in the United States and 2,000 additional foreign students were trained in oversea Army schools.

With assistance and advice from MAAGs, military schools are established by other free world nations for the training of their officers and noncommissioned officers. In many cases where it is determined desirable, the schools established by these allied armies are patterned directly on their United States counterparts. For example, Iran, Turkey, Vietnam, the Philippines, and Korea—to name but a few—have developed counterparts of the schools at Forts Leavenworth, Benning, Sill, Knox, and at West Point. These schools are not counterparts in terms of physical plant, but in curricula, methodology, and in the spirit of learning. Frequently, the commandant and key faculty members of these schools are themselves graduates of corresponding U.S. Army schools.

Thus, from a relatively small group of U.S. military personnel, the security of the free world has gained strength and cohesiveness in many critical areas, especially those about the periphery of the Sino-Soviet empire.

The Army's Role in Civil Defense

During fiscal year 1960, the Army took steps to improve its preparedness to render support to the Nation in a civil defense role in the event of general war. Realistically evaluating the dangers arising from a massive nuclear attack on the United States and the widespread devastation which would exist, the Army recognized that its responsibility

to offer effective assistance would be second only to its combat responsibility. Sizable military forces may be required for employment in civil defense and substantial military resources may be necessary to assure national survival. While the Army emphasizes that military participation in civil defense is not a substitute for civil action or civil authority, realistic analysis dictates that all elements of national strength be prepared to participate in the national recovery effort in the event of general nuclear war, consistent with their capabilities and other missions.

To this end, the Army's position is that assistance to civil authorities in case of a natural disaster or a nuclear attack on the United States is a secondary task within the mission of all Army forces, both active and reserve. Reserve component units have a ready capability in this connection because of their wide geographical distribution, their possession of arms and equipment, and because of their trained manpower organized within the military structure.

Reserve Components

The over-all mission of the reserve components is to provide trained units and individuals to the Army in the event of war or national emergency. In the case of units, they must be of proper strength, be sufficiently advanced in training, and have sufficient equipment to enable them to be deployed with a minimum of postmobilization time. In a like manner, individuals designated as reinforcements to active Army and reserve component units must be in a state of training equal to that in the units they are to reinforce.

In the Korean war, the importance of the reserve components during an emergency was illustrated by the ordering to active duty of 124,500 enlisted men and 14,100 officers of the Army National Guard and 78,500 officers and 165,000 enlisted personnel of the Army Reserve.

In the past, many have thought of the reserve components as being an adjunct of the regular Army, something added to the peacetime forces during an emergency. Today, such a viewpoint distorts the purposes of the reserve components. In the last 7 years, the regular establishment has been reduced from a 20-division force to a 14-division force. As these regular forces were reduced, reserve components forces have been designated for mobilization in the event of an emergency to assist in accomplishing the Army's broad mission.

During fiscal year 1960 the Army's continuing program to bring the active Army and the reserve components into more effective relationship was carried on at an accelerated pace. Today, under the quasi-wartime conditions of the cold war, the Army has closed the ranks between its active and reserve forces more tightly than ever before in peacetime, administratively and operationally. Active forces and re-

serve components are closely linked into "One Army." The "One Army" program, which has been expressed as the development to the fullest of the spirit of unity among all branches and components of the Army, recognizes the importance of highly ready reserve forces in deterring war and the very real military power which they represent—a power whose potential can be realized only through the closest of associations with the active forces. This potential, with the industrial mobilization base which supports it, is essential so far as dealing with limited war is concerned. It is also essential to the accomplishment of the tasks a general war would bring—recuperation and civil defense, active air defense, and the ultimately decisive land operations of a prolonged war.

Organization and Strength of Reserve Components

Beginning in 1956, the active Army reorganized its combat divisions and supporting forces for modern warfare under the pentomic concept. This reorganization brought about changes in tactical employment, weapon systems, and the size and number of units. The reorganization of the reserve components to the pentomic structure was completed in fiscal year 1960.

They are now organized into 37 combat divisions, 27 of which are Army National Guard and 10 Army Reserve. In addition, provision is made for 13 Army Reserve training divisions to operate training centers as part of the mobilization base and for numerous combat support and service support units of both the Army National Guard and the Army Reserve.

At the end of the Korean war various committees began studies of the means by which the manpower requirements of the reserve components could be met. The Korean experience and the results of committee studies laid the foundation for the National Reserve Plan and the legislative proposals which culminated in the Reserve Forces Act of 1955. This act provided trained manpower for the reserve components by establishing the legal authority for the 6-month active duty for training and by requiring active duty veterans to participate in the reserve programs. This influx of trained manpower has permitted the reserve component units to progress into unit training, thereby reducing their requirement for postmobilization training by almost half. Incident to this progress has been the maintenance of unit strengths adequate for the conduct of unit training.

To assure the continued availability of qualified personnel in the Army Reserve, a screening program was initiated in fiscal year 1956 to refine the Ready Reserve by discharging or transferring to the Standby or Retired Reserve individuals who did not meet retention criteria or who did not wish to remain after the initial quantitative

screening. Activities now emphasize qualitative screening. (See fig. 5.)

The total strength of the Army's reserve components at the end of fiscal year 1960 was 2,625,021, of whom 1,432,098 were in the Ready Reserve and the remaining 1,192,923 were in the Standby and Retired Reserve.

The actual paid drill training strength of the reserve components at the end of fiscal year 1960, including Ready Reservists undergoing 3 to 6 months' training, totaled 702,846.

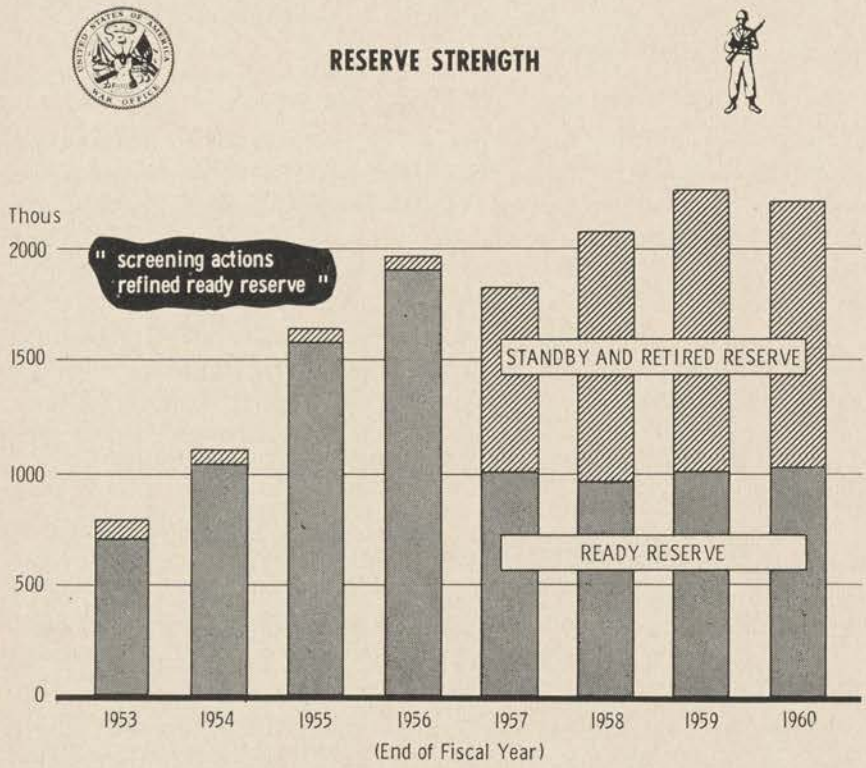

Figure 5

The Army National Guard portion of the 702,846 strength was 401,765; the Army Reserve portion was 301,081. Undergoing 3 to 6 months' training on June 30, 1960, were 58,014 Ready Reservists, 33,925 Army National Guard, and 24,089 Army Reserve.

Readiness of the Reserve Components

In the reorganization of the reserve components, a concept of relative priorities was developed. The substance of this concept is that

those units which are required for mobilization and deployment first will attain a higher level of training prior to mobilization. This in turn will require in the premobilization period relatively higher manning and equipment levels. As a consequence, such units must be specifically designated in advance and receive priority treatment prior to mobilization. Units in Priority I include nondivisional units to round out the active Army, the on-site National Guard units, and other units and individuals to expand the mobilization base of the active Army.

Priority II units include a group of balanced division forces known as Ready Reserve STRAF and additional units for the phased expansion of the mobilization base. Remaining reserve forces are placed in Priority III.

School Training

During fiscal year 1960 further efforts were made to bring the members of the reserve components more realistically into the school system of the active Army without detracting from the active Army need for school graduates for current operations.

To assure the civilian soldier the same proficiency level of training as the man in the active Army, the Army Signal Training Center at Fort Gordon, Ga., undertook an experimental training program for reserves. Nearby reserve signal units, particularly those from Georgia and South Carolina, were invited to send their signal specialists to Fort Gordon for training on Sundays. Because of the distance involved for the Alabama signal units, a mobile instructor team with selected equipment visited the units. These and other unique experiments in training were made during the year to make the "One Army" concept a working reality.

Since the Korean war, the Army National Guard has developed a system of officer candidate schools that is almost nationwide, increasing from 4 to 43 at the end of fiscal year 1960, with enrollments jumping from 500 to 2,600.

Nearly 8,200 members of the Army National Guard attended Army service schools during fiscal year 1960. This was a 35 percent increase over the rate of attendance at the end of the war in Korea.

During fiscal year 1960, 4,390 officers and 442 enlisted personnel of the Army Reserve were trained at Army service schools in courses varying in length from 2 weeks to several months.

Training Exercises

Elements of the reserve components participated in two major training exercises during the past year—Exercise READY FREDDY and Exercise PUERTO PINE/BIG SLAM.

Exercise READY FREDDY involved 3,000 members of the Army Reserve who were assigned to units in the First, Second, and Sixth Armies. This exercise evaluated the capabilities of the Ready Reserve mobilization reinforcement system and provided realistic training in mobilization procedures.

In Exercise PUERTO PINE/BIG SLAM, 300 Guardsmen of the 2d Howitzer Battalion, Utah National Guard, and 200 Army reservists of the 3d Howitzer Battalion, 15th Artillery, of the 79th Infantry Division participated. The reserve component units were airlifted from the United States to Puerto Rico for 2 weeks' training and were then returned by air.

Reserve Officers' Training Corps

The primary mission of the Army Reserve Officers' Training Corps (ROTC) program is to provide junior officers for the active Army, the Army Reserve, and the Army National Guard. The Army is dependent upon the ROTC as the principal source of its officers in peace and war. The Army ROTC program not only produces several thousand officers each year for the active Army, but also supplies several thousand officers annually for troop units of the Ready Reserve and for assignment to leadership positions in all components of the Army in the event of emergency.

Currently participating in the program are 233 ROTC units at 248 institutions in the senior division of colleges and universities, 40 units at 40 institutions in the military schools division, and 92 units at 258 secondary schools in the junior divisions. Enrollments in the ROTC program during fiscal year 1960 totaled 231,381 cadets.

The Department of the Army has reexamined the ROTC program to redefine its objectives and to determine areas where changes may be necessary in view of future requirements. Following almost 2 years of study and research by the Army, a revised curriculum for ROTC was approved during fiscal year 1960. This revised ROTC curriculum authorized the substitution of 90 hours in university-taught courses in the advanced course, in the areas of science comprehension, effective communication, general psychology, and political institutions.

As a result of a divergency in hours between the Army and Air Force ROTC basic courses, an administrative difficulty developed at the institutions sponsoring both programs on the campus. This difficulty was resolved when both Services agreed to conduct a basic ROTC program which would authorize the substitution of 30 hours in university-taught courses. This revised basic course was approved by the Secretary of the Army for implementation in school year 1961–62, and will be applicable to all institutions sponsoring Army ROTC

who desire to adopt this modified basic course. Authority was granted those institutions having Army and Air Force compulsory ROTC units to implement the revised basic course curriculum during school year 1960–61, if desired.

A great deal of pressure has recently been focused on educational institutions by student and faculty groups to change from a policy of requiring the student to pursue a course in military science and tactics during his first 2 years of college to a policy of an elective program. This pressure has resulted from, among other causes, the increase in college enrollments (requiring additional classroom space), the demands by accrediting associations for increased emphasis on academic subjects leading to degrees, and in some cases, to opposition to military training on the college campus. Although the decision on compulsory versus elective ROTC is one to be decided by school authorities or State legislatures, the Army has consistently advanced its support of the required system. The Army has based its position upon the necessity of a broad base from which to select students for the advanced course, the need to insure qualitative production, and the desire to further the schools' efforts to instill within the student a sense of patriotism and responsibility. The Army's position has been further predicated upon the observed decline in enrollment within the ROTC when a school permits the student to take the course on an elective rather than a required basis.

At the end of fiscal year 1960, the University of California, Ohio State University, and Washington State University were considering changes to an elective system. Massachusetts Institute changed to an elective system in September 1959; the University of Wisconsin, Rutgers University, Cornell University, and the University of Puerto Rico changed to elective systems effective with academic year 1960–61. The ultimate result of these changes cannot be predicted at this time. However, the Army experience factor in this matter indicates that, should the trend toward an elective basic program continue, the annual production goal of 14,000 junior officers of high quality for the ROTC may not be capable of attainment.

Army Intelligence Reserve

Reorganization of the Army Intelligence Reserve into 127 detachment- and company-size units was completed during fiscal year 1960. The consolidation resulted in eliminating many small teams located in smaller communities throughout the United States. Every effort was made to salvage the trained intelligence personnel by transferring them to other units as intelligence specialists or by forming them into training detachments.

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Fifty percent of the units of the Army Intelligence Reserve are Strategic Intelligence Research and Analysis Detachments. These detachments, with only 11 percent of the personnel of the Army Intelligence Reserve, contribute to the over-all Army intelligence effort by working on research and analysis projects during their training periods. The projects are incorporated into the national intelligence effort.

Tactical support intelligence units of the Army Reserve are located in metropolitan areas of the United States so that they may more easily recruit linguists, which constitute approximately 50 percent of their military occupational specialties.

Combat Intelligence

Knowledge of an enemy, the weather, and the geographic features used in the planning and conduct of tactical operations within a given area are of great importance in the operations of the field Army.

The requirements of modern warfare—which demand wide dispersions of troops and great mobility—have resulted in major changes both in the role of combat intelligence and the means employed. The combat intelligence system has been modernized to emphasize more highly developed means in the search for, the detection of, and the identification of targets. Rapid collection of information has remained critically important. A great deal more responsibility has been placed both on the individual soldier and on the whole collection network in the field army. Increased emphasis has been placed on intelligence training in individual and unit training and in field exercises. Programs of instruction of service schools have been reviewed and changes made, where applicable, to insure that combat intelligence instruction continues to keep pace with new requirements. During fiscal year 1960 the organization of intelligence units in the field army was revised to meet the changes required by modern warfare.

New advances have been made in the employment of patrols, in the field of flash detection devices, and in ground surveillance devices at the battle group and battalion level. The division commander now has available aerial surveillance drones, aircraft, and communication and electronic intelligence collection means. The corps and field army commanders also have been provided more elaborate technological means for intelligence.

A new organization has been provided at field army level—the Air Reconnaissance Support Battalion—which gives the Army commander an improved operational link to the Air Force tactical air reconnaissance effort. This new unit receives, reproduces, interprets,

annotates, and delivers air photography provided by tactical air reconnaissance.

Because of the great mass of information expected to flow through intelligence channels in any future war, great emphasis has been placed on adapting automatic data processing equipment for field use in intelligence production. In fiscal year 1960 significant progress was made in this field.

Mapping and Geodesy

In fiscal year 1960 a revised worldwide command requirement for mapping and geodesy in support of current plans of the Department of Defense was published, and programs and production planning were designed to reflect the changes. The fact that only 27 percent of the world is considered adequately mapped for Department of Defense purposes is an indication of the magnitude of the mapping job that lies ahead. (See fig. 6.)

During fiscal year 1960 approximately 500,000 square miles of large-scale and 1,000,000 square miles of medium-scale maps were produced through the combined efforts of the Army Map Service, U.S. Army, Pacific, and U.S. Army, Europe. In addition, the Inter-American

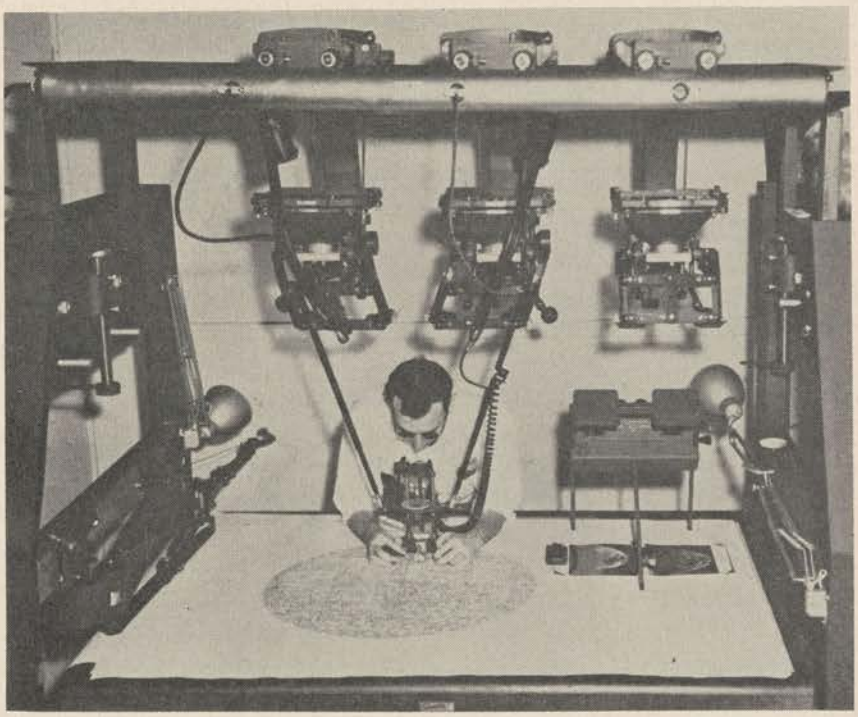


Figure 6. Operation of sterco-plotting device in mapmaking.

Geodetic Survey, an Army agency in the Caribbean area, continued its extensive survey efforts in cooperation with Latin American countries. In the Far East, approximately $700,000 in yen was made available to the Japanese Government for the improvement of large-scale maps of Japan, copies of which will be made available to this country. In the Middle East, U.S. Army topographic troop units continued survey operations in Iran and Libya.

Throughout the year, liaison was maintained with foreign countries in which the United States has a mapping interest. No new collaborative mapping or exchange agreements were made during fiscal year 1960.

In the new technology of using satellites for topographic and geodetic measurements, a project was initiated to procure SECOR (Sequential Collation of Range) electronic range measuring equipment to be used for obtaining intercontinental and interdatum ties by observation of signals from the SECOR, which is scheduled to be placed in orbit in the Navy's TRANSIT satellite. Also, the Army continued operation of three Minitrack Mark II stations for observation of the VANGUARD Beta satellite for geodetic purposes.

Prototypes of a new 1:250,000-scale topographic map-aeronautical chart, the only coordinated map-chart series available to the Services, were produced and delivered to field units for Service testing and evaluation.

Developmental studies in automation of certain mapping and surveying operations and in advanced systems for mapping were made.

The Army Map Service began preparation of a 1:5,000,000-scale topographic map of the moon during fiscal year 1960.

Army Attaché System

The primary mission of the U.S. Army Attaché System, through its attachés worldwide, is the overt collection of all information of value to the Department of the Army in the country to which accredited. This is an internationally accepted attaché mission. The Army attaché represents the Chief of Staff of the Army and serves as advisor to the chief of a diplomatic mission on Army matters.

During fiscal year 1960 there were some 70 Army attaché stations in operation in countries around the world.

III. Personnel

Since the end of the Korean war the Army has made outstanding progress in its total management of personnel—in the procurement, allocation, and utilization of manpower in bulk and in the management of its people as individuals.

Strength and Distribution

The authorized military strength of the active Army for the whole of fiscal year 1960 was 870,000. This was continued as the ceiling for fiscal year 1961.

At the end of fiscal year 1959 actual active Army strength had dropped 8,036 below the programed strength of 870,000. This variation below the authorized ceiling was filled early during fiscal year 1960 and a fairly level strength was maintained throughout the year. Actual strength on June 30, 1960, was 873,078, consisting of 770,112 enlisted men, 87,327 officers, 10,180 warrant officers, 3,729 nurses and Army Medical Specialist Corps personnel, and 1,730 cadets.

Actual distribution of Army personnel by the type of function performed at the end of fiscal year 1960 follows, with a percentage comparison with the distribution at the end of fiscal year 1953.

	Numbers	*Percentages*	
	30 June 1960	*30 June 1953*	*30 June 1960*
Operating Forces	562, 277	58. 8	64. 4
Training Forces	148, 069	24. 9	16. 9
Support Forces	89, 019	6. 4	10. 2
Special Activities	58, 366	2. 2	6. 7
Transients and Patients	15, 347	7. 7	1. 8
Total	873, 078	100. 0	100. 0

The Army's significant improvements in personnel management are reflected in these figures—the proportion of operating forces increased significantly, and major reductions were achieved in the percentage of personnel engaged in training and nonproductive as transients and patients. The increased percentage of support forces reflects both the smaller size of the Army as a whole (with minimum essential support applied to a smaller base and, therefore, reflecting a higher percentage) and the increasing technical complexity of the equipment in the hands of troops. It is unlikely that any significant reductions will be

achieved in the relative proportion of support forces in the future. Special activities include international, joint service, diplomatic, and liaison functions. Here, as in the support function, the increases are readily explained, and it is unlikely that significant reductions will be achieved in the future. Nevertheless, it is the aim of the Army to continue to achieve the best attainable balance within the resources made available and, at the same time, to continue the trend toward an even larger percentage of operating forces. (See fig. 7.)

An Army strength of 870,000 is hardly adequate for all the functions the Army must fulfill. While Army roles and missions have remained basically unchanged, its worldwide commitments have increased and the personnel requirements to support them have increased since the establishment of the 870,000-man strength ceiling during fiscal year 1959. These increased requirements include increased trainers for support of reserve forces, personnel for the support of the non-United States NATO atomic weapons stockpile, personnel for organizations employing new weapon systems, new attaché offices, and several other new manpower obligations.

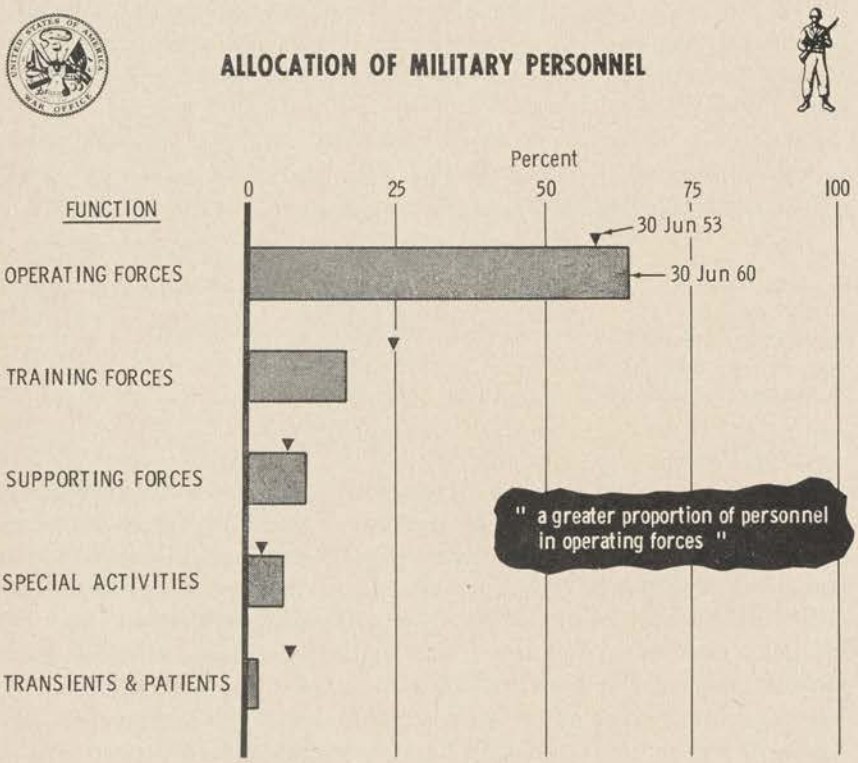


Figure 7

Personnel Management Program

Personnel management—a principal effort in the personnel field since the end of the Korean war—deals with those matters affecting people as individuals. It is concerned not only with raising the quality of the Army personnel, but also in making the Army system more responsive to individual needs. Manpower management, on the other hand, has as its object the efficient handling of men in bulk—their procurement, their allocation, and their utilization.

Programs to raise the quality of Army personnel in recent years have been most successful, with the result that in fiscal year 1960 the over-all quality of enlisted personnel was higher than at any time since the end of the Korean war. The final test of this quality is, of course, in the Army's combat readiness. However, a further indication of high quality is the fact that 7 years ago the Army operated five disciplinary barracks while today it has only one. The rate of prisoners in confinement has dropped from 11.1 per 1,000 Army strength on June 30, 1953, to 4.5 on June 30, 1960. (See fig. 8.) The rate of absences without leave has also dropped markedly. There are many reasons for the improvements in discipline which these figures indicate. Among them are the over-all higher quality of Army personnel and a better system of allowing them to fulfill their ideals and desires as individuals within the Army system.

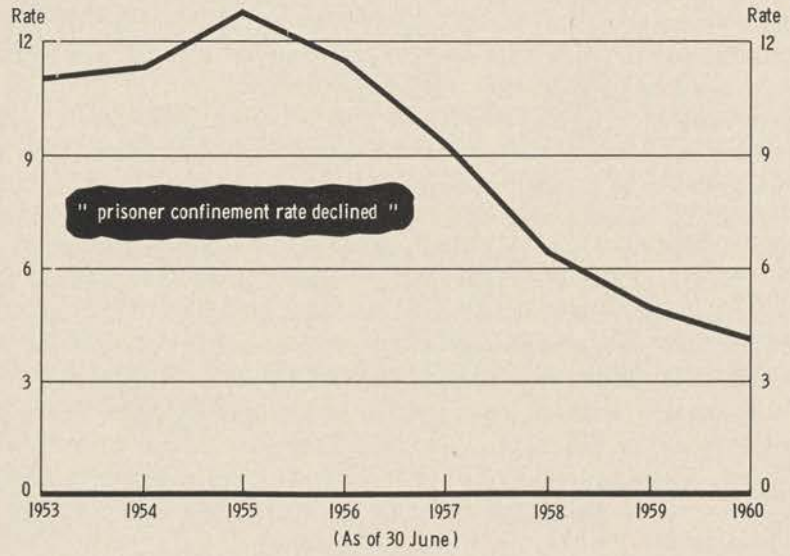
Since January 1, 1959, the Army has raised the acceptance score in the armed forces qualification test to a higher level than ever before established. Draftees have been accepted who score below the higher norm established for enlistees only if they can qualify in at least two aptitude areas of the Army classification battery of tests. Under these criteria there is a reasonable assurance that the men coming into the Army can absorb and profit by the training they receive and that they can contribute materially to Army programs. By keeping out the less apt, the Army also eliminates to a great extent a group that accounts for a disproportionate share of disciplinary problems. As indicated in the attached chart, both the educational level and the intelligence level of the Army greatly increased between June 30, 1953, and June 30, 1960. (See fig. 9.)

General Educational Development

The Army's general educational development program is an important personnel management activity which contributes directly toward improving the quality of military personnel.

Throughout fiscal year 1960, there was constant participation by some 125,000 officers and enlisted personnel in this program. More than 420,000 courses of all kinds were completed during the year in

MORALE INDICATORS



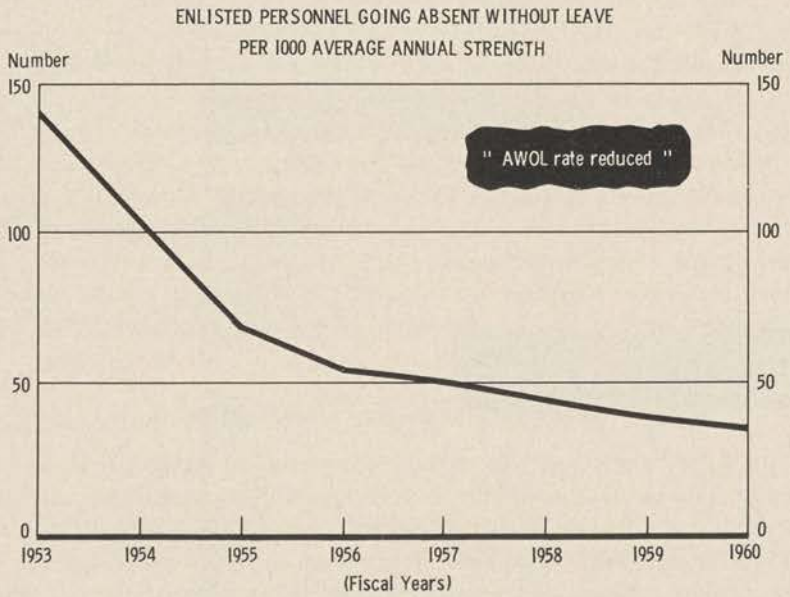


Figure 8

PERSONNEL CHARACTERISTICS

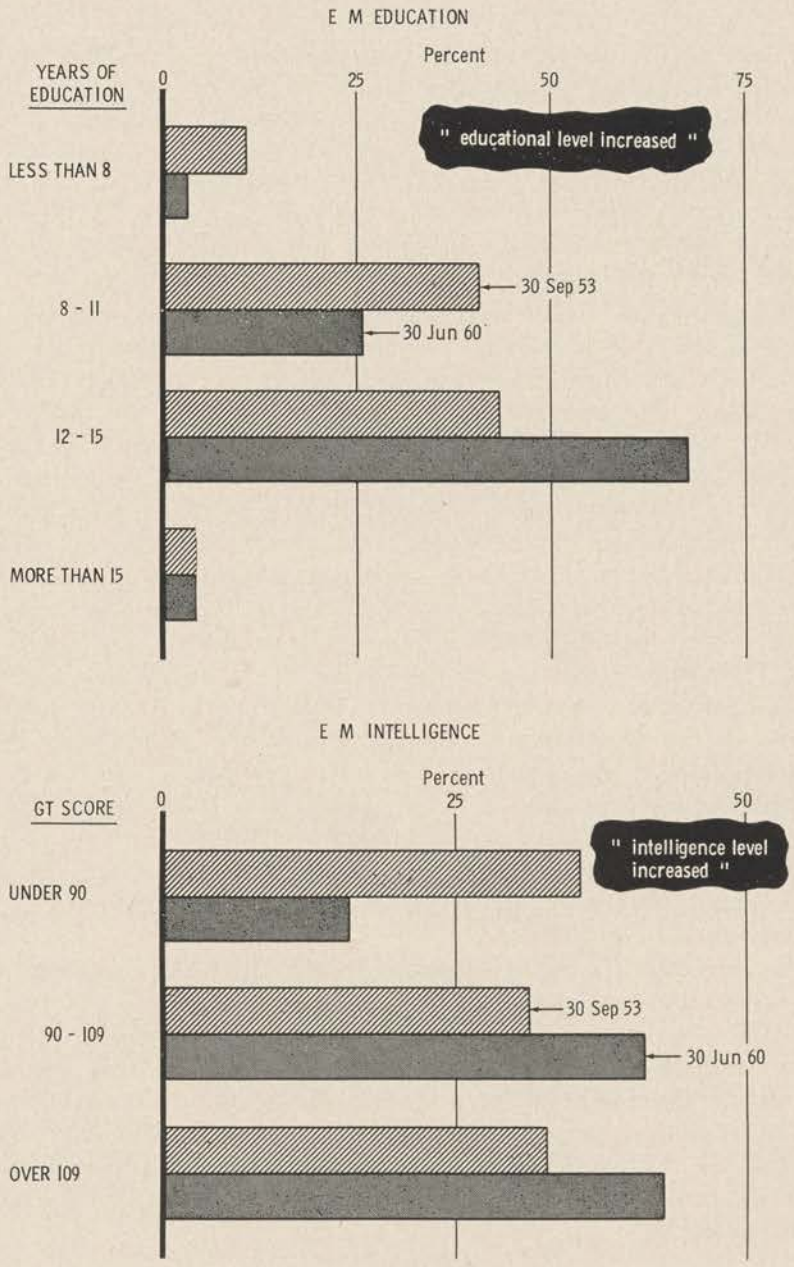


Figure 9

off-duty attendance at civilian colleges and universities, in group study classes in Army Education Centers, and in correspondence courses monitored by the U.S. Armed Forces Institute. Although the subject matter is of a general nonmilitary nature ranging from elementary to postgraduate levels, the general educational development program's support of military training has been increased by providing courses related to military occupational specialties and by assisting enlisted personnel in preparing for job proficiency tests. Emphasis is also placed upon foreign language instruction in view of the Army's worldwide commitments and in support of the President's people-to-people program. In fiscal year 1960 there was participation in off-duty foreign language study by an average of 16,000 individuals at any one time. More than 20,000 courses were completed in 27 languages.

Together with higher standards for induction, enlistment, and reenlistment, the general educational development program has contributed to the appreciable increase in the quality of Army military personnel. For example, during fiscal year 1960, 49,496 Army enlisted personnel attained high school equivalency through successful completion of general educational development tests recognized by departments of education in 49 States, the District of Columbia, Puerto Rico, and the Canal Zone. In addition, more than 5,000 Army officers and enlisted personnel attained 1-year college equivalency, and almost 600 achieved baccalaureate or graduate degrees through the program.

The Army led the military Services in its response to the appeal by the President's committee for assistance in recruiting high quality personnel for the teaching profession. Following the Army's endorsement of the postretirement careers in teaching program in 1958, thousands of Army personnel have been motivated to consider postretirement teaching careers. During fiscal year 1960, approximately 4,000 officers and enlisted personnel completed off-duty courses toward meeting teacher certification requirements. This action also benefits the Army directly by improving the quality of its personnel at no expense to the Government.

In June 1960 the Army expanded its plan to enable commissioned officers to finish college by authorizing leaves of absence of up to 12 months to complete requirements for baccalaureate degrees. Provisions were made for 600 officers a year to participate in this program. Under the degree completion program, officers are permitted to attend college full-time, provided they pay their own educational expenses and travel. During fiscal year 1960, 350 officers received baccalaureate and advanced degrees. This represented a 65 percent increase over fiscal year 1959.

Enlistments and Reenlistments

During fiscal year 1960 initial enlistments for the Regular Army totaled 102,114 despite higher mental criteria for enlistment and a very healthy economy. This total compares very favorably with the highest enlistment year since the end of the Korean war, which was fiscal year 1955, when 119,778 initial enlistments were obtained under less restrictive mental standards. During fiscal years 1957 and 1958 initial enlistments totaled 68,944 and 78,521, respectively. Success in obtaining the higher number of initial enlistments in fiscal year 1960 was due to the combined impact of revitalized recruiting programs, better selection and assignment criteria for recruiting personnel, and the granting of status to the recruiter by establishing his occupation of career counselor as a primary military occupation specialty. Constant refinement of the enlistee's right to choose his occupational area has undoubtedly helped recruitment also, as have the community relations programs of the Army.

Army reenlistment rates continued to improve during fiscal year 1960. While the reenlistment rate of career soldiers remained approximately the same as for fiscal year 1959—83.9 percent for fiscal year 1959 as against 83.2 percent for fiscal year 1960—the first-term rate improved.

The enlistment rate of draftees upon termination of their compulsory service almost doubled in fiscal year 1960 as compared to fiscal year 1959 (9.1 percent as against 5.1 percent). This improvement was due primarily to stronger command support of the reenlistment program throughout the Army.

The success of the recruiting program together with improved reenlistment rates is resulting in a continuing growth of the Regular Army content of Army personnel. At the end of fiscal year 1960, 76.6 percent of active Army enlisted strength was Regular Army, as compared with 72.9 percent at the end of fiscal year 1959 and 64.7 percent at the end of fiscal year 1958. (See fig. 10.)

Enlisted Evaluation System

Many of the policies designed to improve and retain the best enlisted personnel are included in the enlisted evaluation system, which provides for evaluation of each soldier's proficiency against Army-wide standards.

Fiscal year 1960 was the first full year in which the Army enlisted evaluation system was used. Although actual testing under the system began in the last half of fiscal year 1959, it was not until fiscal year 1960 that the effects of the program were felt throughout the Army.

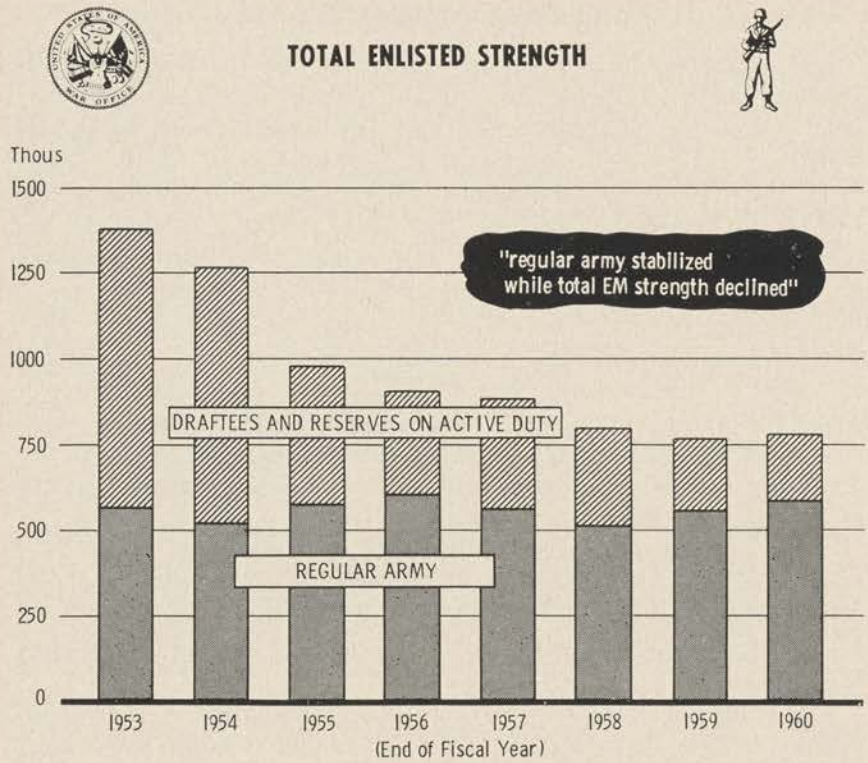


Figure 10

In addition to identifying personnel for proficiency pay purposes, plans were made during fiscal year 1960 to expand the system to serve as a means of determining the qualification of individuals in their military occupational specialties. Eventually, the evaluation system, in combination with other factors such as length of service, may be used in additional personnel actions—promotions, for example.

In fiscal year 1961 the Army has for its aim the evaluation of 216,000 enlisted personnel in 293 military occupational specialties.

Proficiency Pay

Fiscal year 1960 was the second year of the Army's program for the award of proficiency pay to enlisted personnel. This special pay award program was designed to provide extra pay to enlisted personnel who possess special proficiency in military skills. There were 60,653 monthly payments of $30 a month in effect at the close of fiscal year 1960. This was 46,860 more than were awarded in fiscal year 1959.

Individuals who held primary military occupational specialties designated as critical for Army operations received 98.2 percent of the total proficiency pay awards. The criteria which determine whether or not occupational specialties are critical are: Length of training time, reenlistment rate, and shortage of personnel. Payments to individuals in noncritical specialties under a provision in the program for outstanding effectiveness amounted to 1.8 percent of the total awards.

Individuals holding military specialties which were designated for proficiency payments competed on a worldwide basis under the enlisted evaluation system during the past year to attain eligibility for proficiency pay awards. Annual requalification for retention of proficiency pay was initiated during fiscal year 1960.

Personnel Movement

The policy of reducing the number of permanent changes of station for officers and enlisted men, which was adopted shortly after the end of the Korean war, was heavily emphasized in fiscal year 1960. However, other actions, such as the deployment of an airborne battle group to Okinawa, the divisional reorganizations, both overseas and within the United States, and continuing steps to provide the Army with the most up-to-date weapons and organizations, served to counteract the over-all effort to reduce movement of individuals.

In order to minimize movements occasioned by activation, inactivation, and organization and reorganization of units, provisions for in-place utilization of personnel and for early release of personnel due for separation and rendered surplus by organizational shifts were enforced.

Further, in order to detect more readily the causes of movement so that reductions, where possible, might be made, a new report system was established to provide actual monthly permanent change-of-station performance data on military personnel.

In May 1960, when it became apparent that travel funds for fiscal year 1961 would be insufficient for what was considered a reasonable rate of movement, additional restrictions on movement of personnel within the United States were imposed. Still further restrictions to be imposed on the movement of personnel during fiscal year 1961 to cope with fund limitations were under study.

Two major improvements were effected during the year in the Army replacement system—one, the carrier company replacement system; the other, the unit-to-unit replacement system.

The carrier company replacement system is a means whereby replacements are formed into units for shipment to specific oversea or-

ganizations in Europe. Under this plan all personnel entering into advanced individual training are formed into 4-man teams. The composition of each team primarily arises from the desires of individuals to team up with others from the same home town, from the same civilian school, from the same basic training group, or from other associations. Individuals are given the opportunity of selecting those with whom they wish to be closely associated during the 8-week advanced training period and during the first subsequent assignment.

The 4-man team formation is not a guarantee that the four men will be assigned to their first station together, but, insofar as Army requirements permitted during fiscal year 1960, planned team assignments were carried out. The 4-man team system proved beneficial during the past year in raising the morale of trainees and retaining it to the point of assignment where the esprit and morale-building procedures of each unit come into play.

The unit-to-unit assignment system is a program for assignment of individual enlisted personnel from their duty stations in the United States directly to oversea units. Procedures were published during fiscal year 1960 providing for the worldwide assignment of individuals in grades E8 and E9 under the system, and for all E1 through E7 personnel who are ordered overseas upon completion of advanced individual training or schooling. This did not include certain training personnel who will come under this system in fiscal year 1961.

Women's Army Corps

The strength of the Women's Army Corps increased by about 500 during fiscal year 1960 to a total strength of 9,053. Improved recruiting procedures, the retention of newly commissioned officers, and higher reenlistment rates accounted for the rise. Officer strength was improved with officer gains exceeding officer losses during fiscal year 1960 for the first time since the end of the Korean war.

A new Women's Army Corps detachment was activated at Headquarters, U.S. Army, Pacific, during the year.

Several advances in personnel management of enlisted women were made during fiscal year 1960 such as a more valid basis for assignment of enlisted women to school training, better promotion opportunities, and more satisfactory assignment procedures.

The number of military occupation specialties in which enlisted women may be assigned has been expanded to provide a broader range of school training and utilization. At the end of the year, 465 enlisted women were receiving proficiency pay; 33 women had been promoted to pay grade E8 and 1 to E9.

Civilian Personnel

The trend in Army civilian personnel management since the end of the Korean war has been toward a smaller, more highly skilled, and more efficient civilian work force. This has resulted partly from changing missions and partly from an intensive effort by the Army to reduce the number of civilians required through training and utilizing each employee to his full capacity. During the Korean war a large proportion of Army civilian employees was directly engaged in the production of military supplies. Most of these manufacturing activities ceased with the end of the fighting, so that today fewer than 5 percent of civilian employees are engaged in manufacturing activities. On the other hand, other missions, notably research and development, have expanded. Today 10 percent of all civilian employees are engaged in research and development activities.

To make possible the expansion of research and other vital new activities, unremitting efforts have been devoted to increasing efficiency in all operations by improving the training of employees; by introducing labor-saving devices, especially automatic data processing equipment; by improving work methods and procedures; and by eliminating unnecessary administrative procedures. The success of these efforts is demonstrated by the fact that Army civilians today are doing a larger, more complex, and more difficult job than they were 5 years ago, even though their number is smaller.

Strength

At the end of fiscal year 1960, 503,000 civilians were employed by the Department of the Army. Of this total, 390,000 were direct hire employees working in the continental United States, its Territories and possessions, and in foreign countries; the remaining 113,000 were local national employees who support the Army in France, Germany, Korea, and Japan.

Since the end of the Korean war, total civilian employment in the Army has declined by 408,000 employees, or 45 percent. Almost 70 percent of this reduction has resulted from the elimination of direct and indirect hire of local national personnel in foreign countries. In the continental United States the reduction has amounted to 119,000 employees, or 26 percent of the 1953 work force. (See fig. 11.)

During fiscal year 1960 the total strength of civilian employees of the Army was reduced by 23,000, or almost 5 percent. Although this reduction was less than those of recent years, there was considerable shifting of civilian manpower as some old activities were reduced or closed down and new activities initiated. In the area of logistical

functions, for example, there was a total increase in civilian personnel. Although several ordnance depots and maintenance activities were closed down, causing a net reduction of logistical personnel of 3,500, at the same time expanded responsibilities—particularly in improvement and maintenance of missiles, electronic devices, and aircraft—required the hiring of 10,000 civilians.

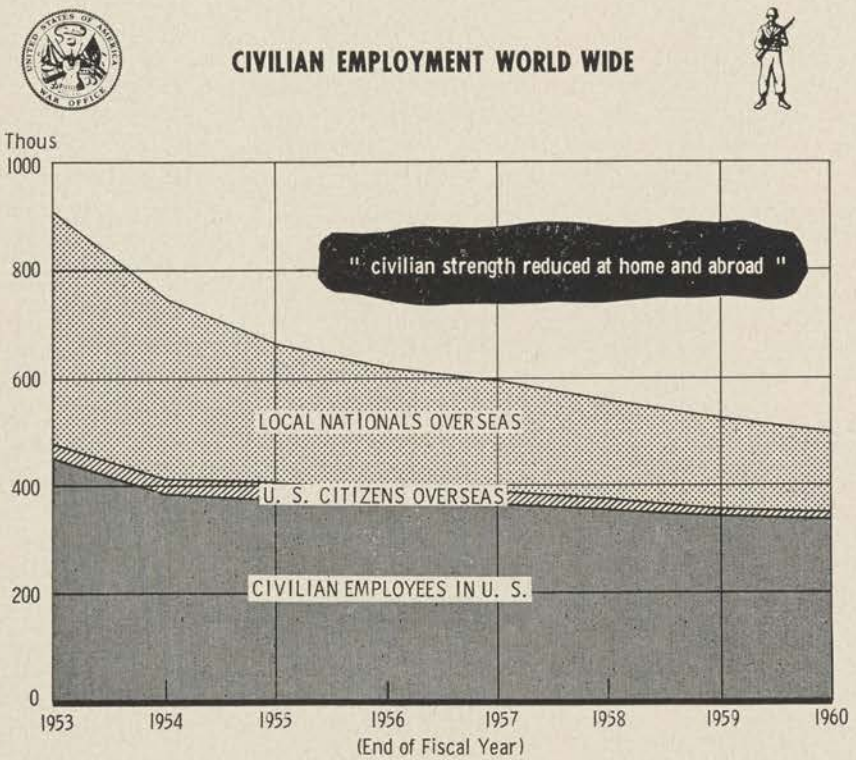


Figure 11

Career Programs

One of the most important projects for long-range improvement of the civilian work force is the development of career programs to provide for the training, evaluation, and best placement and use of employees throughout their careers. Long preliminary work in this area began to bear fruit in fiscal year 1960 as a result of the supply management career program and the civilian personnel administration and the comptroller career programs. More than 32,000 employees are covered by these three programs in which specific training plans and career patterns are laid out for a wide variety of occupa-

tions. Army-wide career programs are being developed for seven additional career fields.

A preliminary report of the use of civilian career programs to develop and select executives was submitted to the Civil Service Commission in the past year. Although the Army at present has no great problem in replacement, there is a need for selecting, developing, and advancing highly qualified persons in the younger age groups.

Health Benefits Program

A major employee benefit was established during the past year by the Federal Employees Health Benefits Act. This act provides a voluntary health benefits program with the Federal Government defraying a substantial part of the cost. While the Civil Service Commission was given over-all responsibility for the administration of the act, the Army conducted orientations for its employees, so that they might choose intelligently and freely from the available health plans.

Oversea Work Force

During fiscal year 1960, as in the past, the Army emphasized raising the efficiency and productivity of its oversea work force. With respect to the local national worker, efforts have been pointed toward extending the capability of each worker in order to reduce the size of the work force while increasing its efficiency. Well-established training programs prepare local nationals to fill more difficult jobs and supervisory jobs, thereby decreasing the number of U.S. citizens required overseas.

A good start has been made on extending Army-wide career programs to oversea employees. In addition, mandatory reemployment rights have been extended to persons accepting oversea assignments. These actions will help to assure that responsible jobs overseas will be filled by experienced and highly qualified employees and will aid in orderly rotation of civilian employees between the United States and foreign duty stations.

Requisitions on hand for oversea jobs at the end of the year reflected a satisfactory situation, with a decrease from 264 at the end of fiscal year 1959 to 195 at the end of fiscal year 1960. Of the 195 requisitions on hand, 115 were for employment in Korea, which indicates a need for special emphasis on recruiting for that area during fiscal year 1961.

Placement in Army jobs within the United States of returning oversea employees increased substantially in 1960. This has worked particularly well in direct exchanges of employees between oversea

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areas and the United States. The Army has acted to stimulate rotation of employees with extended oversea service. Results of this action have been reflected in increased placement activity.

Incentive Awards

Substantial advances made in the Army's incentive awards program in recent years continued in fiscal year 1960. The number of suggestions submitted increased 31 percent over fiscal year 1959, and there was a 22 percent increase in the number of adopted suggestions. Operation SEARCHLIGHT—an Army-wide suggestion campaign—during fiscal year 1960 related suggestion activity more directly to areas for possible improvement which had been identified and publicized by management. The fiscal year 1960 objective of 250 suggestions per 1,000 employees was exceeded, with a fiscal year 1960 achievement of 270 suggestion submissions per 1,000 employees; the adoption rate was 66.7 per 1,000 employees. First year dollar benefits accruing to the Government as the result of this activity approximated $18 million. In addition, military suggestion activity increased substantially.

The biggest single award of the year, amounting to $5,000, was made to eight employees of the Army Audit Agency for ingenuity in an audit procedure.

Recognition of achievements of Army personnel by authorities outside the Department of the Army included the award of the Department of Defense Distinguished Civilian Service Medal to two outstanding members of the Army's scientific staff, and the Arthur S. Flemming Award to a third outstanding Army scientist.

Safety

The Army received the President's Safety Award for calendar year 1959 and thereby became the only Federal agency employing more than 50,000 persons to win it for the second time.

The National Safety Council awarded its seventh consecutive annual Award of Honor (for fiscal year 1960) to the Army.

The reduction in accidents during fiscal year 1960, in comparison with projected averages, resulted in saving 98 lives, 2,300 injuries, 68,900 duty days, and $1,656,000 in costs.

Accident prevention is an integral part of the development of new weapons and methods of warfare—in planning, testing, production, storage, movement, and utilization.

Continued coordination with National, State, and local authorities in the United States has resulted in a 17 percent improvement in the private vehicle military fatality rate in fiscal year 1960 over 1959 and a 44 percent decrease from the peak year of 1952.

IV. Logistics

In the 7 years since the end of the Korean war intense logistical planning and reorganization has been carried on in the Army with the same vigor and imagination as in the realignment of the combat forces of the Army. For this reason the true picture of logistical accomplishment in fiscal year 1960 cannot be portrayed merely in statistical terms of what was procured, what was distributed, what was disposed of, and what was maintained. These physical accomplishments are important because they are the positive measure of the materiel support provided for the Army during the past 12 months. But, equally important, although not so easily measured within the cut-off dates of the beginning and the end of fiscal year 1960, are reorganization within the logistical system and improvements in managing the system so that it might be capable of rapid and sustained support of the flexible strategic and tactical forces of today's modern Army.

Requirements

Army materiel requirements are closely related to the schedules for mobilization and deployment of forces as outlined in the Joint Strategic Objectives Plan. When the Korean war ended, the Army materiel program called for $33.6 billion in major items of equipment as the requirement for general war. The inventory on hand to meet this requirement was valued at $12.6 billion and had been accumulated partly as a result of crash procurement of items available and needed for the conduct of the Korean war. Both the items procured and the industrial facilities which produced them were largely the remnants of World War II production.

This poor position in equipment was further accentuated by the development of new and complex weapons made available by technological progress and, at the same time, modern concepts of nuclear and nonnuclear warfare. Requirements for Army equipment thus involved both the problem of quantity and the problem of quality.

The groundwork for research and development in missiles, battlefield nuclear explosives, improved communications, off-the-road vehicles, and other arms and equipment of today's Army was laid shortly after World War II but it was not until the early 1950's that the urgency of rearmament with new and awesome weapons became apparent.

The extent to which the Army could modernize its equipment has been limited, however, because of funding limitations. In the past few years only the highest priority items could be procured. Recently, the Army has been devoting an increasing share of its procurement funds to the procurement of missiles, which in numbers actually account for only a small percentage of the more than 100 new or improved items which have been developed, standardized, and made ready for purchase since the end of the Korean war. Some 300 additional equipment items are in various stages of development or testing and will be ready for procurement in the near future.

The NIKE-AJAX, NIKE-HERCULES, REDSTONE, CORPORAL, and HONEST JOHN missiles, the M–48 tank, the M–59 personnel carrier, and a new family of conventional artillery are a few examples of new equipment items that have given the Army a far greater potential to wage successful war than it had 7 years ago. The beginning of procurement of the M–60 tank, the M–113 personnel carrier, the M–14 rifle, the new Army aircraft, and other newly developed items of equipment is further increasing the combat power of the Army at an accelerating pace.

Prior to 1956 the Army had no significant electronic, photographic, or infrared capability for conducting surveillance behind the enemy's lines. Today special aircraft and extremely fast and reliable drones have been developed which carry side-looking radars, infrared detectors, and photographic sensors. Surveillance devices now in the hands of troops, although significantly better than those of Korean war days, provide only a fraction of the capability for behind-the-lines surveillance which is expected to be available within the next few years.

Because of stringent peacetime funding for Army procurement, the Army, at the end of fiscal year 1960, had replaced only approximately 38 percent of its World War II and Korean war equipment with relatively late models. In addition, some of the equipment on hand was not qualitatively the best available, because the Army was short of the most modern items needed for equipping forces in both the active Army and the reserve components.

Procurement

The accelerated pace of scientific and technical developments in military equipment since the end of the Korean war continued to have a great effect on production of new items during fiscal year 1960. The need for engineering improvements and design changes to exploit new technological developments in some cases resulted in extending production cycles and tended to slow down programed delivery schedules.

Nevertheless, during the past year deliveries from production exceeded previous year-end forecasts.

During fiscal year 1960 the value of major equipment deliveries from procurement contracts, including materiel procured for customers outside the Army, totaled $1.750 billion. This total represents a decrease of $307 million, or 15 percent, below fiscal year 1959 deliveries. Deliveries in fiscal year 1961 are expected to reach a total of $1.8 billion.

During the past few years, missiles have made up an increasing portion of total materiel deliveries. In fiscal year 1958 they amounted to $330 million, which was 24 percent of total deliveries; in fiscal year 1959, $1.018 billion, or 50 percent of total deliveries; and in fiscal year 1960, $910 million or 52 percent of the total. However, the forecast for fiscal year 1961 indicates missile deliveries will not be much more than one-third of the total. This is due not only to a leveling off of missile deliveries but also to increases in the deliveries of combat vehicles, ammunition, and electronics and communications equipment. (See fig. 12.)

Production and introduction into the inventory of new equipment items which provide significant operational improvement—such as the M–60 (105mm. gun) main battle tank, the M–113 armored personnel carrier, the M–14 (7.62mm.) rifle, the M–60 (7.62mm.) machine gun, and the HU–1A Iroquois helicopter—began during the past year. The Army plans increased production and distribution of these items in fiscal year 1961.

Procurement Procedures

The lowest price is not the only consideration in Army procurement. The Army is also obliged to reduce concentration of production in the facilities of large prime contractors. Two basic methods for accomplishing this are the breakout program and the control of subcontracting.

Under the breakout program, components and subassemblies, originally obtained from a prime contractor responsible for a major weapon system, are purchased by the Government directly from suppliers on a competitive basis. For the larger and more complicated weapon systems the Army has found it necessary to place the responsibility for development and initial production on a single company with outstanding engineering and management capabilities in order to insure the success of the system. However, from the first phase of research and development on, the Army never loses sight of the goal to widen the circle of participating companies progressively.

Among the factors considered in selecting a company as prime contractor responsible for a major weapon system are the company's

PROCUREMENT

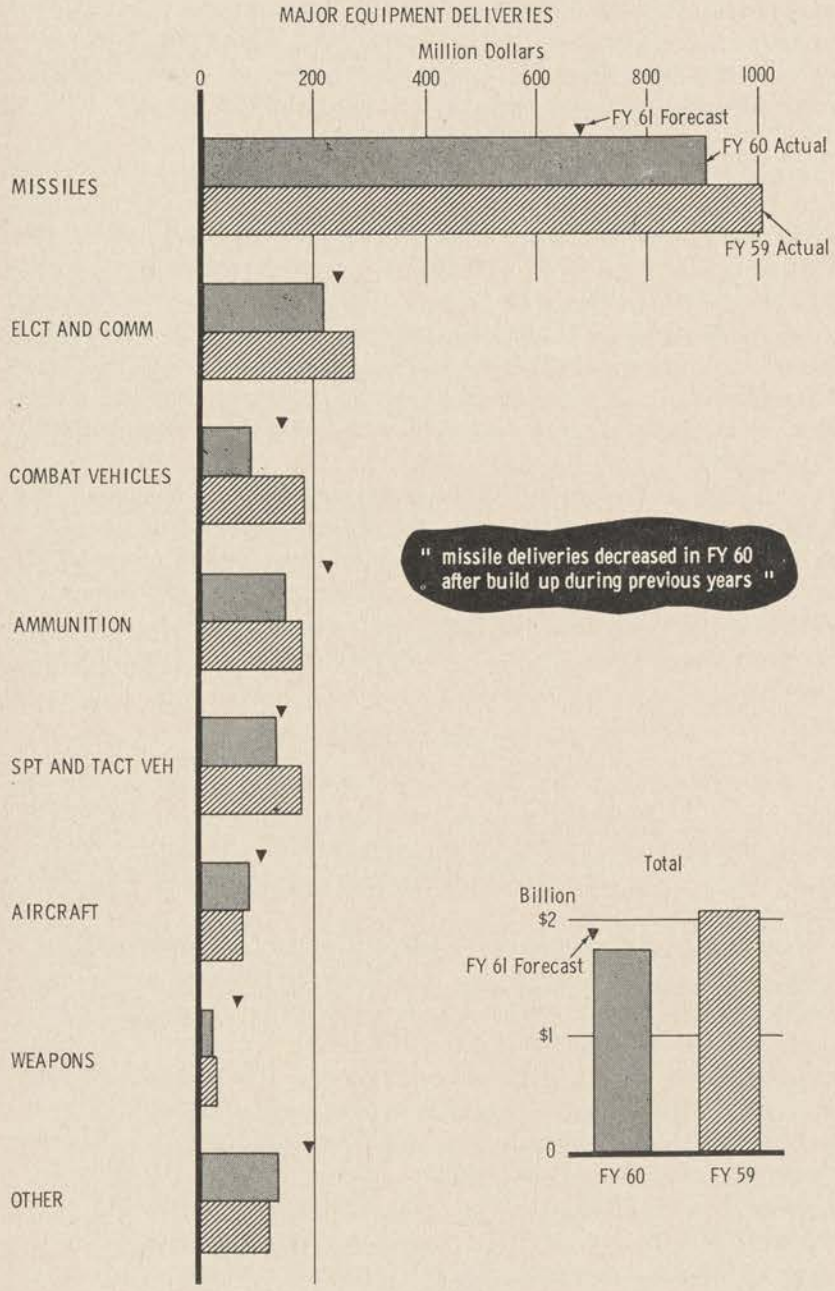


Figure 12

purchasing policies and its planned use of subcontractors. A critical examination is made of the items that the company plans to make in its own facilities and those which are planned for production by subcontractors. Prime contractors are especially encouraged to broaden their subcontracting base by obtaining the widest possible competition. If costs are reduced by broadening the base, such efforts are recognized during price redeterminations and when future contracts are placed. Provisions on subcontracting and on the use of small businesses are now incorporated not only into prime contracts but also into major subcontracts in order to avoid overconcentration of production in the hands of major subcontractors.

These policies are presently being applied to the MAULER, RED-EYE, HAWK, LACROSSE, NIKE-HERCULES, NIKE-ZEUS, SERGEANT, PERSHING, and MISSILE A missile systems, to drone systems, to surveillance systems, to radar and communication systems, and, insofar as possible, to other items. For example, the system prime contractors on the HAWK, LACROSSE, and PERSHING missiles are subcontracting 40 to 55 percent of their work and are placing up to 94 percent of this subcontracted work through competitive methods. There are many examples, also, which show that by breaking out components or subsystems, instead of procuring them from the system prime contractor, the resulting competition is bringing about reduced prices. In a number of instances, subassemblies of complex missile systems are of such unusual design and so difficult to produce that relatively high prices have to be paid for their initial procurement. However, as soon as design is sufficiently stabilized, the items are broken out and procured on a broader competitive basis.

As examples of the effect of these policies, it was possible in fiscal year 1960 to reduce the prices for cable assemblies used in HAWK ground equipment by 59 percent, for adaption kits for the NIKE-HERCULES system by 35 percent, and for warhead metal parts for the LACROSSE system by 39 percent. The Army will continue to push its breakout program during fiscal year 1961 to increase competition and to extend participation by a diversity of industrial firms, with emphasis on the inclusion of small business.

Contracting teams made up of engineering, legal, accounting, and other specialists are one of the means used in the Army's continuing effort to improve procurement. These teams place great emphasis on the soundness of procurement actions at the time when a new contract is made. Their efforts, however, do not end at this point. During the entire life of a contract, careful reviews and, where appropriate, policing actions continue, to safeguard the interests of the Government and to assure fair treatment of the contractor and subcontractors involved. Only in this manner is it possible to arrive

at the favorable results in the breakout and subcontracting programs mentioned above.

Watchful administration and continuing controls of performance have also contributed to the establishment of fair and just price contracts. Procurement by formal advertising and fixed-price contracts are the preferred contracting methods. In some cases, however, when entirely new and complicated items with no cost-of-production data available are being procured, it becomes necessary to use contracts with price redetermination clauses or cost-plus-a-fixed-fee-type contracts. In the former case, a cost statement is submitted by the contractor at a specified time. In both cases, expert audits of actual cost are undertaken. These enable Army procurement teams to reach agreement on redetermined prices or approved contract costs which are fair to both the Government and the contractor.

Storage and Distribution

Reorganization of combat elements in order to achieve the mobility and flexibility required to meet the threat or actuality of modern nuclear and nonnuclear war has created demands not only for modern vehicles, weapons, and equipment, but also for a logistical system capable of rapid and sustained support of these forces. Since the advent of long-range nuclear bombers and missiles, the Army has been particularly aware that the logistical base in the continental United States will not enjoy the relative invulnerability which it has enjoyed in the past. In view of this, the Army has adopted a plan to disperse its reserve stocks of items essential for combat on a widespread regional basis within the United States.

At the operational level the trend of logistical organization within combat units is toward small, composite organizations capable of performing several missions. For example, within the airborne division all supply functions are combined in the supply and transport company, and signal, engineer, and ordnance maintenance are combined in the maintenance battalion. Emphasis in technical service unit organization is on development of a versatile and balanced service troop structure adaptable with a minimum of change to any combat environment. Plans for the future provide for direct support logistical units behind each division, backed up by general support echelons further to the rear. These direct support and general support units will also be composite units capable of providing one-stop service to users. Progress along these lines is exemplified in the table of organization and equipment for Quartermaster direct and general support companies, which was developed in fiscal year 1960.

The Korean conflict pointed up the desirability of having an on-the-ground logistical planning and management capability in

areas where U.S. forces are likely to become engaged. In the past few years logistical commands have been included in the troop bases of all major oversea commands. These units proved invaluable during the past year for the day-to-day logistical support of deployed forces.

A logistical command is also part of the Strategic Army Corps (STRAC). The composition of the STRAC is such that a part of it, to include logistical support elements, can be deployed without destroying the effectiveness of the remainder. In anticipation of the need to deploy all or part of this force in support of U.S. forces or to assist allied nations in various areas, forward depots have been established on Okinawa and in Italy. Stockage at such forward depots of materiel needed in the initial stages of combat will reduce the impact on logistical stocks in a theater to which the STRAC might be deployed and would achieve a significant reduction in the time required to deploy this force by reducing its requirements for airlift and sealift. Forward depots also provide the nucleus for a larger logistics base to support expanded operations or to permit greater aid to allies.

Probably the best example of modernization of a large operating supply system was the establishment in Europe over the past few years of the U.S. Army's European supply line (called USAREUR (Rear) ComZ), which stretches from the Bay of Biscay to Germany in support of the U.S. Seventh Army. It is a vast operation in which 74,000 people handle an average of 50,000 weekly supply requests and control a 2 million ton inventory spread widely over Europe in 25 separate depots. In addition, 540 miles of petroleum pipelines are operated and 9.4 million barrels of oil were distributed last year in this system.

Dispersed though this supply line in Europe is, efficient central control has been maintained and the whole system is very responsive to troop demands.

The over-all Army supply system, which stocked 608,000 different items on June 30, 1960, is one of the largest supply systems in the world today. It also is one of the most complex, due to the constant introduction of new weapons, communications systems, and transportation systems. The simplification of this supply system and the reduction of its administrative costs received constant attention during fiscal year 1960. Some of the most outstanding accomplishments along these lines were:

a. Deletion of 157,000 line items. Although 108,000 new items were introduced into the supply system, there was a net reduction of 49,000 items. (See fig. 13.)

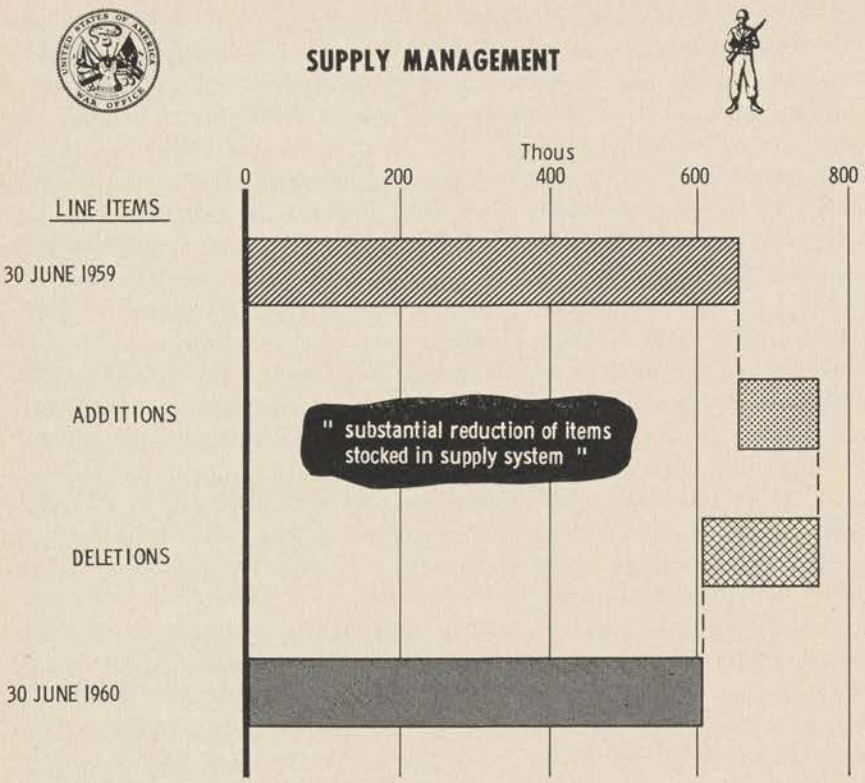


Figure 13

b. Single line item punch card requisitioning was started by oversea commands and in 12 installations within the United States. This segment of the supply system is designed to expedite supply, simplify processing, and cut administrative costs by utilizing electrical accounting machines, automatic data-processing machines, and high-speed data transmission equipment.

c. Monetary accounting procedures were developed and placed in operation at Quartermaster clothing sales stores within the United States. These procedures eliminate item accounting and attendant administrative costs and provide simpler, faster service to customers.

d. Distribution of inexpensive expendable items was simplified by stocking selected repair parts in self-service supply centers and by authorizing Army Reserve and ROTC units to purchase selected items from local commercial sources.

e. Stockage of repair parts at installation level was reduced by restricting it to fast-moving items and those essential for assigned missions. Slower moving items are stocked only at

Army distribution depots and may be requisitioned only as the demand is generated.

In its search for more efficient supply methods, the Army tested a new system during the past year and expanded the test for fiscal year 1961. This system, known as the economic inventory policy, provides for stockage of low-cost, fast-moving items in larger quantities than in past practice at installation level, thereby reducing the number of requisitions to higher echelons for resupply and assuring more timely supply support for the maintenance of equipment. Stockage of more expensive items is restricted to those echelons which have shown the most rapid turnover based on their missions. Because supply of repair parts represents over 80 percent of the Army's supply transactions, it is essential that they be readily available to maintain missiles, conventional weapons, rolling stock, and other major items of equipment. The economic inventory policy has demonstrated a great potential for economy of operations in supply support during the past fiscal year.

Maintenance of Equipment

The fact that the Army acquires newer and more effective weapons and equipment does not by itself indicate the extent of the Army's improved capability. Many more elements are involved, one of the most important of which is maintenance. Complex weapons and equipment usually demand complex and expensive maintenance, involving in many cases costly special tools, new catalogues of repair parts, and specially trained maintenance technicians. Although these are support factors they are essentially connected to combat power.

Army missile and aircraft inventories continue to grow at a rate of approximately $300 million per year, and maintenance of this equipment is taking a high proportion of the maintenance dollar. In fiscal year 1960, 51 percent of Army maintenance funds was required for missiles and aircraft; 55 percent is planned for this purpose in fiscal year 1961. This has been a continuing trend in maintenance since the end of the Korean war, with the result that a progressively lesser portion of the maintenance money has been available for maintaining conventional equipment.

The Army entered fiscal year 1960 with a depot overhaul backlog of conventional equipment valued at $1.2 billion. Maintenance funds available for this purpose were $60.2 million.

The Army vigorously attacked this very serious maintenance situation by purging from the inventory a great amount of obsolete equipment, by strict observance of economic repair criteria, by improved maintenance techniques at depots, and by insistence on maximum

authorized maintenance in field maintenance facilities. These measures reduced the maintenance backlog by $500 million during fiscal year 1960. Great though this accomplishment was, the Army still had a very serious maintenance problem as it entered fiscal year 1961.

In order to keep maintenance within reasonable limits in the future, the Army placed great emphasis on product improvement, with the objective of developing equipment that will have capabilities for longer nonmaintenance periods, for reduced requirements for skilled maintenance personnel, and for reduced time required for maintenance. This program has resulted in:

a. The teaming of the maintenance engineer with design engineers to insure that simplicity of maintenance is built into equipment while it is still on the drawing board.

b. The reorienting of missile system design to provide easier maintenance by plug-in units rather than by piece-part replacement.

c. The design of equipment components and assemblies for "throw away" under certain conditions when such action is determined to be more economical than repair.

d. The modification of equipment to facilitate maintenance procedures.

Property Disposal

At the conclusion of the Korean war, the Army was confronted with the serious and difficult problem of cleaning out of its inventories great masses of equipment used in two wars. From the beginning of 1954 to the end of fiscal year 1960 equipment with an original cost of $20.1 billion was either sold, transferred to other Government agencies, donated to schools, hospitals, and civic organizations, or disposed of otherwise.

The Federal Government does not depreciate the value of property on its books, as is the normal practice in business, despite the length of time it is used or its condition. Nevertheless, this great mass of Army property had served its useful purpose and its residual value at the time of disposal was only a very small percentage of its original cost.

In fiscal year 1960 the Army disposed of property whose acquisition value was $3.3 billion.

Rapid introduction of new equipment items into the Army's inventory makes necessary the disposal of the older items being replaced. Therefore the Army expects to have a large disposal program for the foreseeable future. As has been the practice in the past, every effort will be made to reuse or redistribute excess items within the Army, the other military Services, other Government agencies or among the nations of the free world.

Military Assistance Program

During fiscal year 1960 the Army discharged its responsibilities under the Department of Defense Military Assistance Program by providing logistical support to 42 nations of the free world eligible for grant-aid military assistance and to 66 nations eligible to make purchases under the military sales program.

During fiscal year 1960 the Army made deliveries under the grant-aid program of $88 million in tanks and general- and special-purpose combat vehicles, $55 million in artillery and conventional weapons of other types, $121 million in rocket and missile systems, and $157 million in ammunition. In the mutual security military sales program the Army made deliveries of approximately $100 million. As a result of recommendations by the President's committee to study the U.S. Military Assistance Program, procedures for managing this program have been improved. In the future, military assistance plans will be developed for a 5-year period rather than for 1 year, and they will be integrated into Army long-range plans. This change will bring many advantages to the program, including more timely supply action. Decentralization of the management of the Military Assistance Program will also increase the efficiency of the program.

Inter-Service Support

The Army supports the other military departments in a great variety of logistic functions on a worldwide basis. Some of these functions relate to peculiar capabilities of the Army, and the Army generally has responsibility for performance wherever the service must be rendered. Other activities are not the special province of the Army, but the Army frequently performs them when it is the dominant user or where it is host to tenants from other departments. The support the Army provides other departments includes such diverse logistical services as procurement and supply, real estate administration, maintenance of reserve industrial facilities, transportation services, military traffic management, operation of ports and terminals, medical services including dental care and laboratories, maintenance of combat support vehicles, military construction, and operation and maintenance of facilities including such local services as building maintenance, commissary operation, and laundry and drycleaning.

The Army's objectives with regard to inter-Service support have been in consonance with the Department of Defense goal of gaining greater military effectiveness from available resources—manpower and funds. The Army pressed for the early publication of a Department of Defense policy directive for inter-Service support. The di-

rective was published in fiscal year 1960 and on June 29, 1960, the military Services agreed to establish a Joint Working Group for Inter-Service Support to coordinate its implementation.

The new policies for inter-Service support promise greater efficiency for the entire Department of Defense. Implementation of these policies should result in improved allocations of men and money to the Services for inter-Service support functions and in equitable agreements among the Services concerning their activity.

The Single Manager Activities

Integration of the logistic systems of the military Services, to effect economies through the elimination of unnecessary duplication and overlapping of effort among the military Services, has been one of the most perplexing problems faced by the Department of Defense since its inception. The Single Manager system, under which the Secretary of one military department becomes responsible for the supply of a certain group of items or for performing a service for all the military Services, is generally recognized as the outstanding contributions to the solution of this problem. It was initiated by the Department of Defense in 1955 when the Secretary of the Army was made the Single Manager for subsistence. In 1956, six additional Single Manager assignments were made. Of these the Army received two: Clothing and textiles and traffic management. Four additional assignments were made in late 1959 and in 1960. Of these, the Army received three: Military general supplies, automotive supplies, and construction supplies.

The Single Manager system has proved to be effective and economical. As of June 30, 1960, the Single Managers had established the creditable record of satisfying 95 percent or more of their customers' requirements within the time limits specified by the customers. While achieving this high rate of supply effectiveness, they also achieved identifiable one-time savings of approximately $425 million and annual savings of almost $20 million per year. Only the savings achieved in the original 1955–56 assignments are reflected in these figures. No savings attributable to the 1959–60 assignments are included since these are still in the process of implementation. Neither can such transportation savings be included as those resulting from reduction of backhauling and crosshauling, since there is no way of measuring these savings. It is worthy of note that these things were achieved within the existing Defense structure, utilizing existing channels of command and communication and exploiting the capabilities and know-how of the military Services.

Examples of accomplishments in the Army-managed assignments as of June 30, 1960, are: 40,000 clothing and textile back orders inherited from the separate Service systems had been reduced to less than 1,000 back orders; 58 locations previously used for storage of clothing and textiles had been reduced to 13 locations; personnel savings of over $2 million per year in the subsistence field and $1 million per year in the clothing and textile field had been achieved; a net reduction in inventories of approximately $400 million had been achieved; and procurement delinquency rates had been reduced approximately 90 percent.

The Army is devoting a great deal of effort to insure that its single manager assignments are managed efficiently so that they serve the customer well and conserve the defense dollar. Studies are continuing to determine the applicability of the single manager technique to additional areas. In any extension of the single manager concept into additional commodity and functional areas the Army, by reason of its logistics capability, experience, and demonstrated effectiveness in carrying out these assignments, should continue to play an outstanding role.

Installations

Construction

Replacement of outmoded, inefficient, and uneconomical temporary structures constructed before or during World War II is a vital part of the Army's over-all program of modernization. Since the end of the Korean war the program of building durable low maintenance structures at Army installations has progressed at a steady pace. This is illustrated by the completion of permanent barracks sufficient to house 150,000 soldiers, service school buildings, chapels, hospitals and other structures necessary for the wide variety of Army functions. Despite this progress the Army has been able to construct in recent years only about 60 percent of its desired long-range program for modernization of facilities.

Construction was started in fiscal year 1960 on a total of $200 million of new facilities to support the worldwide operations of the active Army. A major part of this program, 47 percent, was devoted to air defense construction. Requirements in the United States and its possessions for construction other than air defense accounted for 43 percent of the program, while 10 percent went for foreign base construction in support of oversea operations.

Contract awards for construction of permanent plant in fiscal year 1960 amounted to $85 million. Although this was only 50 percent of

that required by the long-range plan, the most urgent operational, logistical, and training requirements were met. Among the major new starts in the year's program were $10 million for new support and technical facilities at Fort Bliss, Tex., and White Sands, N. Mex., (two of the Army's centers of missile activity); four major hospital facilities; and $11 million for training facilities and housing at the U.S. Military Academy.

The air defense construction was designed to up-date the defenses of major metropolitan areas and strategic installations in the United States, to provide protection of critical oversea areas, and to support development of NIKE-ZEUS, the antimissile missile. The work included facilities for new NIKE-HERCULES and HAWK deployments, continued conversion from NIKE-AJAX to NIKE-HERCULES at selected sites, MISSILE MASTER control centers, and support and technical facilities for NIKE-ZEUS research and development. Late in the year additional deployment of NIKE-HERCULES batteries to metropolitan areas was planned, but work on the installations had not started by the end of the year.

Foreign base construction in fiscal year 1960, which totaled $20 million, provided necessary support for U.S. troops overseas, for worldwide communications facilities, and for Army Security Agency stations in oversea areas.

The Army also started construction on approximately $6.5 million of new industrial-type facilities for production of items not available from private industry.

Additional facilities for the reserve forces, totaling $32 million, were started during fiscal year 1960. This included $16 million for Army Reserve training centers and supporting facilities and $16 million of Federal funds for the construction of National Guard armories and related facilities.

Family Housing

Since the end of the Korean war the Army has made most outstanding progress in constructing almost 30,000 houses for dependents. (See fig. 14.)

During the past year, 7,147 Capehart family housing units and 274 units financed by military appropriations were completed. Another 2,772 family housing units were started, of which 2,576 were Capehart.

The Army acquired 1,596 units of Wherry housing at three installations, bringing acquisitions to 16,560 out of a total 22,249 units constructed under Army sponsorship.

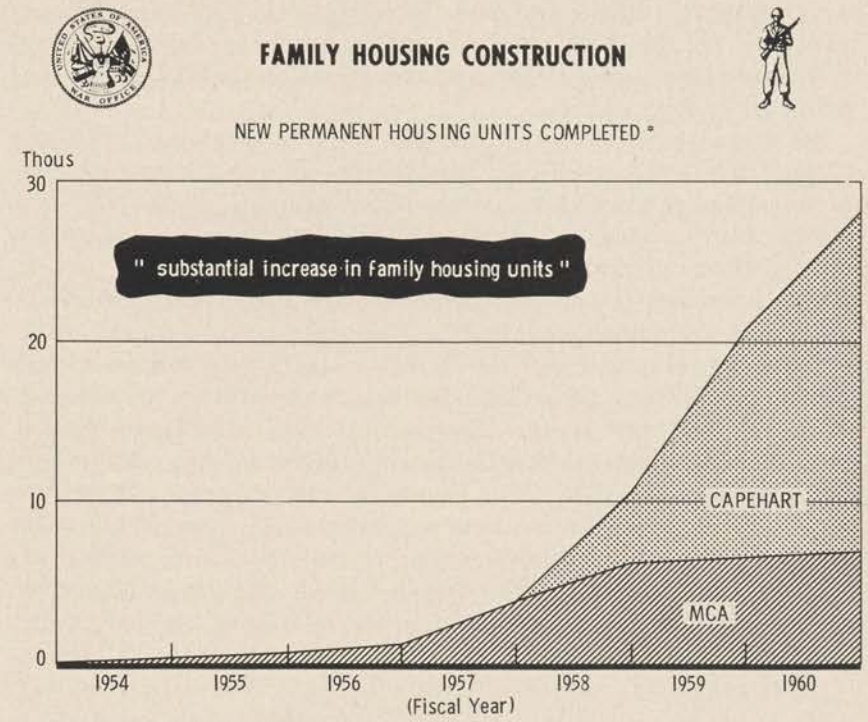


Figure 14

Management and Maintenance of Facilities

The Army had 931 million square feet of building space for use at active facilities at the end of fiscal year 1960 as compared to 955 million at the end of fiscal year 1959.

Since the end of the Korean war over 100 installations and activities have been inactivated, including 5 during fiscal year 1960. The five inactivated during the past year were the Branch U.S. Disciplinary Barracks in California, Camp Lucas in Michigan, the Army Navy Hospital in Arkansas, and Camp Gary and the San Jacinto Ordnance Depot in Texas. The Army has carried on extensive and comprehensive studies since the end of the Korean war to effect the fullest and most economical utilization of installations while at the same time maintaining the Army's maximum effectiveness in operational requirements and training. Many factors are considered in determining the inactivation of installations. Some of these are: Tactical and strategic considerations; maximum use of installations having permanent construction; logistical factors involved in the

transportation of personnel and materiel; present state of development, and the feasibility and costs of future development; economy of operation and maintenance; and the impact on the civilian economy in the particular locality.

Maintenance of the Army plant is complex and costly, not only because of the vast floor space in buildings all over the world, but because of the many old temporary buildings still in use. As time goes on and the buildings get older, the amount of maintenance necessary to assure minimum standards for occupancy increases. As the need for maintenance has become greater, the basic cost of performing it has increased steadily.

The money allocated for over-all real property maintenance, including the provision of all utilities, has increased about 25 percent since the end of the Korean war. However, the higher maintenance expenditures have been more than offset by inflationary trends. As a result, there has been some deterioration of the capital plant. Today the backlog of essential maintenance required to attain reasonable working and living standards amounts to an estimated $110 million. In fiscal year 1960, expenditures for maintaining active facilities totaled $544 million. This included all utility bills such as heat, water, electricity, and refuse disposal.

Construction for the Air Force

For the Department of the Air Force the Army awarded construction contracts for facilities of all types totaling $698 million during fiscal year 1960. Approximately two-thirds of this total was for missile projects, including seven ATLAS and four TITAN missile bases. The remaining one-third, amounting to $228 million, was for facilities for air bases such as runways, utilities, dormitories, hospitals, hangars, shops, and other operational and training structures and for air warning, communications, and tracking systems with their related support items.

Major active Air Force projects in the intercontinental ballistic missile program currently under construction included 13 ATLAS squadrons at 11 bases and 6 TITAN I squadrons at 5 bases, with a total estimated cost of $640 million. Other major active projects included the Ballistic Missile Early Warning System project (BMEWS) at Thule, Greenland, which was essentially completed, and the eastern extension of the DEW line across the Greenland ice cap, which should be ready for occupancy in October 1960.

Anticipated construction for the Air Force in fiscal year 1961 will cost $640 million. The major portion costing $382 million will be for missile base construction.

Because the national urgency of the intercontinental ballistic missile program required very close relationships between Army Engineer personnel and their counterparts in the Ballistic Missile Division of the Air Force, the Army expanded its Los Angeles field office to better assist the Air Force in this complex construction program. Plans for further reorganization of the Army Engineer effort in the interests of greater efficiency in this program were being made as fiscal year 1960 closed.

Army Medicine

The health of Army personnel in the United States and in oversea areas was excellent in fiscal year 1960. The hospital and quarters admission rate for disease and injury declined to near the record low set shortly after the end of the Korean war. The noneffective rate, which is the average number per day of Army personnel per 1,000 strength who are excused from duty because of illness or injury, also declined and reached a record low.

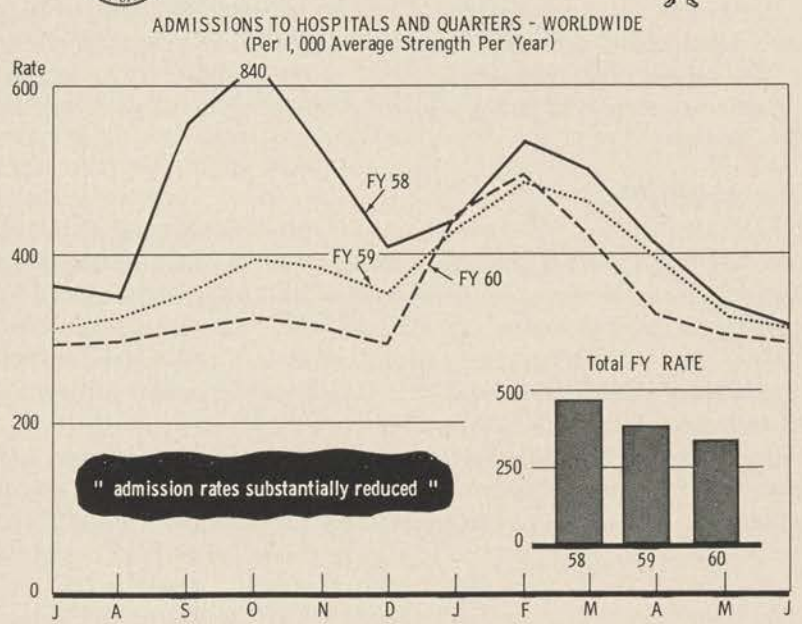
The rate of admission for diseases dropped from 326 per 1,000 average Army strength to 293 in fiscal year 1960. This is a 10 percent decline from the preceding year and more than a 30 percent drop from the rate in fiscal year 1958. The injury admission rate decreased slightly from 51 to 50 per 1,000 average strength. (See fig. 15.)

The noneffective rate, which came down at the end of the Korean war to 15.8 per 1,000 per day, continued to drop through recent years except for a rise in fiscal year 1958 as a result of an Asian influenza epidemic. This rate had reached a then-record low of 12.3 persons noneffective per 1,000 strength on the average day in fiscal year 1959 and dropped further to a new low of 11.7 per 1,000 strength in fiscal year 1960. (See fig. 15.)

Besides reflecting good fundamental living conditions, a high level of training in field sanitation, a safety program of the first order, and good morale in today's Army, this record health experience was due also to greater efficiency in Army medicine. Early diagnosis, quick evacuation, improved facilities, highly trained personnel, and bold exploitation of the most advanced medical practices contributed to this high efficiency and were indications that even under most adverse conditions, current practice is gauged to produce the best possible medical support for the Army.

Many medical disorders which formerly required hospital care are now being treated in outpatient clinics. In many other conditions the period of hospitalization is being reduced by the judicious use of clinic services for prehospitalization care. As a result of these policies there were more than 25 outpatient visits for each hospital admission during fiscal year 1960.

HEALTH OF THE ARMY



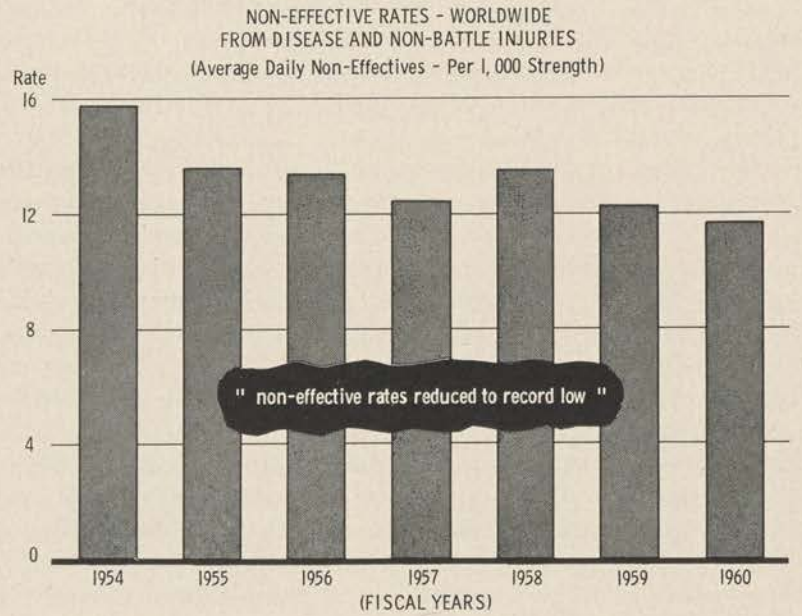


Figure 15

During fiscal year 1960 there was an increased appreciation of the significance of diseases as a cause of lost manpower in military operations. In 1953 the virus responsible for the largest number of respiratory illnesses among recruits was isolated and described by a scientist at the Walter Reed Army Institute of Research. This virus has become known as the adenovirus. Following this discovery, a vaccine for prevention of adenovirus disease was developed and adopted for inoculation of Army recruits. Its first routine application was made late in fiscal year 1960 with very promising results.

Neuropsychiatric Program

Since the end of the Korean war major emphasis has been placed upon improving the organization and function of the Army neuropsychiatric program toward a goal of prevention of noneffective military performance. The principal arm of this endeavor has been outpatient psychiatric units known as Mental Hygiene Consultation Services, which have been established gradually on almost all Army posts in the continental United States and in oversea divisions. These mental health services have implemented programs based upon the early recognition and prompt treatment or management of noneffective military personnel regardless of whether the manifestations are symptoms or behavioral abnormalities.

Since 1956 there has been implemented with the close collaboration of the Military Police Corps a program in which mental health personnel evaluate all stockade admissions with a view toward administrative elimination of the recidivist offender and the psychiatric treatment and rehabilitation of those considered to have a high potential for useful military service.

Coincident with the stockade screening program stated above there had been a steady decline of both stockade and disciplinary barracks population, contributed to by medical as well as other factors. Four of the five disciplinary barracks in use at the close of the Korean war have been closed and the present prisoner population represents the lowest rate in Army peacetime history.

Fiscal year 1960 has seen a continuation of progress in the Army neuropsychiatric program in its many endeavors to prevent noneffective military behavior. The hospital and quarters admission rate for psychiatric conditions in the past year decreased for the third consecutive year to 7 per 1,000 average strength, a new low in rates recorded since 1938.

Modernization for Combat Operations

The first Medical Air Ambulance Company was activated as a standard Army organization during the past year. The company has

the battlefield mission of providing for aeromedical evacuation of selected patients, emergency movement of medical personnel and accompanying equipment and supplies to meet a medical requirement, and around-the-clock emergency delivery of whole blood, biologicals, and medical supplies. Twenty-five utility helicopters are authorized for this type of company.

The USAMEDS Combat Development Group has evaluated several concepts to provide mobility to Army Medical Service organizations in the combat zone. Several factors influence developments in this area. The threat of use of nuclear, chemical, and biological weapons imposes many problems on the Army Medical Service. The necessity for rapid mobility and, at the same time, for protection of medical service personnel and patients is related to this development.

The futuristic aspect of this work can best be depicted by the present requirement for the U.S. Medical Research and Development Command to develop a family of air transportable medical treatment facilities. These facilities or pods will include surgeries, X-ray units, evacuation pods, laboratories, wards, and similar elements. They will be self-sufficient with a power unit that will provide heating, lighting, air-conditioning, and filtering of outside air. The pods as an operating entity will be transportable by medical helicopter, on truck chassis, or by a varied combination of air and ground vehicles.

Medical Personnel

At the end of fiscal year 1960 the Army had 3,644 physicians, 1,747 dentists, and 3,314 nurses. In addition to these groups there were some 35,500 other officers and men with a wide range of medical service support capabilities.

The worldwide Army requirement for professional medical personnel is a continuing problem.

The Army has over 600 medical officers on duty who have been certified by the various American specialty boards, which is more than double the number of board-certified doctors on duty at the end of the Korean war. Concerted efforts are being made to qualify more medical officers in the command and staff career field, and emphasis is being continued on chemical, biological, and bacteriological warfare and on preventive and field medicine.

Dependents' Medical Care

When the Korean war drew to a close, the widespread functions of the Army tended to disperse some 40 percent of its personnel in areas where Army medical facilities were not available. Congress passed

the Dependents' Medical Care Act which became effective in fiscal year 1957. Medicare, as the civilian portion of the program was called, provided that civilian physicians and private hospitals would be used to supplement existing service facilities and staff in providing authorized care for spouses and children of active members of the uniformed Services.

To assure optimum utilization of the uniformed Services' medical facilities and to effect economy while providing care authorized by the Dependents' Medical Care Act, certain restrictive changes in the program became effective in October 1958.

The curtailment of benefits resulted in savings, but at the same time it created serious problems that had adverse effects upon the objectives for which the program was established. The favorable morale advantages evidenced initially through the establishment of the Medicare program were visibly affected by the cutback in services.

During fiscal year 1960 most of the benefits were restored. Reinstatement of the program to its original coverage, with minor exceptions, has resulted in the promotion of morale and a more uniform program of medical care—the objectives for which the dependents' medical care program was established. Approximately 190,000 dependents were admitted to civilian hospitals during fiscal year 1960 under Medicare.

Army Hospitals

As part of the Army's long-range hospital replacement program, the following hospitals have been completed since the end of the Korean war: Ireland Army Hospital, Fort Knox, Ky.; DeWitt Army Hospital, Fort Belvoir, Va.; Okinawa U.S. Army Hospital; Irwin Army Hospital, Fort Riley, Kans.; Patterson Army Hospital, Fort Monmouth, N.J.; Martin Army Hospital, Fort Benning, Ga.; Womack Army Hospital, Fort Bragg, N.C.; and Walson Army Hospital, Fort Dix, N.J. The last was completed in fiscal year 1960.

At the end of fiscal year 1960 work was progressing on new hospitals at Fort Leavenworth, Kans., Fort George G. Meade, Md., and Fort Lee, Va., all of which are expected to be completed and dedicated during the coming fiscal year. Contracts were awarded for construction of new hospitals at Carlisle Barracks, Pa., Fort Eustis, Va., and Fort McClellan, Ala.

By the end of fiscal year 1960 the Joint Commission on Accreditation of Hospitals, which is a representative body of the four most influential groups dealing with health in the United States (The

American College of Surgeons, The American College of Physicians, The American Medical Association, and The American Hospital Association) had surveyed and accredited 42 of 43 U.S. Army hospitals in the continental United States eligible for survey. The forty-third was accredited July 1960. All eligible oversea hospitals (15) have been accredited by the Joint Commission.

V. Research and Development

Outstanding accomplishments in Army research and development in fiscal year 1960 were:

—Successful interception of HONEST JOHN and LITTLE JOHN missiles by HAWK and of a CORPORAL missile by a NIKE-HERCULES. These tests demonstrated a technical capability of current Army air defense weapons to defeat tactical ballistic missiles;

—Successful firing of several prototype NIKE-ZEUS missiles, the Army's and the Nation's antimissile missile;

—The initial firings of the new PERSHING missile, the solid propellant replacement for the REDSTONE;

—Operation of TIROS I, a meteorological satellite, developed under technical direction of the Army and under general supervision of the National Aeronautical and Space Administration (NASA); this satellite successfully televised thousands of pictures of the earth and its cloud cover to Army-developed stations;

—The beginning of construction of Camp Century, an under-snow camp for 100 men on the Greenland ice cap;

—The start of a nitrogen-cooled atomic reactor driving a gas turbine; and

—Development of techniques for effectively freezing red blood corpuscles for transfusions for a period of 44 months.

Army research and development efforts are directed toward adapting the advances and discoveries of modern science and technology to means of waging land warfare in order that man, the ultimate weapon, might fight and survive in an ever-more hostile battlefield environment. The scope of these efforts appears to be limitless, potentially encompassing all fields of knowledge.

Since the end of the Korean war, the Army started America's exploration of space with its JUPITER C missile. The Army also developed the JUPITER as part of the national effort for the first operational intermediate-range ballistic missile of the free world. Seeking long-range means to support forces in land combat and in air and missile defense, the Army fired into space and recovered a heat-protected nosecone, launched EXPLORER I, the free world's first

earth satellite, recovered live monkeys carried into space in a missile, and established many other scientific "firsts" in space both on its own initiative and in support of other agencies.

But it is not in space experiments alone that the Army has made advances. In basic research, which is not aimed at a specific development, the Army has expanded far beyond its scope of activities of the early 1950's. Basic research has come to be considered crucial by the Army. It is the principal determinant of progress in the art of weapons for the next decade and beyond.

Approximately $40 million of the $170 million set aside for research was spent on basic research in fiscal year 1960. Research, both basic and applied, is conducted at 74 Army installations. It has the cooperation of 22 other Government agencies, nearly 300 profit-making firms, and more than 110 nonprofit research institutions. Well over 200 universities and colleges share in the program. The Army is encouraging contributions from all over the free world, and currently has many leading scientists in 20 foreign countries participating in its research projects.

More than 20,000, or about 5 percent of all Army Civil Service employees, more than 2,000 engineer-trained military officers, and about 1,500 enlisted technicians were engaged in the Army's internal research activities in the past year. External activities, such as basic research grants and contracts to colleges and universities and other institutions or contracts with industry, employed several times as many scientists and technicians as the Army's own internal program.

Research funds permit acceptance of only the most promising one of every three to four proposals submitted for analysis and evaluation. Therefore in selecting research tasks the Army is constantly aware of the ever-present hazard of leaving gaps in areas that might yield breakthroughs—the revolutionary concept for new weapons that could establish decisive superiority over existing weapons. Because of this the Army seeks and uses counsel of the best scientific talent available. A permanent Army Scientific Advisory Panel, made up of over 60 distinguished scientists, educators, and industrialists, assists in making the basic determinations on courses to be pursued.

Simplifying Procedures

During fiscal year 1960 Army research and development continued to cut down its leadtime—the time from initial concept to hardware. In many programs in the past the research and development process was greatly accelerated. A notable example is the JUPITER program which was completed in 3 years. However, leadtime for the entire research and development program averages out to almost 8

years. This is considered too long, particularly in view of Soviet leadtime on new weapons which is thought to be about 5 years.

Although the Army has its own significant capability, only a small portion of the research and development process for weapons and equipment is carried on internally.

The REDSTONE and the JUPITER were developed with the Army acting as the prime contractor, but all other missiles except LITTLE JOHN have an industrial firm as the prime contractor for development. As Army research and development has given increasing attention to extremely complicated weapon systems consisting of combined weapons with electronic guidance and specialized carrier and other integral support equipment, the Army's research and development responsibility has been narrowed to determining what is needed and how and by whom it is to be provided. Army personnel monitor programs through development and production to insure that progress and results are in the best interests of the user—the combat forces of the Army. The Army evaluates developmental items to determine whether they suitably meet the requirements of the user. Because of these complementary but necessarily separated functions, the Army believes that part of the solution to over-long leadtime lies in more closely integrated teamwork between the Army and industrial contractors.

A 4-year cycle from the basic concept of weapons and equipment to actually getting them into the hands of troops is the long-term objective set by the Army during the past year. Every effort is being made to cut through lengthy administrative procedures, to force deferred decisions, to improve systems management, and, by better management of money, to overcome inadequate funding.

Overlapping and telescoping some phases of the research and development cycle and simplifying complex standards were tried during the past year to shorten leadtime. For example, service and engineering tests were conducted concurrently or on a combined basis in some instances; on some projects production engineering and tooling were started before normal schedules in the development cycle; decisions were made to accept designs of products earlier and thus save the time and money which would be used in pursuing research further to arrive at an optimum design; seeking reliability with simplicity while sacrificing questionable refinements was urged throughout the research and development system; and adhering to commercial practice and using commercial components to the maximum extent feasible were intensified.

In addition to these and other specific actions taken to accelerate the research and development cycle, an over-all investigation was conducted into the whole command and control complex of the various

research and development agencies spread throughout the Army. Although this investigation was not finished at the end of fiscal year 1960, there were indications that the Army research and development effort would benefit from more centralized and authoritative direction and from more clear-cut lines of communications between the Army's Chief of Research and Development and the various research and development agencies within the Army.

Financing of research and development after the Korean war reached $1.021 billion in direct obligations in fiscal year 1959, then climbed to $1.072 billion in fiscal year 1960. For fiscal year 1961 research and development was planned at a level of $1.182 billion. Emphasis was continued on missiles and related equipment while increased emphasis was placed on military sciences and on selected important weapons systems. (See fig. 16.)

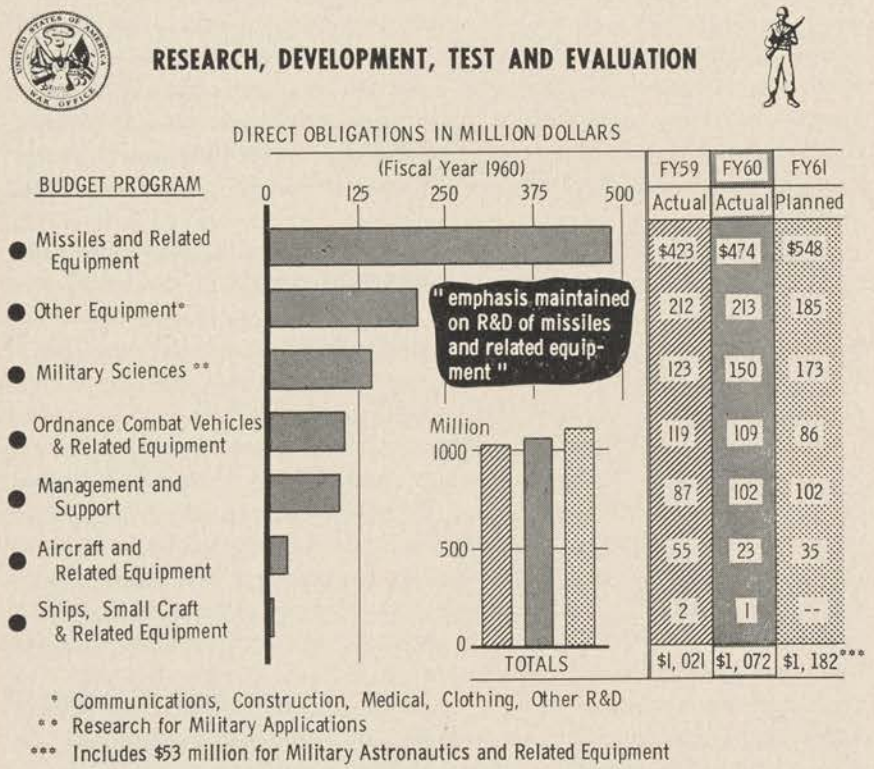


Figure 16

Firepower

A fundamental characteristic of the Army today is its versatility in being able to meet any enemy under any set of circumstances and to defeat him by applying whatever measure of force is necessary. The

key to this versatility lies primarily in the possession of a wide variety of weapon systems and the mobility and communications means and operational concepts to use them as needed.

In the Korean war the Army was limited essentially to the same battle formations and the same short movements on the battlefield as used in World War II by the range, mobility, and explosive force of its weapon and by the nature of its mobility and communications. Weapons now in the hands of troops, or under development to supplement or replace them, permit major changes in the nature of future land warfare. In the field of firepower, missiles and rockets particularly have brought about this modernization. The REDSTONE, CORPORAL, LACROSSE, and HONEST JOHN, which are in common use throughout the Army today, have greatly increased the dimensions of combat power available to ground commanders. The NIKE-AJAX and NIKE-HERCULES air defense missiles besides being on site throughout the United States, provide air defense for combat troops and logistical installations overseas.

During fiscal year 1960 the following missile and rocket systems were under development.

PERSHING

The PERSHING is being developed for the field Army as a replacement for the REDSTONE. It is a solid-propellant, inertially guided, two-stage missile with a nuclear warhead. The missile and all support equipment are smaller, lighter, and more mobile than REDSTONE. The PERSHING system includes a mobile missile transporter-erector-launcher. Goals in the development of this system are reliability, short reaction time, and simplification of equipment, with mobility and versatility in all types of terrain and climate. The development of the PERSHING is on schedule and the first test missile was fired on February 26, 1960, about 2 years after the initiation of the project. Five PERSHING missiles were fired during fiscal year 1960 and all were completely successful. (See fig. 17.)

The fourth flight was particularly notable. Erratic movements were fed into the missile's flight plan to determine how much strain the PERSHING's structure and control system could withstand. The PERSHING shook off the severe stresses and continued in a high, accurate arc and at the proper time sent its dummy upper stage into the target area.

The industrial contractor for PERSHING is using facilities in Florida for principal development of the missile. The fact that these facilities are close to special test facilities at Cape Canaveral, which were turned over to the contractor, is believed to be an important element in the current favorable rate of development.

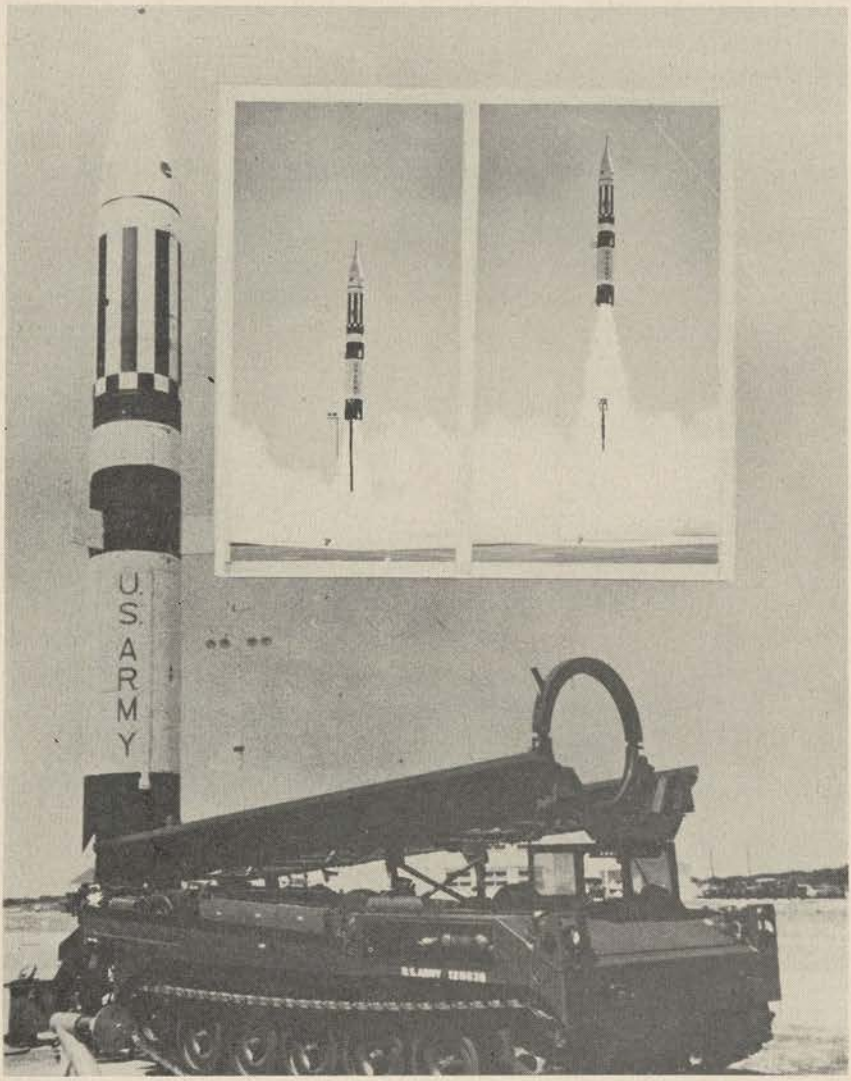


Figure 17. PERSHING missile and transporter. Test firing (in insert).

SERGEANT

The SERGEANT is a solid-propellant surface-to-surface ballistic missile which is under development to replace the 6-year-old CORPORAL in the Army corps. The SERGEANT incorporates many improvements over its predecessor in mobility, reliability, accuracy, and simplicity of operation and maintenance. It has a range of 75

miles. Only 5 motor vehicles are needed to support the SERGEANT as against 30 needed for the CORPORAL. The rate of firepower of the SERGEANT unit is several times that of a CORPORAL unit because there is no delay in fueling. (See fig. 18.)

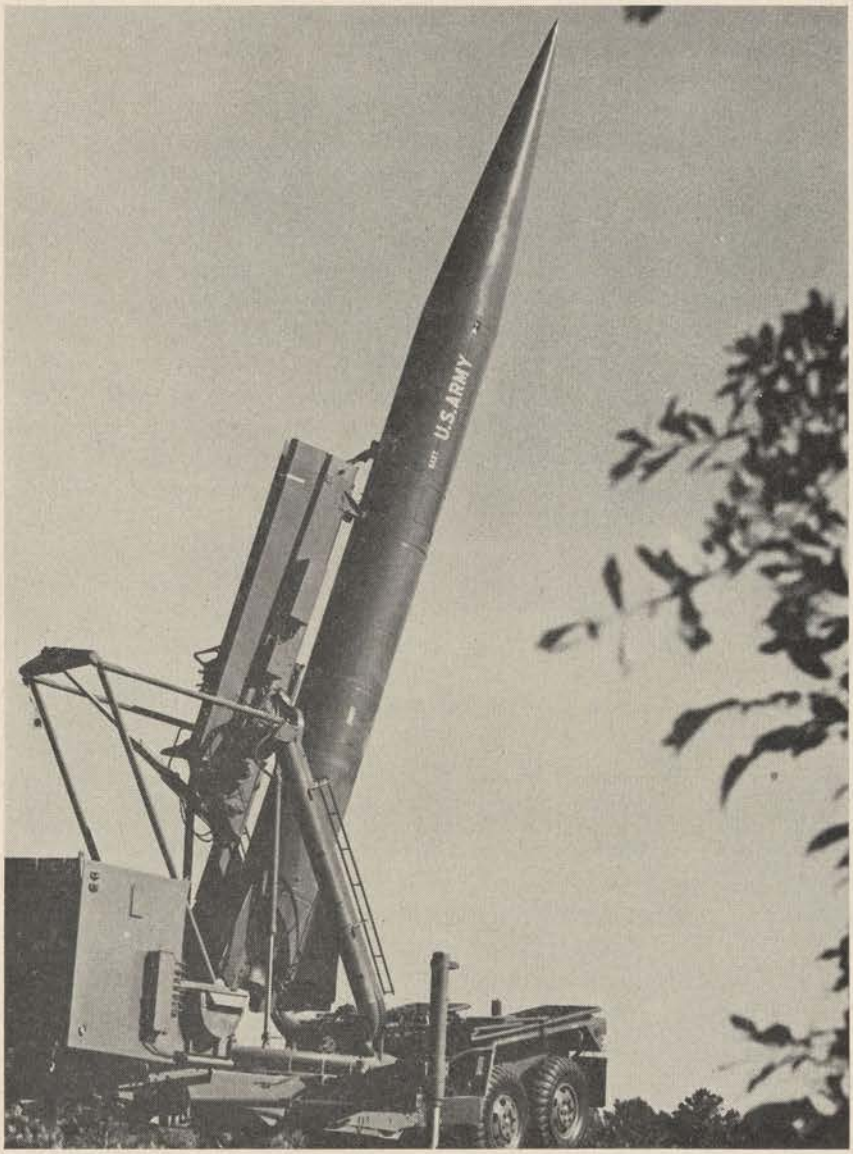


Figure 18. SERGEANT missile on transporter.

LACROSSE

LACROSSE is a general support field artillery guided missile for use in close tactical support of ground troops. It is highly mobile, being mounted on a modified standard Army truck which acts as the launcher. Its development was essentially completed in fiscal year 1960. LACROSSE became operational in fiscal year 1960 and LACROSSE units were deployed to Europe.

MISSILES A and B

Evaluation of the feasibility of MISSILES A and B was completed and development of guidance, launching, and rocketry techniques was started during the past year. MISSILES A and B are being planned as part of a complete second or third generation family of lightweight, highly mobile, simply operated missiles for use by Army combat forces on the future battlefield.

LITTLE JOHN

LITTLE JOHN is a small, 15-foot-long, surface-to-surface rocket to supplement medium and heavy artillery. It is an extremely simple weapon with a high degree of mobility. Tests have demonstrated great reliability. In fiscal year 1960 this rocket entered its final phase of development.

SHILLELAGH

In fiscal year 1960 the Army completed its preliminary studies and started development of SHILLELAGH, a high-performance missile for use against field fortifications and armor and for close-in support of troops. The weapon can be mounted on a vehicle from which it can be fired rapidly.

NIKE-HERCULES

New developments during the year in NIKE-HERCULES, particularly in radar systems, indicated that it may be possible to increase greatly the capability of the NIKE-HERCULES system against tactical enemy missiles such as those which might be fired against the United States from submarines along the coast. Proof of the improved technical capabilities of the system came toward the end of the fiscal year when the improved NIKE-HERCULES destroyed a CORPORAL missile fired at the Army's White Sands Missile Range. NIKE-HERCULES developments included efforts to perfect equipment which would operate effectively in an environment of massive electronic countermeasures.

Development of an improved mobile missile transporter increased the mobility of the NIKE-HERCULES system for deployment with the Army in the field.

HAWK

HAWK is one of the Army's newest air defense missiles to become operational. Its design provides optimum capability against medium- and low-flying supersonic aircraft and cruise-type missiles. Developmental work continued during fiscal year 1960 to improve its reliability and effectiveness against smaller and higher speed targets. HAWK demonstrated a technical capability to engage short-range ballistic missiles when the system destroyed an HONEST JOHN rocket during the past year. (See fig. 19.)

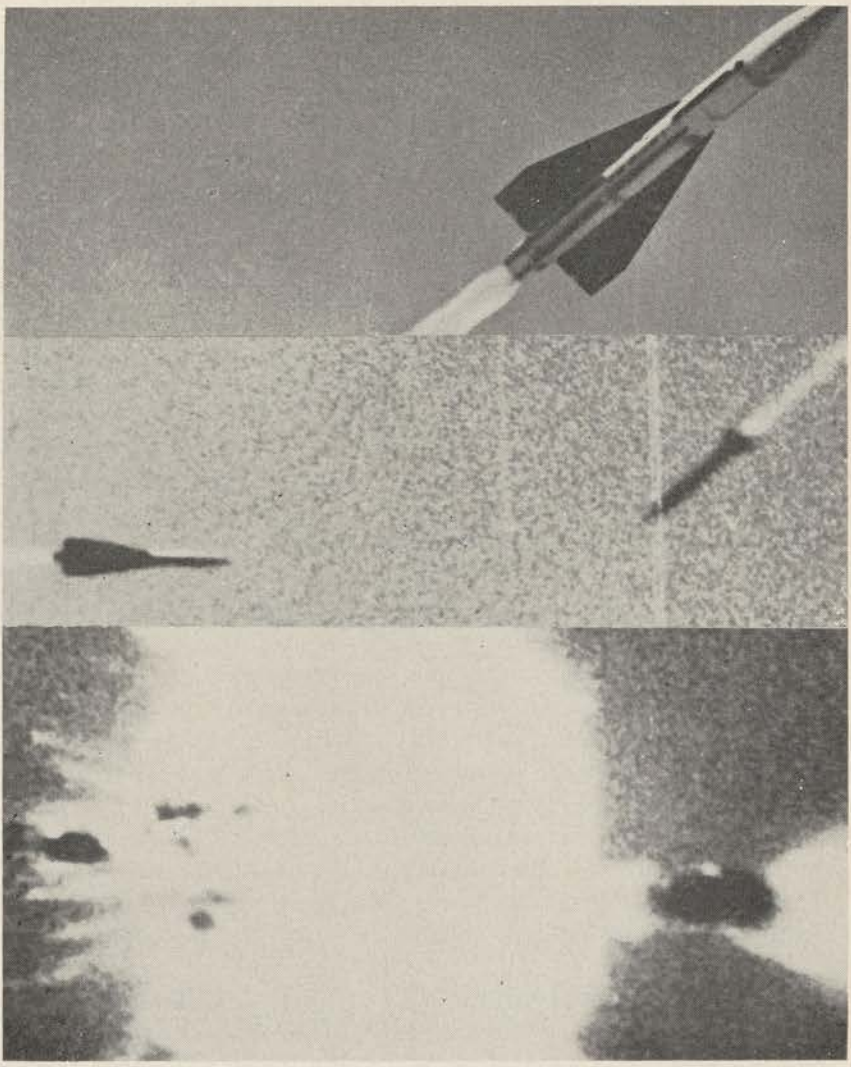


Figure 19. HAWK fired (top), homes toward interception (center), and destroys HONEST JOHN.

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REDEYE

REDEYE is a shoulder-fired, bazooka-type air defense guided missile which will provide the individual soldier on the battlefield with a defense against low-level aircraft. The REDEYE has a built-in heat-seeking device which guides the missile toward the heat radiated by an aircraft engine. REDEYE will replace the .50-caliber air defense machine gun, as well as provide a new range of capabilities not covered by present weapons. Development of the missile continued during fiscal year 1960.

MAULER

Development began on MAULER in fiscal year 1960. It is a completely self-contained, self-propelled guided missile system for air defense mounted on a tracked chassis of standard design. MAULER will be able to move with armor and infantry units of the field Army to provide protection against short-range ballistic missiles as well as low-flying high-performance tactical aircraft.

NIKE-ZEUS

NIKE-ZEUS is being developed to provide a defense of the United States against ballistic missiles. It is the only weapon under development specifically designed to meet this threat. Started 4 years ago, research and development on the radars and high-performance missile continued on schedule during fiscal year 1960 in accordance with established program objectives. During the past year a firing test program for the prototype missile was carried on at the White Sands Missile Range. These tests have provided data to evaluate the launch, propulsion, and aerodynamic characteristics of the missile, and to test the underground launcher.

A powerful new electronic tube has been developed which makes possible several breakthroughs of fundamental importance in the NIKE-ZEUS system. The ability of the new tube to generate and control precisely a large amount of high-frequency radar power gives accuracy, speed, and certainty in tracking small fast-moving targets at much greater ranges than heretofore achieved. This new tube will permit more effective discrimination between a genuine missile nose cone and decoys. Significant advances have been made in the technology of using the new equipment for the purpose of decoy discrimination.

In the past 3 years Department of Defense has allocated $459 million for the development of NIKE-ZEUS. Toward the end of fiscal year 1960, an additional $22 million which the Army had saved in other

areas was transferred to the NIKE-ZEUS research and development program to speed development of automatic processes for production of new types of electronic transistors, resistors, and other NIKE-ZEUS components. This action reflects the urgency which the Army feels about proceeding as rapidly as possible with development, testing, and preproduction engineering of NIKE-ZEUS as an effective antimissile system.

Artillery

A family of artillery pieces, including a 280-mm. gun capable of firing an atomic projectile, was developed after World War II and became available just as the Korean war ended. Development of these weapons was accelerated at the beginning of the Korean war and they were completed, but they did not fulfill the complete requirements or desires of the Army nor did they reflect full exploitation of what technology could then provide.

Subsequently, research and development was started on a completely new family of four artillery pieces. All four of these weapons are designed to be self-propelled. In comparison with earlier models, weight is drastically reduced, reliability and operating range are increased, and the cost of each piece is reduced. Two of these weapons—improved 105-mm. and 155-mm. howitzers—are mounted on aluminum armored, self-propelled carriages, with the tubes having complete traverse of 360°.

An 8-inch howitzer and a 175-mm. gun, which are mounted on the same unarmored self-propelled carriage, complete this new family. All of these systems were nearing the end of a successful test program in fiscal year 1960.

Late in fiscal year 1960 development was started on a lightweight 105-mm. howitzer, both as a towed and a self-propelled weapon, to provide desired battlefield mobility and air transportability.

An automatic computer for field artillery fire direction centers was under development in fiscal year 1960. This is a completely transistorized digital computer to solve fire direction problems and survey problems and to correlate flash and sound ranging data.

Recoilless Rifle

A 90-mm. recoilless rifle was released to production during fiscal year 1960 as the standard shoulder-fired antitank weapons. Weighing only 35 pounds, this weapon is capable of knocking out the heaviest known tank at a range of 500 yards.

40-mm. Grenade Launcher

Development of a new grenade launcher to give the infantry rifle squad the capability of delivering accurate high-explosive fire against small area targets to a range of 400 yards neared completion during fiscal year 1960.

CLAYMORE

Development of CLAYMORE, a small mine-type weapon which blasts steel fragments out in a fan-shaped beaten zone about 60° wide to a lethal range of almost 50 yards, was completed in fiscal year 1959. However, investigation of an improved version of this unique concept in defense weapons was started immediately thereafter. Development of the new version was successfully pursued during 1960 and is scheduled for completion during fiscal year 1961.

DAVY CROCKETT

During the past year the Army made significant progress in the development of DAVY CROCKETT, a lightweight, highly mobile, man-portable weapon system which will provide nuclear firepower for the support of small tactical units. (See fig. 20.)

Figure 20. DAVY CROCKETT, man-portable and vehicular-mounted atomic-capable weapon.

Night Vision Devices

An infrared weapon sight for small arms for use in the dark was tested and made ready for production during the past fiscal year. This sight is a great improvement over the sniperscope of World War II, being much lighter and smaller, having greater range, and being easier to maintain. A new small infrared searchlight with a dual capability for infrared and visible light for illuminating targets for infrared sighting devices was developed and placed under test during the year.

Tests were successfully completed on infrared, helmet-mounted binoculars which will permit easy night driving of vehicles equipped with infrared filters over the headlights.

Mobility

The requirements of modern nuclear and nonnuclear warfare place a high premium on greatly improved strategic and tactical mobility. In developing every piece of equipment, whether it be a rifle, a tank, or a gas mask, the Army must consider mobility as a primary factor. In the interest of mobility everything that the individual soldier must carry has been made more easily portable while being otherwise improved. Logistical mobility, as well as tactical mobility, has had high priority in all research and development.

One of the major forces in increasing mobility has been the effort to make the Army's combat and logistical land vehicles more mobile. The aim in developing the Army's new vehicles has been to make them capable of operating on any kind of terrain and under any set of conditions. Lesser ground pressures of the wheels or tracks, greater ranges, simplified maintenance, and amphibious and air-transportable characteristics have improved the mobility of the vehicles developed since the end of the Korean war. A good example of this line of development is the M113 armored personnel carrier which is now in production.

Despite great progress made in developing more mobile land vehicles in the past few years, the Army continues to seek greater improvement. Through the Army Mobility Research Center established in 1957 it has been seeking a major breakthrough for improvement of mobility for land vehicles. As a specific example of an approach being stressed, the Army is studying various types of soils to determine how they react to weight, driving, turning, and braking forces of military vehicles. It is hoped that these studies will provide data that can be incorporated into the design of future vehicles to increase their capability to move on all kinds of surfaces.

In order to move small groups of soldiers rapidly from one part of a battlefield to another in any type of terrain, the Army has long felt

that reliance on wheels and tracks alone is not realistic in terms of the mix of dispersion and concentration necessary for modern warfare. Since the end of the Korean war, therefore, there has been an increasing emphasis on developing air vehicles combining the peculiar takeoff, hover, and landing characteristics of the helicopter with the advantages of the fixed-wing, forward flight aircraft.

Armor

The M–60 main battle tank which went into production in the past year has a great many advantages over any tank the Army has had in the past, notably in its better armament system with a family of superior ammunition and in its diesel engine, which gives it a wider operating range than previous tanks. This tank is capable of defeating any known armored vehicle now existing or anticipated in the next 5 years. Nevertheless, from the research and development point of view, the M–60 tank is not an optimum main battle tank. The principal barrier to new departures in tank design has been the main weapon system which necessarily has been large and heavy and has demanded sturdy, rugged vehicles as support. Consequently, any truly new departure in tank design must be accomplished through a radical change in the main armament system. It now appears that this possibility exists in the development of the SHILLELAGH.

The SHILLELAGH weapon system is being developed to provide a direct fire surface-to-surface guided missile with a significant improvement over conventional gun-type armament in first round kill probability.

Largely because of the SHILLELAGH characteristics, it has been possible to initiate development of entirely new concepts of all armored vehicles. The first of these is an armored reconnaissance-airborne assault vehicle, which is being designed as a replacement for the 76-mm. gun light tank currently in reconnaissance units, as well as for the 90-mm. airborne assault gun currently found in the battle groups within airborne divisions. It is anticipated that the SHILLELAGH principle also will be applied to the future main battle tank.

This armored reconnaissance assault vehicle will be air transportable and amphibious.

Goer

Testing of two prototype models of a new concept in logistical vehicles, called Goer, was carried out with good results during fiscal year 1960. The two vehicles—one a 15-ton cargo truck and the other a 5,000-gallon tank truck—incorporate many of the features of large rubber-tired construction equipment. Together with the large-diameter, low-pressure tires which reduce ground pressure, the Goer trucks

have wagon steer which gives the body of the vehicle a capability to twist, tip, and turn sharply without overturning in off-the-road operations. Body construction of the vehicle (called exoskeletal) eliminates conventional suspension components and places the strength of the vehicle in the outer skin rather than in a heavy interior frame, thereby decreasing the ratio of weight of the vehicle to its payload and providing an immediate floating capability. In tests carried on in the past fiscal year the Goer has performed remarkably well in mud, water, and difficult terrain.

Trucks and Amphibians

Prototype 3½-ton trucks and 5-ton trucks were constructed during the past year for comparative tests. Some of these are of a hull-type design while others are designed with small compartments throughout their frames filled with a synthetic foam material to provide flotation. These trucks indicated a new trend in the construction of logistical vehicles to provide greater payload ratio, mobility, and ability to float. They also represent a trend toward diesel engines with which they are powered. Diesel engines are used also in the Goer, the M–60 tank, and the M–113 personnel carrier.

To increase the Army's over-the-shore capability the Army has devoted considerable time and effort since the end of the Korean war to the development of an efficient amphibian. A 5-ton amphibious lighter called the Larc was the result of the program, and successful testing was completed in fiscal year 1960. Replacing the 2½-ton Dukw of World War II, the Larc has a greatly improved seaworthiness and increased mobility on land to haul cargo inland to nearby trucking depots, air heads, or rail heads.

Development was initiated on a new concept of an amphibious ferry to accompany forward combat forces and to be used either as a ferry or as a floating bridge with a capacity of 55 tons.

Aircraft

The Army has made excellent progress since the end of the Korean war in developing special fixed-wing aircraft and helicopters to improve its mobility on the battlefield. The Caribou, a rugged, forward area 3-ton payload airplane, and the Mohawk, an observation and surveillance aircraft, continued to undergo tests during the past year. As the two principal fixed-wing aircraft under development, they were providing to be capable of fulfilling the expanding need for air transportation and aerial surveillance in the modern land combat environment.

The development program for the Chinook, a multiturbine, 2- to 3-ton payload transport helicopter, progressed through mock-up and

design release during the past year and is scheduled for operational availability in fiscal year 1963. The Army believes that the Chinook, which will incorporate helicopter experience factors into its design and will be powered by a newly developed turbine engine, will be a vastly improved helicopter for military purposes. A specific objective in its development is to decrease the current unfavorable ratio of maintenance hours to flying hours.

An improvement program to take full advantage of the newly developed Iroquois utility helicopter was undertaken during fiscal year 1960. Modification of its turbine powerplant and redesign of the troop compartment were expected to improve greatly the performance of this already versatile and dependable craft.

A new concept for a light helicopter to replace the current light observation airplane (L–19) and the two light helicopters (H–13 and H–23) is being carried forward to development with fiscal year 1965 as the target date for operational deployment of the system.

The Army continued its long-range research and development of turbine engines for aircraft to obtain greater performance relative to weight and less maintenance. The exploration of new aerodynamic principles which might lead to more efficient air vehicles was continued at a reduced rate during fiscal year 1960. The first stage of research and development was completed on test platforms employing the concepts of tilted wing, ducted fan, and deflected slipstream to obtain VTOL capabilities. Evaluation of data will determine future lines of development for these craft.

A 10-year Army aviation program was developed in fiscal year 1960 which outlined the planned growth of the program in the 1960–70 period.

Communications

Improved communications or command control is one of the three primary requisites for modern warfare, being an equally essential counterpart to firepower and mobility. Army advances in this field have kept pace with advances in weapons and vehicles. In fact, many of the breakthroughs in the science of communications have led the way to progress in the other fields.

The trend since the end of the Korean war has been toward much smaller, more rugged, and more dependable communications equipment requiring little maintenance. The development of transistors, printed circuits, and other devices and techniques is providing the Army a new family of communications equipment which is completely mobile and air transportable.

Development of a new automatic electronic switching telephone communications system for central headquarters in a combat zone

was in the testing and evaluation stages during fiscal year 1960. This, together with new types of field wire and telephones, constitutes a major improvement in military telephone communications systems.

A radio central exchange mounted on a small truck to provide rapid and efficient radio telephone communications on the battlefield was placed in limited procurement during the past year. This system will provide a capability for switched telephone-type communication by means of radio propagation using a minimum of the radio frequency spectrum. (See fig. 21.)

Figure 21. Truck-mounted radio central exchange.

Prior to 1956 the Army had no significant electronic, photographic, or infrared combat surveillance capability. Surveillance was accomplished by reconnaissance either in aircraft or on the ground, with optical instruments as the main equipment. Today, the Army possesses a promising capability with many new devices such as an unmanned aerial surveillance system (drone), Army aircraft mounted side-looking radars, airborne infrared scanning equipment, and improved photographic cameras. These items represent the first steps toward providing the Army in the field with a reliable all-weather combat surveillance system. (See fig. 22.)

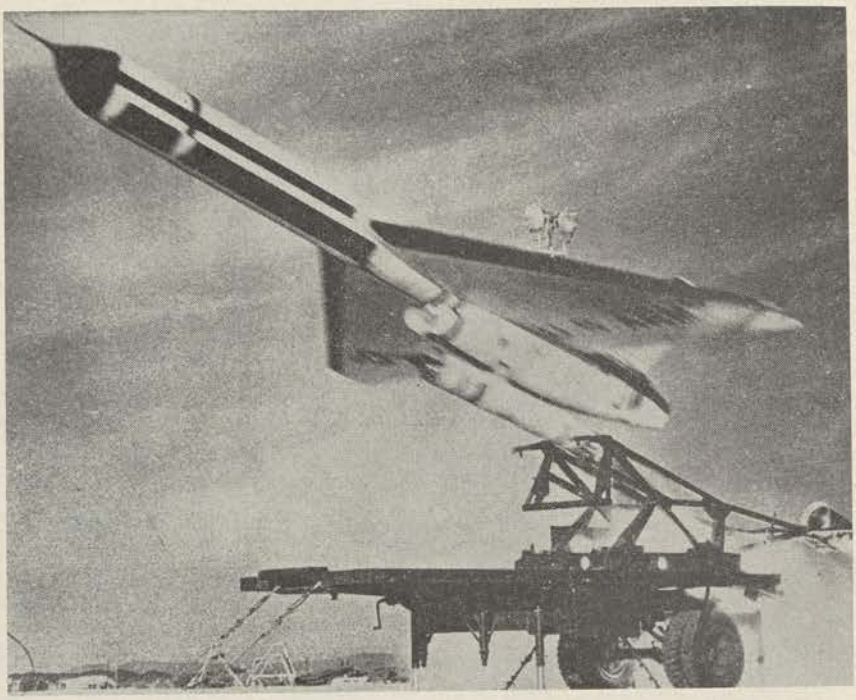

Figure 22. Turbo-jet unmanned surveillance drone.

An indication of what the future holds in this field was demonstrated toward the end of fiscal year 1960 by the successful flight of the jet-powered, unmanned, aerial surveillance system (drone). This is a high-performance craft capable of great speed and very low altitudes which is designed to carry electronic surveillance equipment to provide Army commanders with continuous information about the enemy and his movements.

Another major breakthrough in miniaturization during the past year, which is basically a new concept in circuit fabrication, is expected to revolutionize completely military electronics, with a fur-

ther 90 percent reduction in weight effecting great savings in production. The breakthrough is a technique for tailoring electronic parts on tiny ceramic .3-inch square wafers. Called micromodules, these can be stacked, wired, and embedded in tough plastic to make a rugged supercompact circuit. Progress during fiscal year 1960 amounted to development of 16 standard micromodules which made possible the selection of the first field equipment in which they might be used. Complete integration of this concept into the research and development program is several years away.

A very notable development in Army communications during the past year is a new electronic ear called Ruby Maser which is considered to be one of the most sensitive listening devices ever invented. Ruby Maser is relatively inexpensive, weighs only 25 pounds, is easy to operate and can detect hitherto imperceptible radio signals from distant stars or from space vehicles millions of miles away. Use of this instrument in following and detecting intercontinental ballistic missiles and for communication between future manned space vehicles promises a valuable future for Ruby Maser in Army communications.

Arctic Research

Since the end of the Korean war, Army scientists have been making extensive studies of Arctic conditions on the Greenland ice cap. Sufficient data about the ice cap and the use of snow as a construction material had been collected to warrant the start of construction of a permanent camp under the snow in fiscal year 1960. Camp Century, as this unique camp is called, is under construction about 150 miles out on the ice cap in northwestern Greenland.

When completed, Camp Century is expected to be a highly efficient under-snow installation where 100 Army scientists and their assistants will be able to carry on coordinated programs and studies in vehicular transportation, meteorology, and communications, food, clothing, health, and well-being in the extreme polar environment. (See fig. 23.)

Almost every aspect of design and construction of the subterranean camp requires radical departure from normal engineering methods. The quarters, shops, and laboratories are being made of specially insulated, prefabricated shells erected within chambers which are hollowed out of the snow. Ventilation, sewage disposal, and water supply require systems that will operate despite extremely low temperatures that preclude the use of ordinary facilities.

By agreement between the Governments of the United States and Denmark, since Greenland is sovereign Danish territory, a prefabri-

Figure 23. Construction of under-snow Camp Century in Greenland.

cated pressurized nuclear powerplant is installed in snow tunnels in the camp, capable of delivering about 1,500 kilowatts of electricity and 1,000 pounds of steam per hour.

Chemical and Biological Weapons

Chemical and biological research was expanded during fiscal year 1960 so that the armed forces may be better prepared in the event chemical and biological weapons are used in a war.

In chemical research, a large number of compounds have been examined to find potential nonlethal incapacitating agents. Several compounds show promise and one of these is now undergoing extended evaluation tests. Intensive research has also been conducted on effects-through-skin agents so as to characterize better their effectiveness. Research on therapeutic measures for treating these through-the-skin casualties has revealed that the combination of two chemicals called atropine and oxime is much more effective than atropine alone. This latter information has been made available for use by physicians in treating cases of insecticide poisoning.

Biological research in fiscal year 1960 resulted in the development of a live tularemia vaccine which, upon completion, will provide a greatly improved immunization capability against this disease in the event of biological attack.

In the field of viral genetics, some success has been achieved in altering the characteristics of simple viruses. If these tests are successful, they may eventually make possible the change of immunogenic and stability characteristics of viruses.

Medical Research

Since the end of the Korean war there has been an emphasis on basic medical research with 75 percent of funds available for basic medical research being committed to 150 universities and nonprofit organizations and the remainder to 8 Service laboratories. Basic research has formed the base for major solutions to Army medical problems in recent years.

During fiscal year 1960 the following medical research and development progress was made:

—detailed studies of the basic mechanisms involved in antibiotic resistance have produced voluminous data which promise to aid in the production of new antibiotics.

—laboratory and volunteer studies on new drug combinations for the suppression and prevention of malaria have resulted in a tablet which may eliminate the need for the 14-day primaquine treatment of returnees from malarial areas.

—studies in the field of viral vaccines have resulted in more effective concentration and purification methods, which not only enhance the protective capability of the vaccine but also reduce any undesired reactions.

—many new applications of fluorescent antibody techniques for the rapid laboratory identification of disease organisms have been made, although these procedures are still in the early stages of development. The potentialities of these procedures as a basic research tool are enormous. In addition, once perfected, they will permit speedy and accurate identification of organisms with the result that immediate steps may be taken for the prevention and treatment of epidemics or as a protection against biological warfare agents.

—studies have resulted in the discovery of a drug capable of permitting animals to function normally and without undue effort when exposed to 5 percent carbon dioxide. Studies now planned are aimed at determining the effectiveness of this drug in delaying onset of or decreasing fatigue in humans.

—acclimatization studies are continuing and preliminary studies have shown that man can be acclimatized to both heat and cold at the same time. From a medical standpoint acclimatization will permit the immediate employment of entire units in any climate of the world.

—the prototype development of a lightweight battery-operated pulse X-ray machine shows promise of providing suitable X-ray supported field medical units.

—progress in protecting animals against the lethal actions of radiation has been achieved by the synthesis of additional pro-

tective chemicals. Combinations of these chemicals may reduce toxicity to an acceptable level for their use in man.

—investigators have succeeded in obtaining over 18 months' survival of a homo-transplanted kidney in nonidentical twins and the recipient is still progressing satisfactorily. These efforts have revealed important basic leads in eventually obtaining permanent survival of tissue transplants.

—glycerinated frozen red blood cells have been successfully preserved for as long as 44 months and approximately 1,500 successful transfusions have been administered with this blood with less than the usual incidence of reactions. This method has not yet been developed to a point where it is practical for large-scale military operations, but further improvements and simplification are expected. This method will be particularly valuable in the long-term storage of rare blood types.

—excellent progress continues to be made in the identification of communicable disease causes in areas throughout the world.

In addition to the accomplishments stated above, close cooperation is attained with the peoples of various countries throughout the world, particularly in Germany, Mexico, India, Japan, and countries in Southeast Asia, through the combined efforts of United States and native investigators working together on problems of mutual interest.

Pneumatic Techniques

An important breakthrough was made during the past year in pneumatic techniques. Basically this involved the use of a lower energy jet or fluid to impinge on and deflect a high-energy jet or fluid. The energy controlled can be 100 times greater than the controlling energy.

There are many possible applications of this principle, two of which are most notable—the guiding of a missile by the deflection of its thrust and the construction of computers. With no moving parts except the fluid itself, computations (feedback) can be obtained. In applying this principle to a computer it is estimated that in future applications a 10-inch cube can perform functions equal to an electronic computer with as many as 300 vacuum tubes.

So important was this project considered to be, that to the $230,000 of Army funds allocated to it in the middle of fiscal year 1960 the Department of Defense allocated at the end of the year an additional $1,000,000 in emergency funds to continue the research.

Space Research and Development

The Army, during the past year, transferred to the National Aeronautics and Space Administration the world-renowned Von Braun space team, together with some important facilities. A reorganization of the Army Ordnance Missile Command was made at the Army's Redstone Arsenal preparatory to turning over the necessary facilities to NASA.

EXPLORER VII

The Army fired its own JUNO II booster to place successfully in orbit a scientific satellite (weight 91.5 pounds) to make space environment measurements. The construction of both booster and satellite was accomplished by the Army Ballistic Missile Agency at Huntsville, Ala., in support of a NASA-funded program. The satellite was still transmitting at the close of the fiscal year; it is expected to remain in orbit for approximately 20 years.

TIROS

Technical direction of the design and construction of the ground stations and the satellite of the TIROS meteorological satellite project for NASA was completed by the Army in fiscal year 1960. The outstanding success of TIROS during its operation in orbit was a significant first in space science. More than 20,000 television pictures of the earth's cloud cover were obtained. These photos greatly aided meteorologists in their quest to understand the worldwide weather pattern and to improve forecasting.

SECOR

The Army initiated a project to accomplish geodetic measurements from space. The system will be space tested in fiscal year 1961 when a special radio transponder will be carried into orbit aboard a Navy TRANSIT satellite.

COURIER and ADVENT

During the year the Army continued its work on communications satellites which was begun so dramatically in December 1958 when the President's Christmas message from space was transmitted from the Army-constructed equipment of project SCORE. The current efforts deal with projects COURIER and ADVENT.

COURIER is a satellite-borne delay repeater which will receive messages from one ground station, record them on tape, and discharge them later on command to another ground station far over the horizon.

ADVENT will be an instantaneous repeater in a 24-hour equatorial orbit at an altitude of 19,300 miles. It will provide immediate communication between any two ground stations which are in view of the satellite. The management of this Department of Defense project during the past year was being accomplished with the Army responsible for the communication portion. The over-all managerial responsibility was later assigned to the Army.

SATURN

In test firing all eight engines of the SATURN superbooster missile during fiscal year 1960, the Army prepared for the first giant step into outer space with very heavy payloads. The engines developed a thrust of 1,300,000 pounds in the few seconds they were operating on the test stand. SATURN was to be turned over to NASA in the beginning of fiscal year 1961.

Human Factors Research

A human factors research program carried out a wide range of research concerned with the discovery and development of principles and techniques relating to the soldier's ability to operate and maintain his equipment, serve his weapons, give and accept commands, adapt to environmental and psychological stresses, and conduct himself efficiently in combat. This program is also concerned with the study of indigenous populations and troops in foreign areas.

Personnel research is directed toward the development of new and improved techniques for selection, classification, assignment, and utilization. The present emphasis of this phase of human factors research is upon improved means of identifying combat and leadership potential, as well as developing refined selection devices for personnel with technical specialties.

A second phase of the program is dedicated to new training methods, techniques of leadership, and the means of increasing motivation in training and combat. Special emphasis is being placed upon improving and, when possible, reducing the length of specialized training courses. In the past year considerable success has been achieved in improving the quality of graduates of some electronics courses. In some cases the time span of these courses has been reduced.

The development of training devices has been accelerated considerably during the past year to meet a growing requirement for simulators to provide realistic and less costly training in new weapon systems. Control of development of these devices has been integrated more closely with control of the hardware development.

Another important element of the broad human factors research program is concerned with increased effort in man-machine compatibility; that is, the adjustment of a machine to an operator and an operator to a machine. During the past year, in addition to increased research in this area, a series of seminars and central conferences served to further the understanding of this portion of the human factors program.

A final aspect of this program is research in support of psychological operations and unconventional warfare to develop an appreciation of pertinent social and psychological factors. Although this is a relatively new program, it has produced guide books for establishing informal communication with target groups in key areas.

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VI. Civil Works

The U.S. Army Corps of Engineers is by far the largest and most highly diversified engineering organization in the world. In addition to its military functions of performing the billion-dollar-a-year worldwide construction of facilities of all kinds for the Army and the Air Force, of providing combat engineer support for the Army in the field, of developing military nuclear power and heating plants, and of improving the accuracy of maps and data concerning the size and shape of the world, the U.S. Army Corps of Engineers has a central responsibility in the Federal plan to develop the water resources of America.

From the beginning of the United States, Army Engineers have been associated with laying out national roads, improving rivers and harbors, and surveying the first rail routes. However, it was not until 1936 that the Congress gave the Army Engineers the responsibility for nationwide flood control. This mission was very broad since it directed comprehensive surveys embracing power, navigation, flood control, irrigation, and other water uses for the Nation's river basins. Each survey was to deal with a river system as a single entity, to take into consideration all the problems and uses of water engendered by the complex American industrial society, and to draw up a plan for development. This was the beginning of a great cooperative effort for public and private development within a framework of sound river basin planning.

This program is known as the civil works of the Army. Today it is a multimillion dollar activity consisting of more than 3,000 projects in all the States, the District of Columbia, and U.S. possessions. Although these civil works contribute from a long-range point of view to the over-all military power of America, fundamentally they are nonmilitary activities, intended for the economic growth of the Nation and the well-being of its citizens.

Progress in Fiscal Year 1960

During fiscal year 1960, construction was underway on 111 channel and harbor projects; 20 locks, dams, and canals; 6 bridge alteration projects; 125 local protection projects; 56 flood control dams; 32 multiple-purpose projects; 3 shore protection projects; and 19 construction features of the Mississippi River and tributaries project—or a total of 354 projects. By the end of fiscal year 1960, 26 navigation improvements, 3 bridge alterations, 3 shore projects, 38 local protection

projects, and 4 flood control dams were sufficiently well along in construction to allow for useful operation. Among the 354 projects were 41 new starts or resumptions. (See fig. 24.)

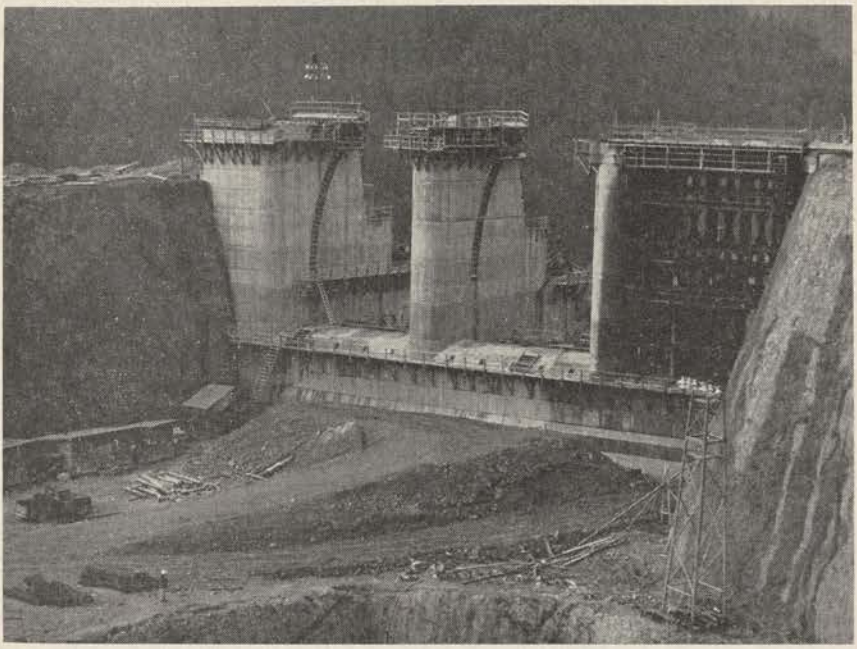

Figure 24. Construction of Hills Creek Dam, Oregon.

Fiscal Year 1960 Appropriations

Funds appropriated to the U.S. Army Corps of Engineers for civil works in fiscal year 1960 amounted to $872,621,959. These were allocated as follows:

Construction, general		$661,356,247
Planning and design	$9,845,600	
Construction	651,510,647	
Operation and maintenance		117,684,950
Mississippi River and tributaries		69,068,512
General investigations	114,562	
Planning and design	163,000	
Construction	51,727,950	
Maintenance	17,063,000	
General expense		12,324,000
General investigations		10,481,250
St. Lawrence River Joint Board of Engineers		39,000
Permanent appropriation (Maintenance and operation of dams; hydraulic mining; payment to States)		1,668,000
Total		872,621,959

Navigation

Federal activity in the construction of channels and harbors began with the passage of the first River and Harbor Act in 1824 for clearing and snagging in the Ohio and Mississippi Rivers. The present program includes projects located throughout the continental United States, Alaska, Hawaii, and Puerto Rico. These projects consist of coastal harbors and channels, Great Lakes harbors and channels, and the inland and intracoastal waterways. Navigation facilities provided by these projects accommodated both foreign and interstate commerce amounting to more than 1 billion tons in fiscal year 1960.

There are now 22,231 miles of improved waterways, approximately 500 improved harbors, 230 locks, and 190 navigation dams in the United States and possessions. During fiscal year 1960, 131 of the projects under construction were for navigation, and 26 of these were opened for useful operation. Maintenance and operation activities were conducted on navigation projects during the past fiscal year at a cost of $77.9 million. In the allocation of maintenance funds, primary consideration was given to work on deep-draft harbors and to major inland waterways because of the urgent requirements of waterborne commerce.

A $1.6 billion program for modernization of canalized waterways through replacement or repair of existing locks and dams calls for 8 reconstruction projects on the Monongahela, 3 on the Warrior system, 19 on the Ohio River, 4 on the Mississippi River, and 5 on other rivers.

Fifteen of these structures already under construction will cost an estimated $384 million to complete.

Flood Control

Since the passage of the Flood Control Act in 1936, the U.S. Army Corps of Engineers has completed 358 flood control projects at a total cost of $982 million. Under construction in fiscal year 1960 were 153 projects which will have a total cost of $3.9 billion when completed several years in the future. An active program, consisting of 236 projects estimated to cost $1.8 billion, has not been started because of unavailability of funds.

Despite progress made on construction of projects for flood control, total protection in most river basins is insufficient, and the Nation as a whole is highly vulnerable to severe damage from major floods. The disastrous effects of recent floods emphasize an immediate need for protective works in many parts of the country. Orderly prosecution of existing flood control plans, expanded on the basis of up-to-date engineering and economic studies, can provide the necessary

protection. It has been established by the results obtained through the operation of completed flood control projects that most flood damage experienced in recent years could have been prevented economically through comprehensive river basin development of water resources throughout the Nation.

During the winter season of fiscal year 1960 record-breaking floods occurred on the Green, Snohomish, Snoqualmie, and Stillaguamish Rivers in the State of Washington. Damage was severe.

In the spring of fiscal year 1960 flooding from rain and melting snow was widespread in Nebraska, Iowa, northern Missouri, South Dakota, and eastern Kansas. Fifty of Nebraska's 93 counties were declared national disaster areas. The extensive flooding was caused by exceptionally rapid melting toward the end of March of the very heavy snow cover which had accumulated. The partially completed Tuttle Creek Dam on the Big Blue River impounded and controlled some of the water and reduced the flood threat downstream appreciably.

Unusually heavy rains in March fell on the north-central part of Florida and caused record flooding of several streams. Several thousand people were forced to evacuate homes on the lowest sections of ground. Twelve counties in central Florida were declared a disaster area.

Severe localized flooding occurred in New England, Texas, Arkansas, Oklahoma, and other areas during the past year. Forty-two flood control projects were placed in useful operation during fiscal year 1960. The following 12 of these projects were valued at more than $1 million each:

Reservoir Projects	*Type*	*Total Estimated Cost*
East Barre Reservoir, Winooski River Basin, Vt.	55′ earthfill dam with uncontrolled spillway.	$2, 378, 000
Sutton Reservoir, Elk River, W. Va.	220′ concrete gravity dam with gated spillway.	34, 600, 000
Painted Rock Reservoir, Gila River, Ariz.	181′ earthfill dam with uncontrolled spillway.	19, 000, 000
East Brimfield Reservoir, Quinebaug River, Mass.	55′ earthfill dam with uncontrolled spillway.	6, 500, 000
Local Protection Projects		
Abilene, Kans	Channel improvement; railroad bridge alterations; levee; floodwall.	1, 100, 000
Allentown, Pa	Channel improvement; levees	1, 710, 000
Memphis, Wolf River and Nonconnah Creek, Tenn.	Levees; floodwalls; bank protection; pumping plant.	11, 200, 000
Multnomah County Drainage Dist No. 1, Ore.	Levee; drainage structures	1, 740, 000

Local Protection Projects	*Type*	*Total Estimated Cost*
Muscatine (Mad Creek), Iowa	Levees; floodwalls; pumping plant.	$1, 160, 000
Sioux Falls, S.D	Channels; levees	5, 470, 000
Wilson, Wenkel and Prairie, Du Pont, Ill.	Levees; channel; floodwall	5, 253, 000
Woonsocket, R.I	Pumping plant; levee; floodwall; channel.	4, 120, 000

Power

In fiscal year 1960 the hydroelectric generating capacity in commercial operation was increased by 472,000-kilowatts capacity at U.S. Army Corps of Engineers multiple-purpose projects bringing total generating capacity to 6.6 million kilowatts at the end of the year. This hydroelectric power, installed in 32 multiple-purpose projects located in 19 States, is 4 percent of the Nation's electrical generating capacity and 20 percent of the national installed hydroelectric capacity. Total power produced for marketing at Army Engineer projects during the fiscal year was 27.9 billion kilowatt-hours, or 3.8 percent of the total produced in the Nation and 19 percent of the hydroelectric power produced.

Water Supply

More than 40 cities and several agricultural areas were served by water supply and irrigation storage provided in 31 flood control and multiple-purpose reservoirs. About 1.5 million acre-feet (500 billion gallons) of storage has been reserved for water supply in U.S. Army Corps of Engineer projects, and 4 million acre-feet of storage has been reserved for irrigation and related purposes. Demands and releases for domestic and industrial water suply vary widely from year to year. Recent annual releases for water supply have amounted to 1 million acre-feet, and releases for irrigation have been on the order of 2 million acre-feet. During the past year some 25 million acre-feet were released from reservoirs for conservation and power generation and incidentally to improve downstream flows of rivers.

Beach Erosion Control and Hurricane Protection

During fiscal year 1960 shore protection projects were placed in useful operation at Ocean Beach, Del.; Seal Beach, Calif.; and Fire Island Inlet, N.Y. Work on these projects was carried on in accordance with the Federal policy of assisting local interests under certain conditions in the construction of works for restoring shorelines or protecting them against severe erosion.

The first projects undertaken under the Flood Control Act of 1958 which provided for hurricane flood protection were progressing on

schedule. Advance engineering and design for the hurricane-flood protection project in Providence, R.I., progressed during the year to a point which would allow for construction in fiscal year 1961 should funds be available.

Advance engineering and design were also carried forward on the New Bedford, Fairhaven, and Acushnet, Mass., project.

Recreation

Attendance for recreational purposes at civil works projects developed by the U.S. Army Corps of Engineers reached 107 million during calendar year 1959. There has been an average increase in attendance of 11 million each year since 1952. Public access to the waters of projects is now available at 4,000 points, and boat launchings may be made at 1,600 launching ramps. The recreational facilities available to the public are provided and maintained either by the U.S. Army Corps of Engineers or by cooperating Federal or local agencies.

Planning is accomplished with funds appropriated in both the current and previous years for preconstruction planning of specific authorized projects.

Planning for the navigation program during fiscal year 1960 was primarily for continuing modernization of existing facilities. Planning for navigation projects included modernization of Ohio River locks; Arkansas River project to Tulsa, Okla.; Snake River project; and the new Poe Lock at the Soo on the Great Lakes.

Flood control reservoirs in the planning stages are Kasinger Bluff and Joanna in Missouri, Saylorville in Iowa, New Melones in California, and Somerville in Texas.

Planning for multiple-purpose reservoirs including power was carried on for the Little Goose and Lower Monumental on the Snake River; Green Peter and Bruces Eddy in the Columbia River Basin; Stockton in Missouri; DeGray in Arkansas; and Millers Ferry on the Alabama River.

Experimental Studies in Water Resource Development

Hydraulic model studies relating to the design and construction of flood control, navigation, and shore protection projects were carried out during fiscal year 1960 at the Waterways Experiment Station in Vicksburg, Miss., and at other field laboratories. Design features which were tested included outlet works, spillways, stilling basins, fish ladders, intake structures, gates, tunnels, valves, and lock-filling and emptying systems. Other investigations included the comprehensive Mississippi River model, the San Francisco Bay model, and several harbors, rivers, shores, and beaches.

Investigations and studies not associated directly with specific

projects were also accomplished. These included studies related to the physical phenomena, basic principles and remedial or control measures for shore protection and improvement, analysis of major storms, and the collection of sedimentation data. Under the civil works investigation program, testing and evaluation of materials were carried on and construction practices and equipment were investigated. The net result of this research was new engineering and design criteria and procedures.

Water Resource Development for the Future

The principal future needs in development of navigation are deeper waterways and larger locks to make possible the use of more efficient vessels and barges. Tankers and ore carriers on the Great Lakes at present are restricted to sizes considered too small for modern efficient operation in the shallow harbors and constricted connecting channels of the Great Lakes. A trend toward larger river barges with a consequent decrease in the cost of water transportation is being held back also by small locks on the inland waterways. Several modernization programs under study, planning, or construction are: Gulf Intracoastal Waterway, Warrior-Tombigbee Waterway, Illinois Waterway, Ohio River system, Great Lakes connecting channels, and Delaware River Waterway. Extensions of several waterways are also under consideration or construction.

With increasing economic development in river basins, there is an increasing necessity for more flood protection. Future needs can best be met by orderly construction of presently authorized projects and new projects found to be justified by up-to-date investigations and studies. Construction of upstream multiple-purpose reservoirs will reduce flood damages and facilitate local flood protection.

One of the most pressing needs in good planning for flood control is orderly development of real estate with a recognition of flood hazards. At present there is growing recognition of the need for some legal restrictions on the use of flood plains in order to avoid creation of future flood hazards.

The increase in hydroelectric generation in the future will be relatively small compared with the increase in fossil fuel generation because sites suitable for hydroelectric installations are limited. Major projects now under study, planning, or construction in the Columbia River Basin, Alaska, Alabama, Arkansas, and in Missouri will make additional hydroelectric power available in future years.

Thirty-one U.S. Army Corps of Engineers reservoirs now provide water for domestic and industrial use and irrigation. There is an increasing need for more water for these purposes in several regions across the Nation.

VII. Management

Improving Management

Modernization of Army weapons and tactics since the end of the Korean war has been accompanied by an all-pervading modernization of the Army's business management practices. This improvement in Army management, though not as well known as other changes recorded in this report, has provided the solid nontactical support essential for Army forces deployed on the borders of the free world, for the Army Strategic Reserve Forces including the combat-ready STRAC, for active Army troops and reserve components in training, for the comprehensive research and development operations, and for other broad programs devised for maintaining combat ground forces and air defense essential for supporting national policy.

The improvements made in Army management in fiscal year 1960 are the culmination of broad programs started in the past decade. These programs have been complementary; each has provided new energy and significance to the others and the growth has been an interacting continuous expansion in all directions throughout the nontactical areas of Army activities.

The basic premise of improved management in the Army is that the systems for programing, budgeting, accounting, and manpower and supply management must be directly and continuously related. The methodology to accomplish this required interrelationship has been formally designated as the Army Command Management System (ACMS).

This system was developed in the Army to bring together what had been essentially two basic management processes—the program management system and the financial management system. The integration of these two basic processes required many extensive developments in financial management in addition to extension and improvement of program management. The Army's system of integrating programing, budgeting, accounting, and reporting provides a common framework for relating programs with resources and for communicating on this common basis between the successive levels of Army command, the Department of Defense, Bureau of the Budget, and the Congress.

Development of ACMS began in fiscal year 1955 when studies were initiated to integrate programing and budgeting at the operating

level. The objective was to produce the kind of data necessary for commanders at all levels to control missions and resources so that they might adjust resources to respond to both long-range and immediate changes in missions and mission priorities. Achievement of this seemingly simple objective required many actions, the most significant of which were:

—integration in the command channels of all fund accounting. Prior to 1954, obligation, cost, and expenditure accounting operated in separate channels and created excessive reconciliation workload as well as duplication of document processing effort. The change involved organization of finance and accounting offices within installation and agency headquarters to provide the integrated obligations, expenditure, cost, and other accounting services.

—establishment of a common classification of functions performed by the Army for use in programing, budgeting, manpower and supply management, accounting, and reporting. This action required revision of the Operation and Maintenance, Army, appropriation structure so that it might be more consistent with missions and activities of the Army. Also, budget programs in that appropriation were reduced from 16 to 8. A common classification of the functions of the Army was then provided in an Army management structure which was made applicable on a mandatory basis in fiscal year 1958.

—establishment of new procedures which require direct correlation of programing and budgeting actions at all levels of command. This was accomplished through revision of the Army program system made fully applicable for fiscal year 1960. Program and budget guidance is now furnished simultaneously in the same document and each command, agency, and installation is required to prepare an annual operating program and operating budget.

—establishment of new accounting and fiscal procedures so that programs and functions could be presented and evaluated with emphasis in terms of costs rather than obligations. This involved elimination of those portions of the separate systems for cost accounting and obligation accounting which duplicated one another. In existence prior to 1955 were separate cost systems such as those used for hospitals, repairs and utilities, field maintenance, and laundries. Commencing in 1955, these were integrated, and uniformly applied accounting principles and simplified procedures were established to produce required operational data.

—establishment of dollar knowledge of inventories through financial inventory accounting. Although financial inventory accounting is largely applicable to depot stocks, essentially the same procedures enable commanders to relate supply consumption costs, supply replacement, and required inventory position changes in realistic terms of effect on dollar obligation authority.

—development of cost and performance summary reporting. This reporting forms a key feature of ACMS. It provides for the communicating of progress against plans both with respect to accomplishment in relation to programs and cost of performance in relation to budget forecasts. It also provides for analysis of deviations and, more particularly, explanation of corrective action taken or needed with respect to programs or resources. While such reporting was always envisioned under ACMS, it was not prescribed for reporting to Department of the Army until the fourth quarter, fiscal year 1958. Further refinement of this concept of reporting, effective for the fourth quarter, fiscal year 1959, accomplished the objective of integrating the quarterly cost and performance reports with the quarterly and midyear reviews of the budget execution process, thus providing the method whereby operating budgets are kept currently revised and approved at every level in coordination with programs.

In summary, the Army Command Management System as it has evolved since 1955 and as it is presently implemented within the Department of the Army specifically provides for:

a. Integration and coordination of programing and budgeting.

b. Mandatory use of an integrated account structure for use in programing, budgeting, manpower, and supply management, and in accounting and reporting associated therewith.

c. Improved budgets and reports for use at operating and departmental level.

d. An integrated accrual accounting system.

e. Preparation and use of cost-based budgets at all levels.

f. Relating budget justifications and utilization of resources in response thereto through information on performance and program costs to the management of operating programs and major activities of the Army.

A major principle of the Army Command Management System is that the commander will be given the resources for the accomplishment of his assigned missions and the prerogative of arranging his program so as to have flexibility in the use of resources given him. This means that within the framework of the priorities assigned to the broad objectives by higher headquarters, the local commander,

through his approved operating budget, may, without specific approval, incur costs in consideration of the local situation provided he does not exceed his total budget limitation. In giving the commander this flexibility he is still accountable for the results—the accomplishment of his mission and the utilization of resources.

Management Improvement Programs

More than 300 separate management improvement programs operate at Army installations throughout the world. These programs are many-sided efforts, and typically they include work simplification, incentive awards, automatic data processing applications, performance analysis, training, engineered standards activities, and others. Summarized below are two selected examples of management improvement activities.

Operation OVERDRIVE

Operation OVERDRIVE was a comprehensive management program at Fort Campbell, Ky. It was aimed at efficiency and economy throughout the entire Fort, including the combat elements, through nine projects. These included blue collar industrial types of activity, do-it-yourself repair of barracks' and quarters' utilities, the entire administrative process of the Fort, supply and mess, and troop unit performance. Even dependent tenants of Army housing took courses on how to maintain their dwellings, including minor repairs.

Operation OVERDRIVE was successful not only as a means of making more efficient use of resources but also in highlighting the close and necessary relationship between the combat readiness of a unit and its supporting business management.

Operational Analysis

The U.S. Army Command in the Caribbean, because of limited resources, was faced with the elimination, reduction, or consolidation of many activities during fiscal year 1960. To accomplish the assigned missions with as little loss of effectiveness as possible, a composite management survey team was formed, made up of full-time representatives from the comptroller, personnel, logistical, and engineer staff sections. This team carefully worked out a plan for analyzing all nontactical activities according to a rigid schedule. The survey of each activity consisted of two major phases, presite and onsite. In the presite analysis the management team studied the operating program, budget, standing operating procedures, internal and external reports, inventory status, facility utilization, and capital equipment requirements and thus arrived at a list of potential problem areas and

an over-all plan for the onsite study. This phase was then followed by the fact gathering and analytical onsite phase.

This intensive and comprehensive type of analysis was found to be more effective than the short, special purpose surveys that were previously utilized. The most significant single advantage gained from this improvement technique was the rapid resolving of conflicts over proposed and existing policies and systems.

Operational analysis, as these surveys were called by the local command, provided the means by which reductions and consolidations of functions were carried out while retaining the most essential functions of the U.S. Army in the Caribbean.

Work Simplification

Work simplification has its roots in scientific management through the use of selected tools and techniques such as work distribution charting, flow process charting, motion economy, and layout studies. These techniques are normally taught in scheduled classes and laboratory sessions, and instructions follow up on the student long after the class work is over. This helps to assure continued use of the techniques for many years.

During fiscal year 1960 an appraisal was made of the Army work simplification program with the result that the Army's program showed up very favorably when compared with similar programs in private industry. In most comparative cases studied, Army efforts for work simplification far exceeded those of private industry.

During fiscal year 1960, more than 10,000 supervisors were given class and laboratory work in the preparation of work distribution charts, flow process charts, motion economy, and layout studies. Improvements installed during the year totaled more than 5,000 with an estimated $5 million in benefits to the Army. During the past 8 years 130,000 supervisors were trained in work simplification techniques producing 72,000 installed improvements with benefits amounting to $78 million. The improvements installed through work simplification came from personnel closest to the point where the work is done.

VIII. Budget

Budgetary Trends

In the years since the Korean war annual direct obligations in the Army budget have remained relatively constant. The average direct obligations of the Army for the 7-year period following the Korean war amounted to about $10 billion per year.

To help finance this program the Army had access to some of the unobligated balances built up during the Korean war, particularly the sizable carryover of funds in the appropriation for the Procurement of Equipment and Missiles. In the years immediately following the Korean war the Army's procurement program was financed in part from these carryover funds, thereby decreasing the need for new obligational authority. The Army was not permitted to use all the unobligated balances of the Korean war, however, since the Department of Defense and the Congress designated substantial portions of these for other purposes. In the past 2 years, fiscal years 1959 and 1960, the unobligated balances or carryover funds from previous years were relatively small and new appropriations were required to meet procurement objectives.

Another source of financing available to the Army since the end of the Korean war was an artificial one—the drawdown or reduction of inventory. This source has been available because of the abnormally high stock fund inventories due to the logistical buildup for the Korean war. Also, improved supply management procedures in that part of the Army supply system financed by the Army Stock Fund have enabled the Army to operate more efficiently without procuring supplies to replace some inventories used. As a result, the Army has drawn down its inventories and has generated $2.8 billion of cash from the Army Stock Fund, over and above operating needs. This cash was either turned over to the U.S. Treasury or was transferred to other Army or Department of Defense accounts. This source of ready cash from the stock fund, however, has been reduced to a fine point today.

Although the availability of funds from previously unobligated balances and drawdown of inventories provided an element of flexibility to Army financing, the Army has been hardpressed to support its forward deployed forces on the borders of the free world while expanding its activities at the same time. Some of the biggest new

activities were the development, procurement, and deployment of missiles both for air defense and for ground support, the vast extension of horizons in communications and the efforts to modernize a variety of equipment necessary for the new demands of warfare. In addition to these and other costly long-range programs there were temporary troop movements and logistical buildups generated by threats to national and world security, including those in Berlin, Taiwan, Lebanon, and Laos.

Financing these expanded functions has been extremely difficult since the end of the Korean war, and the Army's financial management problems have been further aggravated by a continuing depreciation of the dollar and a gradual advance of about 10 percent in wholesale prices.

Effect of Budget on Army Programs

Materiel Modernization

The Army has been urging materiel modernization at a level which would require an average annual investment of $2.5 billion to provide items adjudged to be the highest priority equipment for Army tasks in cold, limited, and general war. This sum has not been made available in the past and funds which were provided were barely sufficient to replace the annual losses of equipment due to consumption, wearout, and obsolescence. However, modernization has been effected in some degree because the quality of a portion of the Army's equipment inventory has been enhanced by procurement of new missile systems and some advanced firepower, mobility, and communications items. The funds included in the fiscal year 1961 budget, though again short of Army modernization needs, will be sufficient to replace with modern equipment most of the items which will be lost during the fiscal year from wearout, obsolescence, and consumption in training. Thus, some limited progress is being made in modernization.

Military Construction

In military construction, top priorities given to the special construction required for the surface-to-air missile program resulted in severe limitations on construction needed to modernize permanent installation facilities. A long-range military construction program developed originally by the Army in fiscal year 1954 was almost 50 percent (over $2.5 billion) behind schedule at the end of fiscal year 1960. To complete the construction program by the target year, 1974, more than

$200 million per year would be required. Obligations for the permanent plant portion of the construction program amounted to only $85 million in fiscal year 1960.

Operations and Maintenance

In operations and maintenance the overriding priority to provide as adequately as possible for requirements directly associated with the combat readiness of operating forces has necessitated a continuing reduction in facility and equipment maintenance levels since the end of the Korean war. The backlog of essential facility maintenance projects deferred through necessity has continued to increase. In addition, many requirements for rebuilding unserviceable but repairable major items of equipment remained unfunded during the past year.

During fiscal year 1960 an intensive effort was made to reduce maintenance costs by improving procedures, by reducing where possible the amount of maintenance required, and by more efficient use of facilities and equipment.

During fiscal year 1960 the backlog of deferred equipment maintenance has not increased, and in fiscal year 1961 this backlog is expected to be held in check. Just as a material reduction of the backlog of maintenance was not possible in fiscal year 1960, so it is expected to be in 1961.

Budget Management

The Army has made great strides in improving its financial management in recent years by relying on costs, rather than obligations, as the indicator of accomplishment. Starting in fiscal year 1960, the operating programs of the Army were developed and periodically reviewed on the basis of costs rather than obligations. This transition, which has been a 10-year project stemming from the intent of Public Law 216, 81st Congress, in enabling Army commanders at all levels to review more meaningfully the efficiency with which activities within their commands are being conducted. The quality and accuracy of the information generated under the Army's cost system is now being developed sufficiently so that a cost-based budget can be presented to the Congress.

Another improvement in budget management was a revision of the appropriations structure. The most important change was the consolidation of the testing and evaluation aspects of research operations and all other direct costs into the new Research, Development, Test,

and Evaluation appropriation. This has opened the door for management improvements in the research area. During fiscal year 1960, the first year of centralization of funding authority under a single program director, an acceleration of the entire research and development process was brought about because of the precision and expediency with which funds could be managed.

New Obligational Availability

During fiscal year 1960, the Department of the Army received a total of $9.960 billion in new obligational availability for financing the programs vital for a strong modern Army. This sum represents a $204 million increase over fiscal year 1959 which resulted primarily from: (1) Funds appropriated in fiscal year 1960 for modernization of capital equipment; (2) increases in the Reserve and National Guard programs; and (3) a higher fiscal year 1960 appropriation for construction which was necessary because of the depletion of unobligated military construction balances of prior years.

Direct Obligations

The Army's direct obligations in fiscal year 1960 amounted to $9.867 billion, or an increase of $313 million over direct obligations in 1959. Most of the additional money was spent for procurement of equipment and missiles, while increases and decreases in all other appropriations essentially offset each other.

Expenditures

In recent years, expenditure limitations have become an increasingly important factor in determining the levels of Army appropriations and obligation programs. In view of the requirements to provide for expenditures to meet rising operating costs, the proportion of the overall total available for capital expenditures has been growing smaller.

Army expenditures for fiscal year 1960 totaled $9.392 billion, a decrease of $76 million from the fiscal year 1959 level. The effect of this low expenditure level was to continue the need for program shifts and stretch-outs and a continuation of a policy of "living off the shelf" for many consumable supplies.

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ARMY

DIRECT OBLIGATIONS

(Millions of Dollars)

Appropriation Category and Title	*Fiscal year 1959*	*Fiscal year 1960*
Military Personnel		
Military Personnel, Army	3,501.6	3,469.7
Reserve Personnel, Army	213.5	220.8
National Guard Personnel, Army	208.9	231.1
Operation and Maintenance		
Operation and Maintenance, Army	3,086.9	3,063.1
Operation and Maintenance, Army National Guard	140.7	150.8
Nat'l Board for the Promotion of Rifle Practice, Army	.3	.3
Operation and Maint. Alaska Comm System, Army	5.7	6.9
Prep for Sale or Salvage of Military Property, Army	----	----
Procurement		
Procurement of Equipment and Missiles, Army	1,097.0	1,387.6
Research, Development, Test and Evaluation Research,		
Development, Test & Evaluation, Army	1,021.5	1,072.2
Military Construction		
Military Construction, Army	239.8	232.4
Military Construction, Army Reserve	23.9	15.9
Military Construction, Army National Guard	14.8	16.6
Construction, Alaska Comm System, Army	.1	.1
Total	9,554.7	9,867.5

IX. Conclusion

The decade of the 1960's will be of crucial importance in the conflict between the Communist bloc and the free world. Several important factors will affect the capability of the United States to maintain its position as leader of the free world. These include the impact of the increasingly rapid advances in technology on the art of war; the increasing power of the Communist bloc not only in the military sense but also in the economic, political, and scientific areas; the impacts of the emerging "third force" nations on the power balance; and the relative ability of the United States and the free world on the one hand and the Communist bloc on the other to best organize and apply resources, both material and spiritual.

The U.S. Army will have a highly important role in the changing world of the next 10 years. In filling this role, it must continue to improve its capabilities to deter and, if necessary, to engage successfully in any form of war throughout the spectrum.

In general war, Army forces are necessary both for United States survival and for ultimate success. In the event of general war, forward deployed forces of the Army, with those of the other Services and our allies, should prevent seizure of critical land areas and populations by Communist forces. Army air defense forces would assist in minimizing the damage to the United States. After a thermonuclear exchange, Army forces would play a major role in the national postattack recovery effort, the defense of the United States against all forms of further attack, the continued defense of critical land areas, the counteroffensive to defeat Communist forces, and the eventual seizure and control of land areas and their populations as required to bring the conflict to a successful conclusion.

It is also important to understand that, without a manifest ability to carry a long general war to a successful conclusion, the United States deterrent to general war might not be adequate, for a potential enemy may come to believe that he can recoup or counterbalance first phase losses through relatively unopposed conquest in the subsequent place.

Deliberate resort to general war is neither a credible nor a rational course of action for the Communist bloc as long as the United States

maintains effective, balanced deterrent defensive and retaliatory forces. Limited war, on the other hand, might well prove to be advantageous to the Communists, to gain objectives otherwise unobtainable.

To meet the requirements for and threats of limited war, adequate, modernized, dual-capable ground forces, together with dual-capable naval and air forces, are essential to the free world just as they are in general war. Without them, Communist threats to use of conventional forces or the actual use of such forces could achieve piecemeal absorption of more and more of the free world into the Soviet bloc.

A strong and modern U.S. Army, suitably deployed, backed up by mobile reserves, and having tactical atomic weapons readily available but able to fight successfully with or without them, is an essential component of adequate over-all free world forces. Without such U.S. Army forces obviously ready and willing to fight in any form of war, other free world nations may not have the strength or will to oppose Communist threats or actual force.

In the cold war, Army forces stationed overseas, the Strategic Army Force (spearheaded by the Strategic Army Corps) and the Army's continental base are essential to the free world's concepts of collective security and forward strategy and make a major contribution to the deterrence of Communist resort to war. Furthermore, in the cold war, the manifest readiness of such forces to move to support a threatened free world country provides a real bulwark of power which lessens the blackmail or coercive effects of Communist threats to use force. Because of this bulwark, the leaders of the weaker free countries, particularly those along the borders of Red China and those in the Middle East, can take effective action against Communist infiltration, subversion, and coercion without being blackmailed into compromise by the threat of local, overt Communist intervention.

Those Army units stationed overseas are an especially potent symbol of American resolve to make collective security work. They exercise a stabilizing effect and strengthen the resolve of allies by demonstrating the willingness of the United States to stand shoulder to shoulder with them in the face of danger. The Army forces in Europe, Korea, and the Pacific area as well as those in strategic reserve in the continental United States, should not be diminished. In fact, in the years ahead, it may become necessary to increase our Army forces by moderate amounts to meet fully the diversified threat posed by international Communism.

Progress was the mark of the Army in fiscal year 1960 as it has been throughout the 5 years of my stewardship and, for that matter, throughout the Army's entire history. It is essential for the safety of America and the free world that this progress be continued and accelerated during the critical years ahead.

Wilber M. Brucker.

WILBER M. BRUCKER,
Secretary of the Army.

Annual Report

of the

SECRETARY OF THE NAVY

July 1, 1959, to June 30, 1960

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Introduction

New dimensions are being added to naval warfare and to the naval mission.

There have been challenges and contests of varying sorts over use of the seas since the time when travel upon the waters of the earth first began. As these waters became more and more significant in human relations and endeavors, progressively more sophisticated and purposeful measures have been sought and employed to assure the ability to use them.

Historically, the basic approach to seaborne armament has been to base the top weapon of the day on a ship. So armed, it has then been fundamental naval strategy to exploit the advantages of freedom of movement, dispersion, and concealment which the oceans offer, thereby achieving the mobility and versatility which are characteristics of the naval force. Evolution of this process has paved a long and widening highway of naval weapons and tactics development, leading to the guns, amphibious troops, floating airfields, and missiles of today, with constantly advancing ranges and accuracy and now the awesome power of atomic warheads. Through many years, the elements which surround the sea have been probed for that added bit of military advantage which, with competent armament, often forms the narrow margin between victory and defeat.

The current period has seen the advance of sea sciences and naval weaponry reach and pass new and important horizons. We have explored the oceans to their greatest known depths and to their polar regions—and have enabled humans to exist and operate there. We have broken through the earth's external physical barriers to extend greatly the capability of human observation and communication. We have pushed human speeds and weapon velocities far beyond previously conceived ranges. We have greatly extended human limits of comprehension and reaction by the use of electronic computation and direction. Highlighting the whole, we have now bridged these horizons with a naval weapon system that will exploit the new dimensions to the full; more important—for the time being at least—we thereby preserve these new frontiers to the cause of peace and freedom.

The Fleet Ballistic Missile Weapon System

This is the year of POLARIS—the Navy's fleet ballistic missile. A year of final developmental push has brought to successful demonstration a completely new weapon system, 3 years earlier than originally contemplated.

POLARIS started from "scratch," as it were, relatively few years ago although the technical feasibility of the major components and principles necessary for its success was known. The weapon system is a logical marriage of the nuclear-powered submarine and a newly developed underwater-launched ballistic missile of great destructive power. It was necesary to solve a multitude of unprecedented technical and engineering problems in its development. Prior Navy experience in solid-propellant rockets and advanced shipboard control systems aided their solution considerably.

Culminating an accelerated parallel development of all elements of the system, the first full-scale launching of POLARIS missiles from a submerged nuclear-powered submarine took place successfully on July 20, 1960, off the eastern coast of Florida. For the first time in history, a preaimed missile has been fired from a completely submerged naval combatant vessel into space and back into the atmosphere to a distant predetermined target.

The advantages of the far reaches and depths of the sea, the atmosphere, and space thus are joined for the employment of a potent deterrent to enemy attack. The new naval capability, having solved the extreme complexity of its offensive task, now shifts the tactical burden to the enemy defense. It enlarges this burden considerably and poses a new and exquisitely complicated defensive problem for him.

Growing Naval Frontiers

Along with POLARIS and other advances in destructive weapons and their accessories, there has been an important enlargement of the sea arena during this period, and future years will see additional extension of naval operational limits above, on, and below its surface.

Manned penetration to the bottom of the deepest ocean area known has been achieved—in the Marianas Trench of the Pacific Ocean at 35,800 feet. Two men reached that depth January 23, 1960, in the Navy research vessel *Trieste*, called a bathyscaph, and successfully made initial scientific observations there. This accomplishment is a positive herald of the eventual use of all ocean depths and their boundless resources for mankind's benefit—humanitarian or military.

Navigation, under ice, of the north polar regions has been performed successfully by U.S. Navy submarines and prompts considerably

greater naval interest in those regions. To a degree, the voyages have reclaimed them from the category of an unexplored unknown and have opened them to potential use as navigable ocean highways.

At the other end of the world, Navy support forces continue to assist in the scientific exploration of the south polar land masses and the sea around it, and our knowledge of the area grows. Near-future installation of a nuclear reactor will initiate the application of atomic energy to further exploration and development of the new continent. And so the Antarctic waters likewise acquire fresh importance as an oceanic line of communication.

These accomplishments, and others described in this annual report of the Secretary of the Navy, exemplify the breadth of the Nation's charge to its Navy and Marine Corps—to assure availability of the vital seas and to prevent their hostile use. Science and technological progress are adding steadily to the naval arsenal required to maintain this assurance; they are also adding to our dependency upon it. The frontiers of sea warfare are expanding. Alertness and constant improvement of the strength and capability of the naval service are demanded in order to keep pace.

I. The Fleet

The Naval Mission

The mission of the Navy is implicit in law and directives of the Secretary of Defense—a continuing responsibility to be "organized, trained, and equipped primarily for prompt and sustained combat incident to operations at sea," and, additionally, "responsible for the preparation of naval forces necessary for the effective prosecution of war, except as otherwise assigned . . . ." The combatant naval forces so developed are assigned to the operational command of unified or specified commanders, and are united with components of the Army and the Air Force to form efficient operating teams.

The objectives of the armed forces thus maintained are traditional: To support and defend the Constitution of the United States against all enemies, foreign and domestic; to insure the security of the United States, its possessions, and areas vital to its interests; to uphold and advance the national policies and interests of the United States; and to safeguard the internal security of the United States.

Naval forces have specific tasks: To seek out and destroy enemy naval forces and suppress enemy sea commerce; gain and maintain general naval supremacy; control vital sea areas and protect vital sea lines of communications; establish and maintain local superiority (including air) in an area of naval operations; seize and defend advanced naval bases; and conduct such land and air operations as may be essential to the prosecution of a naval campaign.

Implementation of National Policy

International communism continues to be an aggressive threat to the security of the United States and other free nations. Soviet Russia persists as a major source and exponent of this threat.

Prevention of general war is primary; containing and subduing limited wars is next in major importance. Unmistakable assurance of devastating retaliation serves to deter Communist forces from initiating a general war. Naval forces continue to form an essential part of this deterrence and to contribute in a unique degree to the Nation's capabilities in limited war and the lesser disputes which have become typical of recent world unrest.

The attack carrier striking forces, REGULUS missile-equipped submarines, and cruisers are on station, teamed with other forces of

unified and specified commanders and ready to respond to any attack. The Navy is pressing its efforts to achieve the earliest practicable operational readiness of its ballistic missile submarines. To inhibit and cope with limited wars, mobile naval task fleets, using the seas as their base of operations, are either operating near scenes of possible conflict or ready for rapid deployment thereto. The deployments of these fleets and those of U.S. ground and land-based air forces are coordinated under the over-all direction of the Joint Chiefs of Staff.

The Sixth and Seventh Fleets cover thousands of miles of the southern and eastern perimeter of the Sino-Soviet bloc. The Second and First Fleets are maintained ready for forward deployment, either to reinforce engaged forces or to move to other areas to assist our allies. These versatile units in waters adjacent to areas of tension have had a stabilizing effect, deriving from their capability to apply, in a selective manner, a degree of power varying from a show of force or an amphibious landing to a heavy nuclear strike.

In executing peacetime polices of the United States, the contribution of naval forces ranges from humanitarian assistance to good will visits to foreign ports. Visits by friendly warships, individually or collectively, are accepted by custom and tradition, and U.S. naval vessels and personnel are helping greatly to advance the President's people-to-people program.

Changing Concepts of Naval Warfare

Preparation of naval forces for war involves the fitness both of present ships, aircraft, and weapons and of the types of forces and weapons required to carry out future combat operations. Achievement of a proper balance between current forces and future readiness is a difficult problem, faced continually by all the military Services.

Certain changes in warfare are underway now; others are discernible in the future. One present need is to increase further the security of our retaliatory system against surprise missile attack. Diversification of weapon systems, operating from both land and sea, will help to assure the survivability of a deterrent to abortive enemy action. Forces at sea can exploit to still greater degrees the advantages of mobility, concealment, and dispersion available to them.

With the likelihood growing that future attempts at aggression will take a form less than general war, overseas offensive power must be versatile and capable of containing the threat and helping free nations counter it. The need for prompt, sustained, and discriminating response will in the future place increasing demands upon the versatility and flexibility of naval forces. Inherent mobility will permit their de-

ployment throughout the tremendous base of operations offered by the seas. Their composition will be scaled to the specific emergency.

New weapons and methods of propulsion are increasing operational effectiveness and enabling naval forces to adopt new tactics. Space systems will contribute substantially in surveillance, communications, meteorology, navigation, and other fields. The seas themselves offer potential bases for launching, controlling, and recovering these space systems. By thus developing improved naval forces to fit future needs, these forces will continue to be an excellent instrument of national policy and an even more important contribution to the composite armed strength of the United States.

Technological Challenges

As the technological frontier advances, new challenges arise in all areas of naval warfare. Technical superiority of the Fleet is emphasizing the need of such forward-looking efforts as the following:

IN UNDERSEA WARFARE—to develop equipment that can discriminate positively between real and false target echoes at great range and depth.

IN ANTISUBMARINE WARFARE—to develop combat equipment and tactics that will overcome the advancing speed and depth advantages of the modern submarine.

IN SURFACE WARFARE—to develop reasonably inexpensive surface-to-surface missile systems for destroyer, amphibious, and service-type ships to replace present gun batteries.

IN AIR WARFARE—to exploit new propulsion and airframe development; to improve strike and defense capabilities by means of better missiles, advanced instrumentation, greater destructive yield from explosives, and techniques for operating in all kinds of weather.

IN SPACE TECHNOLOGY—to explore critically the use of satellites for navigation, communication, and reconnaissance; to study techniques for the use of space by tactical commanders.

IN ELECTROMAGNETIC DEVICES—to devise systems for detecting aircraft and missiles at very long ranges, including targets moving beneath the line-of-sight capability of present detection systems.

IN COMMAND AND CONTROL—to develop very high capacity communication systems or links having capabilities of extremely rapid transmission and reception with automatic data processing and display.

IN SHIPS AND VEHICLES—to develop propulsion systems and hull contours that will reduce radiated noise and thwart localization by sound detection systems.

Fleet Operations and Training

Employment of Forces

The necessity for employment of U.S. naval forces overseas remains constant, and the fleets continue on station in many critical areas. The Sixth Fleet is in the Mediterranean, the Seventh Fleet is in the western Pacific, and other forces are in the Middle East. Additional Atlantic and Pacific Fleet units are ready for immediate movement to troubled areas. Fleet striking power is built around aircraft carriers and amphibious forces, supplemented by antisubmarine and logistic components. In all operations and training exercises, there is continued attention to improving striking power, antisubmarine, and air warfare capabilities.

Antisubmarine warfare is still a problem of major proportions. Training and exercises in this specialty are constantly in progress in order to achieve proficiency in the use of equipment and tactics necessary to combat the submarine threat.

Exercises covering all facets of naval operations are being conducted by Fleet units deployed around the world. Naval units are constantly preparing for combat operations and supporting U.S. policy from the Arctic to the Antarctic. They are participating in NATO, SEATO, CENTO,* and other bilateral exercises, supporting other U.S. Services in their missions, and conducting special cruises and humanitarian missions. International good will is being advanced by personal contact with local inhabitants of the ports visited, and through participation in rescue and assistance missions.

Large-Scale Exercises

The operating schedules and requirements of the four major fleets permitted inclusion of a number of large-scale exercises during the past year. These exercises covered all types of training for our ships and included many operations with our NATO, CENTO, and SEATO allies.

Exercise CRESCENT MACE† brought together the Sixth Fleet and units of the United Kingdom and Turkey in Ionian and eastern Mediterranean areas in September 1959. Exercise BIG DEAL II was conducted by the Second and Sixth Fleets in February 1960 in the western Mediterranean upon the occasion of the routine relief of ships in the Sixth Fleet and emphasized atomic strike and antiair warfare exercises. The Persian Gulf was the scene of a naval

*NATO—North Atlantic Treaty Organization
SEATO—Southeast Asia Treaty Organization
CENTO—Central Treaty Organization

†(Nicknames are given to major exercises and other operations and projects for convenience in reference and communications.)

exercise for the CENTO forces participating in MIDLINK II in November.

Fleet operations in the western Atlantic and eastern Pacific included numerous exercises emphasizing combat readiness. Amphibious training exercises with Marine Corps troops, using both vertical-envelopment and over-the-beach assault techniques, were prominent among these Fleet activities.

Atomic strike, antisubmarine, and mine warfare exercises were stressed by ships comprising the Seventh Fleet in waters of the Far East. Exercises such as SEA LION during May 1960, in which a convoy was supported against simulated air, surface, and submarine attacks, were conducted with our SEATO allies; also, a number of warfare techniques were demonstrated for SEATO military leaders. On several occasions joint exercises were held with ships of the Japanese Maritime Self Defense Forces. Antisubmarine exercises, such as UNITAS, were conducted with South American naval units.

Special Operations

Submerged Record

On May 10, 1960, U.S.S. *Triton* (SSRN 586) surfaced off the Delaware coast, having completed a submerged circumnavigation of the earth in 84 days. Following many of the routes taken by Magellan, *Triton* cruised 46,000 miles and set an endurance record which is expected to last for some time. (See figs. 1 and 2.)

Arctic Operations

U.S.S. *Sargo* (SSN 583) in February 1960 penetrated the Bering Straits under the ice, and made another penetration to the North Pole following similar underice cruises by the nuclear-powered submarines *Nautilus* and *Skate*. *Sargo*'s cruise was especially significant because she proved the Arctic route to be usable in any season. (See figs. 3 and 4.)

Antarctica

Logistic support operations for Operation DEEP FREEZE 60 began in October 1959 with the arrival of aircraft of Air Development Squadron 6 in Antarctica. Ski-equipped C–130 aircraft delivered 400 tons of cargo and proved the feasibility of landing heavy four-engined aircraft on snow airfields near the Pole and Byrd Stations. U.S.S. *Atka* (AGB 3), first of eight participating ships, reached McMurdo Sound on December 15, 1959. A channel through the bay ice was completed sufficiently to permit off-loading of U.S.S. *Arneb*'s (AKA 56) cargo to commence on December 29.

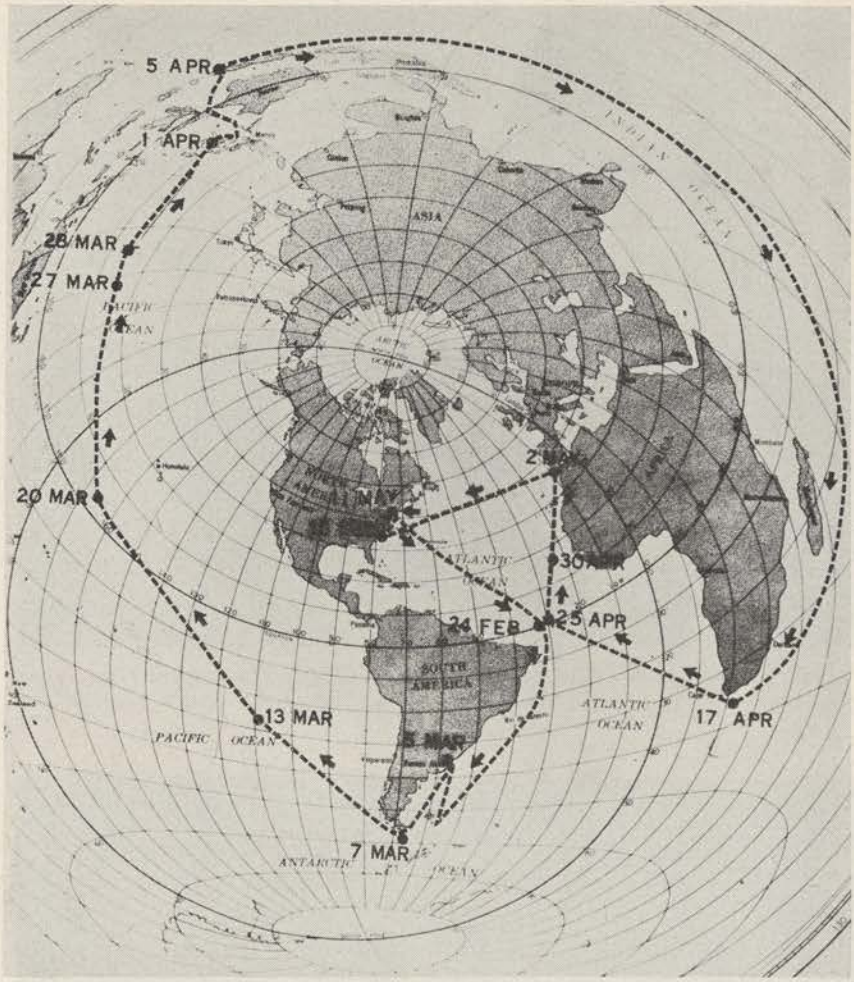

Figure 1. Course followed by U.S.S. Triton (SSRN–586), world's largest submarine, on her shakedown cruise in which she circumnavigated the globe submerged.

Reconnaissance and photo mapping were accomplished in selected areas of Marie Byrd Land on flights between stations and in support of traverse parties. There is, however, an urgent need to put our Antarctica mapping efforts on a systematic, large-scale basis to achieve adequate results.

After two previous attempts since the inauguration of DEEP FREEZE operations, a successful penetration of the Bellingshausen Sea was accomplished—the first time by any country. It afforded a 2-week period of geographical and photographic studies (including establishment of ground control points for future charting work) in

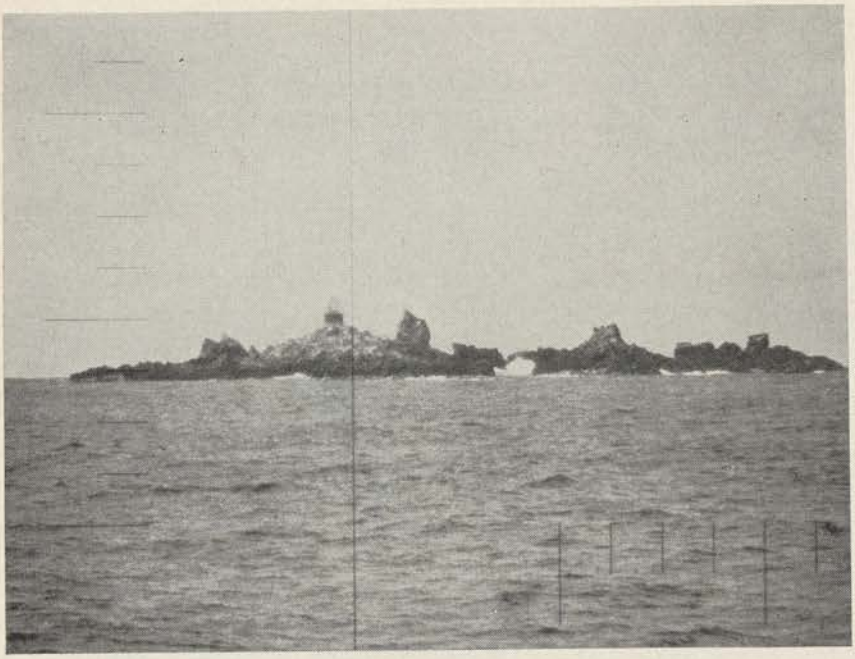

Figure 2. Through the Triton's periscope—Saint Peter and Saint Paul Rocks jutting out of the Atlantic Ridge in midocean between South America and Africa.

Figure 3. Night at the North Pole—The nuclear-powered submarine Sargo rests quietly in the Arctic ice at the geographic top of the world.

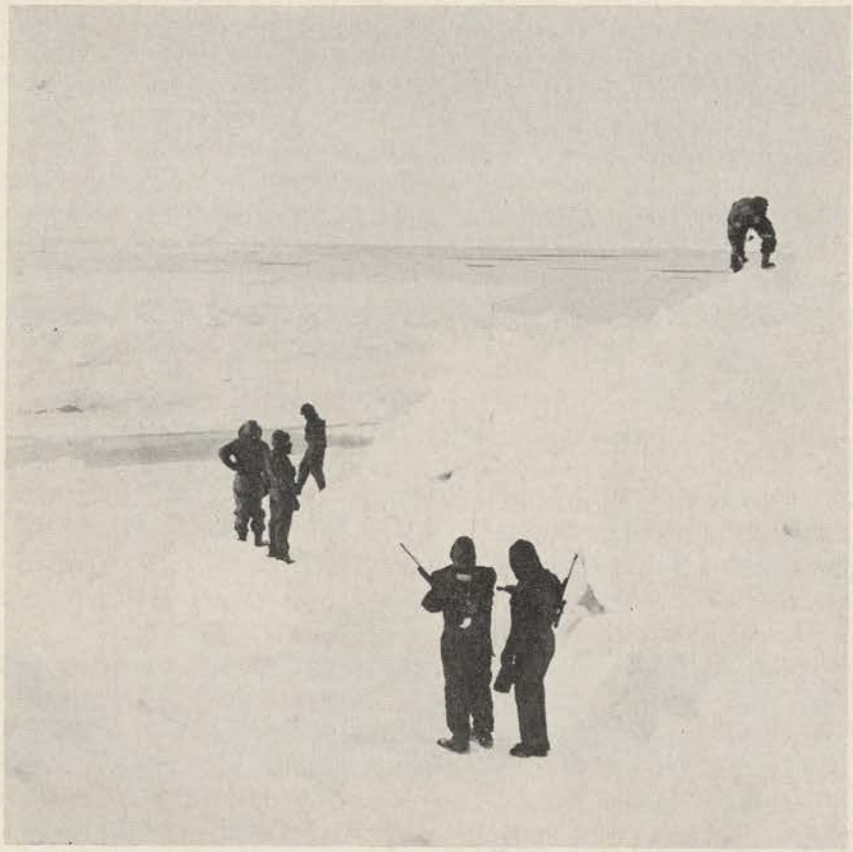

Figure 4. An ice exploration party alongside one of the ridges bordering a polynya (hole in the ice) in which the U.S.S. Sargo surfaced. The Sargo surfaced through the ice seven times en route to the North Pole.

the Thurston Peninsula area, plus an initial program of hydrography, oceanography, meteorology, geology, and biology. In addition, U.S.S. *Burton Island* (AGB 1) conducted oceanographic surveys on its voyages to and from the Bellingshausen coastal area, and stopped briefly at Peter I Island to enable scientific survey. The Bellingshausen Sea mission was curtailed in order to respond to calls from the Argentine icebreaker *San Martin* and the Danish ship *Kista Dan* under charter to the British Antarctic Expedition, both of which were trapped by ice in Marguerite Bay off Palmer Peninsula.

All resupply was completed, and the last ship left Antarctica on March 23, 1960.

Project MERCURY

The Project MERCURY program to achieve orbital flight and successful recovery of a manned satellite is a matter of national

urgency. Navy participation in this program has been principally in planning for normal recovery and contingency recovery operations, developing techniques and usable recovery equipment, and operations at sea involving search for and recovery of the MERCURY capsule. The support furnished by Fleet units has been extensive.

During the past year, shots requiring capsule recovery have been fired from Wallops Island, Va., and Cape Canaveral, Fla. Support of these tests used a total of 2,051 aircraft flying hours and 97 ship-days at sea. Responsive to the tempo of test firings scheduled by the National Aeronautics and Space Administration, since January 1960 the amount of Navy support required has been increasing as the program progresses.

First Shipboard Launching of POLARIS

On August 27, 1959, U.S.S. *Observation Island* (EAG 154) made the first shipboard launching of a POLARIS missile. This eminently successful shot was made from the sea area off Cape Canaveral, Fla.

Visits to Foreign Ports

Unusual ports were included in the cruise of U.S.S. *Jonas Ingram* (DD 938). With Commander, South Atlantic Force, embarked, the destroyer visited African ports in Senegal, Sierra Leone, Belgian Congo, Republic of Congo, southwest Africa, Union of South Africa, Mozambique, Mauritius, and Tanganyika. U.S.S. *Valor* (MSO 472) visited the Ivory Coast, Belgian Congo, Sierra Leone, and the Canary Islands. U.S.S. *Maury* (AGS 16) had the unusual opportunity of visiting Odessa, Russia. She was the first U.S. Navy ship to enter the Black Sea since 1945, when U.S.S. *Catoctin* operated as headquarters ship for the Yalta Conference of heads of state.

The Battle of the Coral Sea celebration, conducted annually in Australia, was the occasion for visits to nine ports by five different types of U.S. Navy ships from mid-April to mid-May. The crews of these ships joined the Commander-in-Chief, U.S. Pacific Fleet, and the Australians in the commemoration of that famous battle which prevented the invasion of Australia by the Japanese during World War II.

Humanitarian Operations

Sea-induced accidents, natural disturbances, severe weather, and similar hazards are common on the seas and littorals of the world. In the tradition of the sea, the U.S. Navy stands ready to render all practicable aid and assistance to ships or persons in distress. During

the year, a number of noteworthy actions were taken to relieve human suffering and salvage valuable property; some examples follow:

Typhoon Vera struck Nagoya, Japan, on September 29, 1959. U.S.S. *Kearsarge* (CVS 33) and embarked Helicopter Squadron 6 rendered assistance until October 4 when Japanese authorities were able to cope with the situation.

Agadir, Morocco, was the scene of a devastating earthquake on February 29, 1960, which leveled a large portion of the resort city. Naval aircraft and personnel from Port Lyautey and U.S.S. *Newport News* (CA 148) from the Sixth Fleet participated in the emergency relief operations until March 5.

Four Russian soldiers were rescued from their drifting landing craft about 1,000 miles west-northwest of Midway Island in the Pacific Ocean by U.S.S. *Kearsarge* (CVS 33) on March 7, 1960. The soldiers had been adrift for several weeks after their engine failed during maneuvers at sea off the Kamchatka Peninsula.

Floods inundated the Paramaribo area of northeastern Brazil in late March. U.S.S. *Glacier* (AGB 4) interrupted her return from Antarctic operations to work with local authorities in the Fortaleza area from April 2–13, 1960. *Glacier* provided helicopter and boat transportation and emergency supplies to beleaguered residents in the area.

Exceptionally severe earthquakes rocked southern Chile in late May and June 1960, injuring and killing hundreds and doing physical damage of such severity that the general economy of the area was greatly affected. From June 15–21 a survey of the disaster area was made to determine Chile's requirement for ships and craft in the relief effort. U.S.S. *Catamount* (LSD 17) sailed on June 26 for Valparaiso with much needed water transportation (three LCU's, three LCM's, and six LCVP's). These craft are being loaned to the Chilean Government to assist in rehabilitating the area.

For the first time in 5 years a Navy ship, the U.S.S. *John S. McCain* (DL 3), visited Calcutta, India. She delivered medical supplies valued at $5,000 to aid flood relief in the west Bengal area.

The British freighter S.S. *Shunlee* grounded on Pratas Reef in the South China Sea on June 8 endangering the lives of her 54 crewmen and passengers. Helicopters from the U.S.S. *Yorktown* (CVS 10) lifted all survivors to safety.

Military Assistance to Other Nations

The Navy portion of the Military Assistance Program, as approved for this fiscal year, aided 30 countries. It included ships, aircraft, weapons, and the necessary matériel to support such components.

Total cost of this grant-aid program was $137,656,000; of this sum $15,811,000 was spent overseas for procurement of material. The value of military sales during the year was $64,349,872, representing the amount of Navy equipment and other matériel sold to 29 foreign countries under the mutual security program. The value of such sales is steadily increasing, and with many nations becoming more self-sufficient economically this trend will rise sharply. Grant-aid and military sales programs are providing our allies with matériel ranging from basic conventional arms for relatively undeveloped countries to advanced weapon systems for highly developed countries.

In support of the Military Assistance Program, efforts to establish weapon production capabilities abroad are intended to make our NATO partners self-sufficient in producing their weapons needs. At this time, the SIDEWINDER and BULLPUP aircraft missiles and the MARK 44 antisubmarine torpedo are naval weapons which are being cooperatively produced by our European allies under the aegis of NATO.

Air Training and Safety

Pilot production in the Naval Air Training Command for the fiscal year 1960 was 1,611, compared with 1,789 in the previous year. Reductions in available aircraft and funds were the major limiting factors.

Students commenced training in the new North American T2J plane in the Basic Training Command during this year. Introduction of this basic jet trainer provides the jet graduate with increased experience and more jet time in the Training Command before his transition to fleet-type aircraft.

This has been the safest year in the history of naval aviation. The aircraft accident rate reached an all-time low of 1.9 per 10,000 flight hours, a reduction of 28 percent from the previous year's rate of 2.6. Although individual accidents were more expensive, the total dollar loss has also decreased, from $311 million to $226 million.

The accident rate's decline has been general in every phase of naval aviation, but the most significant area of improvement has been in the carrier landing rate. More large modern carriers in the Fleet, coupled with angled decks, mirror landing systems, and improved techniques have helped to reduce carrier landing accidents from 6.0 to 3.7 per 10,000 landings. Over 50 percent of this year's carrier landings were made by high-performance swept-wing jets.

Both the severity of accidents and their individual costs have increased with the growing proportion of heavy high-performance aircraft. Over half of all accidents result in "strike" damage* to the air-

*(i.e., damage beyond economical repair)

craft, and the average cost per accident is now approximately $404,000. This cost can be expected to increase in direct proportion to the greater cost and complexity of aircraft.

Operational Readiness and Capability

Air Strike Warfare

The Navy's carrier striking forces are composed of attack carriers, cruisers, and destroyers, some of them equipped with guided missiles. They form a powerful and versatile attack team. The 14 attack carriers provide a prompt and effective projection of armed strength, competent to inhibit or cope with limited wars while maintaining a ready posture against the threat of general war. Their capability includes that of supporting amphibious operations. Eight are assigned to the Pacific Fleet and six to the Atlantic Fleet. The *Independence* (CVA 62), fourth of the *Forrestal*-class carriers, completed final acceptance trials in November 1959 and deployed to the Sixth Fleet in August 1960. Seven of the present *Essex*-class attack carriers were first commissioned during World War II.

Each attack aircraft carrier can now launch 40 to 50 attack aircraft. Each carrier striking force includes a combination of all-weather attack aircraft, which can deliver nuclear weapons to a radius of over 1,000 miles, and light jet attack aircraft which can, with in-flight refueling, deliver nuclear and conventional weapons to a radius of 900 miles. The A4D–2N plane, introduced this year, will improve the all-weather capability of light attack units. A large proportion of Navy attack aircraft is capable of close air-support operations. In limited war situations, the air groups can deliver conventional bombs, rockets, air-to-surface missiles, napalm, and gunfire promptly and accurately, while concurrently establishing and maintaining air superiority over the objective area.

Navy capability to conduct nuclear warfare has been increased by improvements in weapons and aircraft. At the same time, its ability to conduct limited war with conventional weapons has increased, furthering its competence to apply discriminately the proper type of force in the proper increment at the most opportune time.

Antiair Warfare

"Antiair warfare" has replaced "Fleet air defense" as a concept in naval operations, and embraces the operations conducted against aircraft and/or missiles, their supporting forces, and operating bases. It is prosecuted as a corollary to and in support of the force mission, comprising all measures, both active and passive, employed in achieving air superiority.

Extended-range air-search radars are being installed in the Fleet in increasing numbers. Evaluation has been completed on an improved height-finding radar, and procurement has been initiated. All aspects of electronic warfare are being pursued most actively.

The WF–2 carrier-based airborne early warning (AEW) aircraft has been introduced into the Fleet. Its radar provides long-range detection of air targets and target height determination, heretofore impossible in carrier-based aircraft. The F4H–1, the Navy's new all-weather fighter, has exceeded Mach 2.2* speed and has zoom-climbed to over 98,000 feet with normal armament of four SPARROW III missiles. The EAGLE-Missileer long-range air-to-air missile system is under development and will overlap the service life of the SPARROW III-F4H system.

The first two TERRIER missile-equipped frigates (DLGs), the U.S.S. *Dewey* and U.S.S. *Preble*, have been commissioned. In addition, 4 more missile cruisers have been added, bringing to 10 the number of missile ships in commission at the end of the fiscal year. Five additional missile cruisers are either building or being converted from World War II cruisers, and 40 guided-missile-destroyer types are under construction.

Development of the TYPHON surface-to-air missile system has started. It will improve the capability of combating enemy aircraft from the surface.

Amphibious Warfare

Amphibious forces continue to maintain a high state of readiness in both oceans, being prime instruments for covering the threats of limited war. In keeping with previous practice, an amphibious squadron with a Marine battalion-landing-team embarked was maintained in the Mediterranean; in the western Pacific a larger squadron, capable of lifting a Marine regimental landing team and its associated Marine air group, was kept on rotational deployment. Additional amphibious lift is kept ready to reinforce the deployed fleets and to react to emergencies in other areas. A busy schedule of amphibious training was conducted, including exercises with the U.S. Army and certain of our allies.

Progress toward a strong helicopter-borne assault capability for the Marines continues to be limited by a lack of modern, specially configured ships. Although three new amphibious assault ships are being constructed, the first is still a year away. Meanwhile an improvised helicopter capability is being maintained by using two World War II aircraft carriers, a converted escort carrier, and the limited helicopter capabilities of certain other amphibious ships.

*(2.2 times the speed of sound)

Mine Warfare

All three aerial mining squadrons were redesignated as patrol squadrons with a primary antisubmarine mission, leaving no active forces with a primary mission of mining. However, submarines and the principal mining aircraft, A3D and P2V, are required to maintain and demonstrate proficiency in their secondary mission of minelaying. The first production units of new mines designed specifically for antisubmarine warfare have been delivered.

In mine countermeasures, helicopters have been tested further using lighter weight equipment, and sweeping speeds up to 20 knots have been achieved. However, minesweeping helicopters are not yet available for use by the Fleet. Existing forces, trained in all phases of countermeasures against known mines, are being maintained at minimum peacetime size. Readiness of existing matériel has increased steadily, and new equipment, designed to eliminate present deficiencies, is under development.

A small harbor defense program provides a nucleus of trained personnel. During the year, 14 of the 16 active Harbor Defense Units were disestablished, and their personnel were consolidated at the remaining 2 active units at Norfolk, Va., and San Francisco, Calif. Harbor defense exercises on both coasts have included participation by Reserve divisions as part of their regular drills. Research and development is in progress to improve and extend our capability in this defensive specialty. A small program in minehunting and channel conditioning is being prosecuted in order to keep the state of the art alive.

Antisubmarine Warfare (ASW)

Soviet submarine forces continue to present the greatest challenge to free world use of the seas. The additional possibility of submarine-launched missile raids on coastal cities of the United States is obviously a problem deserving all the skill we can muster. The Navy has long recognized it, and is devoting every effort to countering it by means of greater deterrent measures and Fleet exercises to perfect the tactics and weapons needed. We face the fact that a large hostile submarine force is an ever-present threat in any future conflict, limited or general. It is a force in being, ready for use, and Navy plans must assume that it will be used.

Antisubmarine warfare measures form an organic part of all naval plans and operations, and are receiving concentrated attention at all levels. Commander Antisubmarine Defense Force, U.S. Pacific Fleet (COMASDEFORPAC), has been established as the over-all ASW agency under CINCPLACFLT. This parallels the Atlantic Fleet organization and will simplify the command structure for antisub-

marine warfare and permit quicker reaction to a submarine threat. Replacement squadrons were established to provide ASW aircraft squadrons with better trained personnel and increase their readiness for combat operations. U.S.S. *Essex*, another angled-deck carrier designated as an antisubmarine carrier (CVS), joined the ASW forces. Thus, seven of the nine active carriers of this type have angled decks.

Evaluations of two important long-range ASW weapon systems—a rocket-propelled weapon (ASROC) and a drone antisubmarine helicopter (DASH—are proceeding satisfactorily. The SQS–23 sonar, a component of both systems, has shown a marked increase in detection ranges against submarines and will add greatly to the ability of surface forces to control modern submarines. The detection capabilities of aircraft are increasing as the improved sonobuoy systems, JULIE and JEZEBEL, are installed.

Operational evaluation of a new ASW homing torpedo for surface ships was completed and it has been approved for Service use. The development of a hydrofoil craft was expedited in order to test its tactical usefulness against submarines. The use of the nuclear submarine in both submarine and antisubmarine warfare is being studied thoroughly. From this study, tactics to counter the nuclear submarine will be developed and promulgated as standard doctrine for Navy forces.

While progress is being made, there should be caution against undue optimism. Advances in antisubmarine measures are partially offset by the increasing capability of the submarine. However, the research efforts of past years are beginning to show results and are generating weapons and equipment which will give a substantial increase in readiness if available in sufficient quantities.

Submarine Warfare

A strong, balanced submarine force is an integral part of the Navy team. Two primary missions—destruction of ships (particularly submarines) and strike warfare—constitute the essence of submarine offense. Secondary missions include early warning, reconnaissance, mining, support of underwater demolition teams, troop carrying, control of guided missiles, and navigational and weather reference for friendly planes.

Most U.S. Navy submarines were built during World War II, and the present building program is not scaled to an orderly replacement of them. However, added emphasis on maintenance and modernization will assist in combating mass obsolescence of these older submarines and extend their useful life.

Five new submarines joined the Fleet this year: The nuclear-powered *Halibut*, *Triton*, *Seadragon*, and *George Washington* and the conventional-powered *Blueback*. The *George Washington* is the first of the fleet ballistic missile submarines. The eight submarines launched are the nuclear-powered *Scorpion*, *Sculpin*, *Shark*, *and Tullibee* and the ballistic missile submarines *Patrick Henry*, *Theodore Roosevelt*, *Robert E. Lee*, *and Abraham Lincoln*.

Operational Developments

The effectiveness of future naval operating forces is dependent upon today's research and development. Constant generation and application of new techniques and new ideas is necessary to keep the expanding boundaries of sea warfare in sight and the Navy capable of guarding them.

Fleet Ballistic Missile Program

Key objectives in the year's schedule for this program were accomplished. Most significantly, U.S.S. *George Washington*, first of the fleet ballistic missile submarines, was commissioned December 30, 1959, and, after preliminary tests with inert models, successfully performed flight tests of the prototype tactical POLARIS missile on July 20, 1960, off Cape Canaveral, Fla. (See figs. 5 and 6.)

U.S.S. *Patrick Henry*, second of the ballistic missile submarines, was commissioned on April 9, 1960, and test of its weapon system is progressing. Like the *George Washington*, it has, while submerged, successfully launched inert test vehicles which closely simulate POLARIS missiles. It is expected that the two ships, each armed with 16 POLARIS missiles, will be operational about the end of the calendar year 1960, along with the tender U.S.S. *Proteus*, specifically designed to provide logistic support to this type of submarine.

Thirty-three POLARIS flight tests were conducted, including 13 of the prototype tactical missile. Twenty-one were completely successful in achieving their primary objectives, and 12 were partially successful. In addition, close to 200 ground tests were performed to support development of the propulsion subsystems. Range of the missile which will become a part of the operational system in late 1960 is 1,200 nautical miles. A 1,500-mile POLARIS is expected in 1962, and development work is planned to extend the range still farther.

Space Technology

The Naval Photographic Interpretation Center at Suitland, Md., processed and analyzed weather data transmitted by the artificial satellite TIROS, which was launched under the auspices of the National Aeronautics and Space Administration. The project demon-

strated the great value of worldwide weather coverage by space vehicles when quickly available to deployed naval forces.

Tests of the mobile launching of space vehicles (ARGUS) were first undertaken from ships at sea and later investigated in experiments using floating boosters (HYDRA). The freedom of choice of orbit, and the safety, security, and ease of launching obtainable at sea have prompted the further development of such mobile facilities for launching space probes and satellites.

Detection of unknown space objects was ably demonstrated by the Navy-operated Space Surveillance System, which discovered a U.S. satellite not previously known to be in orbit. Orbit data on Russian Sputnik satellites have been transmitted regularly to the operating fleets to afford training in evasive tactics.

The navigational satellite TRANSIT provided valuable scientific data regarding the shape of the earth and ionospheric refraction, and has given promise of a worldwide all-weather navigational system of great accuracy for naval and commercial applications.

Electromagnetic Devices

Significant developments have been made in high-frequency radar that will permit detection of missile launchings and tracking of aircraft over great distances below the horizon. These developments, known as TEPEE and MUSIC-MADRE, both operate at high frequencies and use the ionospheric mode of propagation to "see" over the horizon. TEPEE detects a missile launching by the interaction of the pulsed high-frequency energy from the transmitter with the rocket exhaust trail and its effects on the ionosphere. MUSIC-MADRE operates in the pulse mode and employs longtime integration techniques to detect airborne targets by doppler signals from the target skin and exhaust. Both techniques use high-power transmitters and may provide a missile-tracking capability.

Command and Control

Personnel training, computer programing, and testing of a three-station shore-based model of the new Naval Tactical Data System (NTDS) were conducted throughout the year at the Naval Electronics Laboratory, San Diego, Calif. Test results to date have been excellent. Production of equipment for service test is underway, and tests in three ships are scheduled to begin in September 1961.

Ships and Vehicles

A contract was let for construction of the Navy's first operational military hydrofoil craft, a 100-ton patrol vessel (PCH) which, as previously mentioned, will be evaluated for antisubmarine warfare

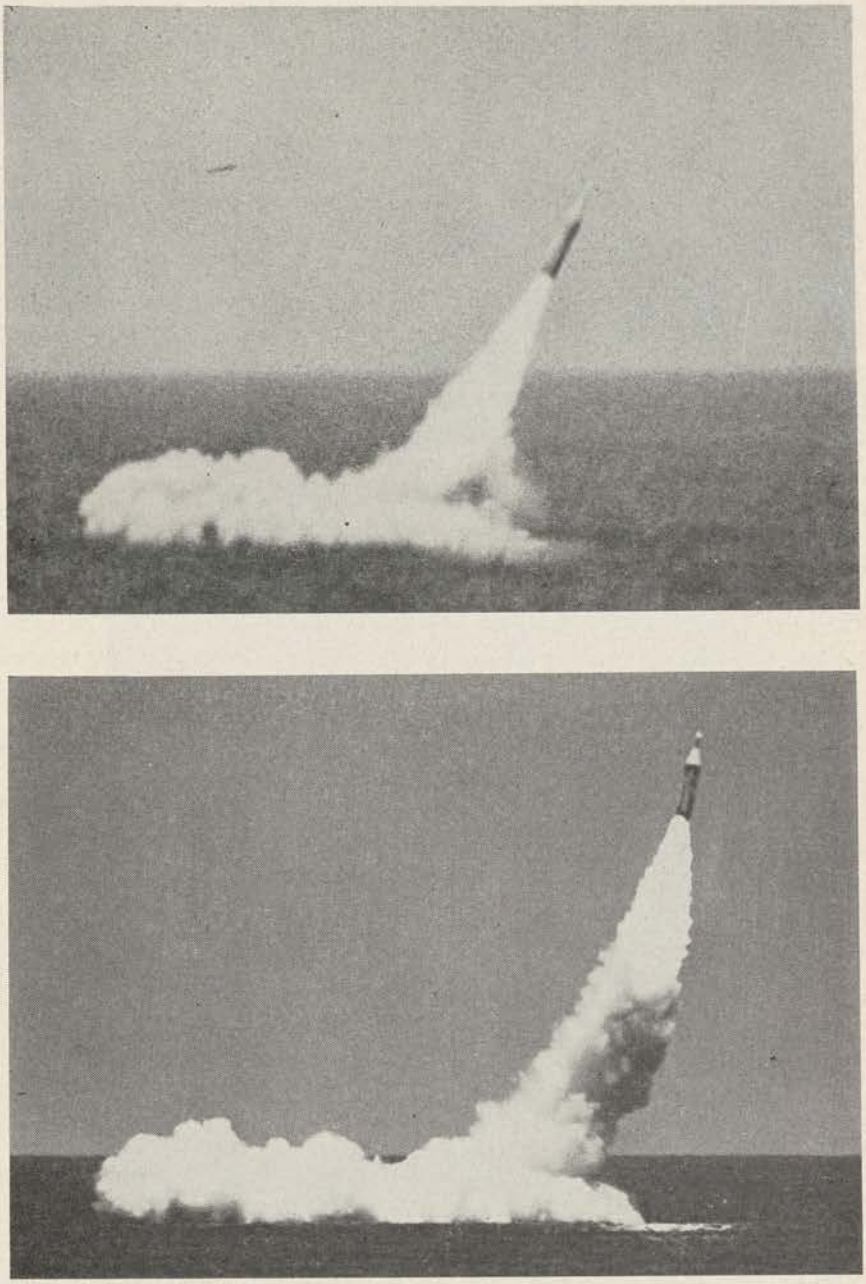

Figure 5. In its first full-scale submerged launching, the POLARIS missile breaks the surface of the Atlantic Ocean, ignites, and starts on its predesignated flight path to a preselected target area.

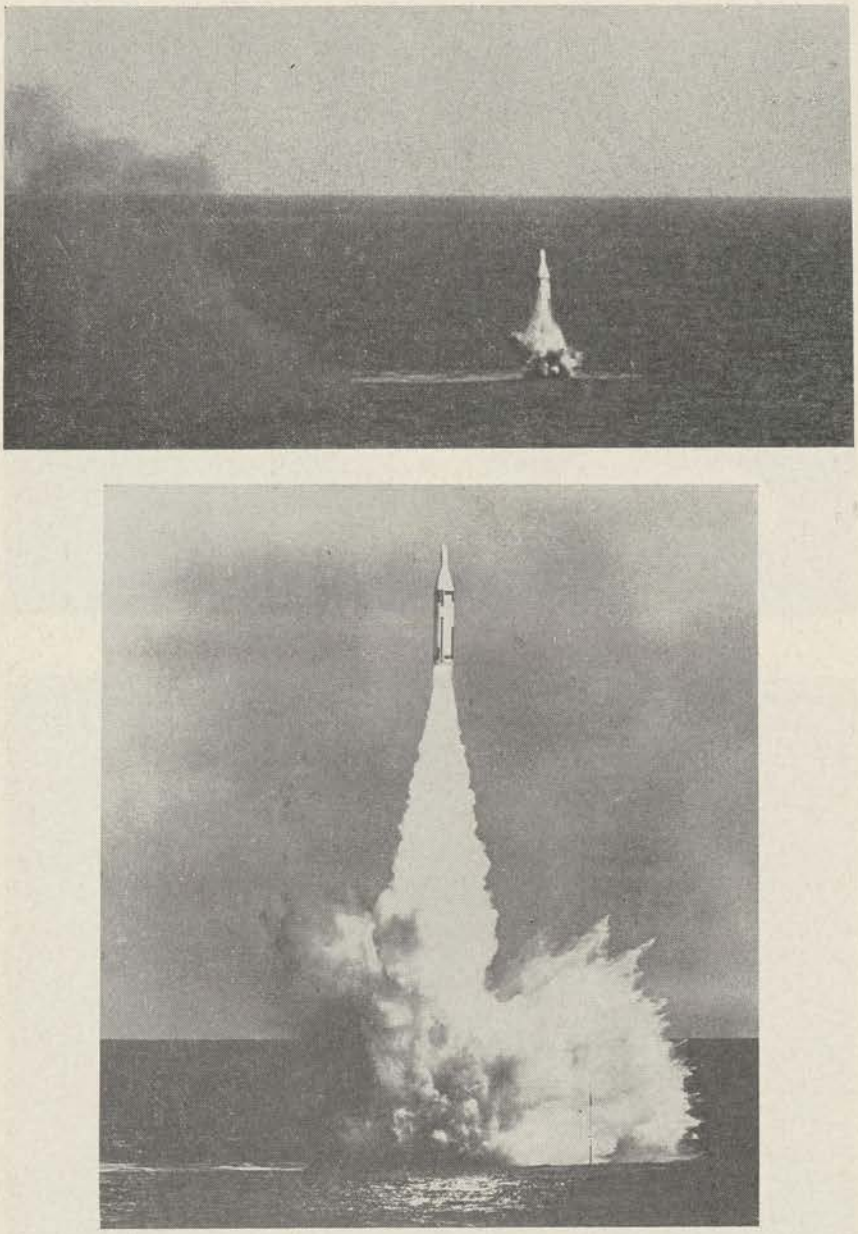

Figure 6. The nuclear-powered submarine U.S.S. George Washington releases a smoke marker to guide observers and photographers; then fires a second POLARIS missile to its target. Extended above the surface to the right is a temporary radio antenna tower, used to receive telemetered data from the test missile. Neither the antenna nor the smoke marker would be used in operational launchings.

use in 1962. An accelerated research and development program was initiated to develop hydrofoils of larger sizes (up to 500 tons) and higher speeds (up to 90 knots) in order to test their potential fully.

Exploratory research and model testing culminated in delivery of the Navy's first "ground effect" machine designed for over-the-water operation, a 21-inch Hydroskimmer. This will be followed closely by other test craft and further development to evaluate an oceangoing capability for those high-speed ships by 1963.

The preliminary design of an experimental deep-diving submarine was completed. It will multiply present submarine operating depths and provide a test vehicle for development of items of military hardware usable at great depths.

Material Condition of the Fleet

Since World War II, the material condition of the Fleet has been declining, due to insufficient maintenance coupled with a consistently high operating rate. A complex of several factors is the cause. For one reason, the building program has not yet been sufficient to offset the fact that 75 percent of the active fleet's ships date back to World War II and are approaching over-age en masse. The high tempo of operations accelerates this aging. In another aspect, years of minimum funding have been aggravated by a continued rise in the cost of labor and material, and this has adversely affected the completeness of overhauls. Further, personnel experience levels have not improved enough to make a significant difference in the situation.

In an attempt to arrest this trend, the Navy has adopted a three-pronged improvement plan consisting of (1) the Fleet Rehabilitation and Modernization (FRAM) program, (2) a program for thorough overhauls, and (3) an increased effort to modernize selected ships. As a result of these actions, the present material readiness of the Fleet is improved from a year ago but is still marginally low. The plan is sound but its effectiveness is dependent upon future ability to devote additional funds to it. A satisfactory material condition in the active Fleet requires systematic replacement of old ships, timely and thorough overhaul periods for operating ships, and persistent modernization to keep abreast of technological advances in warfare. Many active ships cannot be fully modernized due to hull and design limitations.

During the year 367 ships started overhauls, 118 of them in commercial yards.

The Naval Communications Service

In January 1960, the first public demonstration of the Navy's new moon-relay communication system took place. Messages exchanged

between Washington, D.C., and Hawaii by bouncing signals off the moon traveled almost a million miles in 5½ seconds. An important addition to the Navy's worldwide communications, this circuit has been used to pass operational traffic.

Trans-Atlantic cable leased lines became operational in February, providing reliable and rapid teletypewriter communication channels between Washington and U.S. forces in eastern Atlantic and Mediterranean areas. As a result of the Second Inter-American Naval Conference, an inter-American naval communications net has been established which links together the headquarters of the navies of South America and the United States.

A prototype transportable contingency communications facility, capable of rapid activation and self-sustaining, has been developed. This unit will provide voice and teletypewriter communications to connect an advance base area to the nearest naval communications station under emergency conditions.

Fleet communications improvements now in progress include the installation of single-sideband equipment to increase the reliable communication range with no added cost in power, weight, or space; the replacement of over-age low power manual-shift UHF equipment with high power quick-shift equipment; and the provision of better antenna systems and receivers to all Fleet units.

The Military Sea Transportation Service (MSTS)

MSTS has continued to meet effectively the assignments stemming from its mission of ocean transport for the armed Services. Its nucleus fleet is now at the approved minimum level, and its material condition is good considering that most of its ships are of World War II vintage. Minor alterations have been completed on 11 T–2 and 4 T–5 tankers of the nucleus, to provide a limited replenishment-at-sea capability within the Service.

U.S.N.S. *Marine Fiddler*, first MSTS ship to operate on the Great Lakes, lifted a nuclear powerplant for Camp Century, the "city under ice" being built beneath the Greenland ice cap. The plant was loaded at Buffalo, N.Y., for discharge at Thule, Greenland. This is the first prefabricated nuclear powerplant ever to be shipped and then assembled at its site.

II. The Marine Corps

Employment of Forces

The Fleet Marine Forces continue to be capable of meeting initial requirements for limited and general war. Their deployment supports the national strategy of maintaining ready, mobile forces, suitably positioned to be quickly responsive to international crises as they may develop. Marine elements located in the western Pacific, the Mediterranean, and the Atlantic are prepared for immediate commitment to combat. They are backed by substantial forces, equally ready, on both the east and west coasts of the United States.

The Marine Corps has undertaken a troop test program to see if potentially greater combat capabilities might be obtained by reorganizing elements of the Fleet Marine Force. (This is discussed further in the section on Organization, Operations, and Training, and considerable time will be devoted to it.) Meanwhile, the Corps continues to develop and emphasize the doctrine of initial entry into combat via the amphibious vertical envelopment technique.

During this year, Marine Corps landing forces of the Atlantic Command, together with amphibious and other naval supporting forces, have been maintained in a condition of preparedness in the Caribbean. In the Pacific Command, arrangements were completed to maintain a special landing force afloat in the western Pacific. A Marine battalion-landing-team forms the nucleus for this landing force. These measures have enhanced the readiness of naval forces in widely separated areas of the world.

Requirements and Objectives

Personnel limitations have made it necessary to continue certain elements of the Fleet Marine Forces in a cadre status during the past year. It is anticipated that a more favorable personnel situation in the foreseeable future will permit strengthening some of these units. Even so, the Fleet Marine Forces will necessarily remain at a manning level less than 100 percent of full strength. Should their employment be required, the Marine Corps will be able to deploy three combat divisions and three Marine aircraft wings; however, it would not be feasible to deploy them and simultaneously to execute mobilization plans with the personnel strength currently authorized.

Amphibious shipping geared to the tempo and tactics of modern

amphibious warfare continues to be a key requirement for advancing Marine Corps capabilities. While the reduced reaction time resulting from maintaining an afloat battalion-landing-team in both the Sixth and Seventh Fleets can offset the requirement to some degree, the availability of greater numbers of high-speed ships compatible with vertical assault concepts remains a vital objective. The World War II ships of the amphibious types continue to age at a greater rate than they can be replaced. In an effort to increase the high-speed amphibious lift, consideration has been given to converting more CVS-type aircraft carriers for employment as amphibious assault ships. The lasting solution, however, lies in providing the active fleets with sufficient fast modern shipping for lifting two Marine division-wing teams simultaneously.

Constant study and evaluation of concepts, organization, and equipment of the Fleet Marine Forces is maintained in order to insure their capability to meet the changing requirements of modern combat. Present doctrine provides for entry into combat by helicopter vertical assault, by surface assault, and by a combination of these two techniques. Efforts to secure increased flexibility and performance with more efficient equipment are continuing. As an example, a short airfield for tactical support (SATS), employing mobile arresting gear and short field takeoff techniques for combat jet aircraft, was successfully employed in a major exercise during the past year. Continuing progress in research, development, and procurement will afford additional improvements in the future.

The increasing speed of operations and the degree of dispersion inherent in the development of a vertical assault doctrine require constant attention to the capability of logistic support to keep pace. Efforts in this direction have caused the assignment of newer and lighter equipment to Marine divisions. Of equal importance and receiving equal attention is the achievement of sufficient stock levels to sustain combat until industrial mobilization can satisfy requirements and the positioning of this material in locations where it is available to using units.

Organization, Operations, and Training

Organization

Operating forces constitute 59.2 percent of Marine Corps strength and are comprised of the Fleet Marine Forces, Security Forces, and Ships' Detachments. At the close of the reporting period, the distribution of the remaining Marine Corps strength consisted of 21.9 percent to training, 10.3 percent to support, and 8.6 percent in the category of transients-patients-prisoners.

The Fleet Marine Force consists of three divisions and three aircraft wings, together with the necessary headquarters, combat support, and service units. Approximately two-thirds are assigned to the Pacific Fleet and one-third to the Atlantic Fleet. These forces provide Fleet commanders with the means of projecting naval power ashore, as missions and strategy may require.

Security Forces have again assumed increased commitments, in providing security for five activities which were established during the period. This was accomplished by reducing the number of Marines assigned to other security establishments and by the deactivation of one Marine barrack.

One light antiaircraft missile (HAWK) battalion was activated during the year, and it will soon provide an improved low-altitude antiaircraft capability. At the close of the period, plans were completed and directives issued to disestablish the Marine Corps Department of the Pacific at San Francisco and to eliminate the command Aircraft, Fleet Marine Force, Atlantic, combining its functions with Fleet Marine Force, Atlantic.

The future tactical organization of the Fleet Marine Forces will be influenced greatly by the results of a field test and evaluation program which was developed during this year. Tests scheduled under this program are designed to expedite the efficient and orderly assimilation of modern equipment into combat units. Almost every type of Marine organization, both ground and air, will be involved. Results are expected to point the way to tables of organization best fitted to accommodate and exploit the Marine Corps' newest materiel.

A reorganization has taken place within Marine Corps Reserve ground units in order that they may conform, insofar as possible, with the structures of their regular Marine Corps counterparts.

Operations

Except for a short period in December 1959 and January 1960, elements of the Fleet Marine Force, Atlantic, were maintained in the Caribbean area because of the continued unrest there. Units serving in the Caribbean conducted training exercises on Vieques Island and at all times maintained a high degree of preparedness.

A similar force was provided for the Sixth Fleet. This unit, designated as Landing Force Mediterranean, was of battalion-landing-team size and capable of conducting landing operations in support of Mediterranean area contingency plans. Operations during the entire period were limited to amphibious exercises in furtherance of its readiness.

In the Pacific, as in the Atlantic and Mediterranean, the Marines assigned to the Seventh Fleet continued to improve their ability to

respond quickly to an emergency. Both training and operating capabilities of these forces were enhanced by completion of the relocation of one helicopter air group from Japan proper to Okinawa.

Training

The Fleet Marine Forces keep training at a high level and have completed a cycle of amphibious training which commenced with small units and progressed through major training operations. It is significant that 38 principal amphibious exercises were conducted during the year.

As examples, amphibious exercises BLUE STAR and LANTPHIBEX 1–60 deserve special mention. BLUE STAR, a Seventh Fleet amphibious exercise, involved the 3d Marine Division, 1st Marine Aircraft Wing, units of the 1st Marine Brigade, and other units of the Fleet Marine Force, Pacific. This combined exercise, which was supported by all elements of the Seventh Fleet, also included participation by the Navy and Marine Corps of the Republic of China. Conducted on Taiwan during the period March 7–April 10, 1960, it demonstrated the vertical envelopment capabilities of western Pacific Marine forces and marked the first helicopter lift of a Republic of China Marine force. A significant feature of the exercise was the early establishment of a SATS. This short (3,400 feet) field was constructed in 50 hours, and the first aircraft made an arrested landing at H+72 hours. Jet fighter and attack aircraft were operated successfully from it, using the mobile field arresting gear (MOREST) for landing and afterburner or jet-assisted takeoff (JATO).

LANTPHIBEX 1–60 was a major amphibious exercise conducted by the Second Fleet and a landing force consisting of the 2d Marine Division, 2d Marine Aircraft Wing, and supporting units of the Fleet Marine Force, Atlantic. It took place on the U.S. east coast during the period March 22–April 5, 1960, and featured helicopter-borne as well as water-borne assault forces. The mount-out and deployment of this landing force were conducted in accordance with current contingency plans. The exercise was designed to test Force capabilities to seize, occupy, and defend key points, evacuate personnel, protect U.S. interests, and support or reestablish orderly government.

In the Marine Corps Reserve, units normally performing 24 or 48 drills were reduced to 22 and 45 paid drills respectively, due to a reduction in funds available. All units performed 15 days of annual field training, some of them having both air-ground exercises and amphibious training. Home armory drills for ground units are now being conducted on a multiple-drill basis. This has made training more effective and has permitted them an increasing use of multiple unit field maneuvers and air-ground exercises in their own locales.

Landing Force Research and Development

In efforts to develop a high-speed landing force amphibious support vehicle, extensive investigation is being made of various design concepts based on the use of planing hulls, hydrofoils, ground effects, and combinations thereof. Along with Navy technical authorities and the U.S. Army, the Marine Corps is actively participating in a concentrated investigation of ground effect machines, both theoretical and experimental.

Major attention has been given to the development of ground electronics equipment which will enhance capabilities in air control, air defense, and all-weather air support, particularly in regard to range and automation. Communications programs are emphasizing the development of a family of single-sideband radios, which will provide increased range and greater reliability.

Development and testing were completed and procurement initiated on a rough-terrain crane and progress was made on a rough-terrain forklift—both sectionalized for helicopter transport and needed by engineer forces. Testing has been completed satisfactorily on the LVTE–1 (Landing Vehicle Tracked-Engineer) and plans are being formed for the procurement of this item for use in clearing mines from beaches.

Development of air defense guided missile weapon systems has progressed satisfactorily. The HAWK weapon system is now being issued to units of the Fleet Marine Force, and the REDEYE missile is in the developmental stage.

Prototypes of the XM70 115-mm. boosted rocket artillery launcher are being tested. Development of ammunition for this weapon is also progressing satisfactorily. The HOWTAR, a combination of the 4.2-inch mortar and the 75-mm. pack howitzer, will be field tested by units of Marine divisions in the very near future.

Operational requirements were determined for an assault support helicopter, a tactical electronic countermeasures aircraft, and a light assault transport helicopter. In aircraft armament, development and testing of a multicarriage bomb rack were accomplished and investigation started for a means of protecting assault helicopters from heat-seeking antiair weapons such as the REDEYE.

Personnel Plans, Policies, and Programs

Strengths

The authorized strength of the Marine Corps remained at a level of 175,000 personnel in the fiscal year 1960. End-year strength was slightly below that authorized, as actual accessions in the fourth quarter were less than programed. Favorable recruiting months are ex-

pected early in the succeeding year, and the authorized personnel strength should be attained quickly.

The fiscal year 1961 is expected to be a period of low personnel turnover, and an increase in the availability of personnel for the Fleet Marine Forces is anticipated. Stabilized personnel objectives of the unit transplacement controlled input program have been expanded to include all infantry battalions with the exception of those in the 1st Marine Brigade in Hawaii. In addition, three 8-inch howitzer batteries and all aviation squadrons are under separate programs to stabilize personnel, and these programs include intact movements of units overseas. All Fleet Marine Force tours of duty overseas, with the exception of Hawaii, are performed by personnel unaccompanied by their dependents.

The end-year strength of the inactive Marine Corps Reserve was 258,477. The Ready Reserve, at 209,245, was slightly in excess of the authorized strength of 208,000. Included were 41,562 drill-pay reservists and 3,270 3-to-6-month trainees performing initial active duty for training. Organized Marine Corps Reserve strength was 44,832 at year's end.

Officer Programs

An active duty career program for Reserve officers, including increased opportunities for service with the Regular establishment, has been undertaken as a means to improve Reserve officer retention. One year's implementation of the provisions of Public Law 86–155 (the "hump" legislation) has seen progress in solving the promotion problem and accomplishing an equitable career pattern and progression for the officer corps. Personnel stability has been increased by new policies relative to the time required in grade by colonels and lieutenant colonels before voluntary retirement.

Requirements for officer specialists and technicians are being met to an increasing degree by expanding the warrant officer and limited duty officer programs. Increased proficiency on the job is being achieved, and less valuable technical training is being invested and lost in short term officers who go to inactive duty upon completion of obligated active service.

Requirements for legal specialists are being met by the assignment of present lawyer officers exclusively to legal duties and by bringing Reserve lawyers into the Regular establishment. A new platoon leader's class in law has been established to insure an adequate input of lawyers in the junior grades.

Enlisted Programs

Continued emphasis has been placed on the 4-year enlistment, 99 percent of all new enlistments being for this length of time. Standards for reenlistment remained at the high levels previously established. The ratio of noncommissioned officers to the total enlisted population was 36.2 percent at year's end.

The project to establish a systematic method of determining enlisted billet grade requirements in all Marine Corps organizations has been continued. It will provide the foundation for a realistic job evaluation system which will enable the correlation of rank requirements among occupational fields. Approximately half of the initial evaluation phase was completed during the year.

The Marine Corps proficiency pay program expanded to a year-end total of 10,338 awards. All awards were within the P1 increment at $30 per month, and were effected under a system of competitive evaluation on the job within local commands. All were made in pay grades E3 through E7. Pay grade E3 was eliminated from eligibility effective in fiscal year 1961.

A decentralized promotion program for appointment to lance corporal and corporal was instituted in the second quarter of the year. This program has proven effective in encouraging local on-the-job competition for promotions within table of organization vacancies, and has made possible the current effectiveness of the stabilized unit concept wherein the local commanding officer trains and promotes his own junior leaders.

Logistics

Marine Corps logistics stress the best use of all available resources including inter-Service support. Its primary source of support is an integrated supply system, with supply centers at Barstow, Calif., and Albany, Ga., providing support to the two Fleet Marine Forces and supporting establishments within their geographic areas.

Logistic effectiveness has been improved in a number of ways:

(1) Prepositioned war reserve stocks have been reviewed and items not essential for combat have been deleted.

(2) Inventory and stock control procedures have been refined to provide more accurate supply management information.

(3) More efficient "test and rebuild" standards have been established to reduce the degree of disassembly necessary in depot overhaul. An expanded use of production line techniques in small quantity job-shop operations within the supply centers has also been established.

As in past years, materiel procurement has followed policies designed to reduce weight and bulk, increase firepower and mobility, and

improve communications capability. New items for modernization of the Corps constituted the bulk of procurement. Mobilization reserve stocks were only slightly increased.

Modernization of equipment in Fleet Marine Force units continues and has resulted in the following significant improvements:

(1) Equipment for one HAWK missile battalion was delivered.
(2) As part of a planned 4-year program, procurement of the first increment of the 7.66-mm. family of weapons was initiated.
(3) A program to modernize the LVTP5 landing vehicle was started.
(4) Procurement of the first increment of a planned 3-year procurement of the M17 protective field mask was begun.
(5) Of the Mighty Mite M422 ¼-ton trucks, 233 were received and distributed to Fleet Marine Force units for service test.
(6) Sufficient numbers of the Mechanical Mule M274 light infantry ½-ton carriers were received to equip one division with its initial interim allowance.
(7) A lightweight team-pack radio relay system, designed for reliable communications between low echelon units, was issued to troop organizations.
(8) An additional increment of modern single-sideband radios was issued and provides a substantial increase in the reliability and range of communications.

Procedures and programs have been instituted for performing the computations of material planning studies by means of electronic data processing machines. It is estimated that this procedure has saved approximately 25,000 man-hours in the preparation of Marine Corps Supply Department publications.

Requisitioning procedures previously permitted only two types of priority, i.e., Emergency or Routine. A new system has been devised which relates the military importance of the requisitioner (user) to the end use of the material so that 1 of 20 numerical priority designators may be assigned to each request for material. The priority system has been linked to the operation of the electronic computers which process Marine Corps punched card requisitions in such a manner that the computer will recognize the priority indicator and indicate appropriate supply action.

Electric accounting machine facilities were provided at the Marine division and aircraft wing levels to perform stock accounting mechanically and prepare punched-card requisitions. This permits the preparation of requisitions in suitable form for processing by computers at the supply centers and by electric accounting machine facilities at other stock points, and now accomplishes the mechanization of all supply procedures in the Marine Corps.

III. Naval Personnel

The active duty strength of the Navy in the fiscal year 1960 was as follows:

	30 June 1959	*30 June 1960*
Grand total	626,340	617,984
Total Officers	69,795	69,559
Men	67,057	66,848
Women	2,738	2,711
Total enlisted	552,221	544,040
Men	547,236	538,680
Women	4,985	5,360
Total Officer Candidates	4,324	4,385
Midshipmen (Naval Academy)	2,534	2,658
Naval aviation cadets	1,111	730
Officer candidate school	570	829
Aviation officer candidates	109	168

The pressure upon manpower resources continues to grow, and along with it the difficulty of meeting, within presently authorized limits, the increasing requirements of new ships and weapon programs. Coupled with lowered manning levels in shore activities, these demands for naval personnel are creating the need for a higher authorized strength, or the alternative of further reductions in operating ships and aircraft.

Officer Personnel

Shortages in various grades of unrestricted line officers continue to hinder proper distribution, despite the institution of administrative measures to assure the most equitable assignment of those officers that are available. Current requirements of high priority programs (the fleet ballistic missile, nuclear power, the Naval Tactical Data System, replacement air group training, and others) are being met with increasing difficulty. The numbers of officers qualified to enter these programs is extremely limited, and the high proficiency levels required for them make the general shortage of experienced officers felt all the more severely.

An aviation officer career program was established during the year for certain aviation duties not requiring a pilot. Plans for line officer subspecialization are proceeding satisfactorily. Progress in the subspecialization concept is most apparent and effective in detailing procedures, where depth of experience is being emphasized rather than breadth of experience.

The "hump" legislation which became law on August 11, 1959 (Public Law 86–155) has permitted the commencement of an orderly long-range plan for solving the Navy's officer promotion problem. By screening 295 Regular Navy line and staff captains this year, vacancies were created to permit promotion of about half of the commanders in one of the very large impeded groups. Opportunity for promotion to captain for the remainder of the group is planned to be between 40 percent and 45 percent—significantly higher than that which could have been offered without legislation. A similar relief was given to the remaining lieutenant commander groups, providing opportunity for about 60 percent to advance to the commander grade. A total of 583 Regular line and staff commanders were screened in the fiscal year 1960 to create the necessary vacancies.

Promotion computations for women officers are based on the number of Regular Navy women line officers. It is considered that a line total of at least 320 must be maintained to provide even minimum promotion opportunities for them. The 30 percent commander and lieutenant commander strength allowed by statute (10 U.S.C. 5452) has almost been reached. This situation needs attention, and it is planned to propose remedial legislation so that computations may be based on *active duty* rather than active list strength. This will permit Reserve officers on active duty to be included in the total strength figures.

Enlisted Personnel

The over-all enlisted personnel situation remained fairly static in the fiscal year 1960. First term reenlistment rates have in general approximated those of fiscal year 1959 (i.e., about 21 percent). In the critical electronics-type ratings, however, the first term reenlistment rate which was only about 14 percent last year is down again this year, to slightly less than 13 percent. The career reenlistments have retained their high level of about 90 percent.

The low first term reenlistment rate, particularly in the critical ratings where it is well below the average, presents a major problem which the Navy must solve. Personnel replacement costs are a significant factor from a financial standpoint, but even more important is the resultant inadequate manning level in these important ratings, wherein deficiencies have a direct and deleterious effect on combat readiness.

Retention of first term petty officers is also a problem of increasing magnitude. Since new weapon systems are more complicated and require long personnel training cycles for their support, only career personnel are appropriate training risks. These factors require greater numbers of career personnel to be assigned as instructors or students for long periods of time, and leave too few experienced petty officers to man the Fleet.

To enlarge the problem more, the World War II groups of senior petty officers are beginning to retire or transfer to the Fleet Reserve in large numbers. While the petty officer ratio can be maintained by normal advancements, unless the exodus of trained first term petty officers can be reduced the enlisted experience level will decline considerably further over the next 5 years.

Centralization of the naval districts' active duty enlisted distribution offices and their supporting machine accounting functions into one location has resulted in more efficient and accurate determinations of personnel requirements in the continental United States and better utilization of enlisted manpower.

Since its implementation in the fiscal year 1959, the master chief petty officer (pay grades E8 and E9) program is progressing and the planned strength will be reached in the fiscal year 1963. This program has advantageously provided a further line of advancement for the Navy's most outstanding chief petty officers and appears to have increased both performance and morale. In another of the previous year's programs, selective reenlistment after 20 years of service was instituted in order to free opportunities for advancement in ratings which have been overcrowded. This program has served its purpose and has been canceled.

Opportunities for advancement are becoming greater in all ratings which have had a history of restricted promotion quotas. With retirement, or transfer to the Fleet Reserve, of increasing numbers of senior petty officers (World War II personnel) and a selective retention program, all pay grades within the petty officer rating structure can look forward to more liberal advancement opportunities in the near future.

There were 25,774 proficiency pay awards issued this year, somewhat below plan because inadequate numbers of personnel in pay grades E4 and E5 were recommended to take the examinations. This situation has been corrected by clarifying instructions to all commanding officers, and results of examinations in May 1960 indicate that the program is now current. The second (P2) level of proficiency pay ($60 per month) was approved for implementation next year. Although statistics are not yet conclusive in any particular rating, there is gen-

erally a higher reenlistment rate (by about 3 percent) among personnel who are drawing proficiency pay than in the entire rating involved.

Personnel Procurement

The Navy Recruiting Service enlisted 86,047 recruits, of which 59.5 percent were trainable—a number approximately 3,600 lower than the trainable total last year. Enlistments effected under the high school graduate training program totaled 26,420, a decrease of 4,441. The nuclear category of this program has been expanded and a POLARIS category instituted. The quota for women was exceeded, WAVE enlistments increasing by 149. Enlistment of personnel in mental group IV was confined to 7.1 percent compared to the 6.4 percent of the fiscal year 1959. As the fiscal year 1961 began, it appeared that recruitment needs will present an even greater challenge to the Recruiting Service than heretofore.

Although inputs into the aviation officer candidate program were smaller this year, 86.1 percent of the quota was attained. Naval aviation cadet requirements were met by slightly more than the previous year when 84.3 percent of quota was attained. Although but 62.4 percent of the quota of the Officer Candidate School (Newport, R.I.) was filled, inputs into this program have exceeded that of the fiscal year 1959—3,298 as compared to 2,317. About 64 percent of the WAVE officer candidate quota was met, which approximates the experience of fiscal year 1959. All other officer program quotas were met. A new program to recruit aviation ground officers to serve in observer, weapon systems, and maintenance billets was established.

Training and Education

The naval personnel training program is oriented to keep the skills and competence of officers and men in phase with the acceleration taking place in nuclear applications, the fleet ballistic missile, and related areas. Revision of the curriculum at the Naval Academy reflects the progressive trend, and a start has been made toward expanding and strengthening the postgraduate program, with a new goal of providing some postgraduate education for all qualified regular officers. Opportunity has been extended for naval officers to study to the doctorate level.

Plans were completed and arrangements made to establish three new 1-year postgraduate curricula. The Navy management curriculum has been revised and expanded to a 1-year program leading to a master's degree; a 1-year curriculum in international relations will be instituted at Harvard and American Universities; and a basic 40-week science course will be conducted at the Naval Postgraduate School.

In addition to the foregoing, the research program conducted at the Naval Postgraduate School will be expanded; 25 officers selected to be Naval Academy instructors will receive 1 year of preparatory instruction at either the Naval Postgraduate School or George Washington University; and a combined 22-week communications-electronics course has been established to meet requirements for communications officers equipped with a background knowledge of electronics.

A further evaluation of the curriculum at the Naval Academy was completed in November 1959. In general, it confirmed steps which have been taken to reorient the curriculum, give it academic strength, and keep it up to date. Among changes made were policies whereby a student may acquire advanced standing as a result of previous work taken at the college level, and whereby better students may undertake a variety of elective courses in addition to the required courses of study.

Considerable increases in training loads were experienced at functional and Fleet schools to meet expanding requirements in such high priority programs as antisubmarine warfare, guided missiles, the fleet ballistic missile, submarine warfare, and nuclear propulsion.

The naval leadership program, with its revitalization of the leadership qualities of naval personnel at all levels, continues active. The results of its second year of operation are as encouraging as the first year, demonstrating that the approach in general has been sound and that organizational provisions and training materials have been developed in realistic terms. Leadership field teams have continued as the primary tool to aid field commands, and the personal interest of Fleet and type commanders has done much to give the program momentum. Emphasis on the inspirational, technical, and moral elements of leadership and the importance of personal responsibility will continue, so that the full value to combat readiness may be realized.

The Naval Reserve

At the beginning of this year, Naval Reserve strength was 802,786 officers and men; it decreased to 742,128 by June 30, 1960. This decline was anticipated, as the first large group of men who entered the Naval Reserve with 8-year service obligations during the Korean emergency completed this obligation. The strength of the Reserve is sufficient for its part in meeting requirements of current mobilization plans.

A sharp 3-year downward trend in the number of reservists performing paid drills was halted at a low point of 113,338 in October

1959, and by year's end there were 120,232 Selected Reservists in a drill-pay status. Stabilization and subsequent growth of the Selected Reserve has been a significant accomplishment of the year. It was achieved by a concerted recruiting effort to obtain new enlistees, and to affiliate with a Selected Reserve unit those men released from active duty who have a residual service obligation.

Progress was made in increasing the responsiveness of the Selected Reserve by predetermining mobilization assignments for more members and issuing them orders to active duty. These orders become effective automatically in the event of attack upon the United States, or when directed in lesser emergencies.

Morale and Welfare

In response to the President's expressed concern regarding measures to maintain the physical fitness of the youth of America, a comprehensive program of athletics is maintained with major emphasis placed at the intramural level. Support of the Olympic games continues, and about 20 Navy personnel will participate in the games in Rome as official members of the U.S. Olympic team.

Considering that large numbers of naval personnel will be retiring in the 1960–65 period, close relationships have been established with the Department of Health, Education, and Welfare, the Department of Labor, the U.S. Employment Service, and a number of nongovernmental groups who are concerned with effective utilization of retired personnel. It is expected that appreciable benefits will accrue from this effort, both to Navy retirees and to the national economy.

During the year, cumulative attendance at divine services conducted by Navy chaplains approximated 7,000,000. An additional 70,000 personnel were in organized church parties leaving ships and stations. The organization of lay leaders on ships without chaplains is becoming increasingly beneficial in providing adequate religious coverage. The leaders are carefully supervised by chaplains and are provided with guidebooks and audiovisual aids to assist them.

IV. Design and Construction of Ships

Powerful new ships joined the Fleet in the fiscal year 1960. Progress on construction, conversion, research, and design programs will aid future Fleet effectiveness and prospects of overcoming the threat of mass obsolescence.

Most potent retaliatory weapons to go to sea were the fleet ballistic missile submarines *George Washington* (SSBN–598) and *Patrick Henry* (SSBN–599). As mentioned previously, the *George Washington* accurately fired POLARIS missiles from under the sea to targets over 1,000 miles away just after the end of the year, proving the weapon concept with spectacular success. These shots were the first in which the fleet ballistic missile submarine was tested in its entirety. It had been necessary heretofore to test elements of the extraordinarily complex system separately.

Confidence in pushing the program rapidly has been justified. Bearing in mind that the entire POLARIS submarine building program began as recently as fiscal year 1958, two have already been commissioned, four are expected to be completed next fiscal year, three more are progressing rapidly, and all five in the 1961 program were assigned or awarded in July 1960 for construction.

Some of the POLARIS missile submarines in next year's program will be SSBN–616 class ships. This new class will incorporate recent improvements in the missile system and will be somewhat longer in order to provide for recreation, study, and exercise areas. Such habitability features will greatly enhance the crew's efficiency in restricted space over the long periods when the ship is submerged.

Another missile-firing submarine to join the Fleet was *Halibut* (SSGN 587), completed in January 1960. *Halibut* is capable of sailing submerged on nuclear power to any sea area on the globe, then surfacing and firing REGULUS I guided missiles (possibly with nuclear warheads) at enemy territory or ships.

Many notably versatile guided missile surface ships have gone to sea. Four guided missile light cruisers were completed, two equipped with TERRIER systems (*Providence* and *Topeka*, CLGs 6 and 8) and two with the even more powerful TALOS system (*Galveston* and *Little Rock*, CLGs 3 and 4). One more of each type will be completed by the fall of 1960.

Guided missile frigates *Dewey* (DLG 14) and *Preble* (DLG 15), both *Farragut* (DLG 6) class ships, were commissioned in December 1959 and May 1960, respectively, the first of this type to join the Fleet. Seven more *Farragut*-class frigates are expected to be finished in the fiscal year 1961, and the remaining 10 frigates—some *Farragut*-class, some *Leahy* (DLG 16) class—are under construction and are coming along well. Three additional guided missile frigates in next year's program are DLG 26-class ships. They will be similar to DLG 16-class ships, but longer and with long-range bow-mounted sonar and drone antisubmarine helicopter facilities (DASH) added.

Guided missile destroyers also are progressing well. Eight were launched during this fiscal year and five will be commissioned next year. Meanwhile, 1960 saw the completion of the last of the postwar conventional destroyers (*Parsons* and *Turner Joy*, DDs 949 and 951).

The conversions covered by the Fleet Rehabilitation and Modernization program (FRAM, Mark I) are stretching the life of World War II destroyers to halt block obsolescence. The prototype for this program, *Perry* (DD 844), was completed in this year. There are 7 others in the 1960 program and 14 in the 1961 program.

These cruisers, frigates, and destroyers are built for many functions—to work (as members of a team or singly) against submarines, surface ships, land installations, or aircraft. Frequently they will be operating in a task force, screening such aircraft carriers as the four *Forrestal*-class ships already at sea. Two more of these carriers, *Kittyhawk* (CVA 63) and *Constellation* (CVA 64), are nearing completion. The nuclear-powered carrier *Enterprise* (CVAN 65) will be launched in the fall of 1960.

The next, CVA 66, will be similar to the *Forrestal*-class carriers, with important improvements. She will be about the same size and will have many of the same features but will have better sea-keeping qualities due to "cleaner" sides, and some electronic improvements including an automatic all-weather landing system and the Naval Tactical Data Systems. She will have two twin TERRIER missile launchers aft. Conversion of the *Midway*-class *Coral Sea* (CVA 43) has been completed with capabilities approaching those of *Forrestal*-class carriers.

In addition to the more spectacular functions popularly associated with them, submarines can provide an outlying screen for carrier task forces, combating both surface ships and submarines. The last two conventionally powered submarines in the Navy's postwar building programs (*Blueback* and *Bonefish*, SS 581 and SS 582) are now with the Fleet. Good progress is being made on the 19 nuclear-powered submarines (not counting POLARIS submarines) building or on

order. *Thresher* (SSN 593), prototype for the newest class of attack submarine, is now over 75 percent complete.

Submarine design continues to develop rapidly. Additional new concepts are being worked into the Navy's key experimental ship for postwar hull design, the *Albacore* (AGSS 569). Soon to start is a conversion of *Albacore* which will involve replacing the after horizontal and vertical control surfaces with an X configuration forward of the propeller. A dorsal rudder will be added just aft of the sail, and it is expected that such a rudder will offset the snap roll which occurs during high-speed turns in *Albacore*.

The contract design has been completed for a further conversion of *Albacore* to be accomplished in approximately 2 years. Among other things, *Albacore* will then receive a contrarotating propulsion system and silver-zinc batteries, providing greater endurance.

A deep-diving submarine programed in 1961 will provide for experimental development of the hull structure, sonar, and weapon systems for combatant submarines of the future. The design emphasizes small size, greatly increased test depth, active and passive sonar, and instrumentation for acoustic and oceanographic research.

The Navy has made rapid progress in under-ice operations. *Sargo* (SSN 583) made a midwinter exploration of the Arctic Ocean's inverted canyons and produced valuable information which was then used to prepare for *Seadragon's* (SSN 584) under-ice trips the next year. Special gear and structural changes are needed for these trips. The submarine must have inertial navigation equipment in order to determine its precise location without surfacing. It needs upward-beamed fathometers to detail the icepack's underside, fathometers beamed downward to picture the ocean floor, and an iceberg detector to "watch" for obstructions ahead. *Sargo* used such gear intensely as she threaded 1,800 miles through canyons between icepeaks closer to the ocean floor than her sail. She had special communications equipment enabling her to receive messages even beneath the ice.

Submarines operating beneath the icepack can reach the surface on occasion through "polynyas"—areas where the ice is fairly flat and likely to be thin enough (less than 5 feet) to permit a submarine to break through with her sail. A delineator pictures the polynya's extent and any underside peaks which might puncture the ship. An ice measurer checks ice thickness. Rate-of-rise meters enable the submarine operators to achieve precisely the rate needed—fast enough to break through, slow enough to avoid damaging the ship. The sail is strengthened by a special steel cap and reinforced sides to take the very heavy temporary load.

Further refinements are now under development. For example, the under-ice sonar equipment will have no moving parts topside

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where they could easily be damaged in Arctic operations. Information from these sonars will be coordinated and displayed on a single console, so that it may be evaluated more readily. Such refinements will give future submarines which are properly fitted a capability for virtually unrestricted operations under the ice.

In the near future the Navy's amphibious warfare capabilities will be enhanced by the addition of ships built to advanced concepts. Three amphibious assault ships (LPH) especially designed for the Marines' vertical envelopment tactics are already in progress. Two LPDs (amphibious transports, dock), each of them in effect a combined attack transport and attack cargo ship, are under construction and a third is in the fiscal year 1961 program.

Pyro (AE24) and *Haleakala* (AE25), ammunition ships, joined the Fleet in 1959 to strengthen support forces. Two ships in the 1961 program will provide the forerunners of future support operations: A fast combat support ship (AOE) and a combat stores ship (AFS). The AOE is a tremendous ship for its type, bigger than the battleship *North Carolina*. Her powerful machinery plant will enable her to steam with a striking force rather than in the underway replenishment group. She will be able to carry more oil than the Navy's latest class of oiler, and the same ammunition volume as either *Pyro* or *Haleakala*. The AOE will be able to replenish supplies of black oil, aviation fuel, conventional ammunition, Fleet missiles up to and including TALOS, selected underwater ordnance, special weapons and provisions, and Fleet freight. The combat stores ship (AFS) has been designed to combine the resupply capabilities of the present stores ship (AF), a general stores issue ship (AKS), and an aviation supply ship (AVS).

Both ships will be equipped with a completely new system for replenishment at sea. Conventional kingposts and booms are eliminated. In their place are large M-frames equipped with automatic tension devices which maintain taut transfer lines between replenishing ships despite rolling and yawing and prevent broken lines and consequent delays. Ram tensioners will be used; their cost and weight is about one-fifth those of counterweight systems previously used. Fueling will be more rapid through use of probe-type connections similar to the type used for refueling aircraft aloft. Both ships will have helicopter platforms. Helicopters will be able to meet immediate supply needs (other than fuel) of ships in a task force spread over a wide area.

The last two of the *Claud Jones* (DE 1033) class of escort vessels were completed this year, and contracts for two of a new class (DE 1037) were awarded. The DE 1037-class ships and two DE

1040-class ships in the 1961 program are especially designed for locating and destroying enemy submarines, although they can perform many other types of duty. They will have the integral bow-mounted long-range sonar and drone torpedoes.

Future designs of escort vessels, as well as destroyer types, will lean heavily on knowledge gained from constructing the escort research ship (AG) in the 1961 program, an experimental hull of advanced hydrodynamic and propulsion design emphasizing sonar performance. Contract for a 100-ton hydrofoil patrol craft (PCH) was awarded during the year. In addition, the Bureau of Ships is initiating a large-scale research and development program to develop hydrofoil ships up to 500 tons and 90 knots. A supercavitating propeller especially designed for use on hydrofoil ships was successfully tested on a boat at 62 knots.

Other unusual craft are being explored. Research and model testing culminated in delivery of the Navy's first ground effect machine—a 21-foot boat designed to skim over the surface of the water supported on a cushion of air. Further test and development programs are aiming toward an ocean-going "hydroskimmer" for future application in amphibious and antisubmarine warfare, air-sea rescue, and other naval uses.

Detection of an enemy and coordination of offensive or defensive action relies heavily upon electronics equipment, and great progress is being made in this field. The AN/SQS 23 sonar was accepted for service use. This equipment markedly increases capabilities of detecting submarines, in or below the surface isothermal layer. A contract design was completed for installing it in a new bulbous bow on *Randolph* (CVS 15). Radar development is attaining greater range, coverage, and accuracy—capabilities ever more vital as the speed of aircraft increases. New radars completed or nearing completion had not only these improvements but more reliability and less susceptibility to countermeasures as well.

Very rapid progress was made on the high priority NTDS, a major effort in modernizing the shipboard command and control system. The basic operating concepts of the over-all system were proven on the developmental equipment, and many system functions such as tracking, threat evaluation, weapon assignment, and intercept control were successfully demonstrated. Extensive and extremely successful tests were made of the automatic exchange of digital data between the NTDS and an experimental ship at sea at ranges up to 300 miles. NTDS equipment is being procured for installation aboard *King* (DLG 10), *Mahan* (DLG 11), *Oriskany* (CVA 34), *Enterprise* (CVAN 65), and *Long Beach* (CGN 9). Preliminary design has been completed for its installation on three DLG 16-class guided

missile frigates and the CVA 66 carrier in the 1961 shipbuilding program.

Progress was rapid on OMEGA, a very-low-frequency navigation system which is expected to provide worldwide coverage with only seven stations. In this system, not only planes and ships but submarines completely submerged, with no antenna extended, will be able to receive signals.

The rising cost of building, maintaining, and modernizing ships continues to be a severe problem. This factor necessitated deferral of three new frigates and one escort research ship in the 1960 construction program, along with a guided missile cruiser (CG) conversion. Although 52 top priority ships were scheduled for the 1960 FRAM, Mark II program (a more modest version of the FRAM, Mark I), spiraling costs forced a reduction to 27 ships. Curtailments in other areas were necessary to provide sufficient overhaul and repair funds to maintain the status quo in the active fleet.

Programs for improving active fleet ships have been reduced for both this year and next year. Scheduled military improvements have decreased to 45 percent of the previous level. Operational improvements have been restricted to mandatory safety items, and the program to improve habitability has been eliminated. Measures to combat obsolescence in reserve fleet ships were halted and scheduled drydockings were deferred.

Since fiscal year 1959, only minimum maintenance has been possible. Maintenance of Naval Reserve antisubmarine training ships is being funded at a level equivalent to 66 percent of the level of active fleet repairs and no modernization is being provided. Funds for technical support programs and Fleet support facilities have been curtailed even further than is consistent with austere Fleet maintenance and modernization. Deferred maintenance projects at Fleet support facilities continue to build up.

The Navy is taking strong measures to reduce all costs within its 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 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 ships program has been made. Nonessential specifications are being eliminated and essential specifications are being completely reconstituted to make them simpler and more direct statements of requirements. Industry standards and specifications are being substituted wherever possible and cross-references are being reduced to an absolute minimum.

A series of meetings with shipbuilders, major components manufacturers, and electronic manufacturers has been instituted to solicit their suggestions and ideas for cost reduction. Those contacted have shown a keen interest and have contributed willingly and enthusiastically to the cost reduction effort. The meetings have been fruitful and benefits are already being realized.

Naval shipyard operations are being streamlined to achieve greater efficiency and economy. Uneconomical support-type shops are being eliminated where feasible. Shipyard production shops are being consolidated into a few groups, each under a master mechanic. The production planning and control program is being revamped and improved.

Savings already made and in prospect as a result of these economy efforts are substantial, but even greater economies are being sought in order to offset, at least in part, the growing cost of building and maintaining the modern Fleet the United States must have to maintain the peace.

V. Weapons and Aircraft

Establishment of the Bureau of Naval Weapons

Fiscal year 1960 marked the birth of the Bureau of Naval Weapons, established by the Act of Congress of September 1, 1959, which merged the former Bureaus of Ordnance and Aeronautics of the Department of the Navy. The purpose of the merger is to reduce the leadtime between expression of an operational requirement and delivery to the Fleet of an effective weapon system. It represents an acknowledgment that the sophistication of the guided missile has outgrown former approaches to weapons development, and that timely, effective, economical development and production of modern weapon systems require a closely coordinated effort among contributing offices.

The functions of the new Bureau embrace research, development, design, test, operating standards, manufacture, procurement, fitting-out, storage, distribution, issue, maintenance, alteration, repair, overhaul, material effectiveness, disposition, and salvage of all naval weapons, aircraft, targets, photographic and meteorological equipment, and supporting equipment. Headed by a Chief and Deputy Chief, its basic organization has been formed under five functional Assistant Chiefs: Research, Development, Test, and Evaluation; Production and Quality Control; Fleet Readiness; Field Support; and Contracts. This is supported by a staff which includes the Inspector General who is also Assistant Chief for Administration; the Comptroller; the Counsel; and the Patent Counsel. In addition, program management is set out vertically and defined as a key function, headed by an Assistant Chief for Program Management. The latter is the third senior executive of the Bureau, and has authority and responsibility for planning, directing, and coordinating the individual functions of the other assistant chiefs in a weapon system context.

Astronautics

Navigational Satellites

The year has seen appreciable progress in space vehicles. Chief Navy attention has been devoted to the TRANSIT satellite, under development to provide an accurate worldwide, all-weather navigation system. On September 17, 1959, a first attempt at orbit failed, al-

though the long ballistic flight provided considerable useful information. On April 13, 1960, a TRANSIT satellite was placed in useful and satisfactory orbit, with a life expectancy of several years. Precise navigational data have been received from it, along with corroboration of geodetic discoveries made by the Navy's earlier VANGUARD satellite. With such progress, the Department of Defense was able to terminate the association of the Advanced Research Projects Agency with the TRANSIT project, and on May 9, 1960, transferred it fully to the Department of the Navy. The third launching of the year was the ambitious TRANSIT 2A on June 22, 1960, with three "passengers" accompanying—a galactic noise receiver, an infrared scanner, and a "piggyback" satellite to measure solar radiation. A successful orbit was made, with all experiments functioning properly and producing useful results.

The Pacific Missile Range

Since its establishment late in 1957, the Pacific Missile Range has provided range support for the Department of Defense and other agencies. Here are fired guided missiles, satellites, and other space vehicles in research, development, evaluation, and training programs. Located in the vicinity of Point Arguello, Calif., it also participates in the MERCURY program (manned orbit) of the National Aeronautics and Space Administration. Responsibility for three stations of the "man in space" worldwide tracking network has been assumed by the range.

During the year, two launch pads were completed at Point Arguello for the Advanced Research Projects Agency of the Department of Defense. Construction has started on the missile impact location facilities in the Pacific Ocean, and a joint Army-Navy arrangement for testing NIKE-ZEUS missiles at Kwajalein was completed. The Atomic Energy Commission transferred the Eniwetok Proving Ground to the Department of the Navy on July 1, 1960.

The Navy has operated the recovery ships U.S.N.S. *Haiti Victory* and U.S.N.S. *Dalton Victory* to afford down-range recovery support. These ships have proven valuable in the DISCOVERER satellite program. The U.S.S. *King County*, another ship associated with the range, has been replaced by the U.S.N.S. *Range Recoverer* (AG 161, formerly the FS 278). Additional afloat facilities for operation of the range include activation and instrumentation of the *Niantic Victory* and the *Knox Victory*, and upgrading the U.S.N.S. *Joe E. Mann*. The *Range Tracker* (AG 160, formerly the *Skidmore Victory*), is currecently undergoing conversion for range duty, with completion scheduled for May 1961.

By agreement with the Air Force, the Navy assumed responsibility for range safety instrumentation and procedures, including those for all missiles fired from the Point Mugu—Point Arguello—Vandenberg Air Force Base complex.

Antisubmarine Weapons

Considerable progress is being made in equipping surface ships with greater capability to destroy modern submarines. Much improvement in this aspect of naval warfare has resulted from the FRAM program. In addition to the more prominent new weapons, electronic and launching gear have been installed to enable employment of the Navy's new fast, deep, and more destructive torpedoes.

One of the major items procured in the FRAM program this year was the new drone antisubmarine helicopter (DASH) system. It is intended as a standard early-attack weapon for new destroyer-type ships as well as for those being modernized. It makes use of extended-range detection equipment aboard ship, a lightweight drone helicopter, and depth charges and torpedoes.

DASH is designed to augment and complement the ASROC weapon, whose entry into Fleet use was a significant event of the year. ASROC is a rocket-thrown antisubmarine missile, and represents a major advance in early-attack capability for surface ships. It delivers either a depth charge or homing torpedo attack well beyond the range of the currently standard Weapon ALFA. The destroyer *Perry* was the first modernization completed in the FRAM program and the first ship outfitted with a production model ASROC system. Concurrently, the frigate *Norfolk* has begun an operational evaluation of the prototype ASROC system, which will be completed in the fiscal year 1961.

The submarine is an excellent submarine killer, and good progress has been made in a balanced undersea weapon program. Fleet deliveries of up-to-date weapons in quantity, design completion of a weapon system to cope with the type of targets we may shortly expect, and other substantial developments are promoting increased capability in antisubmarine warfare. The MARK 37 submarine-launched (or surface-launched) standard torpedo began to make its presence felt in the Fleet this year. This homing torpedo has a speed and range sufficient to catch and kill the targets it is likely to find today. The ASTOR torpedo completed the development phase, and operational evaluation has begun. It provides a capability of destroying high-speed, deep-diving submarines with reliability and accuracy. First test vehicles of the SUBROC early attack submarine weapon performed most satisfactorily, confirming the success of development to date. It will extend our submarines' attack range to the limits of detection capability.

Attack Aircraft Weapons

The Navy continues to possess sufficient stocks of competent nuclear weapons for air-strike delivery. Among air-launched weapons other than nuclear, the air-to-surface missile BULLPUP, designed for use by light attack aircraft against small defended targets, continued to demonstrate operating reliability and accuracy. The current missile is an improved version of that first produced in the fiscal year 1958 and still operational in the Fleet. Features of the newer version include a more powerful warhead and a better fuse. It provides an extended flight time, increased range, and greater over-all destructive and penetrative capability. Production of a prepackaged liquid fuel-type engine will begin early next year, to replace present solid fuel engines. The Air Force and the Marine Corps are also using BULLPUP.

The 5-inch aircraft rocket ZUNI is a folding-fin rocket used by attack-type aircraft. It is highly effective against tanks, pillboxes, gun emplacements, trains, motor convoys, ammunition and fuel dumps, and small ships. Built to replace the World War II HVAR rocket in high-speed aircraft, up to four ZUNIs can now be carried for each HVAR formerly carried. The launcher can be jettisoned after firing to increase the speed of the launching plane.

Fighter Aircraft Weapons

Enemy aircraft targets are reaching such altitudes and speeds that missile weapons become virtually mandatory. Navy's SIDEWINDER and SPARROW missiles have kept pace. The production-proved, battle-tested SIDEWINDER 1A was produced in the largest numbers yet, increasing the readiness of Navy, Air Force, and NATO aircraft. Scheduled production rates were exceeded, and at a price that reached a new low. Meanwhile a first production contract was let for a new version which completed successful test firings. With alternate infrared or radar-seeker heads, it outperforms its predecessor and has an all-weather potential. Companion to SIDEWINDER and substantially more sophisticated is the SPARROW III missile, which has been in the Fleet since August 1958. It is the current operational all-weather missile and will provide augmented range and altitude compatible with the performance of the new F4H Phantom II all-weather fighter plane. Development started on the EAGLE-Missileer combined missile-fighter design, contracts being awarded for the long-range, air-to-air EAGLE guided missile and for the Missileer fighter aircraft.

Other Missile Systems

Clearly a most important breakthrough of the atomic age is the success of the POLARIS fleet ballistic missile system, discussed elsewhere in this report. In addition, an existing strike missile system, REGULUS I, continues to provide a high subsonic speed shore-bombardment weapon. This was the first operational attack missile to join the Fleet (May 1954), and with its nuclear warhead and electronic control it has maintained its good service. In March 1960 the U.S.S. *Halibut* became the first nuclear-powered submarine to fire a missile of any type when it made a highly successful REGULUS launch off the coast of Hawaii. To improve REGULUS missiles in stock, new guidance components have been provided to increase their resistance to enemy jamming.

Guided missile ships now in commission are receiving improved versions of the TERRIER and TALOS supersonic antiair missiles. The latter is a long-range high altitude weapon, and a newer model has doubled the previous range. The small ship antiaircraft missile system TARTAR passed through the later stages of development, preparatory to Fleet delivery in the fiscal year 1961.

Strike Aircraft

Attack aircraft systems continue to play a major role in the Navy's offense. Although manned plane programs declined, this year has seen progress toward a new generation of higher performance aircraft. The A4D Skyhawk, in its latest model, is a light, single engine, limited-weather, high-performance jet aircraft of great versatility. It performs the bulk of short-range attack missions, including strikes against land and sea targets from land and sea bases. The next step in light attack planes will be the A2F Intruder, which reached a major milestone with development, fabrication, and flight of the first aircraft of this type. It is a low-level plane of great range, capable of finding and attacking fixed or moving targets under any conditions of weather and visibility.

The ability to launch aircraft from a moving airstrip (the carrier) gives the Navy an unusual flexibility and reliability for delivery of a massive attack. The principal vehicle for such delivery is the A3D Skywarrior, a heavy attack aircraft of great range, altitude, and weapon-delivery capacity. It is the largest and most powerful aircraft to operate from a carrier deck thus far. Anticipating development of more effective countermeasures, the A3J Vigilante will shortly supplement the capability of the Skywarrior with even greater speed and altitude.

The F8U Crusader has continued to be the basic day fighter, and the Navy began taking delivery of a new version with some all-weather capabilities and with superior radar, engine, fuel capacity, and potential for search and tracking. Matching this increased capability, it will carry the new SIDEWINDER 1C missile.

This year's flight operations of all-weather fighter planes were conducted mainly with the F4D Skyray and the F3H Demon. For the future, emphasis is being placed upon the F4H Phantom II all-missile aircraft as the Navy's general purpose fighter. Selected last year after extensive competitive evaluation, it is a two-place, twin-jet, all-weather airplane. It flew for the first time in May 1958 and on December 6, 1959, established a world altitude record of 98,560 feet at Edwards Air Force Base. The Phantom II is packed with detection and tracking equipment and is capable of destroying enemy bombers and fighters by day or night, in any weather, at supersonic speeds. It employs a radar operator along with the pilot, greatly increasing its effectiveness as an all-weather interceptor. The Phantom II can be refueled in flight by the probe and drogue system, and also uses the "buddy tank" system which allows one F4H to refuel another.

Other Aircraft

First Fleet deliveries were made of the WF–2 Tracer aircraft, which greatly improves a carrier task force's ability to detect enemy aircraft at long range and to control fighter interception thereof. It will replace the AD–5W model. The year also saw first deliveries of the Q version of the WV–2 Super Constellation, with enhanced ability for long-endurance electronic reconaissance.

Patrol Planes

The first production order was placed for the P3V–1 land-based patrol aircraft; meanwhile, patrol operations continued principally with the P2V Neptune, holder of the world's long-distance unrefueled record. The P3V–1 has twice the speed of the P2V and considerably advanced equipment for detecting and tracking submarines. A prototype model of this aircraft was procured in the fiscal year 1959 for use in proving the airborne electronics used in submarine detection. Patrol operations have been supplemented by the P5M Marlin seaplane which was still being produced this year and by several models of airships now out of production.

Search Planes

The S2F–3 Tracker aircraft will shortly give the Navy greater detection, localization and destruction capability under all weather

conditions, day or night. It is an improved version of the S2F–1 series, a twin-engine (reciprocating) carrier-based, fixed-wing search aircraft. The S2F–3 made its first flight during the fiscal year 1960 and Fleet delivery is scheduled for next year. Meanwhile, search operations continue with the earlier S2F–1.

Helicopters

HSS–1N and HSS–2 helicopters were procured to provide the Fleet with an all-weather, around-the-clock ability to search for and attack submarines. The HSS–1N was first delivered in the fiscal year 1959; the HSS–2 will replace the HSS–1 and the HSS–1N in the future. The newer helicopter has new sonar equipment, automatic navigating, and all-weather flight features. Its first flight was made last year and extensive flight testing is now underway. Fleet deliveries of the HSS–1N helicopters continued, operations being conducted with it and the earlier HSS–1.

NATO Antisubmarine Aircraft Development

A standard patrol aircraft for antisubmarine warfare is being developed under sponsorship of the North Atlantic Treaty Organization, financed by five countries, including the United States, under the Mutual Weapons Development Program. This airplane will embody the latest antisubmarine warfare techniques and equipments available. Several U.S. Navy-developed antisubmarine equipments were selected for installation in the prototype aircraft.

Aeronautical Equipment and Materials

Pilot safety is being advanced by installation of the Martin-Baker low-level ejection seat in increasing numbers, some 435 aircraft having been equipped with this device. It affords a pilot a safe means of escape from a distressed aircraft, from extreme altitude down to ground level. F3H Demon and F8U Crusader aircraft in production are now receiving this equipment, and procurement for back-fitting into most operating fighters has begun. To date 30 ejections, most of them at the low levels where the majority of fatalities occur, have resulted in only four fatalities.

An Airborne Tactical Data System (ATDS) has been installed and tested in a WV–2E Super Constellation plane. The speed and multiplicity of aircraft and ships have created growing and diverse demands for guidance data, a complex tactical burden which overwhelms control methods based solely on human decision. The ATDS development incorporates automatic rapid data processing with reliable

high-capacity communication, and will contribute to an airborne tactical control system for future air operations.

High temperatures in planes and weapons have made necessary intensive efforts to develop materials compatible with extreme heat. Substantial gains have been made in sheet-rolling refractory metals, and a titanium alloy sheet rolling program has produced approximately 50,000 pounds of sheet in three compositions. This material has been distributed primarily to airframe manufacturers. Progress has also been made in the production and fabrication of difficult-to-handle metals. A most important development was inauguration of the "In-Fab" facility, an ultra high temperature, airtight metal-working plant operating in an argon atmosphere of high purity. Within a few weeks of the first filling with argon gas the space-suited operators of this plant were direct-forging molybdenum ingots, bypassing the difficult and wasteful extrusion operation which was previously considered essential.

VI. Medical and Dental Services

Health of Personnel

There was a marked reduction in the average length of patient stay (from 34 to 29 days) during this year, and no major disease epidemics occurred among Navy and Marine Corps personnel. At the same time, the reduction in sick days (a decline of 18 percent in the annual total) had a favorable influence on the noneffective rate. In spite of a slightly higher admission rate, the number of naval personnel off duty owing to illness during the fiscal year 1960 was even lower than last year. In 1959 approximately 12 out of every 1,000 active duty personnel were on the sick list each day of the year; this year the comparable figure was 11 per 1,000, a vast improvement over the 20 per 1,000 of just a decade ago.

The admission rate for less serious acute respiratory infections rose slightly, but the rate for influenza and pneumonia remained about the same. The venereal disease rate declined about 12 percent. Meanwhile, a lower death rate was recorded, following a decrease in the average strength. Of the 1,388 deaths, 293 resulted from aircraft accidents, but there was a significant decline in the aviation accident rate from 2.95 per 10,000 flying hours to 1.9, an all-time low, despite an 8 percent increase in carrier flying hours. Some 1,000 fewer persons were lost to the naval service through medical survey discharges and physical-evaluation separations than in the year before.

Patients occupying beds in worldwide Navy medical facilities, including ships, averaged 12,038 daily. More than 5,500,000 out-patient visits were made by Navy and Marine Corps personnel, and over 4,000,000 immunizations were administered to them during the year.

Nearly 9 of every 10 hospitalized patients were in U.S. naval hospitals. Of every 100 such patients, 63 were active duty Navy and Marine Corps and 18 were dependents of the uniformed Services. The remainder comprised mainly Army and Air Force patients, retired personnel, and Veterans Administration beneficiaries. Active duty Navy and Marine Corps personnel occupying beds in worldwide Navy medical facilities averaged 7,969 per day, about 80 percent in U.S. naval hospitals and 20 percent in other Navy medical facilities. Additionally a daily average of 560 patients occupied beds in Army and Air Force facilities, 35 percent of these being in Tripler Army Hos-

pital. Army and Air Force personnel occupying beds in Navy medical facilities averaged about 781 per day.

Dependents' care in Navy medical facilities has increased substantially. Admissions increased 16 percent, the daily average of beds occupied 13 percent, and out-patient services 11 percent. A large part of this workload was related to the approximately 43,500 births, an increase of 32.5 percent. About 88 percent of the daily average of 2,008 dependents occupying beds in naval medical facilities were in naval hospitals in the United States.

The cumulative total of dental patients treated in Navy and Marine Corps facilities was over 2,000,000, and the number of procedures performed for these patients was in excess of 7,000,000. Approximately 6 percent of all patients treated were dependents, an increase of 18.5 percent over the number of dependents treated last year.

Hospitals and Hospital Administration

On June 30, 1960, there were in operation 25 naval hospitals, 30 station hospitals, 4 naval dispensaries, 67 dispensaries with authorized beds, 108 dispensaries without authorized beds, and 316 dental facilities. The total number of operating beds was 15,173. Additionally, 235 beds were utilized in the hospital ship U.S.S. *Haven* at Long Beach, Calif., and 350 beds were provided at the Tripler Army Hospital. A new 800–1,500-bed modern hospital was commissioned in April at Portsmouth, Va., and a similar large hospital is to be completed in the fall of 1960 at Great Lakes, Ill.

Changes were made in the standard organizational pattern for naval hospitals. The finance and hospital supply divisions were merged into a single Fiscal and Supply Division. Clothing and small stores and collection agent functions were placed in this new division, as was a machine records branch at hospitals where the use of electrical accounting and electronic data processing machines was authorized in connection with this range of functions. The changes enabled better control of funds at the allotment level and facilitated the use of improved procedures associated with mechanized methods of equipment.

Installation of remote control dictating equipment for medical records was continued to the extent that funds were available, systems being installed at San Diego, Calif.; Beaufort, S.C.; St. Albans, N.Y.; Camp Pendleton, Calif.; and Jacksonville, Fla. The new hospital at Portsmouth, Va., also has such a system. A standardized outpatient treatment record for dependents was devised which eliminated cumbersome administrative practices previously involved in making records available when a dependent was treated again at a different hospital.

Centralization of ward food distribution systems has continued. Food service management was improved through increased use of the selective menu, closer correlations between the regular diet and therapeutic menus, and the closing of separate therapeutic diet kitchens in some hospitals.

Military Medical Specialties

Submarine Medicine

A number of studies of atmospheric contaminants in nuclear submarines were completed during the period. These include materials given off by water-based paints, combustion gases produced in the firing of POLARIS missiles, and health hazards produced by hydraulic fluids and compressor lubricants and insecticides. Through the latter studies it was learned that insecticides having a residual killing power can be safely used on board submarines.

Astronautical Medicine

Arrangements were made to perform in naval laboratories the research in the life sciences desired by the National Aeronautics and Space Administration. At the same time Navy physicians cooperated closely with NASA in Project MERCURY to put man into orbital space flight. Training was given the astronauts in certain aspects of space flight at the Aviation Medicine Acceleration Laboratory, and the Navy's Mark IV full pressure suit was chosen as the one the astronauts will use. Preliminary preparations were made to provide the equipment and specialized medical personnel who will be necessary in the recovery of the space travelers when they return to earth. In cooperation with aviation medicine programers, investigations continued on ways of arranging the self-contained environments involved in space flight. Varied instrumentation was under development to discover the biological effects on man of the conditions to be encountered in such flights.

Aviation Medicine

The effects of transverse, linear, and angular acceleration on the human body in flight were studied. Methods of posturing the body were developed which protect it against the effects of 25g for 20 seconds, a degree of protection formerly considered impossible. (At 25g a 200-pound man in effect weighs 5,000 pounds.) By further experiments, using a water support system for the body, it was demonstrated that protection from transverse gravitational pull may be afforded at even higher "g" (gravity) levels.

The Human Disorientation Device (Device 9U35) was installed and began operation at the Naval School of Aviation Medicine, Pensacola, Fla. At the Air Crew Equipment Laboratory , Johnsville, Pa., a complete replica of the Project MERCURY capsule was nearly completed within the low pressure chamber by the year's end. Here the astronaut in a full-pressure suit will endure a programed static simulation of space flight during which simulated emergencies will be effected and evidenced by instruments, along with actual automatic activation of emergency life-support systems. Programed simulated flights will require navigation, orientation, timing, and other normal piloting functions of the astronaut, during which simulated emergencies must be met and countered in order to prevent a simulated catastrophe.

A new Life Sciences Department was established at the Naval Missile Center, Point Mugu, Calif. It will have the capacity to develop and test life-support systems, aircrew personnel, and telemetering equipment in aerospace vehicles, both under controlled laboratory and actual flying conditions.

Dentistry

At the Dental Research Unit, Great Lakes, an X-ray machine was evaluated which is able to make a full-mouth exposure on a single X-ray film. The principle involved reverses the normal procedure of dental radiography. The film is positioned adjacent to the patient's face, and the X-rays come from the side of the head opposite to the side being recorded.

Recruits continued to require a large amount of dental care, 6 percent being routinely placed in "holding companies" for extensive surgical periodontal, operative, and prosthetic treatment prior to commencement of training. The installation of high-speed (belt-driven) dental equipment at dental facilities was continued.

Training

Medical Corps

Training to satisfy requirements for fully qualified and certified medical officers in the several clinical specialties continued at a level similar to that of the last 2 years. On June 30, 1960, there were 352 officers in residence at naval hospitals, the U.S. Naval Medical School, and the U.S. School of Aviation Medicine, plus 51 in civilian hospitals and schools. There are now 485 Navy medical officers on active duty who are certified by the various American specialty boards. It was the policy to readjust occasionally the ratio between hospital staff and residents to provide the proper staffing for patient care and at the same time meet training needs in the clinical specialties.

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Three new residencies were established during the year with approval from the Council on Medical Education and Hospitals of the American Medical Association. Five new affiliations were arranged between naval hospitals and civilian institutions to broaden the scope of training in some areas. One hundred and seventy-six interns were trained in naval hospitals. Seventy-one foreign medical officers received instruction in naval medical facilities under the sponsorship of the Military Assistance Program, and a program was developed whereby they may be enrolled in civilian institutions as well.

Several new specialized courses were set up, including a 6-week course in orthopedic pathology for orthopedic residents beyond the first-year level, presented by the Armed Forces Institute of Pathology. A 3-week training period was initiated at the Naval Medical Center, Bethesda, Md., as part of the Defense Atomic Support Agency's 10-month advanced course in radiobiology.

Postgraduate short courses varying in length from a few days to several months were given in clinical medicine, and steps were taken to strengthen the training of all hands in first-aid, self-aid, and "buddy-aid." About 5,000 medical correspondence courses were provided.

There was continued emphasis on training in the military medical specialties, especially nuclear medicine, aerospace, and atomic-biological-chemical warfare defense medicine. During the year, 112 medical officers (including several reservists) participated in various courses related to these fields.

Dental Corps

Eighteen officers received rotating dental intern training while 8 received residency training; 28 were assigned to the 10-month general postgraduate course at the U.S. Naval Dental School, while 2 officers received full-time and 1 part-time postgraduate instruction at civilian schools. Short in-service courses of 5 days' duration were taken by 84 officers at the Dental School, and 62 completed courses offered in the Eleventh and Twelfth Naval Districts. There were 2,308 new admissions and 1,870 completions in the correspondence course program during the year, a substantial increase.

Medical Service Corps

Forty-eight officers received full-time in-service training in hospital administration and other needed specialty courses. Full time out-service training was provided at civilian institutions for curricula not available in Service facilities. This included courses in administration, comptrollership, food service management, physiology, psychol-

ogy, microbiology and physics. Twenty-eight officers were enrolled full-time, while 72 completed various college courses on a part-time basis.

Nurse Corps

At the end of the year 62 nurses were under full-time out-service training in advanced nursing specialties, general nursing, and anesthesia. In summary:

Level	Completed Course	Began Course	Continued Course
Baccalaureate Degree	13	15	27
Masters Degree	3	0	0
Anesthesia	2	0	2

Additionally, 40 nurses participated part-time in short courses, seminars, institutes and workshops sponsored by military and civilian organizations, while 133 enrolled in 178 college courses on off-duty hours at their own expense. At the same time 84 officers attended short courses at the Naval Medical School in such subjects as personnel development, planning of orientation programs, and supervision of nursing services. Eleven Hospital Corps WAVES continued in the Nursing Education Program (a 4-year college program) and 1 was enrolled. In the Navy Nurse Corps Candidate Program 28 continued, 55 graduated, and 9 commenced instruction.

Hospital Corps

A total of 3,994 personnel graduated from basic class "A" schools in medical techniques. In the more advanced class B schools, 402 completed the course which had been reduced from 26 to 20 weeks, and 2,025 graduated from class C schools and other courses for technicians.

Research

There were notable developments in the traditional medical fields as well as in the military specialties. In radiobiology it was shown, for example, that the energy produced by the metabolic activity of intestinal cells after irradiation is not readily available for the performance of functions necessary for the maintenance of cellular integrity. The essential fatty acid content of the liver is also drastically reduced by irradiation but the site of the defect is not yet identified. Research was initiated to investigate, by electron microscopic studies of liver and other tissues, the nature of the subcellular damage that might underlie the observed biochemical defects.

The Navy Toxicology Unit at Bethesda, Md., evaluated toxicity problems which develop from the use of materials in closed spaces such as submarines and ship compartments. Techniques suitable

for use in surgery involving extracorporeal circulation were developed, while methods and apparatus for production of localized hypothermia, useful to control bleeding in open heart surgery, were also developed and used successfully in the operating room.

Studies at Chelsea Naval Hospital, Boston, Mass., showed that frozen glycerolized red cells used in transfusions (1,000 cases without a reaction) survived as well as fresh citrated homologous blood and caused fewer reactions than citrated blood in reaction-prone individuals. The suspension media for the frozen blood can be tailored to the specific needs of the patient. It was also discovered that heparinized blood (substance added which lengthens clotting time) can be frozen without loss of heparin activity.

A new and more reliable test was developed which shows better the difference in night vision sensitivity among individuals. The test can be used to select personnel for positions that require good night vision.

The medical research unit at Taipei developed a vaccine for trachoma which produces antibodies in men and monkeys and protects experimentally against the virus. This disease affects 400 million people throughout the world. Naval Medical Research Unit–3 in Cairo developed a method of electrophoresis by which abnormal hemoglobins might be determined, and through a branch laboratory in the Blue Nile area began a study of kala azar (an infectious fever involving enlarged spleen, anemia, etc.)

VII. Supply

Aviation Supply

Substantial progress has been made in raising the effectiveness of aviation supply support, evidencing the progress of the improvement program described last year. The over-all rate for aircraft out of commission for parts reached an alltime low of 3.3 percent by June 30, 1960, while the rate for first-line combat aircraft alone dropped to a record low of 5.1 percent. The magnitude of this improvement may be seen by comparing the previous rates of 7.2 percent and 15.8 percent for total and first-line aircraft, respectively. Review of the program has also resulted in tightened control over aircraft engine inventories and a marked improvement in the programing of aircraft for material support.

Cataloging

In this year, Department of the Navy inventory managers controlled approximately 1.4 million items of supply, and transacted supply operations for these items using solely the catalog data authorized by the Federal Supply Cataloging System. The range of items continued to be reduced in accordance with schedules established for accelerated purification of the supply system, and Navy reviews led to the elimination of approximately 26,000 Federal stock numbers.

Material Disposal

The aggressive material disposal program established in March 1957 continues. During this year material totaling $3.3 billion in original value was determined to be surplus, and disposals totaled $3.2 billion. The Department of the Navy has disposed of surplus property to a total of $9.5 billion since the inception of the accelerated disposal program.

Proceeds from sales during this fiscal year, including sale of scrap, were $94.8 million. Totals of 1,418 aircraft and 283 vessels (730,542 tons), with an original value of $492.9 and $871.2 million respectively, were included in the sales. Proceeds from the sale of vessels alone amounted to $21.3 million. Redistributions of excess stores materials are valued at $81 million of which 42 percent was redistributed within the Navy, 19 percent transferred to the Air Force, 10 percent to the Army, and 29 percent to other Government agencies. Donations are valued at $75 million. System-wise, Navy equipment and supplies inventories, excluding excess material,

were reduced by $661 million during the fiscal year 1960 through improvements and an aggressive disposal program.

Revised policies and procedures governing the reporting, utilization, screening, and redistribution of surplus were promulgated in May 1960 and are expected to improve utilization screening, reduce screening time, and simplify reimbursement procedures.

Fleet Supply Procedures

Some 4,740,000 line items of afloat repair parts and general stores inventories have been "purified" on 330 active ships during their scheduled overhauls, and excess material valued at $17.1 million was off-loaded. This is a concerted program which complements the Coordinated Shipboard Allowance List (COSAL) program by achieving greater supply endurance in active fleet ships. To make COSALs most effective for fleet ballistic missile submarines, new methods included the application of mathematical decision rules in quantity determination, the introduction of coding by military worth, and the incorporation of weight and cubic data for allowance list items.

The practicability of financing tender and repair ship inventories under the Navy Stock Fund was tested and determined to be of advantage. Capitalization of their inventories will enhance the material readiness of the 33 mobile support ships of this type by enabling them to maintain a complete range and depth of load and allowance list materials, unhampered by operating fund limitations.

To strengthen Fleet support further, mechanization of supply operations has been extended by the installation of electric accounting machines in additional mobile support-type ships. Similarly, paperwork has been substantially reduced by the adoption of a simplified general mess accounting procedure and a 30 percent labor saving has been achieved by simplifying records and returns.

Shipping Procedures

In order to determine the airworthiness of cargo in relation to its need for air transport and to conserve transportation funds, uniform procedures have been established for screening air shipments at Navy Regional Air Cargo Control offices. Transportation costs were thus reduced by approximately $1 million by diversion of shipments from air to surface modes. Additional economies in packaging, transportation, and storage are being achieved as a result of Operation LIGHT PACK, a program for the use of lightweight packaging materials and shipping containers. With the cooperation of the Bureau of Customs and to insure the integrity of the customs laws and regulations, improved regulations were developed to provide for the overseas inspection of personal property being returned to the United States for which free entry is claimed.

VIII. Shore Facilities

Planning

It is becoming apparent that the planning for shore activities is not sufficiently responsive to the changing operational demands on the modern Navy and its needs for support. To remedy this condition a Standing Committee for Shore Facilities has been established, composed of senior officers from planning and operations components of the Office of the Chief of Naval Operations. The committee will exercise surveillance over all aspects of shore facilities planning.

An integrated planning system has been developed. It provides for coordination of peacetime and mobilization requirements for shore facilities; improved planning guidance; engineering evaluations of existing facilities in comparison to total requirements, to determine deficiencies and surpluses; and promulgation of a plan for shore facilities which will cover the 5-year midrange planning period.

Continuing effort is being made to modernize and complete a library of standard engineering guidance for the design and construction of shore facilities. Unprecedented technological advances in weapon systems require new types of shore facilities for their support, and up-to-date design guidance will assure effectiveness as well as economy. Designs are being developed for the utilization of floating drydocks for mobile missile-launching complexes, facilities for nuclear powerplants in advanced areas, and new types of communications installations.

Construction

Vouchers totaling $291 million were paid for shore construction completed during the fiscal year, including such major projects as the Naval Hospital, Portsmouth, Va., for $18 million; a carrier pier at Mayport, Fla., for $1.3 million; and Marine Corps facilities (Camp Schwab) at Okinawa for $15 million.

Construction projects started during the year total about $246 million in value. They include a drydock and caisson at the Puget Sound Naval Shipyard for $22,299,000; the remaining $11 million in contracts necessary to complete the $70 million radio facilities at the Naval Radio Station, Cutler, Maine; and 19 surface and ground projects to support Reserve training at various continental locations for $4.3 million.

Construction contracts amounting to about $803 million were in progress at the beginning of the year. They include air and ground facilities to support the Marines in Okinawa; aviation facilities at the Naval Air Stations, Meridian, Miss., and Lemoore, Calif.; Fleet facilities at Mayport, Fla.; POLARIS missile facilities at various locations; and hospital facilities for the Naval Medical Center at Bethesda, Md.; the Naval Hospital at Great Lakes, Ill.; and the Naval Hospital at Subic Bay, P.I.

Labor relations affecting shore construction contracts have presented no serious problems during this year. Work stoppages due to labor disputes occurred on some contracts and from time to time had a minor effect on critical programs. On the whole, however, relations with the construction trade unions remain good, and shore construction has not been seriously affected by labor disputes. As a result of continued indoctrination of field personnel, there has been further improvement in the enforcement of contractor compliance with Federal labor standards statutes.

Real Estate

During the fiscal year 1960, the Department of the Navy acquired title to 92,628 acres of land, 83,799 of which were public domain lands and 1,863 acres transferred from other Government agencies. In the same period, it disposed of 86,102.9 acres, with a plant-account value of $436,885,451. In addition, 79 major disposal actions were in process, involving approximately 20,107 acres, which, with improvements, represent a total cost of approximately $134,337,000.

Outleases are in effect for all or part of 15 industrial reserve facilities which have an over-all plant account value of $149,159,000. Eleven of these reserve facilities have been declared excess, but the lease management is continuing until they are disposed of by the General Services Administration.

Housing

The gross number of officer and enlisted personnel entitled to family quarters, under permanent legislation, was 279,962 at the end of this year. Requirements are being met in part by 50,080 adequate Navy-controlled units and 93,044 units of private housing which are acceptable as to standards, location, and cost, leaving 136,838 families without adequate provisions. Of these latter, 39,176 are in inadequate Navy housing and 82,579 are in private housing units which are inadequate for reasons of standards, excessive cost, or commuting distance.

Of the 15,840 new quarters authorized under the Capehart Act, 14,879 either have been completed, are under construction, or have bids

under consideration for award. Of the 24,503 Wherry Act units originally constructed, the Department of the Navy had acquired a total of 14,734 by year's end. Under Department of Defense definitive standards and criteria governing the conversion of acquired Wherry projects to public quarters, the rehabilitation and conversion of 12,635 of these 14,734 units has been approved and funded and will provide a net of 11,312 public quarters units when completed. They will return an average of approximately $90 per unit per month or approximately $11,000,000 per year, after a reasonable vacancy and turnover allowance.

Utilities

Procurement of utility services, exclusive of long-lines communications, totaled $59,790,000 during the year. Approximately $3,112,000 was saved through contract negotiations, hearings before State utility commissions, and municipal rate negotiations. Leases of long-lines communications services totaled an additional $7,168,000.

The value of the Navy's mobile power reserve was demonstrated again in this period. The west coast 10,000-kw. railroad-mounted powerplant was shipped to Guam in April, and during next October-November this unit will begin providing vital power service to support operations there, pending development of the first phase of Guam's additional power facilities. Other units which have been deployed are supporting the POLARIS submarine program at the Naval Shipyard, Portsmouth, N.H., and the Air Force DEW line station at Clear, Alaska.

Planning for the second increment of power on Guam contemplates the utilization of a large relocatable mounted (Texas Tower Type) 20,000-kw. nuclear powerplant. A 1,500-kw. nuclear plant is scheduled for McMurdo Sound, Antarctica, to be installed in conjunction with the Atomic Energy Commission.

Maintenance

Despite rising costs of labor and materials, public works management has achieved steady improvement in relative costs of maintenance. Since 1955, the plant replacement value of the shore establishment has increased at the rate of 3½ percent a year. During the same period, maintenance and repair expenditures have decreased from 2 percent of plant replacement value in 1955 to 1¾ percent in 1959.

Further progress has been made in engineered performance standards, work simplification, and utilities conservation. An improved system of cost classifications has been developed in order to permit more critical appraisal and control of maintenance expenditures. A

new method of evaluating transportation equipment requirements and replacements has been developed, which will assure proper appraisal of the economics of all alternatives such as ownership, rental, replacement, and rehabilitation. Additional refinements and improvements have been made in the management and maintenance of motor vehicles, and a reduction of 1,400 general-purpose vehicles was accomplished.

Subsidence at the Long Beach Naval Shipyard

Efforts are being continued to save the naval shipyard at Long Beach, Calif., from inundation due to subsidence of the land surface, and some developments have been encouraging.

Major operators in the Wilmington oil field have joined in a formal unit agreement under which they are undertaking an ambitious antisubsidence program of water repressurization of the field. Field-wide injection totals increased from 211,809 barrels of water per day on June 30, 1959, to 350,892 barrels of water on the same date 1 year later. In that portion of the field underlying the shipyard, water injection rose from 22,771 to 208,002 barrels of water per day during the same period.

Legal and technical evaluations of the progress of the program during this fiscal year were sufficiently favorable, and in March 1960 the Secretary of the Navy made the determination required by the Military Construction Act for 1959 that, for the purpose of that statute, sufficient action has been taken and arrangements made to arrest further subsidence of the shipyard. This determination was necessary as a condition precedent to Congressional authorization of $5,500,000 for the Long Beach Naval Shipyard protective works.

IX. Research

A comprehensive research program is being prosecuted, and is designed to generate the new knowledge and skills necessary to maintain and extend a strong naval technology. As a general summary, progress has been noteworthy in the following areas:

(1) The application of analog and digital computer devices to provide rapid solutions to problems of military and scientific importance in systems and procedure analyses, operational evaluations, logistics planning, scheduling of overhauls, and various problems arising in communication, navigation, war games, and the like.

(2) The development of new synthetic materials having physical and chemical properties more suited for precision scientific naval applications than those of natural origin. These newly developed materials are gradually supplying demands generated by wider ranges of environmental conditions under which the Fleet must operate.

(3) The development of new energy sources and methods of energy conservation such as the application of thermoelectric materials for food refrigeration aboard ship or temperature control of POLARIS fuel, the use of fuel cells for submarine powerplants, and the use of nuclear-powered thermoelectric power units.

(4) Exploration in space to develop precision methods of global communication, navigation, and weather prediction, using man-made satellites as well as those of natural origin.

(5) In particle physics, determining the ultimate nature of matter and the secrets of the binding forces which hold subatomic particles together.

(6) By repeated voyages, increasing scientific knowledge of the vast unknown undersea and polar regions, potentially of great importance in the nuclear age.

(7) Investigation of the depths of interstellar space.

In the category last mentioned, rockets and balloons carrying research instrumentation have brought significant advances in ultraviolet and X-ray astronomy, important to our effort to unlock those secrets of nature having potential naval interest. The solar disk has

been photographed in the Lyman-alpha region with resolution of better than one minute of arc. Spectrographs of high resolution have also been obtained. This information, coupled with results of the study of solar X-ray emission and other observed scientific physical phenomena coincident with visible sun spots, is being analyzed in an effort to get at the basis of such conditions as radio blackout during solar flares and the emission of high-speed ionized clouds in the interstellar spaces. For the first time, a small optical telescope has been used to study the ultraviolet emission of the night sky. This work demonstrated the feasibility of ultraviolet color mapping of the stars, and has given some new clues to the nature of ultraviolet nebulosities surrounding the early stars.

Chemical Sciences

The program in chemical sciences includes research on (a) the properties and behavior of substances in various states and under varying conditions of thermal, mechanical, and chemical stress; and (b) preparation of new molecules and a study of the ultimate composition of matter.

New analogs of siloxanes, components of the important silicone rubbers and plastics, have been prepared. The chemical basis is now available for the production of "aluminones," "titanones," and mixed types containing aluminum and silicon, or titanium and silicon. The properties of these new chemicals justify the expectation that rubbers and plastics with improved temperature resistance and tensile strength will be developed.

The basic research program in nitrochemistry over the past 12 years has been instrumental in the adoption of nitropolymers for the development of solid propellants for the advanced POLARIS missile. A pilot plant built jointly by Aerojet-General Corporation and the Department of the Navy at Sacramento, Calif., is turning out more than 2,000 pounds of nitrocompounds per month for this purpose.

The Naval Research Laboratory has announced the development of a new reusable dosimeter to detect and measure hazardous radiation. This dosimeter is 20 times more sensitive, is less expensive, and is easier to read than the standard film badge now used. Also, the need for costly and burdensome darkroom facilities and equipment is eliminated.

Physical Sciences

Theoretical and experimental techniques have been developed for understanding the interaction of gases with radiation, such as that found in the upper atmosphere or in the neighborhood of large energy releases. The measurements and theoretical predictions toward which

these tasks are contributing are fundamental to solving such important Department of Defense problems as missile defense and radar transmission.

A research program on nonconventional wave guide structures, microwave ferrite devices, and nonreciprocal networks has produced a striking technological accomplishment in depositing thin ferrite films, in thickness 1 to 4 millionths of an inch, on ceramic substracts. The techniques permit vacuum deposition of good quality adherent films approximating a specified composition. They have future implications in microcircuitry, bringing about a union of the concepts of microminiature circuits with those of microwave transmission systems.

A stratospheric manned balloon flight was launched in November 1959 at the stratobowl near Rapid City, S. Dak. Integrated into the sealed cabin was a Schmidt telescope with a 16-inch primary mirror, a spectrograph, and a star tracker. The objective was to determine the feasibility of conducting precise astrophysical research from a manned balloon system. This was the first time that laboratory equipment of this type had ever been airborne and results were of major importance. It was determined that there is water vapor in the atmosphere of Venus, and that the precision equipment and balloon system are compatible for astrophysical research.

A major step toward controlled thermonuclear power production has been achieved by the Naval Research Laboratory. In this experiment, shock preheated deuterium gas is greatly compressed by an extremely high magnetic field to a final temperature state estimated to be of the order of 20,000,000 degrees. This temperature is comparable with that necessary to produce the neutron yield observed in thermonuclear reactions.

Mathematical Sciences

In the statistical analysis program, a study of single item requirements has resulted in the development of methodology for preparation of shipboard allowance lists designed to increase the military effectiveness of combatant ships. Of significance is the fact that military worth of equipment and parts is taken into account. A pilot allowance list for a nuclear-powered submarine carrying ballistic missiles has been designed to permit maximum endurance at sea with a planned mission in mind. A study concerning basic timing relationships in sea transportation has resulted in significant improvements for scheduling convoys and optimum utilization of escort vessels. Formulas have also been developed to generate a more realistic ship repair load than the normal across-the-board percentage method.

Studies of information systems continue, and considerable progress has occurred in the entire field of self-organizing systems including

pattern recognition, learning machines, and other analogs of the human brain. Among Navy-supported efforts, the Cornell Aeronautical Laboratory is conducting tests on a first nonsimulated implementation of its Perceptron, and at the University of Illinois a similar working model of this type of machine is essentially completed. Perhaps most significant are recent new approaches to the subject involving closer ties to classical science, such as the physical analogs of pattern perception being investigated under Navy sponsorship at the University of Chicago. It now appears certain that the research effort with self-organizing systems will soon result in a practical computer-like device capable of pattern recognition and the speedy handling of large amounts of data.

Earth Sciences

Oceanographic research is conducted in the Arctic regions from a research laboratory at Point Barrow, Alaska, by use of laboratory boats and aircraft and, when opportunity permits, from Navy icebreakers during the summer resupply voyages. Better information concerning trafficability, transportation, and aerial operations in sub-Arctic regions has been obtained.

A recent experimental program conducted with support by the U.S. Air Force has proved conclusively the previous prediction of an elevated transoceanic atmospheric duct, capable of trapping and propagating radio waves at low loss over a considerable distance.

The world's largest movable radio telescope is being constructed by the Department of the Navy on a 400-acre site in the Allegheny mountains of West Virginia, near the town of Sugar Grove. It is expected to reach out billions of light years into the universe to "hear" radio emissions from celestial bodies.

Explorations with the bathyscaph, *Trieste* (fig. 7), continued to break ocean depth records and provide generally a means for making oceanographic observations at depths never before attained by man. During the fall of 1959 *Trieste* broke the existing deep-diving record by descending to 18,000 feet. A new and ultimate record was set on January 23, 1960, when it descended to an official 35,800 feet below the surface, reaching the ocean floor in the deepest known chasm of the earth's crust.

Biological Sciences

Evidence has been obtained that certain species of marine fungi have the ability to produce extensive deterioration of cordage. These fungi, grown on manila twine in a culture vessel containing yeast extract and sea water, have exhibited cellulolytic activity accompanied by significant loss in the tensile strength of the fiber. Development

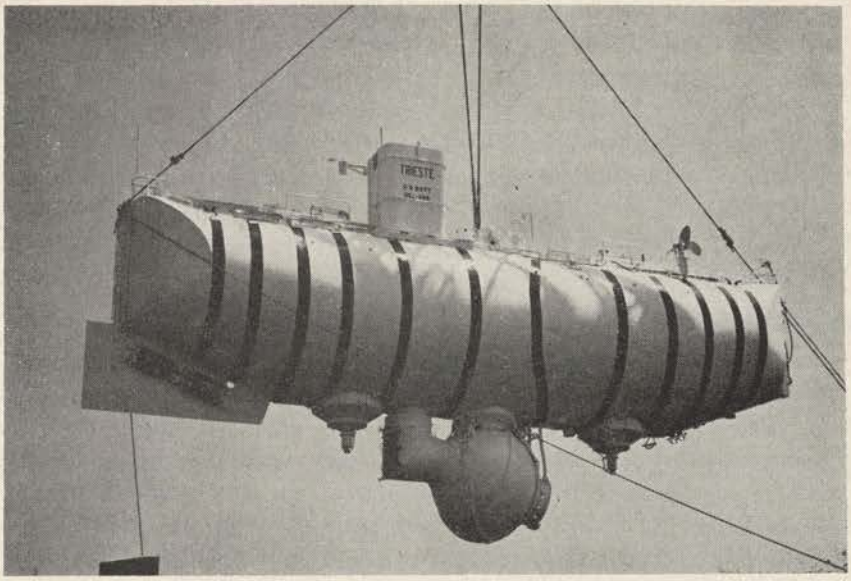

Figure 7. The Navy bathyscaph Trieste being lowered into the water. Purchase of this deep sea research vehicle from its inventor, Jacques Piccard, has provided the Navy with an excellent tool for oceanographic research.

of preventive measures will result in enhancing the life of manila line and savings to the naval service.

It has been suggested by some bacteriologists that the alimentary tracts of the penquins were essentially bacteriologically sterile. In seeking the reasons for this surprising situation, the local algae which constitute a food for the Euphausiids upon which the penguins feed were examined. From among these algae a substance was isolated and recently identified as acrylic acid, which proved to have a strong antibiotic action effectively inhibiting both Gram-negative and Gram-positive bacteria. It appears that this substance may prove effective against staphylococcus aureus, the "hospital staph" currently so dangerous because of its resistance to penicillin.

The biosynthesis of nucleic acid has been achieved for the first time in the laboratory. The synthetic material is identical with natural nucleic acid (RNA) as judged by its chemical, physical, and biological properties. Nucleic acid is a class of substances responsible for every process of living things. Its synthesis represents an important step toward the understanding and control of many diseases.

Psychological Sciences

A new noise protection device utilizing a resonating principle has been developed. Preliminary trial indicates that it will effectively

attenuate acoustical energy, particularly at those frequencies for which the traditional ear plug and muff-type devices afford no protection.

Recent studies of dynamic visual acuity (the ability to see and follow moving targets) have been directed toward providing preventative techniques to avoid midair collisions of jet aircraft. Such techniques would be of value at crowded airfields as faster aircraft saturate traffic lanes; moreover, they would have significant military tactical value.

Material Sciences

A novel heat treatment procedure for strengthening steel has emerged from fundamental studies of the austenite-martensite transformation. This transformation is the basis of the common method of hardening suitable steels by heating and quenching them. It is found that, by repeated cycles of cooling to form martensite and heating to transform back to austenite, both materials become significantly harder and stronger. This discovery has the potentiality of increasing the strength of certain structural steels materially above the levels presently attainable.

Metallurgists at the Naval Research Laboratory have discovered a special protective coating having the capability to "heal" itself automatically when flaws or defects occur in the coating. This makes it possible for the heat resistant metal columbium to be utilized at temperatures at least as high as 2,200° F. The coating utilizes ordinary grades of zinc as the starting material.

Because of the widespread use of ceramic and mineral components in many phases of military activity, a broad program is investigating fundamental aspects of ceramic systems. It also develops special ceramics for urgent naval requirements. Our knowledge of the factors that contribute to the strength of these solids has been markedly advanced. Techniques have been developed for revealing dislocations which affect the strength of certain materials (silver chloride containing aluminum oxide). Observations on the mechanical behavior of these materials may have important applications to engineering materials such as iron and steel.

A new design of an electronic microprobe analyzer has been constructed which should make it possible to conduct point-by-point analysis of regions as small as 1/25,000 of an inch in diameter. This instrument is being used for basic studies related to certain material development programs, protective metallic coatings for refractory alloys for example.

Electronic Sciences

Work on microwave polarization techniques has led to a number of important new devices and to advances in the understanding of electromagnetic wave polarization phenomena. It is now possible to "see" the changes in polarization of radar waves which occur when these waves are bounced back by various type targets. Improved target classification may be possible through recognition of the target's polarization characteristics. The polarimeter and recently developed polarization control techniques have removed misunderstandings regarding these phenomena.

Engineering Mechanics

A breakthrough has been made in furthering the structural feasibility of deep-operating submarines. Studies have shown that extreme depths are now possible of attainment for these vehicles by using certain nonconventional structural arrangements.

A first attempt has been made to operate a boat equipped with supercavitating hydrofoils. This 21-foot boat of approximately 1-ton displacement is fitted with surface-piercing supercavitating hydrofoils and a supercavitating propeller driven by a gas turbine. To date, speeds up to 50 miles per hour have been achieved and no difficulty is anticipated in reaching speeds in the 65–75-mph range.

Energy Conversion

Resulting from research into the direct conversion of heat into electricity, a capability now exists for building a 100-k.w. nuclear reactor thermoelectric power unit. The significant factor was the discovery of high temperature materials with the necessary low thermal conductivity. Though radiation was originally considered to be a major problem, enough experience has now been accumulated to indicate that radiation damage will not be important in the operation of such power units. Another potentially revolutionary method of energy conversion is the fuel cell. Development of cells has reached the point where contracts have been let for prototype models of two types, hydrox and sodium amalgam, of the size of submarine powerplants.

General Science

An extensive investigation of the ground effect phenomena is being conducted. The Aerodynamics Laboratory of the David Taylor Model Basin has developed theoretical methods and techniques for expressing hovering performance of annular jet vehicles, for determining the effect of jet mixing on ground effect machine (GEM) per-

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formance, and for estimating the power required to sustain GEMs of arbitrary size, shape, and weight.

The first phase of a study of the dynamics of an underwater nuclear burst has been completed at the David Taylor Model Basin, a joint effort with the Radiological Defense Laboratory. About 150 small charges were detonated in the test pond to establish the mechanism of spread of radioactivity from underwater nuclear bursts.

There is good evidence to believe that the hydrodynamic drag of marine animals such as fish, whales, and porpoise is considerably less that that of rigid bodies of the same shape and size. While no one would attempt to design a better fish, these creatures do make use of hydrodynamic principles, previously little understood, which could be of value in the design of naval weapons and underwater craft. Considerable advance has been made toward an understanding of these animals through theoretical studies, tests in a water tunnel, and observations of the animals themselves. With the small fish it has been possible actually to observe the flow lines. Such observations have discovered a series of vortices on either side of the fish which act as a series of rollers which push the fish along. With the large animals, preliminary trials have been made with porpoise which are providing such data as speed, power output, and drag. Intermediate speeds of about 16 knots have been investigated and top speed runs are in plan.

Propellant grains in large rocket motors often burn erratically. Up until recently measures to prevent unstable burning have been of the expensive "cut-and-try" variety. Considerable progress toward an understanding of this phenomenon has been made recently by two Navy laboratories, so that rocket motors can be made more by design than by trial and error.

X. Civilian Personnel

The Department of the Navy's civilian staff decreased 9,348 in total during the year. A lower figure for territories and possessions and a higher one for the United States proper are the results of reporting Alaska and Hawaii now in the latter category. There was little change in the number of employees in foreign countries.

CIVILIAN EMPLOYEES

	30 June 1959			
	Total	*United States*	*Territories and possessions*	*Foreign countries*
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

	30 June 1960			
	Total	*United States*	*Territories and possessions*	*Foreign countries*
Graded	136, 779	129, 131	1, 985	5, 663
Ungraded	210, 981	196, 561	3, 469	10, 951
Total	347, 760	325, 692	5, 454	16, 614

The skills and competence of civilian personnel continue at a high level. As can be expected in a dynamic technical age, a number of specialized fields are advancing faster than sufficient personnel can be trained in them, and shortages of qualified people recur and persist in the sciences, engineering, and some highly skilled trades. Recruiting efforts and in-service personnel management programs are alert to the problem and are being adjusted to remedy it in every practicable way.

Employment Methods

Considerable work was applied to improving the techniques of selecting personnel and evaluating their qualifications. A series of workshops on better methods of selecting personnel for higher positions were conducted in several centers of employment, and a pamphlet on "Selecting Executives" was issued to help officials in making sound decisions. Qualification standards for ungraded supervisory and production-facilitating positions were revised to meet

current requirements, along with instructions on personnel measurement and improved vouchers for use in filling supervisory positions.

An interesting motion picture film, "Civilian Careers for Engineers," has been developed as an aid to recruiting prospective engineers and scientists and has been accorded a favorable reception. Intended principally for use at colleges and universities it can also be of value in presentations to groups which have an influence in the engineering and scientific community.

Training

For practical purposes this was the first full year that training and development of civilian employees in the Department of the Navy operated under the provisions of the Government Employees Training Act. Under this act, employees may be authorized to accept contributions or awards in connection with training in nongovernment facilities, and the following awards were received: (a) The Sloan Fellowship Award to participate in the executive development program at the Massachusetts Institute of Technology, by an employee at the U.S. Naval Missile Center, Point Mugu, Calif.; (b) two Mosher Scholarships entitling the recipients to a year of graduate study at the Maxwell Graduate School of Citizenship and Public Affairs at Syracuse University, by employees of the Bureau of Supplies and Accounts; and (c) one Daniel and Florence Guggenheim Fellowship for study at the Jet Propulsion Center, Graduate School, Princeton University, by an employee of the Naval Air Turbine Test Station, Trenton, N.J.

Cooperative education and work-study programs for student trainees continue to represent a significant part of the effort to alleviate the shortage of scientists and engineers and to provide a component of preprofessional manpower to assist senior scientists and engineers. At the end of this year, there were 1,359 student trainees in work-study programs and cooperative education programs in 45 naval activities. During the year, 79 student trainees received bachelor degrees in science, engineering, or mathematics. Of these graduates, 50 continued employment with the Department of the Navy.

In-service training, provided by and within the Department, continues to be the principal training medium. Of the total 9,828,997 man-hours of instruction received by civilian personnel, 8,816,064 man-hours were given on an in-service basis, representing 89.7 percent of the total civilian training effort during the year.

The total training time in nongovernment facilities was 402 man-years, more than half of which (68.4 percent) was obtained by employees on their own time.

Career Development

In response to the President's memorandum of February 5, 1960, on the subject, considerable attention has been given to effective processes of staffing at the executive level. Two rosters are maintained to assure adequate coverage in the procedures of reviewing qualifications, selecting, and developing executive personnel. An executive roster for personnel at grade GS–13 and above is maintained as part of a specific plan for the identification and consideration of employees who are logical candidates for executive positions in the Department proper at and above the GS–14 level. The plan permits immediate identification of those employees who may be considered likely candidates for any vacancy in these higher level positions, and thus provides the selecting officials with a wide range of choice. A similar roster is maintained for scientists and engineers at comparable executive pay levels.

Part of the total plan concerns the developmental training of potential replacements for executive level positions. Identification of training needs follow from occupational analyses and manpower surveys. These studies, in addition to pointing up the needs for action (such as college recruitment), provide the basis for deciding the substance of training and development, and provision is then made at appropriate levels of management for budgeting for and executing the plans.

Position Classification and Wage Administration

Position classification and wage administration programs in 176 field activities were reviewed and evaluated during the year, and a number of new publications and guides were issued to facilitate the classification of positions, including the full 18-grade range of the Classification Act.

Continued wage surveys have resulted in issuing new or revised wage schedules for 113 labor market areas in the United States, all within the 45-day requirement of present law. Twenty-two wage schedules were issued for 18 wage areas outside the United States. Cumulatively, these wage schedules involve the expenditure of approximately $1.75 billion in wages upgraded employees. An extensive study of legal and other aspects of "additional pay" was completed with the release of a directive on changes in additional pay schedules, formula adjustments, and coverage.

XI. Business Management

Procurement and Contracting Policies and Programs

Closer control of contract pricing and greater use of audits have been stressed in the continuing effort to improve procurement policies and practices. A procedure was placed in effect for review of prime contractors' subcontracting programs, and detailed guidance was promulgated to contracting officers for the analysis of the cost of purchased material in contractors' quotations. The prenegotiation clearance was introduced as a new requirement for all purchasing activities and has resulted in more definitive Navy positions before commencing negotiations with contractors, and better pricing in resulting contract awards.

The Department of the Navy has continued to encourage increased participation by small firms in its procurement programs. In cooperation with the Small Business Administration, 6,658 procurement actions totaling $407,387,286 were set aside exclusively for participation by small companies. Clinics were held to present research and development problems to industry and to enlist industry support and interest in the solution of such problems. Approximately half of those attending these clinics were small concerns. Instructions were issued requiring close review of prime contractors' "make or buy" plans to insure that small concerns are in fact being given an equitable opportunity to compete for subcontracts.

Separate procurement, on a competitive basis, of selected items and components which are normally part of a weapon system was emphasized. This permitted participation by small business as prime contractors. Through exhibits and conferences, small business and other firms in labor surplus areas have been informed of Navy prime and subcontract procurement opportunities. Four Navy-Industry Day meetings were held to acquaint small business concerns with the procurement and production assistance available to them, and 10 local and regional "Exhibits of Business Opportunity" were staged in collaboration with the other military departments.

The increased complexity of products has necessitated placing more and more reliance on the use of effective quality assurance methods by contractors, rather than physical inspection by Government repre-

sentatives. Although DOD specification MIL–Q–9858 (quality control system requirements) was not invoked in contracts this year to the extent considered desirable, an increasing number of suppliers voluntarily requested an evaluation of their quality control systems so that they could improve it and enable more use it by Government inspectors. This specification is now being applied (either on a contractual or a voluntary basis) to shipbuilding, nuclear components, missiles, and other items. The standard control clause, relative to supplier responsibility to perform all inspections and tests except those specified for Government performance, is now being included in all supply contracts, and the Government is making increased use of the supplier's inspection results.

Industrial Preparedness

The system for management and control of defense materials is a vital part of industrial preparedness, since it can successfully satisfy the early stages of a mobilization and be rapidly expanded to a full materials control plan. The emergency effectiveness of present measures was demonstrated this year during the prolonged work stoppage in the steel industry. Some of the procedures involved have been simplified in order to relieve industry of some paperwork without sacrificing essential features and value.

Contributions to industrial mobilization by the North Atlantic Treaty Organization have continued through NATO groups of experts on standardization agreements. Navy members of these groups were responsible for initiating work on a standardization agreement on environmental electronic test requirements. In another project, it is expected to shorten the time required to adopt standardization agreements by as much as 90 percent and thus afford up-to-date guidance to manufacturers throughout the NATO family.

Continuing efforts have been made to reduce the number of contractor-operated and privately operated industrial plants in the Industrial Plant Reserve to reflect current mobilization planning. Seventeen contractor-operated plants and 11 privately owned, privately operated plants covered by national security clause agreements have been removed from the reserve during the fiscal year 1960. All of the 12 plants sponsored by the Department of the Navy were removed from the National Industrial Plant Reserve, 3 of these being transferred to the Departmental Industrial Plant Reserve. As of June 30, 1960, there were eight excess plants awaiting disposal, the majority of which will probably be removed from the Reserve during the next fiscal year.

Financial Management

The Navy Budget

During the fiscal year 1960, $11.6 billion was expended in accomplishing and supporting the mission of the Navy and the Marine Corps. This approximated 15 cents of every dollar spent by the Federal Government and about 28 cents of every dollar spent for military purposes by the Department of Defense. The following are the broad purposes or functions for which these expenditures were made.

Expenditures by Budget Category
Fiscal Year 1960

Budget Category	*Amount (Millions of dollars)*	*Percent*
Military Personnel	$3,226	27.7
Operations and Maintenance	2,762	23.7
Major Procurement and Production	3,820	32.8
Research, Development, Test, and Evaluation	766	6.6
Military Construction	287	2.5
Revolving and Management Funds (largely for POLARIS)	781	6.7
	11,642	100.0

One of the major problems the Department faces each year in developing its budget is to provide a reasonable balance between immediate readiness and future capability. This year slighty over half of total expenditures was devoted to immediate readiness, primarily for military personnel and operations and maintenance. The other half was concerned with the Navy and Marine Corps of the future, involving expenditures for research and development, major procurement, and military construction. Expenditures shown above under the heading Revolving and Management Funds comprise mostly procurement and research and development, since they are primarily for the POLARIS missile program.

Military personnel costs were primarily for pay, allowances, subsistence, individual clothing, and individual transportation, and supported an average of about 616,600 officers and men of the Navy and 172,600 of the Marine Corps. Expenditures of about $107 million for Navy and Marine Corps Reserve components are included under this heading.

Expenditures for Operations and Maintenance are concerned with maintaining and operating Fleet, aviation, and Marine Corps units, as well as the Shore Establishment with its air stations, shipyards, ordnance plants, supply depots, and hospitals. These funds supported three Marine divisions and three Marine air wings, about 840 active fleet ships, and about 7,100 Navy and Marine Corps aircraft.

As shown, more funds were expended for procurement of major military items than for any other purpose. This money went to purchase new aircraft, missiles, ships, combat vehicles, weapons, ammunition, electronic, and other items of a long leadtime nature. Almost half of the total procurement consisted of new aircraft ($1.8 billion). Expenditures for shipbuilding amounted to approximately $1.3 billion, while missile expenditures totaled $356 million.

As the title indicates, research, development, and test, and evaluation expenditures have future naval warfare in mind and were to a large extent concerned with antisubmarine warfare, oceanography, electronics, and guided missiles along with basic and supporting research.

The last item, Revolving and Management Funds, includes a number of funds such as the Navy Stock Fund, the Marine Corps Stock Fund, the Navy Industrial Fund, and the Navy Management Fund, of which all except the Navy Management Fund show negative expenditures (more receipts than expenditures) for the year. Expenditures from the Navy Management Fund amounted to about $855 million.

Expenditures and Balances

The following table shows the status of funds for the fiscal year 1960 and indicates the relationship between expenditures, new obligational authority, carryover, and funds available for expenditure.

Expenditures and Balances
Fiscal Year 1960

		(*Billion dollars*)
Carryover or unexpended balances, 1 July 1959		$11.3
Add: New obligational authority		11.3
Total funds available for expenditure		22.6
Less: Expenditures	$11.7	
Reverted to Treasury	.1	
		11.8
Carryover or unexpected balances, 1 July 1960		10.9

As shown, the year began with carryover or unexpended balances of $11.3 billion, most of which was already obligated or held in a reserve status for such long leadtime procurement items as ships, aircraft, and guided missiles. Congress appropriated for the Department of the Navy $11.3 billion of new obligational authority, which represents the granting of new authority to incur obligations for the future payment of salaries, purchases of equipment and supplies, and contractual

services. Funds available to the Department for expenditures during the year, therefore, amounted to $22.6 billion. Of this amount, $11.6 billion was spent and $10.9 billion was carried over into the fiscal year 1961, for expenditure during 1961 or later years as deliveries are made under procurement and other types of contracts. In accordance with law, about $100 million of Navy funds reverted to the Treasury.

Legal Services

Requirements for legal services have continued to rise, typifying the effects of a dynamic era on international and human relations. Workload in international law has increased sharply. Developments in new weapons and surveillance systems; increased capabilities of space vehicles and nuclear-propelled vessels; disarmament matters; the several international conferences in which the Department of the Navy was a participant; and negotiations on status of forces agreements—all have generated extensive and unprecedented legal questions. The unique nature of modern military purchases and business dealings has similarly enlarged the problem of commerical law matters. Workload also increased in legal assistance provided for military and civilian personnel. The legal impact of new developments upon the Department has required the advice and attention of the Judge Advocate General and the General Counsel on an increasing scale.

Improvement in Management

Changes in military requirements, diminished resources, and dramatic spurts in technological progress are complicating the task of management. It has become more evident than ever that substantial improvements and better results in the management of programs can be realized only through modernization and advancement of the basic systems by which requirements are planned, developed, and procured—top-level decisions, in other words. Improvements in procedures and other elements of a total management system can reduce costs, speed processing, and achieve better quality; however, improvement of the total system is necessary for real and enduring benefits. Management improvement efforts are therefore concentrating in major fundamental areas where advances in planning and decision-making bring returns of major proportions.

Long development leadtimes, the wide variety of alternative projects, complex interrelationships among weapon systems, and similar complicating factors are confirming the conclusion that scientific decision-making is a necessity in key management actions. Analysis by

mechanized methods using mathematical and logical principles has been furthered and useful results have been obtained, but it is expected that such methods will serve still greater causes in the future in such fundamental high-level decision-making as the allocation of research and development budgets and the balancing of resources to requirements.

Illustrative of improvements possible through mechanization and the use of operations research techniques is the work done in the Military Petroleum Supply Agency (MPSA) which, under the management of the Secretary of the Navy, has the responsibility for worldwide procurement of petroleum products for the armed Services. Its procurement cycle for aviation fuels has been shortened by 5 weeks through scientific procedures and mechanization. Similar work is being pursued in other procurement programs, including an effort to adapt mathematical programing techniques to the award of jet fuel contracts.

Photography and microreproduction are being put to greater use for automating and streamlining business processes. For example, final steps were taken during the year to procure, distribute, and reproduce aircraft drawings via a punched card-mounted microfilm. This system, and newly developed equipment to facilitate it, are being installed in Class A air stations and being considered for ordnance, civil engineering, and shipbuilding-overhaul drawings.

Advancement of management skills and know-how in executive personnel is being prosecuted in a number of ways. Among its objectives, the naval leadership program has stimulated increased interest and emphasis on better management, and as one outgrowth a 2-week Management Development Institute was sponsored by the Chief of Naval Air Training for 30 commanding and executive officers of the Naval Air Training Command. Speakers and seminar leaders from top management in Navy, other Government agencies, private industry, universities, and the Congress participated. Coordinated by the Navy Management Office as a pilot effort, the results of the Institute indicated that this kind of training would be of value to high-level naval officers. Another significant training development was the foremention revision in the management curriculum of the Naval Postgraduate School, and expansion of the course from 5 to 10 months in length.

A tri-Service effort was successful in developing a missile manufacturing reporting system which, through better information, enabled the Department of the Navy to make better judgments about weapon systems and procurements, saving many millions of dollars on one contract alone. Work started on a similar system for missile

support equipment, which absorbs approximately half of total missile funds.

Spurred by the capabilities of modern data-processing machines, integrated management information systems are progressing. Ten computers were installed in naval activities, bringing to 43 the total number of automatic data-processing installations in operation. On-site resurveys were made of 12 of these installations in accordance with the plan to evaluate each on its first anniversary. In general, all were in productive use and demonstrating their potential for improving systems.

Automatic communications systems and increased automation of data at the source are also progressing well and streamlining the generation end of the information chain. Many varied applications of equipment are producing information in machine language as by-products of routine operations. Electric accounting machines are in operation in such widely separated points as Sasebo, Guam, Guantanamo, and Argentina. Similar equipment is being installed for handling supply and logistics data on supply ships underway. Such installations give dual benefit: They perform the more prosaic tasks of supply, accounting, and housekeeping for the parent activity, and extend the ability to get necessary information into a "machine language" at the point where it is first generated. This information can then be transmitted for further automatic processing at central points, with such communication links as telephone lines, standard teletype, high-speed telegraph, and wireless equipment over long distances.

A major highlight is the development of a common language for data processing, with publication by the Department of Defense in April 1960 of initial specifications for a Common Business-Oriented Language (COBOL) for programing digital computers. COBOL was developed by the Conference on Data Systems Language (CODASYL), a cooperative group of representatives of government and industry interested in standardizing business computer input languages, in which the Department of the Navy has participated actively. By effective use of COBOL, better and more economical utilization of digital computers is expected. It will make it easier for managers to understand the automatic systems; facilitate the conversion, revision, or augmentation of systems by minimizing time, cost, and difficulty of translating programs from one manufacturer's computer to another; and reduce the time and cost of writing initial machine programs. It is estimated that COBOL could reduce programing costs by as much as 50 percent. A Development Committee of the Conference is working to extend its basic concepts into a more advanced language.

Conclusion

The preceding chapters express the substance of what is required to maintain an effective Navy and Marine Corps for a year—money, effort, and thought, and large amounts of all three. To conclude that all have been available or applied in ideal amounts at most opportune times, and have accordingly produced perfection in naval forces, would obviously be unrealistic. The Navy and the Marine Corps are fit and ready to do their jobs today, however, and with continued planning, diligence, and adequate support they will be able to meet their tasks of the future.

Careful planning has maintained United States naval strength throughout the world, contributing greatly to the prevention of full-scale war. Timely on-the-spot application of this naval strength has thwarted Communist aspirations in many areas. It will continue its restraining influence as general conflict becomes less likely with the growth of mobile forces, the POLARIS weapon system, and similar retaliatory strength.

The Implications of POLARIS

POLARIS is a deterrent weapon. To the extent that certainty of swift devastating retaliation would deter a prospective enemy from launching a massive surprise attack, POLARIS on station will do just that. It is capable of other strategic uses.

It would be a serious mistake, however, if the flush of gratification at its development should prompt assumption that the ultimate in weaponry has been reached. POLARIS covers one facet of current world tensions and is not itself the only deterrent force. For the present, it supports a strategic superiority for the free world and helps to keep militant communism at bay. To cover the other facets of international conflict, planes, ships, guns, missiles, and men must equally be ready. For future readiness, new knowledge and techniques must supply new or improved tools for all the aspects of military strategy. History is inexorable in demonstrating that every new weapon has in time brought about a countering defense.

The Navy and Marine Corps are flexible and versatile instruments of national policy. To keep them so, planning and research encompass all their weapons and equipment. Thus, while inhibiting general war,

we will maintain a concurrent ability to apply other types of military influence, and to extinguish the brush-fire war which, unattended, could ignite the international forest.

The International Prospect

The pace of international affairs has quickened in the past 2 years. It is reasonable to expect that the future will be more challenging and to guide naval planning by that expectation.

The "cold" war is no less vital a struggle just because it is cold. Its objective—admitted and implacable—is destruction of the free self-determining form of human order and endeavor which we are learning to value properly now that it is threatened. The Navy and Marine Corps are effectively performing their share of the military task in this contest, helping to maintain the armed strength that forestalls armed aggression and keeps the war "cold."

The weapons of the cold war are not all military, however. Economic, sociological, and psychological forces are brought to bear. They also must be countered, and national purpose, planning, and effort must be concerned with them and marshal adequate defenses against them.

William B. Franke

WILLIAM B. FRANKE,
Secretary of the Navy

Annual Report

of the

SECRETARY OF THE AIR FORCE

July 1, 1959, to June 30, 1960

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I. Introduction

Fiscal year 1960 has been a year of accomplishment for the U.S. Air Force. We have made steady progress in all program areas, with particular emphasis on the combat forces. Plans conceived 5 years ago are now being translated into tangible weapon systems, bringing us considerably closer to our military goal of maximum security against nuclear missile aggression.

As we compare our level of attainment with the state of our force some years ago, we find that the Air Force is thrusting well beyond the traditional frontiers of weapon design and development. Weapons systems now coming into use rely on methods of propulsion and techniques of guidance which are new in man's experience. Our scientists are devoting increased time to the study of life processes in the novel environment of space.

The past year has seen a solid foundation laid for an aerospace striking force consisting of aircraft and missiles operating in close coordination and the auxiliary systems for command and control, communication, and reconnaissance.

In the strategic area, ATLAS missiles are operational at their sites, ready if needed. TITAN is scoring consistently well in its development program and MINUTEMAN has been accelerated to 1 year ahead of its original schedule. The HOUND DOG missile has been added to SAC's B–52's, and the program leading to the SKYBOLT is well underway.

The Air Force is also taking a close look at promising missile concepts to follow the MINUTEMAN. These may be very small, long-range missiles that could, with refined warheads, carry extremely high-yield payloads. On the other hand, they may be very large missiles, possibly with multipurpose warheads.

There is no question that the ICBM is one of the most formidable weapons of all times. Hypersonic speed, long range, nuclear warhead, and demonstrated accuracy make the ICBM an effective contribution to our aerospace force.

Publicity given to missiles and space accomplishments in recent years may tend to convey the idea that our missile forces with their supporting systems will soon replace piloted aircraft. But on careful evaluation of the probable nature of future hostilities, the Air Force considers that aircraft and missiles will complement each other, each performing missions for which it is uniquely fitted.

As of June 1960, the largest part of our deterrent consisted of B–52 and B–47 jet bombers, capable of carrying the most effective modern weapons to any target on earth. They are the principal means by

which the United States can bring strategic war deep inside the territory of an aggressor nation. As our hypersonic missiles and space systems are added to this deterrent force, they are assigned missions where their individual characteristics can be used most effectively.

Warning of impending attack is basic to effective military response since it provides valuable time to launch our counter strike forces on the one hand and to intercept enemy attacking forces on the other. Measures taken to provide warning include the Thule BMEWS site which is expected to become operational in the fall of 1960. Construction at Site Two in Alaska has moved ahead rapidly, and it will become operational in the summer of 1961. Site Three in the United Kingdom will come in a year later.

Defense against ballistic missiles poses a most critical problem. The optimum ballistic missile defense would have the capacity to destroy enemy missiles in the launch or boost phase of their trajectory. The next best alternative would be to destroy the missiles during midcourse flight. If these measures fail, our last defense is to attempt to destroy missiles as they enter the atmosphere over the target.

In line with this reasoning, the Air Force favors intensive study and vigorous investigation to devise means to attack hostile missiles at their most vulnerable time of flight—as soon as possible after launch, before burnout, and prior to the time when the warhead has separated from its booster. An active missile defense of this type appears to provide the greatest hope of an effective counter to the ICBM threat. As part of this larger effort, the Air Force has under development a Missile Defense Alarm System (MIDAS) which will consist of satellites employing infrared sensors to detect missile firings. A series of MIDAS satellites orbiting the earth will be capable of detecting hostile missiles just after launch, while in the boost phase. MIDAS and BMEWS (Ballistic Missile Early Warning System) will provide more reliable warnings of missile attack and will enable us to cope with a wider variety of conditions and tactics.

Until these systems are fully operational, it is vital that we insure by some other means the combat integrity of a critical portion of our strategic force. To this end, funds have been allocated and procurement begun which will furnish us an "on-the-shelf" capability for an airborne alert, if needed.

We should not lose sight of the fact that the Soviet Union continues to possess a substantial manned bomber threat. It has been our objective in meeting that threat to establish a defense in depth ranging to the uppermost reaches of the North American continent. DEW line, the Mid-Canada line, and the Pinetree line have been in operation for some time. More recently, by SAGE and WHITE ALICE, we have taken measures to insure instantaneous communications and coordination among all the units in our far-flung air defense systems. Additionally we have developed missile interception systems and have integrated them into the air defense systems.

During fiscal year 1960, new elements added to our SAGE system tripled the area of the United States covered by this sophisticated automatic control network. Four squadrons of BOMARC–As were added to the active air defense system, and the major problems in the BOMARC–B program have been corrected. Also, the system's manned interceptor capability is appreciably greater than it was a year ago, in view of nuclear-armed rockets and supersonic fighters.

In space research and development, due largely to foundations laid in ballistic missile technologies, the Air Force has made good progress toward realizing our initial objectives. We have demonstrated through the DISCOVERER program an exceptional ability in the exacting jobs of boosting educated satellites into precise orbits, of communicating with them, of stabilizing and commanding these vehicles in orbit, and of recovering capsules ejected from orbit.

In other satellite programs, we have had some success in initial work on SAMOS, and with those satellites the Air Force has launched for the other Services and for NASA—including the PIONEER, TIROS, TRANSIT, and ECHO systems.

These programs represent only the first step in the direction of creating aerospace vehicles to perform military missions. The Air Force is vitally concerned with such useful developments as communications, surveillance, and early-warning satellites. These are the requirements of the hour, dictated by the peril of the times and by the blunt facts of circumstances.

As we shape and refine the measures intended to improve the combat effectiveness of the Air Force, we should never lose sight of this distinction: Building the force structure is one thing; using it is another. The destruction of military targets with the speed and decisiveness that the force structure makes possible is something that cannot be approached in a haphazard fashion. To guarantee the effective use of this force, the recently announced Strategic Target Planning Staff for the first time insures a centralized target planning function within the Department of Defense. It also provides for coordinated execution of war plans by the commanders who are directly concerned. In this way, all of our atomic strike capabilities can be assigned specified targets which are compatible with each system's most effective employment.

The U.S. Air Force is sparing no effort, and I believe the following pages will show in ample detail the nature of this effort, directed toward increasing immediate and long-range military capabilities within the limits of available resources. Specifically, the Air Force has strived to: (1) Increase its present ability to maintain combat integrity in the face of attack and to mount a sufficient residual force that would destroy any aggressor; (2) exploit scientific advances in order to develop more powerful weapons and more efficient equipment; and (3) assist in a variety of other ways to shape the collective defense of the free world.

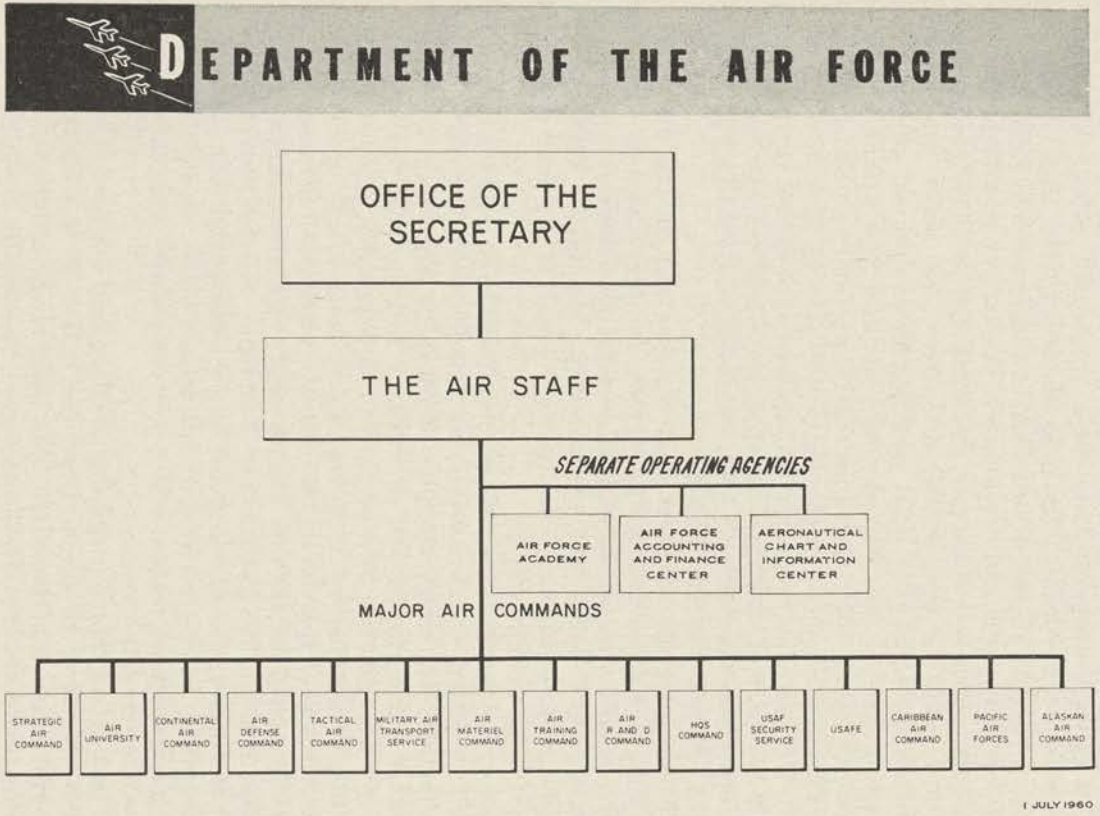
DEPARTMENT OF THE AIR FORCE
OFFICE OF THE SECRETARY
THE AIR STAFF
SEPARATE OPERATING AGENCIES
AIR FORCE ACADEMY
AIR FORCE ACCOUNTING AND FINANCE CENTER
AERONAUTICAL CHART AND INFORMATION CENTER
MAJOR AIR COMMANDS
STRATEGIC AIR COMMAND
AIR UNIVERSITY
CONTINENTAL AIR COMMAND
AIR DEFENSE COMMAND
TACTICAL AIR COMMAND
MILITARY AIR TRANSPORT SERVICE
AIR MATERIEL COMMAND
AIR TRAINING COMMAND
AIR R AND D COMMAND
HQS COMMAND
USAF SECURITY SERVICE
USAFE
CARIBBEAN AIR COMMAND
PACIFIC AIR FORCES
ALASKAN AIR COMMAND
1 JULY 1960

Figure 1

II. Combat Forces

The Air Force continued to reduce its combat forces during fiscal year 1960, dropping from 105 to 96 wings, of which 93 were manned aircraft and 3 were missile. The largest cuts were in air defense, although reductions were also made in strategic and tactical forces. The Air Force actually increased its over-all combat capabilities in most areas through improved organization, technical advances, and the availability of new weapon systems in greater quantity. The ATLAS ICBM, which will add enormously to the Nation's long-range striking power, became operational in September 1959.

The rapid reduction in the number of combat wings—41 since June 30, 1957—required a reduction in the number of bases and changes in the use of active bases. The revised base program presented an opportunity to make important savings that could be used principally for new weapon systems. The impact of missiles on the USAF force structure was felt to a much greater extent during this year in terms of hardware, organizational changes, dollar expenditures, personnel training requirements, and in site planning, construction, and activation.

The Air Force continued to develop and refine the communication and display systems and services through which it provides the Joint Chiefs of Staff with the means to exercise control of combat forces. It enabled the JCS to assume control of worldwide USAF voice circuits and exercise direct communication with all unified and specified commands. Work also went forward on the establishment of a secure communication net for the JCS in the Washington area.

The communications complex of the USAF is the most modern and responsive in the world with the fibers of its network extended to the four corners of the globe.

On May 9, 1960, the USAF officially accepted the Plan 55 automatic telegraph system which employs five automatic major relay stations in the continental United States and one each in Japan, Hawaii, England, Spain, and Germany. A message originating in the Pentagon addressed to Vandenberg AFB in California will enter the network at the Andrews AFB switching center, traverse the continent by high-speed trunk line to the McClellan AFB switching center at Sacramento, where it will be switched automatically to the tributary station at Vandenberg. After manual preparation of a perfo-

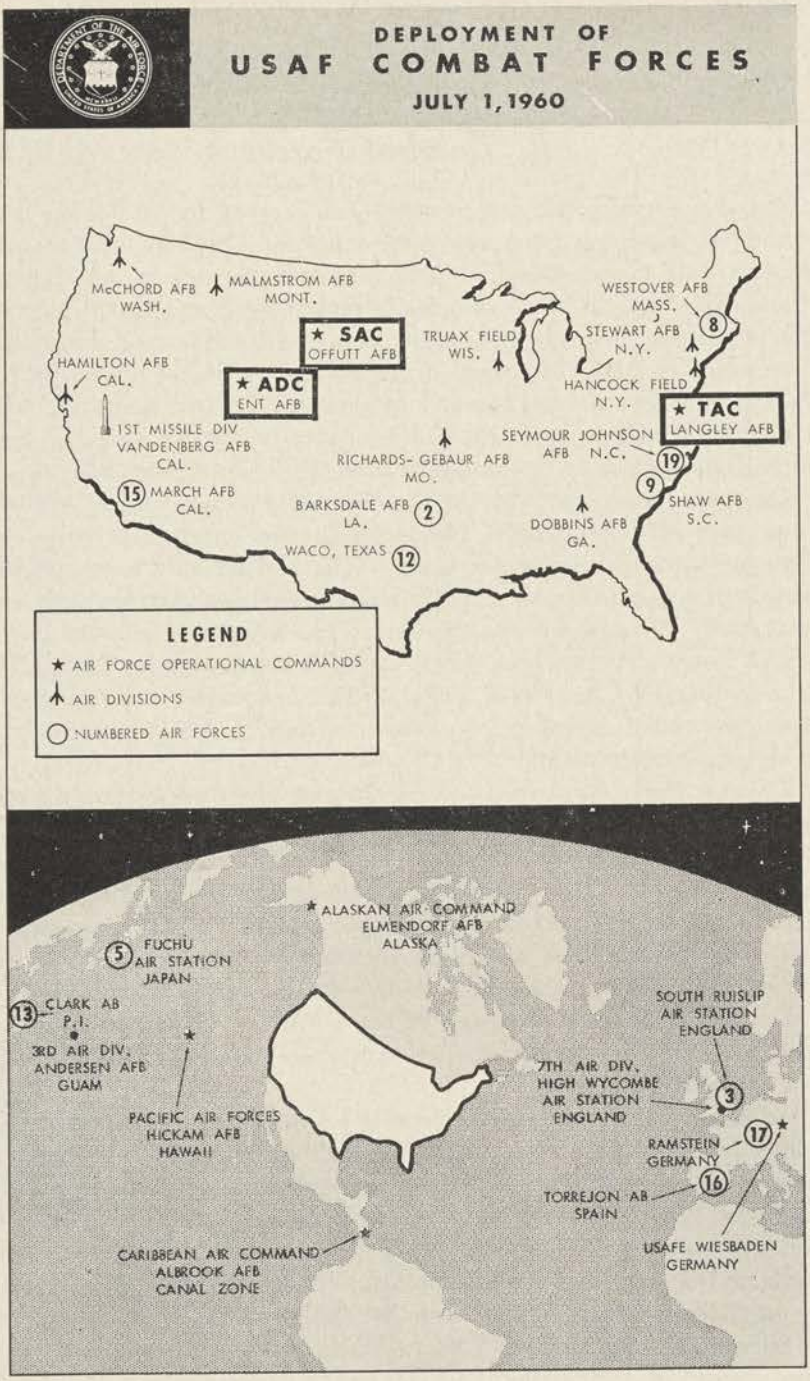
DEPLOYMENT OF
USAF COMBAT FORCES
JULY 1, 1960
McCHORD AFB WASH.
MALMSTROM AFB MONT.
★ SAC OFFUTT AFB
TRUAX FIELD WIS.
WESTOVER AFB MASS.
8
STEWART AFB N.Y.
HAMILTON AFB CAL.
★ ADC ENT AFB
HANCOCK FIELD N.Y.
★ TAC LANGLEY AFB
1ST MISSILE DIV VANDENBERG AFB CAL.
RICHARDS-GEBAUR AFB MO.
SEYMOUR JOHNSON AFB N.C.
19
9
15 MARCH AFB CAL.
BARKSDALE AFB LA. 2
SHAW AFB S.C.
DOBBINS AFB GA.
WACO, TEXAS 12
LEGEND
★ AIR FORCE OPERATIONAL COMMANDS
AIR DIVISIONS
NUMBERED AIR FORCES
★ ALASKAN AIR COMMAND ELMENDORF AFB ALASKA
5 FUCHU AIR STATION JAPAN
13 CLARK AB P.I.
3RD AIR DIV. ANDERSEN AFB GUAM
PACIFIC AIR FORCES HICKAM AFB HAWAII
SOUTH RUISLIP AIR STATION ENGLAND
7TH AIR DIV. HIGH WYCOMBE AIR STATION ENGLAND
3
17
RAMSTEIN GERMANY
16
TORREJON AB SPAIN
CARIBBEAN AIR COMMAND ALBROOK AFB CANAL ZONE
USAFE WIESBADEN GERMANY

Figure 2

rated tape in the Pentagon, no other manual operation is required until the message reaches its destination. The complex of radio and wire facilities would henceforth interlace Air Force activities from the highest headquarters to the farthest tributary station.

The Air Force command post moved into its new, improved facility in the Pentagon in May 1960. A prototype nuclear-blast alarm system installed in the command post covers only a few potential target areas at present, but it will be extended to a wide range of points in the United States and overseas.

Political decisions required redeployment of USAF tactical forces from France during the year. By January 1960, three wings had been moved to Britain and Germany because the French Government wanted to share control of atomic weapons on French soil. The movement of the units, including 12,000 military personnel and dependents, did not require the opening of new bases; two bases in France were returned to NATO as excess.

On December 22, 1959, President Eisenhower and King Mohammad V jointly announced that all American (including four SAC) bases in Morocco would be evacuated by the end of December 1963. A number of USAFE units were withdrawn in March 1960, and the 316th Air Division at Rabat-Salé was inactivated in April 1960.

Strategic Air

The Nation's primary long-range striking force, the Strategic Air Command (SAC), equipped with more than 1,000 B–47 Stratojets, nearly 500 B–52 Stratofortress bombers, and a force of tanker planes including nearly 400 KC–135 jet tankers, constituted the greatest peacetime fighting force in history. At the end of the year SAC operated approximately 70 bases throughout the world. Its 240,000 military personnel made SAC the largest single component of the U.S. defense structure. Although the B–47 medium bomber continued to provide the backbone of SAC striking power, its gradual elimination had already begun. Two B–47 wings and a number of tankers were cut from the force. One replacement for the B–47 is the B–58, the first American supersonic jet bomber, which is capable of a Mach 2 dash over the target area. On December 1, 1959, the first operational B–58 was turned over to the Air Force by the manufacturer. The first B–58 wing was activated in March 1960.

Deliveries of the longer range B–52G continued throughout the year, and modification of all B–52's was also under way to increase their penetration capability. In September 1959, the Air Force announced plans to purchase more than 60 turbofan-powered B–52H bombers equipped with the latest penetration refinements. During the year SAC crews made operational tests of the GAM–77 HOUND DOG

air-to-ground missile and the GAM–72 QUAIL diversionary missile, which will be carried by B–52's. On June 8, 1960, a B–52 fired the QUAIL missile over the Eglin AFB, Fla., test range for the first time.

On September 1, 1959, the ATLAS ICBM was formally turned over to SAC by Air Research and Development Command (ARDC). On September 9, 1959, a SAC combat crew launched the first operational ATLAS from Vandenberg AFB, Calif., and additional successful launches followed. On November 3, 1959, an ATLAS ICBM was airlifted from San Diego, Calif., to Francis E. Warren AFB, Wyo., by a C–133 demonstrating an airlift capability for the ICBM. By May 1960 Francis E. Warren AFB had acquired a limited capability to launch ICBMs in an emergency. The selection of 12 new SAC ICBM sites during the year raised the total number projected to 20. Construction neared completion at three sites and was well advanced at six more. On March 23, 1960, the USAF announced that three MINUTEMAN squadrons would be sited at Malmstrom AFB, Mont., with construction scheduled to begin in January 1961.

On January 7, 1960, at a National Security Council meeting a decision was taken to provide $1 billion extra to finance an additional 7 ICBM squadrons, making a total of 27 (including 13 ATLAS and 14 TITAN) squadrons authorized or under construction. In his state of the Union message, the President also announced that 14 test firings of the ATLAS ICBM had averaged hits within 2 miles of target, "well within the circle of total destruction." To attain an initial operational capability as soon as possible, the first four ATLAS squadron complexes were being constructed in a "soft" configuration with no built-in protection against attack. The fifth, sixth, and seventh squadron launch facilities were to be hardened, with each missile dispersed and housed in a horizontal position underground in a concrete "coffin." The missiles of the remaining ATLAS squadrons, and all of the TITAN and fixed MINUTEMAN squadrons, were to be housed vertically in underground shelters designed to withstand high overpressures. On June 20, 1960, SAC began field tests at Hill AFB, Utah, to determine the feasibility of keeping a part of the MINUTEMAN missile force highly mobile by mounting it on railroad trains.

The program for placing all IRBMs in the hands of our allies continued to make steady progress. The major part of the SM–75 THOR force in England became operational following concerted efforts by the U.S. Air Force and the Royal Air Force to eliminate installation and maintenance problems. The fourth and final THOR squadron, trained by the U.S. Air Force, was accepted by the British in April 1960. These were the last THORs off the production line designed for operational use. THOR boosters for space projects were still being manufactured.

One SM–78 JUPITER site in Italy reached operational capability in June 1960, and work on the remaining launch sites was progressing on or ahead of schedule. Political agreements and technical arrangements were completed for the establishment of a JUPITER IRBM squadron within the Turkish Air Force.

During the fiscal year, SAC bombing tactics were directed toward increasing their effectiveness against Soviet air defenses. On November 4, 1959, SAC and the Federal Aviation Agency (FAA) jointly announced the establishment of seven special air routes within the United States to provide for new low-level SAC training missions. Each corridor was to be 20 miles wide and up to 500 miles in length. Flying in them was placed under FAA instrument control during SAC training operations.

On March 4, 1960, the Secretary of Defense approved a JCS recommendation to develop a capability to keep part of the SAC force airborne, if it should become necessary. Testing of the airborne alert concept, begun in 1959, continued. The Air Force secured permission to reprogram approximately $100 million from 1960 funds for the purchase of necessary spares if the alert were ordered, and it requested $85 million for the same purpose in 1961. SAC strongly supported the desirability of an alert to counteract a probable superiority in ICBM's by the Soviet Union during the 1960–63 time period.

In May 1960 SAC reached the important goal of keeping one-third of the bomber-tanker striking force on 15-minute ground alert. In addition, the program to disperse the strategic force over a larger number of bases proceeded on schedule. SAC also examined other means of surviving attacks.

On June 9, 1960, it began to test the possibility of periodically deploying B–47 units to civilian airports and to air bases operated by other commands. During the spring SAC also carried out Project OPEN ROAD, which demonstrated that all alert aircraft at a base could be launched at a rate about four times as fast as previously thought possible. The new procedures were being implemented throughout the command. By the end of June 1960, SAC had almost completed preparation of an alternate command post airborne in KC–135's.

SAC greatly improved its control over its bomber force in March 1960 when a new single sideband ground-to-air radio system went into interim operation. The four control stations, each of which can control the bomber force in an emergency, are located at SAC Headquarters and at each of the three SAC numbered air forces in the United States. Each station consists of three 45-kilowatt transmitters, six 10-kilowatt transmitters, associated receivers, six single side-

band transceivers for backup, and high-gain directional antennas. The system provides instant voice communication between the SAC command post and combat aircraft in flight. Begun in 1958, the system was to be completed in October 1960.

Tactical Air

The major USAF tactical air components—the Tactical Air Command, the United States Air Forces in Europe, and the Pacific Air Forces—declined slightly in combat unit strength, but this will soon

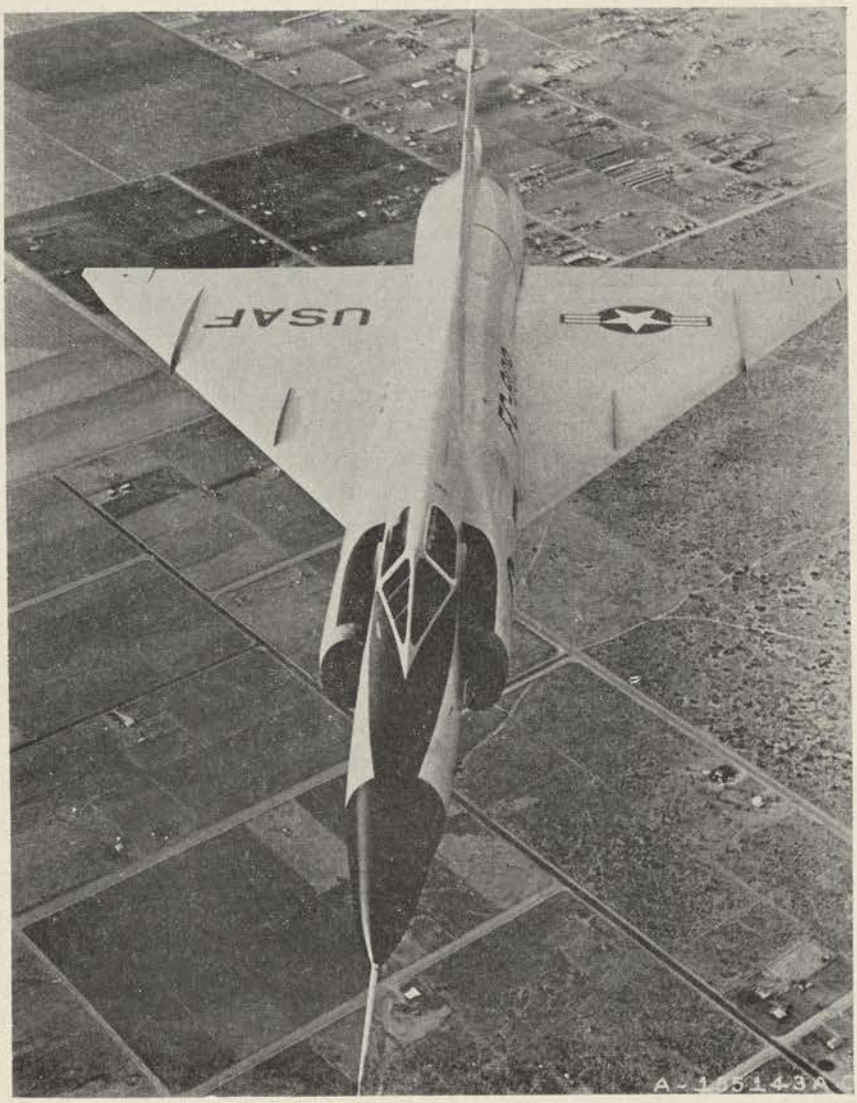

Figure 3. F–102A in flight—overhead view.

be more than offset by the addition of new weapon systems in an advanced stage of development or testing. The most important of these—the F–105B—is a partially all-weather tactical fighter that can deliver atomic weapons. Deliveries of the F–105D, a later model which is a fully all-weather plane, began in February 1960. The backbone of tactical air strength continued to be the F–100 Supersabre. Beginning in 1962 a self-contained starter will improve the F–100's combat capability and reduce the ground equipment required to support it. The GAM–83 BULLPUP air-to-surface missile is already being procured for installation on the F–100D and F–105D.

During the year SAC and TAC (Tactical Air Command) developed joint plans for the emergency deployment of TAC's composite air strike forces (CASF). The use of SAC KC–135 tankers will enable the TAC aircraft to refuel near their cruising altitude, thus conserving fuel and time. The high speed of the jet tankers will also enable them to reach rendezvous points sooner and assist TAC units in reducing their deployment times. The necessary adapter equipment has been procured and a realistic test of the plans was scheduled for the fall of 1960.

The Air Force is converting its MATADOR short-range air-breathing missile groups to the TM–76 MACE, which has improved guidance and greater range. During the year, one USAFE group in Germany completed conversion to the TM–76A, and another was in process of conversion. Delivery of all the TM–76A missiles contracted for was completed in March 1960. Congress sharply curtailed funds for the TM–76B program. Delivery of the TM–76B, originally scheduled to begin in June 1960, was delayed by developmental difficulties.

The USAF tactical air forces were tested in several large-scale exercises. On November 10–12, 1959, TAC carried out Operation SPEARHEAD after a surprise alert by Headquarters USAF. A CASF, refueling at night in bad weather over the Atlantic, moved from Myrtle Beach AFB, S.C., to France. Complete units were in place in France and ready for combat missions within 24 hours, and enough priority cargo was moved, with support from the Military Air Transport Service (MATS), to sustain operations for 30 days. In February 1960, a TAC force of 50 tactical fighter, reconnaissance, troop carrier, and tanker aircraft deployed to the Central Treaty Organization countries—Turkey, Iran, and Pakistan—where they conducted aerial demonstrations and presented static displays. The entire movement took place on schedule, and the demonstrations were witnessed by an estimated 150,000 persons. A much larger exercise during June 1960 tested TAC's ability to support PACAF in the Southeast Asia Treaty Organization countries. A force of 120 aircraft and 1,100 men with support equipment deployed to the Philippines,

Taiwan, and Thailand. The movement was completely successful and was considered of great psychological value in the countries visited. In another exercise, BANYAN TREE II, executed in February 1960 in cooperation with the Continental Army Command, TAC C–130's airlifted Army paratroopers nonstop from Fort Bragg, N.C., to the Panama Canal Zone. F–100's, operating from Florida and using aerial refueling, provided air cover.

Air Defense

Air defense programs were reoriented in March 1960 following a thorough review of air defense in the light of intelligence predictions of the threat to the United States. The review revealed that the parts of the system planned for defense against manned bombers would be completed too late and that the resources allocated to this system were excessive compared with those devoted to the development of systems to counter the ballistic missile threat, expected to become predominant after 1965. Accordingly, the Air Force took the following actions: It curtailed or eliminated antibomber programs that were lagging or appeared to require disproportionately heavy expenditures in the future; it began to modernize and improve the existing manned interceptor force; and it accelerated the construction or development of ballistic missile warning systems.

This realignment of air defense will provide an earlier though lesser order of defense against manned bombers than originally planned, but it will be a substantial improvement over the present system. The BOMARC B program was drastically curtailed; the program for SAGE super combat centers was eliminated.

Organizationally, the three regional air defense forces (Western, Central, and Eastern) of the Air Defense Command were eliminated and will be replaced by six combat air divisions. Because of the curtailment of the SAGE program, only three of these divisions will operate SAGE combat centers. In Europe all air defense activities were concentrated under USAFE with the transfer of the 65th Air Division, based in Spain, from SAC. In another area, however, the air defense reorientation delayed final agreements with Canada for the construction of Canadian Air Defense, North (CADIN).

Missile reconnaissance, detection, and warning systems—BMEWS, MIDAS, and SAMOS—received increased emphasis and acceleration. BMEWS construction at Thule was complete at the end of the year, and excellent results were being obtained from test operations. The BMEWS station at Clear, Alaska, was expected to begin operations in the summer of 1961. On February 15, 1960, the United States and the United Kingdom signed an agreement to cooperate in the establishment of a third station at Fylingdales, in Yorkshire, England.

Construction was well underway by the end of the year. The BMEWS submarine cable linking Thule and Cape Dyer in Canada was completed in September 1959.

The fighter-interceptor force improved in quality during the year. The Air Defense Command completed operational testing of the F–106 and F–101B, and 10 new squadrons of each were activated. By the end of June 1960 all but five ADC squadrons were equipped with Century series aircraft—the F–101, F–102, and F–106. The air defense training force of B–57's, authorized in April 1959, was being equipped with the most modern electronic countermeasure equipment. The B–57's provide the ground and airborne elements of the air defense system with realistic training in the detection and interception of high-performance aircraft equipped with advanced electronic penetration aids.

On September 3, 1959, a BOMARC–A missile intercepted a REGULUS II missile at a height of nearly 7 miles, the first successful interception of a supersonic target by the SAGE-directed interceptor. In the same month the first IM–99A BOMARC missile squadron became operational at McGuire AFB, N.J. Squadrons at three other sites also became operational by the end of the year. As a result of the air defense reevaluation, the IM–99B was reduced from 29 to 9 squadrons. The first operational capability for this advanced version of the BOMARC is scheduled for the spring of 1961.

Air Transport

The bulk of the MATS fleet is 8 to 10 years old. A congressional subcommittee, investigating the entire airlift problem, concluded that the obsolescence of the fleet was creating a serious deficiency in strategic airlift. Congress appropriated $50 million for development of a high-performance, turbine-powered cargo plane to be suitable for both military and civilian use. In April 1960 the Army, Air Force, and Federal Aviation Agency agreed on the requirements for this aircraft. Congress also authorized a $200 million program for limited procurement of aircraft already under development or in production to provide for an interim modernization of the MATS fleet. C–130E's and the C–135 cargo aircraft were included in this program.

The Department of Defense prepared a report on the role of MATS in peace and war in February 1960. After the President approved this report, the Air Force submitted to the Secretary of Defense in May 1960 a program stating the minimum essential strategic airlift force and the increased civilian cargo lift that will be needed as the MATS logistical airlift is reduced. The Secretary of Defense directed the Air Force to go ahead with the proposed program, including revision of procurement practices and negotiations with U.S. inter-

USAF COMBAT WING STRENGTH

TYPE	30 JUNE 57	30 JUNE 58	30 JUNE 59	30 JUNE 60
STRATEGIC	50	44	43	40
AIR DEFENSE	32	28	27	23
TACTICAL	55	45	35	33
TOTAL	137	117	105	96

Figure 4

national air carriers. In preparing the operating budget for MATS airlift for fiscal year 1961, the Air Force left no excess capability. The fleet would average a 4.8-hour daily aircraft utilization rate, which would be consistent with the 5-hour rate deemed essential for D-day readiness.

The Department of Defense decided in January 1960 that, beginning in fiscal year 1962, Army requirements for airlift for joint airborne training would be established by the JCS in time to provide for proper USAF programing and funding. The Army and the Air Force agreed that MATS would fly 40,425 hours in support of the Army during training exercises in fiscal year 1962.

In conjunction with the Continental Army Command, MATS conducted its largest peacetime strategic airlift—Exercise BIG SLAM/PUERTO PINE—from March 14 to 28, 1960. A primary purpose of this exercise was to determine the ability of MATS to move from its peacetime aircraft utilization rate to one of about 8 hours per day. The strategic airlift force lifted 21,095 troops and 10,949 tons of equipment and flew 50,496 hours. The daily aircraft utilization rate rose from 2.5 hours for troop carriers and almost 5 for transports to an average of 7.5 for all aircraft. The exercise demonstrated that the strategic airlift force could accelerate to wartime utilization rates if each aircraft were used 5 hours per day for training purposes. MATS and Army forces demonstrated that they could conduct large-scale movements of troops and equipment with great precision despite poor weather. Since this was a relatively short distance deployment and only one-third of the equipment needed was airlifted, the exercise also exposed the limitations of MATS aircraft—lack of speed, range, and carrying capacity.

In May 1960, MATS flew emergency supplies and equipment from the United States to Chile, where earthquakes had made hundreds of thousands homeless. MATS flew 69 sorties, airlifting 790 tons of cargo, including 2 Army field hospitals, 10 helicopters, food, clothing, and medical supplies. There were other important mercy flights to aid victims of a Japanese typhoon, earthquakes in Morocco, and a tidal wave in Hawaii.

MATS continued its airlift for the Atlantic and Pacific Missile Test Ranges and helped cut critical delivery time by airlifting missiles from the manufacturer to the launching site. It also delivered intermediate-range ballistic missiles from the United States to Europe. Other special airlifts supported project DEEP FREEZE in the Antarctic and scientific stations in the Arctic.

At the end of June 1960 the MATS fleet numbered 533 aircraft, including 493 four-engine transports in the airlift service. MATS supported the three military departments by handling the movement of 993,209 passengers and 279,144 tons of cargo in channel traffic. Of these totals, commercial aircraft carried 424,912 passengers and 65,238 tons of cargo. The number of passenger miles flown in channel traffic was 3,523,924,305 (including 1,710,364,390 in commercial carriers), and the total of passenger and cargo ton-miles flown was 945,273,808 (including 259,010,884 in commercial aircraft).

The success of the MATS mission depended a great deal on the activities of its four technical services, which also gave strong support to the U.S. space program. The Air Rescue Service handled not only the search for and rescue of people but also the recovery of materiel. During the year its aircraft flew more than 2,000 missions, saving 350 people from certain death and some 1,700 who were in great danger. This agency also played an important role in both the MERCURY and DISCOVERER programs and in other aspects of missile and satellite recovery. The ability of the Air Rescue Service to perform these tasks in the future was greatly affected by the reduction in the number of air rescue squadrons from 17 at the beginning to 7 at the end of fiscal year 1960.

The Air Weather Service analyzed television weather pictures transmitted by TIROS I and tested weather maps prepared from these pictures. The Air Photographic and Charting Service correlated geodetic launching positions with those of the potential targets, made electronic surveys for missile guidance systems, and flew almost 83,000 scale-miles of aerial mapping photography. The Airways and Air Communications Service, designated to operate the ground environment of the communication satellite program, was also assigned responsibility for technical control and transmission engineering for BMEWS circuits.

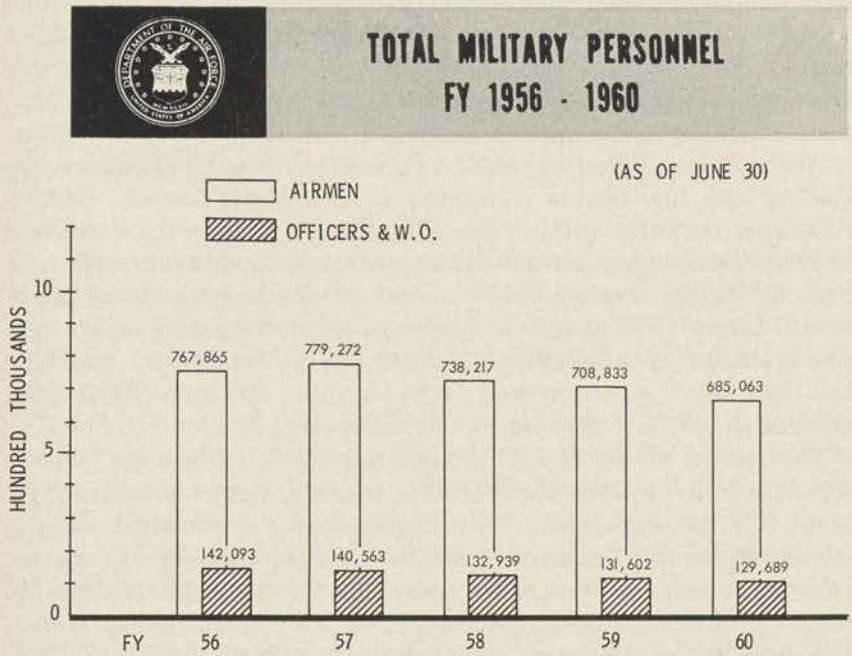
TOTAL MILITARY PERSONNEL
FY 1956 - 1960
(AS OF JUNE 30)
AIRMEN
OFFICERS & W.O.
HUNDRED THOUSANDS
10
5
0
767,865
779,272
738,217
708,833
685,063
142,093
140,563
132,939
131,602
129,689
FY
56
57
58
59
60

Figure 5

III. Manpower

The predicament of greater requirements but fewer people to meet them intensified the manpower problems of the Air Force. The steady downward trend in manpower continued as USAF military strength dropped from 840,435 to 814,752 between July 1, 1959, and June 30, 1960. At the end of fiscal year 1960 there were 129,689 officers and warrant officers and 685,063 airmen, with approximately 207,370 officers and airmen stationed overseas. The number of civilians employed directly by the Air Force fell from 313,466 to 307,449. This decrease of 6,017 was more than twice the reduction of the previous year and came largely toward the end of the year. The overall decrease in USAF manpower was 2.8 percent; in Headquarters USAF personnel strength declined 11.2 percent.

The reduction of 25,683 in military strength between July 1, 1959, and June 30, 1960, following upon the successive reductions over the past few years, placed a severe strain upon the Air Force. Despite the numbers of men released for other jobs by the net reduction of nine combat wings, the Air Force in fiscal year 1960 had to meet the increased manpower demands growing out of the creation of new missile units, increased alert requirements, further dispersal of the heavy bomber force, modernization of equipment, and a substantial increase in the training program In addition, the equipment of certain bombardment squadrons with air-launched ballistic missiles would inevitably require more people.

The Air Force carried on its major programs in spite of the loss of manpower, but expected to improve this situation during fiscal year 1961 by raising military strength to the authorized level of 825,000.

The manpower reduction was most apparent in the operating forces, where a decrease from 105 to 96 wings occurred. The only important increase was in the training forces. The following table shows the changes in utilization of USAF manpower during the year:

	June 30, 1959		*June 30, 1960*	
		Percent		*Percent*
Operating Forces	557, 293	66. 3	530, 566	65. 1
Supporting Forces	141, 451	16. 8	131, 101	16. 1
Training Forces	134, 848	16. 1	145, 789	17. 9
Miscellaneous*	6, 843	. 8	7, 296	. 9
Total	840, 435	100. 0	814, 752	100. 0

*Includes hospital patients and personnel on special assignments.

Decorations

Hereafter the Air Force will have three distinctive decorations to bestow upon its members who perform services above and beyond the call of duty. Legislation passed before the end of June 1960 established the Air Force Cross for combat bravery and the Airman's Medal, both to replace medals previously shared with the Army. The third distinctive decoration is the Air Force Commendation Medal, which has been in use since March 1958.

Changes in Enlisted Personnel System

During the year the Air Force continued a gradual expansion of the proficiency pay and promotion programs authorized by the Military Pay Act. By the end of June 1960 about 51,000 airmen in 131 USAF specialties had been granted proficiency pay. The Air Force completed plans to add a second proficiency pay step, probably in 1961 or 1962.

During fiscal year 1959, the Air Force promoted airmen only to the lower of the two new master sergeant grades of Senior and Chief Master Sergeant. The first promotions to the top grade of Chief Master Sergeant were made on December 1, 1959. By the end of

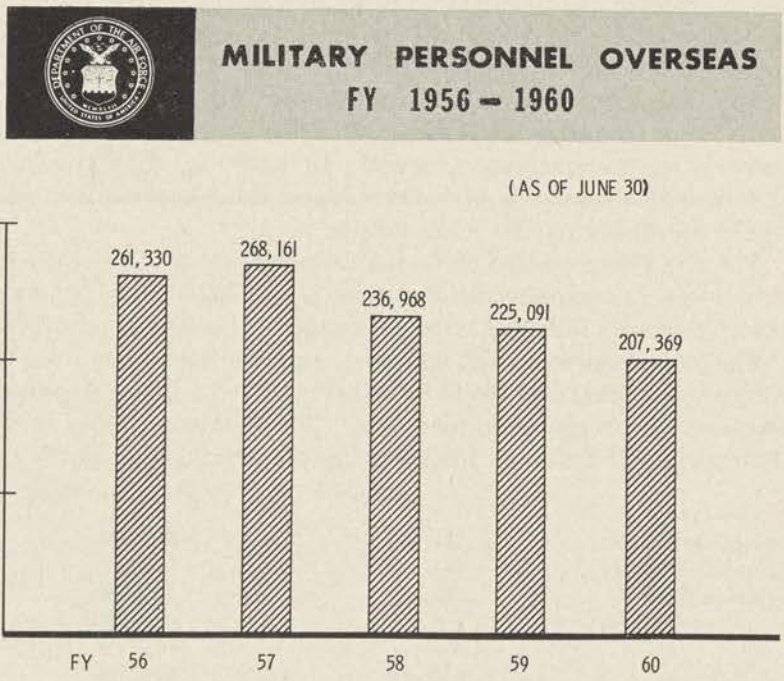

Figure 6

June 1960 there were 7,224 airmen serving in the grade of Senior Master Sergeant and 1,585 serving as Chief Master Sergeant.

The greater attractiveness of a USAF career since 1957 has enabled the Air Force to be increasingly selective in manpower, has produced a notably improved average reenlistment rate, and has steadily raised the percentage of career men in the Service. By fiscal year 1960 the proportion of career airmen (those in their second or subsequent enlistment) exceeded 60 percent. Although this improved upon the old problem of retention of experienced personnel, the Air Force anticipated that a new one would soon arise—stagnation of promotion opportunities. This is the result of the presence of a large group of mature airmen with active service often dating back to World War II.

To deal with this problem in terms of future manpower budgets, the Air Staff set as a goal an over-all optimum force ratio of 55 percent career men and 45 percent first-termers. Career men would include individuals with length of service from 4 to 30 years. In specialized career fields, electronics for example, 62–38 was the desired ratio; in others, 47 percent career personnel might suffice. At the end of June 1960 it was still too early to determine whether the desired ratios could be achieved.

Officer Corps

During fiscal year 1960, 9,526 new officers were appointed to the active Air Force. The Regular officer augmentation program had been largely completed during fiscal year 1959. In fiscal year 1960, the Air Force confined appointment of line officers in the Regular Air Force to junior officers with no more than 5 years of service. Other Regular appointments were given to professionally qualified personnel. By June 30, 1960, the number of Regular officers reached 50,362, approximately 40 percent of the officers on active duty.

The Air Force received 218 graduates from the Air Force Academy and 107 from the other Service academies. These new Regular officers constituted only 11 percent of the necessary annual increment. The Air Force ROTC remained the major source of active duty and potential Regular officers.

The Air Force obtained legislation granting some temporary relief from the Officer Grade Limitation Act of 1954. As a result, the number of majors in the active force may exceed the legal ceiling by 3,000 during fiscal years 1960 and 1961, and promotions may continue while Congress and the military Services review the grade limitation provisions. Adoption of the "best qualified" system in all promotion programs above the grade of captain should result in greater selectivity.

To resolve the "hump" problem remaining from the large buildup of officer strength during World War II, the Air Force began to apply a number of mandatory retirement procedures. These were expected to bring officer strength and grade structure into agreement with Air Force requirements in an orderly and equitable manner.

Women in the Air Force

At the end of June 1960 the WAF had 679 officers, 5 warrant officers, and 5,651 airmen serving on active duty—a loss of 54 officers and 720 airmen since the end of the previous year. Before the beginning of the fiscal year the Air Force had set a goal for June 1960 of 750 officers and 5,000 airmen. Failure to obtain the desired number of officers resulted from a shortage of entries into the Officer Training School and Officer Candidate School which together produced only 31 officers by the end of June 1960. As a result of a decision made in 1958 the WAF ROTC program was discontinued after the last two young women graduated in June 1960.

In April 1960 the Air Force authorized 550 WAF officer positions on the active list of the Regular Air Force. This authorization included a provision to appoint 35 WAF officers as permanent lieutenant colonels during the period 1960–64.

In August 1959 the President signed into law a bill giving active service credit for service in the Women's Army Auxiliary Corps from May 13, 1942, to September 30, 1943. This law, the result of 17 years of effort, benefited 544 WAF and 889 members of the Women's Army Corps.

Civilian Personnel

The Department of Defense established a new ceiling of 310,500 for directly hired USAF civilians, about 2 percent below the previously established objective of 314,693. This lower ceiling was to be reached, insofar as possible, by attrition, without using military personnel, or contracting for services normally performed by civilian employees.

To bring its strength below this ceiling, the Air Force placed a partial hiring freeze on all commands. Most commands were permitted to fill only two out of each three vacancies. In December 1959 the Air Force imposed specific strength limits for the commands when it became evident that attrition would not hold manpower within planned limits. Headquarters USAF and some commands had to apply reductions in force to reach assigned strength figures. Actually, the civilian personnel total fell more than 3,000 below the revised ceiling by the end of the fiscal year.

There has been a steady trend in the past few years toward a

higher ratio of salaried to wage board employees. Since 1955 salaried employees have risen from 42 to 49 percent; hourly wage earners dropped from 58 to 51 percent.

The Air Force continued to employ a substantial number of foreign nationals indirectly through contracts or agreements with other governments. The general decline in strength applied here also, the number dropping to 47,479, a decrease of 3,149 since the end of June 1959.

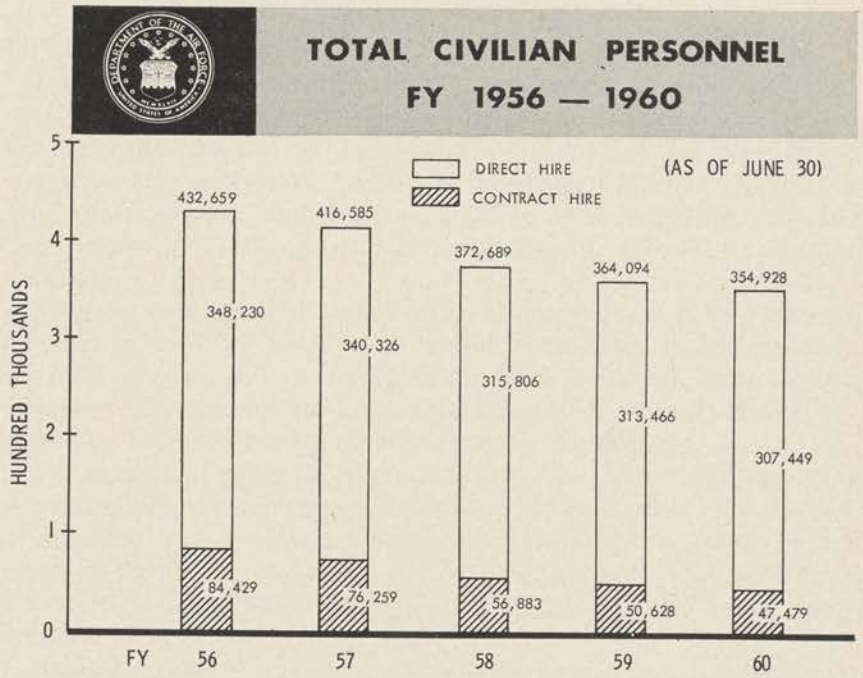

Figure 7

The worldwide turnover rate of civilian employees changed little during fiscal year 1960. The monthly separation rate remained at 1.6 percent, and the accession rate declined from 1.5 to 1.4 percent. About 57 percent of the separations were voluntary—50 percent were resignations and 7 percent transferred to other Government agencies. The Air Force continued its efforts to reduce the number of resignations, particularly among scientific, professional, and technical personnel.

During the year the Air Force realized more than $38 million in first-year benefits from the employee incentive awards program. More than 29 percent of USAF employees made suggestions and

21,111 were adopted. In addition, 17,148 employees received recognition for superior performance and special acts or services.

The Air Force continued to use the services of many physically handicapped workers. About 7½ percent of its employees in the United States have varying degrees of physical impairment, but their work records compare favorably with those of the unimpaired employees.

IV. Military Training

The Air Force had to devote a substantial proportion of its resources to military training, due principally to the acceleration of technological training.

Flying Training

During fiscal year 1960 the Air Force trained 2,342 pilots, 356 less than in the previous year. Among the 1960 graduates were 2,116 for the Air Force, 69 for the Air National Guard, and 157 for foreign countries in the Military Assistance Program (MAP). Navigator graduates increased slightly, from 1,587 to 1,615 including 1,557 for the Air Force, 45 for the Air National Guard, and 13 for foreign countries.

Progress continued in modernizing undergraduate pilot training. Conversion to T–37 jet aircraft neared completion in the primary training schools. Flight-testing of the T–38 supersonic basic trainer advanced satisfactorily at Edwards AFB, Calif. The T–38 will replace the T–33 in basic flying schools by fiscal year 1964.

The number of pilots being graduated has declined. Another drop in pilot graduations is expected to take place next year. By the end of June 1961 the Air Force will have discontinued the use of civilian contract flying schools for primary pilot training and will have consolidated all undergraduate pilot training on USAF bases, using only USAF pilot instructors.

Modernization of advanced fighter-interceptor training began in the spring of 1960 when F–102's and TF–102's were assigned to Perrin AFB, Tex., to replace the obsolescent F–86L's as training planes. This modernization program will continue until all F–86's are replaced by newer fighter aircraft.

The Air Force lacked modern navigator training planes. Newly graduated navigators who have been trained in reciprocating-engine aircraft require much additional training in first-line combat aircraft at high speeds and high altitudes. The primary factor restricting purchase of navigator trainers is limited funds. The Air Force plans to procure some jets to train officers in radar interception, but there is still a critical need for electronic warfare and radar bombardment training.

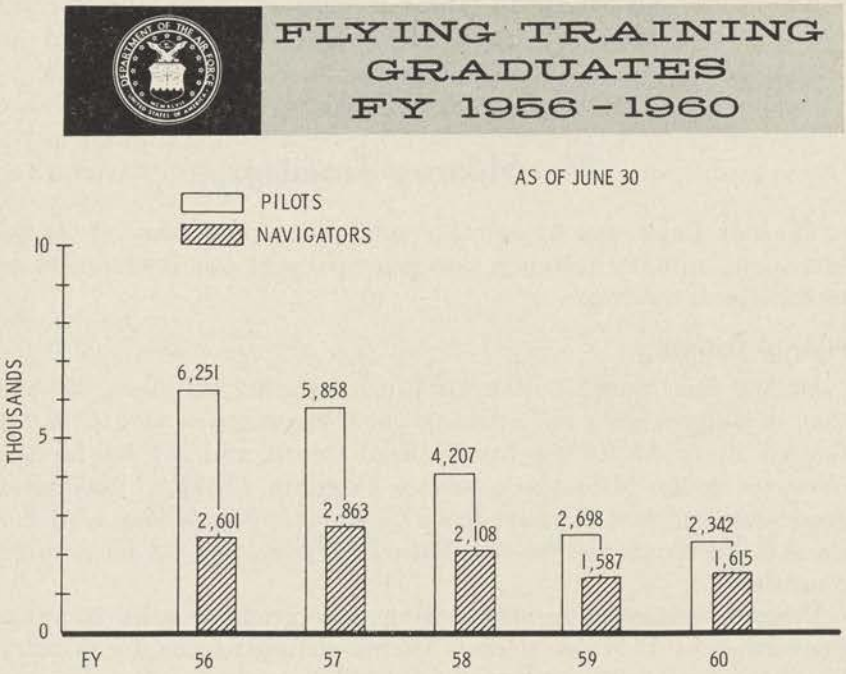

Figure 8

Between July 1959 and June 1960 the USAF survival training school instructed about 4,000 individuals, including the astronauts and a number of Navy personnel.

By special arrangement, employees of the Federal Aviation Agency received training in six types of USAF planes: The B–57, C–121, KC–97, KC–135, T–29, and T–33. The Air Force will be reimbursed for the cost.

Technical Training

To satisfy the demand for more highly skilled technicians, Air Training Command, at the beginning of the fiscal year, increased the length of 45 basic technical courses, some by as much as 20 weeks. As requirements for highly developed skills rose, courses became more difficult and a lower percentage of students completed their training. This meant that more students had to be enrolled to produce a given number of graduate technicians. The greatest demand for graduates generally was in the more complex skills, where the longest training time was required. By the end of fiscal year 1960 the number of students graduating from USAF technical schools included 47,234 classed as highly technical, 17,597 technical, and 15,970 semitechnical.

The total of 80,801 exceeded the previous year's total by 14,305 and that of fiscal year 1958 by 4,357.

During the year the Air Force enlisted more than 84,300 male airmen with no previous service, compared with 59,184 in fiscal year 1958 and 62,106 in fiscal year 1959. Nearly 80 percent of these airmen were enrolled in basic technical courses before assignment to operational units. As a result of the increased training requirements the average student enrollment in the basic technical courses during the year was about 6,000 higher than during fiscal year 1959.

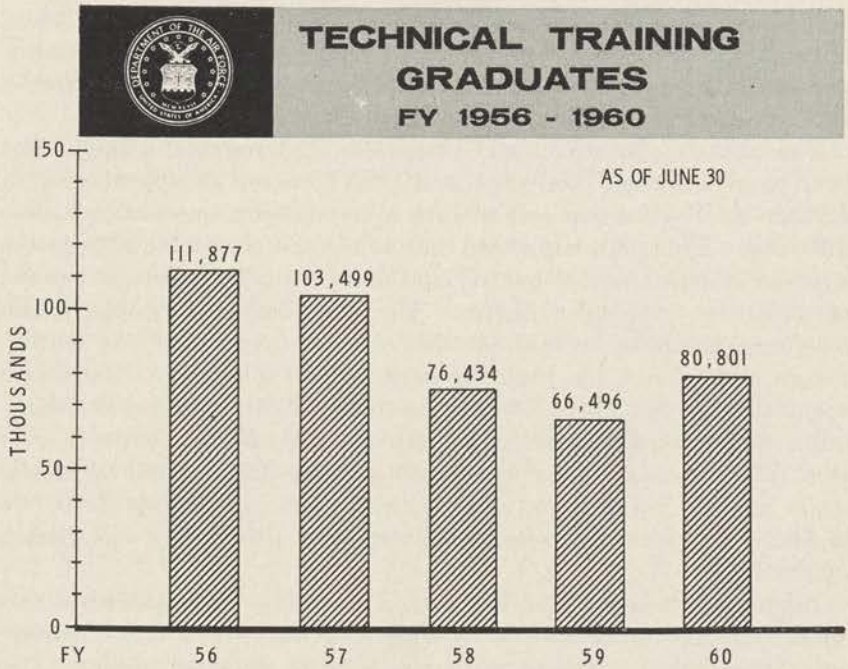

Figure 9

The higher training costs thus generated caused growing concern, especially since further increases were expected in fiscal year 1961. In renewed efforts to reduce these costs, training schools again examined each basic technical training course in an attempt to find and eliminate instances of "overtraining" or the teaching of subject matter not absolutely essential to satisfactory performance on the job. The possibility of shifting more of the responsibility to on-the-job training in operational units was also considered. As a result, 22 technical training courses were reduced in length, with a corresponding decrease in failure rates, by the end of fiscal year 1960. Furthermore, the Air Force expects to achieve further savings by continuing to give only

minimum essential instruction to first-term airmen before they are assigned to operational units. The basic problem in this era of technological developments is to economize on training without reducing operational effectiveness in the combat units.

Professional Education

As the Air Force directed a greater proportion of its skills into technical channels, professional education reshaped its goals in order to provide the necessary leadership in these fields. In order to use the fiscal year 1960 quotas for the graduate engineering courses at the Air University's Institute of Technology, the Air Force established a special quota of 30 in undergraduate engineering—20 for electrical and 10 for aeronautical engineering. The Air University expected to set up another undergraduate program for fiscal year 1961.

The airman education and commissioning program, adopted last year to give airmen interested in a USAF career an opportunity to further their education and to earn a commission, encountered some difficulty. This plan stipulated that an airman must have 50 semester hours of college credit to qualify and that he was limited to 24 months in which to complete a degree. The Institute of Technology also set prerequisites in certain specified courses, particularly in mathematics and science, too high for most airmen to qualify. To obtain applicants the Air Force lowered the academic prerequisites to a minimum of 30 semester hours and eliminated the specific course or subject requirements. As a result, 59 airmen had entered academic study in eight colleges and universities by the end of July 1960. It is likely that more than 24 months may be allowed for completion of the degree.

Beginning in fiscal year 1961, Air University will establish a new space systems orientation course, with an annual quota of 850 lieutenant colonels and civilians with comparable rank or higher. The new course will help key USAF personnel to keep abreast of the new and revolutionary in aerospace development.

At the end of June 1960 the Air Force planned to increase attendance by officers of allied countries at Air University resident schools. This followed Department of Defense policy to increase allied participation in military schools in the continental United States.

Responsibility for foreign language training was transferred to Air Training Command at the end of June 1960. The Air Force also decided to transfer all business school programs from Air University to civilian colleges and universities willing and able to take over this training, a decision expected to result in considerable savings.

A total of 227 students graduated from the Air Force Academy's second class on June 8, 1960. Besides the 218 who accepted com-

missions in the Regular Air Force, 6 were commissioned in the Marine Corps, 2 in the Navy, and 1 was disqualified for medical reasons. The Academy's Board of Visitors in April 1960 recommended that legislation be enacted to allow the Academy to grant master's degrees. This would be the culmination of an effort to encourage superior students to progress as rapidly as their individual talents permit.

Enrollment in AFROTC rose slightly from 80,166 in fiscal year 1959 to 81,415 in fiscal year 1960, including only 5,760 advanced students. AFROTC graduates totaled 3,496, of whom 1,611 applied for flying training—1,317 as pilots and 294 as navigators.

AFROTC remained the principal source of new USAF active duty officers, but many of the 176 units in the participating colleges and universities were not graduating enough prospective officers to justify their cost to the Government.

In early December 1959 representatives of 174 of the 176 institutions with AFROTC units met with top Air Force officials at Maxwell AFB, Ala., to discuss their problems. The discussions resulted in the establishment of an advisory panel of college educators with whom the Air Force could consult on matters of mutual interest. The panel met in March and April 1960, to consider such subjects as modification of the AFROTC curriculum, disestablishments of unit and compulsory basic ROTC courses.

The Air Force agreed not to close any units except on request from the educational institutions involved, but it invited colleges and universities operating unproductive units to request their disestablishment.

The Air Force also authorized participating colleges to modify the AFROTC curriculum in academic year 1960–61. In general, these changes permitted the colleges to accredit additional academic courses for air science. The decision was based primarily on the increased demand on students' study time, the crowded conditions in college classrooms, and the reduction in ROTC teaching staffs. To encourage the colleges in financing ROTC, the Air Force is supporting a legislative proposal whereby the Federal Government would grant additional money—about $400 per commissioned graduate—to the institutions with active units.

The Officer Training School, which supplements AFROTC, commissioned 323 graduates during its first year of operation. OTS offers military training to college graduates who have already been schooled in subjects directly related to USAF requirements. The large number of applications for OTS has permitted the Air Force to be highly selective in accepting students. In the future the Air Force expects to make OTS one of its two major sources of exceptionally well-qualified young officers. The quota for fiscal year 1961 is 625.

Reserve Forces

An indication of the current importance of the air reserve forces is the fact that two-thirds of the tactical reconnaissance units, nearly half of the tactical fighter units, and more than three-fourths of the troop carrier units available to the Tactical Air Command in an emergency belong to the Air National Guard (ANG) and Air Force Reserve (AFRes). In addition, a considerable portion of USAF interceptor units are in the Air National Guard.

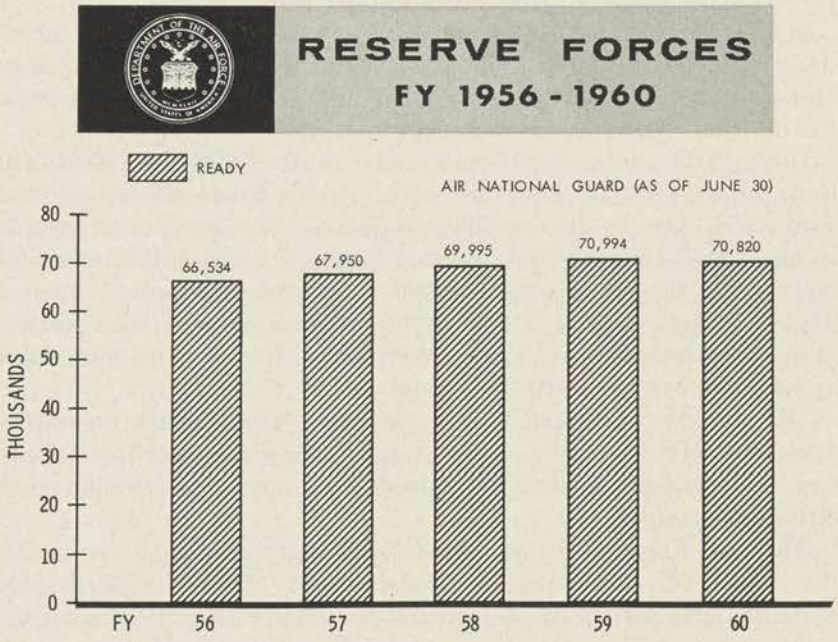

Figure 10

The demonstrated ability of the reserve units to perform wartime missions requiring a high degree of combat readiness and the need to give them additional useful missions resulted in the initiation of a new plan for the management of the Air National Guard and Air Force Reserve. The new plan provided for closer integration of reserve units with the active establishment than ever before. Supervision of training and inspection of flying and certain other units was transferred from the Continental Air Command (CONAC) to the commands having operational control of the units in a national emergency on February 5, 1960. Reservists themselves will take over a large share of the responsibility of running the reserve program. CONAC, relieved of much of its training and inspection responsibilities, will be better able to carry out its functions of command, adminis-

tration, personnel and budgetary management, and logistical support of the AFRes.

In September 1960 the three CONAC air forces will be replaced by six Air Force Reserve regions corresponding geographically to the six U.S. Army areas. Many of the activities at the regional headquarters will be carried on by inactive duty AFRes mobilization assignees. Troop carrier wings will report directly to regional headquarters, but nonflying and individual training units will be managed by 16 sector headquarters, also manned chiefly by mobilization assignees. Below sector level, the reserve program will be managed entirely by reservists, with general control exercised by active USAF advisers and training liaison personnel.

New missions are being assigned to the reserve forces as the Air Force decides that such missions will add to its over-all capabilities. Specific missions already assigned include strategic airlift, postattack recovery, and base support. A test program scheduled for early in fiscal year 1961 will provide experience in training and equipping recovery and base support units to assist the Air Force in recovery from nuclear attacks in wartime. Personnel to man the recovery and base support units will generally come from the present AFRes individual training programs. Individual training will be continued for personnel needed to augment active USAF units in the event of an emergency.

Reserve units continued to perform important peacetime tasks as a byproduct of training. AFRes troop carrier wings supported the Army by airlifting and airdropping troops and equipment during training exercises. The first ferrying of aircraft to oversea areas by the reserves occurred in June 1960, when the AFRes flew 21 C–119's to Agra, India, meeting all schedules successfully.

ANG air defense alert crews from 20 squadrons regularly stood runway alert under ADC control and four Aircraft Control and Warning (AC&W) squadrons operated 24 hours a day as part of the air defense radar network. The 199th Fighter-Interceptor Squadron and the 109th and 169th AC&W Squadrons of the ANG had charge of the USAF defense of Hawaii, operating under the Pacific Air Forces. ANG tactical fighter squadrons conducted firepower demonstrations at several Army bases, relieving TAC of this function.

At the end of June 1960, ANG personnel totaled 70,820, all in the Ready Reserve. Of these 8,570 were officers and 62,250 airmen. The AFRes had a strength of 520,749 not on active duty, including 40,542 officers and 161,964 airmen on Ready status. The AFRes had 56,425 men in drill-pay status, of 63,000 authorized, and the ANG had 70,820 of 72,000 authorized. The activation of AFRes postattack and base support units in fiscal years 1961 and 1962 will probably require the authorization of additional drill-pay positions.

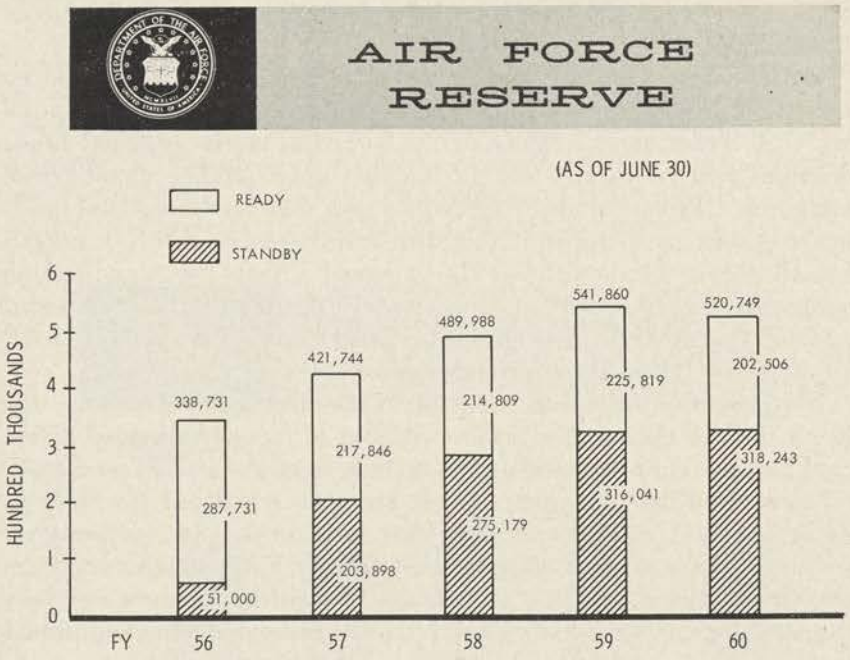

Figure 11

During the year annual inspections and operational readiness tests showed that both ANG and AFRes units were receiving highly effective training and had the ability to react quickly in an emergency. This was also borne out by the flying safety record of both components. The AFRes had 2.9 accidents per 100,000 flying hours during calendar year 1959, and it cut this in half during the first 6 months of 1960. The ANG had an accident rate of *14.3* per 100,000 flying hours during calendar year 1959 and only 7.6 for the first half of 1960.

The air technician program contributed much to the more effective training record. On June 30, 1960, the ANG had 13,158 air technicians and the AFRes had 3,971.

Both the ANG and the AFRes continued to modernize their equipment. By the end of June the ANG had 87 percent of its required equipment, and the AFRes units had from 70 to 90 percent of theirs. To help them perform their new strategic airlift mission, six ANG squadrons obtained C–97 Stratocruisers, the first ANG four-engine transports. Five more squadrons were equipped with Century series aircraft, including F–100's, F–102's, and F–104's. The 144th Air Transport Squadron in Alaska received ski-equipped C–123's to replace its C–47's. The AFRes expected to obtain replacements for

some of its C–119's as soon as suitable aircraft could be made available by the active establishment.

During the year the ANG obligated $11.5 million of Federal funds to construct new facilities. These included six runways, two hangars, and a variety of other buildings, all made necessary by the acquisition of more modern equipment. The AFRes obligated $3.1 million for new facilities, including one hangar and the expansion of existing buildings and aircraft parking areas.

V. Health and Welfare

The Air Force continued its efforts to provide its officers and airmen with improved conditions and benefits. USAF welfare activities received $29 million from the Air Force Central Welfare Fund to supplement funds appropriated for recreational, educational, religious, and general welfare benefits to families living at USAF installations. There were 260 family-service centers in the Air Force with 14,000 volunteer helpers. The Air Force Aid Society continued to provide emergency financial assistance.

Medical Service

Medical Personnel

During the year the number of USAF medical officers increased slightly from 10,429 to 10,699, including 435 residents and interns. This total included 3,354 physicians, 1,745 dentists, 322 veterinary officers, 2,063 medical service officers, 163 medical specialists, and 3,052 nurses. By the end of June 1960 there were 22,851 Medical Service airmen, including 2,885 assigned to dental duties. The Medical Service had difficulty in obtaining qualified clinical laboratory officers and sanitary and industrial hygiene engineers. It added 233 Regular officers during the year.

The major source of active duty Air Force Reserve physicians, the residency deferment program (Berry Plan), enabled young physicians to secure reserve commissions with active duty during the year following their internship or, if selected, to delay their active duty until after completion of residency training in need specialties. Of 572 physicians commissioned by the Air Force from the 1959 medical school graduates, 255 were deferred for residency training, bringing the total number in residence in June 1960 to 685. During fiscal year 1960, 132 physicians completed their residency training and entered on active duty, and 209 were scheduled to do so during fiscal year 1961.

The Air Force continued to sponsor four special career incentive programs to attract highly qualified young men interested in Medical Service careers. At the end of June 1960 about 230 senior medical students, military interns, civilian interns, and dental interns were being sponsored under these programs.

An extensive medical education program for USAF medical officers, designed to meet the needs of the Air Force and to attract professional

personnel to the Medical Service, provided training for specialists, teachers, researchers, and administrators. The training embraced courses ranging from short seminars to several years of residency. On June 30, 1960, the number of sponsored Air Force residents totaled 356.

Health in the Air Force

The health of USAF military personnel improved markedly in fiscal year 1960. The admission rate to medical facilities for treatment decreased 7 percent to a low of only 252 (from 272 in fiscal year 1959) per year per 1,000 strength. The average daily number of noneffectives (for medical causes) also decreased from 9.8 per 1,000 military personnel in fiscal year 1959 to 9.6 in 1960.

Improvement in health as well as the reduction in the number of military personnel resulted in an 8 percent decrease in the daily average number of hospital beds occupied by USAF personnel—from 6,287 in fiscal year 1959 to 5,785 in 1960. Since some of the 5,785 were cared for in non-Air Force facilities, a daily average of only 4,610 USAF personnel occupied beds in USAF facilities. The average daily number of USAF personnel hospitalized fell from 7.4 per 1,000 to 7.0. The Air Force cared for a total daily average of 8,820 patients in its own facilities, of whom 3,834 were nonmilitary and 376 were military other than Air Force.

Decreases in the military patient load were offset by increases in bed occupancy by dependent and retired personnel. The 68,000 babies born in USAF facilities during the year represented an increase of almost 20 percent over the previous year. The clinics, too, had far more patients, the number of immunizations increasing by 558,400 and the out-patient visits by 528,250.

The death rate for fiscal year 1960 was 1.7 per 1,000 average strength compared to 1.9 for the previous year. This represented a reduced death rate from injuries—1.3—and an unchanged rate from disease—0.4. Of the 1.3 deaths per 1,000 from injuries, aircraft accidents accounted for only 0.3, while motor vehicle deaths remained the same as in 1959—0.6. Deaths from miscellaneous injuries accounted for the remaining 0.4.

Air Force Hospitals

Two new hospitals, five new dispensaries, four new dental clinics and six miscellaneous projects completed during the year helped broaden the scope of USAF health services. Under construction in June 1960 were nine more hospitals (three with dental facilities), four dispensaries, and a 500-bed addition to the USAF hospital at Lackland AFB.

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At the end of June 1960 the USAF Medical Service had 182 fixed in-patient facilities, containing 12,183 operating beds. Of these, 123 facilities with 9,410 beds were in the United States including Alaska; 98 were hospitals and 25 were Class A dispensaries. The remaining 59 facilities, with 2,773 beds, were overseas. The Dental Service operated 482 fixed dental facilities and 13 trailer-mounted dental clinics.

During the year, 12 USAF hospitals became accredited, 8 in oversea areas. The total number accredited rose to 76, of which 60 were in the United States.

Dependents' Medical Care

After a comprehensive review of the Medicare program under the changes made in October 1958, additional care of dependents from civilian medical sources was authorized on January 1, 1960. One major restriction continued: Dependents residing with their sponsors still had to obtain a statement of nonavailability of military medical care prior to seeking civilian medical care at Government expense. With this latter exception, the scope of the program in June 1960 was much the same as it was prior to October 1958.

The Air Force had obligated almost $103 million under Medicare from its inception in December 1956 to June 30, 1960. This sum included a charge of 2.2 percent by the Department of the Army for administering the program. During fiscal year 1960, almost $24 million was obligated for the care of USAF dependents in civilian hospitals; the average cost per physician's claim was $80, and the average cost per hospital claim was $132.

Medical Research

The USAF Aerospace Medical Center opened at Brooks AFB, Tex., on November 14, 1959. This modern center for medical research brought into one organization under the Air Training Command the School of Aviation Medicine at Brooks; the USAF hospital and the USAF Epidemiological Laboratory, both at Lackland AFB, Tex.; and the Medical Service School, at Gunter AFB, Ala.

The School of Aviation Medicine performed research in bioastronautics, aerospace medical problems of atomic energy, preventive medicine, clinical medicine, medical standards in aviation, aviation physiology, and visual problems of flight. Although the school did much of this research in its own laboratories, it also contracted with universities, medical schools, and industrial organizations to investigate specific subjects.

Research projects included space-cabin simulation, planetary environments, weightlessness, algal systems, and requirements for constructing complete life-support systems for small animals. Cosmic

radiation research attempted among other things to define the degree of hazard posed by the primary cosmic-ray particles first encountered above 90,000 feet.

In studying the possibility of life on other planets, the school found that certain soil bacteria multiply under environmental conditions simulating those on Mars. Research indicated that an algal system weighing 131 pounds or less would permit a man to breathe in a sealed environment.

ARDC's Aerospace Medical Division, at Wright-Patterson AFB, Ohio, directed bioastronautic projects of great importance to the national effort in manned space flight. Stress tolerance studies concerned the physiology of prolonged acceleration and weightlessness; impact and abrupt acceleration stresses; thermal tolerance; and acoustical, nutritional, vibrational visual, and combined stresses. Capsule habitability studies centered on respiration and nutrition, waste collection and processing, sanitation and hygiene, space capsule design, space suits, abrupt deceleration protection, and other biological problems.

The Arctic Aeromedical Laboratory at Ladd AFB, Alaska, carried out an extensive research and development program dealing with human factors in Arctic environment. The laboratory investigated environmental disease hazards, nutritional requirements, survival techniques, and protective clothing. It also provided facilities, logistic support, and technical assistance to visiting research teams.

Chaplains

Chaplains entering active duty during the year brought the total number at the end of June 1960 to 1,094, still 19 less than authorized. The Air Force called 104 reserve chaplains to active duty, but the loss of 51 from active duty resulted in only 53 additional chaplains.

Missions, retreats, and conferences are held throughout the world wherever USAF personnel are assigned. Air Force chaplains conducted a series of missions for Catholic and Protestant personnel and their families at air bases in Iceland, Europe, the Azores, Bermuda, and the Caribbean. Torah convocations were conducted for Jewish personnel in Europe. The chaplaincy conducted the first Eastern Orthodox mission and retreat in the Far East at Tokyo and Lake Yamanoka, Japan.

Spiritual life conferences for Protestant personnel and their families were sponsored for the seventh year. They were held at Estes Park, Colo.; Ridgecrest, N.C.; and Pacific Grove, Calif. Also, the Air Force sponsored Protestant religious education seminars in Oklahoma and California.

A conference was held in Fuchu, Japan, for USAF chaplains in the Pacific area. Headquarters USAF and USAFE sent chaplain representatives to the annual conference for chaplains of the NATO air forces, held in Rome, Italy, with the Italian Air Force as host. Through the Armed Forces Chaplains Board, the Air Force sponsored spiritual retreats for Protestant and Catholic chaplains in the Alaskan and northeast Atlantic areas.

In July 1959 the Air Force set up a Chaplain Writers Board at the Air University as a research, review, and educational agency of the Office of Chief of Air Force Chaplains. The Extension Course Institute introduced three new courses for chaplains.

In June 1960 there were 740 religious facilities, including 431 chapels and 309 chapel annexes, at USAF bases. During fiscal year 1960, 24 new religious facilities were completed.

Judge Advocate General

The international activities of the Air Force are reflected in the work of its legal advisers. USAF judge advocates monitor the trials of Air Force personnel, military, civilian, and dependents, in foreign courts. New civil litigation in which the Air Force was the defendant arose in Turkey, Greece, England, France, Iceland, Canada, Japan, and the Philippines.

The problem of retaining young lawyers on active duty in the Air Force remained critical. The Judge Advocate General's department lost 199 officers during the fiscal year, adding only 183 new officers. Total strength at the end of June 1960 was 1,203 officers, 16 fewer than a year earlier.

During the year the Boards of Review examined 1,606 court-martial cases, of which 329 were petitioned to the U.S. Court of Military Appeals and 8 were certified to the court by the Office of the Judge Advocate General. During this period, 46 petitions were granted, 283 denied, and 9 withdrawn by the accused. By the end of June 1960, the court had reversed the Boards of Review in 22 cases, sustained them in 33, and reached no decision in 46.

The Judge Advocate General received or reopened 1,477 claims totaling almost $4 million and closed 1,514 claims amounting to $4.6 million. There were 202 claims on hand as of June 30, 1960, in the amount of almost $3 million. The number of foreign claims processed continued low because international agreements apply in many areas and the field settlement authority covers claims to $15,000.

The Tax and Litigation Division received a total of 436 cases and closed 310 cases. There were 1,100 cases on hand at the end of June 1960.

VI. Installations

The rapid evolution of aerospace weapons has created a demand for new ground support facilities. Base facilities are a critical and integral part of missile and space vehicle weapon systems, as are the facilities housing the computers, displays, and control equipment for other new systems. At the same time, existing facilities must be modernized if manned aircraft are to remain effective. And the highly trained technicians needed to operate these modern weapons must be provided with adequate family housing if the Air Force expects to retain them.

Programs

The Air Force had available for military construction during fiscal year 1960 a total of $1.43 billion. This figure included $781 million in new appropriations by Congress, $634 million carried over from the previous year, and $19 million in transfers and reimbursements. Of the total, the Air Force could use $1.18 billion to award new contracts, the balance being reserved for various Government costs and the overhead on current construction.

In September 1959 the Air Force requested a military construction authorization for fiscal year 1961 of $1.03 billion for the Regular Air Force and $9.7 million for the reserve forces. Before submission to Congress, the program was reduced to $675.8 million and $4.6 million, respectively. Congress actually authorized $727.3 million for the Regular Air Force, including $204.7 million for construction within the United States, $105 million for overseas, $408.6 million for missile sites, and $9 million for unforeseen contingencies. The authorization for reserve forces construction was $4.5 million. The appropriation for military construction for fiscal year 1961 was $613.5 million, including $609.5 million for the Regular Air Force and $4 million for the reserve forces.

During the year the Air Force spent $4.7 million for 8,511 acres of land, including 1,457 acres in the public domain, on which new facilities could be built or existing ones expanded. In addition, new leases were acquired at a cost of about $62,000 per year.

At the same time, the Air Force disposed of 425,781 square feet of building space and 23,987 acres of land which were no longer needed.

Figure 12. United States Air Force Academy.

It transferred Vincent AFB, Ariz., to the Navy, declared surplus part of Presque Isle AFB, Maine, halted construction at Richard Bong AFB, Wis., and inactivated five depots in the United States. Cancellation of 304 leases on building space and acreage cut expenditures by $797,600 per year. As of June 30, 1960, there were 2,172 leases in effect at an annual cost of $3.1 million.

Construction

The Air Force did not begin construction of any new major bases during fiscal year 1960, but it did place under contract some missile sites in the vicinity of existing bases. During the year the Air Force placed contracts for new construction projects amounting to $776 million. This sum included about $400 million for ballistic missile and space projects. Awards for projects not related to missiles were slowed down to keep within established fiscal ceilings.

Construction projects valued at $1.38 billion, exclusive of family housing, were completed during the year. This represented a monthly average of $115.4 million as compared with $81 million for the previous fiscal year. On June 30, 1960, projects worth $1.99 billion were under construction with the value of the work in place at these projects totaling $1.19 billion.

By the end of the year the Air Force had let $340.6 million in construction contracts at 13 ICBM sites and had completed 18 percent of the work. It awarded additional contracts amounting to $23.2 million for ICBM testing and training facilities at Vandenberg AFB, Calif., and Patrick AFB, Fla.

In the construction of ICBM sites, the Air Force adhered to the principles of dispersal and hardening. Individual launchers were separated by several miles. The first ATLAS units are scheduled to be placed above ground, but later squadrons, including TITAN and some MINUTEMAN, will be placed in underground silos for better protection. ICBM missile sites will be located in the vicinity of existing major USAF installations to make maximum use of their facilities.

Almost $32.8 million in construction work at SAC bomber and tanker bases was 37 percent completed by the end of June 1960. Dispersal contracts valued at $1.7 million were 42 percent completed. Almost half of the work at SAC guided aircraft missile facilities, worth $6.9 million, was also finished.

Of the BMEWS sites, construction was essentially completed at Thule AFB, Greenland, by June 1960 and 75 percent completed at Clear, Alaska. In February 1960 the United Kingdom agreed to pay for construction of a third BMEWS site at Fylingdales, Yorkshire, while the United States would furnish the equipment. All the rearward communication stations between the Thule and Clear sites were under contract. The total estimated cost of BMEWS construction as of June 30, 1960, was $187 million.

By the end of the year construction of the eastern extension of the DEW line was about 70 percent completed at a total cost of $61.2 million. SAGE facilities were essentially completed. Changes in the air defense program in March 1960 required elimination of the hardened SAGE combat centers. Construction of ADC fighter-interceptor bases totaled about $25 million. Radar improvement work cost $9.4 million.

Four IM–99A BOMARC sites were built at an estimated cost of $42.5 million. Work on shelters for the IM–99B at one of these sites was 90 percent completed at an estimated cost of $2.8 million. Revision of the air defense program in March 1960 caused the cancellation of four IM–99B sites and the designs for three additional sites. The Air Force expected to recoup about $3.5 million from these cancellations. The total remaining BOMARC program called for eight sites in the United States, costing about $75 million, and two in Canada.

In August 1959 a contract for $3.2 million was awarded for construction of the last facility currently authorized for the Air Force Academy—the chapel. At that time the value of the completed

work at the Academy had reached $135.3 million, or 97.9 percent of the total work under contract. Except for one parcel of land, all real estate acquisition had been completed.

On June 30, 1960, the Air Force was using 253 major bases. These fell into six main types, including foreign bases and contract flying schools in which the Air Force had no real property interest:

Active Major Installations

Classification	*Total*	*United States*	*Overseas*
Operational	147	83	64
Operational support:			
Flying	16	8	8
Nonflying	12	3	9
Training	43	43	0
Research and test	7	7	0
Logistical	16	14	2
Non-USAF (no real property interest):			
Foreign Base	7	0	7
Contract flying schools	5	5	0
Total	253	163	90

Engineering

The Air Force continued research on the effects of atomic weapons on structures, and gained greater knowledge of the strength of the soil and its response to shock. Analyses of structures designed to withstand 100 pounds of pressure per square inch revealed that they were actually capable of withstanding twice that pressure, making possible greater protection at less cost.

The Air Force began to revise its drawings for new USAF buildings to provide basements that will serve as shelters also. At little or no additional cost in the construction of a standard facility, the basements will offer some fallout protection.

Family Housing

Housing construction for USAF families proceeded at a rapid rate. There were 24,111 housing units completed during fiscal year 1960, including 19,669 in the United States and 4,442 overseas. Under construction on June 30, 1960, were 16,805 units.

Most of the housing for USAF families during the past few years was constructed under the Capehart-Rains (Title VIII) program. During fiscal year 1960, there were 39,564 housing units completed under this program. Total acceptances for mortgage payments as of June 30, 1960, were 39,153 units with a total dollar value of $617 million.

During fiscal year 1960 the Air Force received $43.5 million from the Defense Department to acquire and improve Wherry housing

projects. It used $4.8 million to acquire new five projects, consisting of 2,304 units, and $36.6 million to rehabilitate acquired projects. A total of 24,409 units in 36 projects have received funds for rehabilitation and improvement under the Wherry program.

The following table shows the total number of existing family units according to each type of funding:

Type	*Existing*
Appropriated funds	35,295
Title VIII (Capehart-Rains)	39,496
Wherry	37,840
Rental guaranty	3,386
Surplus commodity	5,164
Leased	267
Total*	121,448

*Excludes 11,873 inadequate units and 2,571 trailers.

Base Maintenance

During the year the Air Force added new facilities to its real estate inventory valued at about $2 billion, making the total initial cost of the inventory to the Government about $13 billion. The increased workload resulting from these added facilities, plus rising costs, taxed the USAF capacity for day-to-day maintenance at bases. To meet this problem, the Air Force improved its training program, equipment, conservation program, and management procedures. It contracted for about $75 million of maintenance work where it was to the obvious advantage of the Government. The Air Force also contracted for about $85 million of major repairs and improvements during the year. A total of $753 million was spent during the fiscal year for operation and maintenance of real property.

USAF engineers paid increased attention to preventive maintenance and placed continued emphasis on utility rates and usage. Plans were formulated to modernize some of the large heat- and power-plants to permit more efficient operation.

There were 1,565 fires at USAF bases during fiscal year 1960, resulting in losses of $29.9 million. These large losses were caused primarily by one of the worst fires in Air Force history, at Walker AFB, N. Mex. This fire, caused by an aircraft accident, resulted in an estimated loss of aircraft valued at $11 million, a hangar worth $175,000, plus contents of the hangar estimated at $10.2 million, or a total loss of more than $21 million.

VII. Research and Development

The USAF research and development program is in an evolutionary transition to weapons and vehicles for aerospace operations. While continuing to develop weapons for the near future, the Air Force conducts advanced projects for the long-range needs of space warfare.

The development cycle for advanced projects is long and costly. The Air Force therefore must be highly selective in its new weapons. A complete operational weapon system involves many tasks other than development of the weapon itself—provision of operational and training facilities, ground support equipment, and spare parts. To pursue all of these tasks concurrently with development in all cases would be expensive and inefficient and would limit the number of possible projects. On the other hand, to defer all operational aspects until the technical system is completely demonstrated would delay new weapons too long, limiting their military utility. There must be a balanced approach that takes into account the importance of the requirements, the technical risks involved, and the associated costs. The Air Force, therefore, carefully tests the feasibility of proposed weapon systems before expending large sums to develop them.

Congress appropriated $1.16 billion for USAF research and development, an increase of $416 million over the previous fiscal year. This increase resulted mostly from a realignment of effort, whereby the research, development, test, and evaluation appropriation absorbed about $380 million formerly included under the procurement appropriation and $20 million of former operation and maintenance money.

The Air Force administered 35 foreign development projects supported by the Mutual Weapons Development program. This program permitted member nations of the North Atlantic Treaty Organization to join in efforts leading to joint production to meet NATO requirements. The Air Force was responsible for technical assistance in 14 of the 20 areas initially selected, including air-to-air missiles and medium-range ballistic missiles.

Astronautics

USAF participation in military astronautics, which had been largely in support of other agencies, expanded greatly on September 23, 1959, when the Secretary of Defense assigned to the Air Force

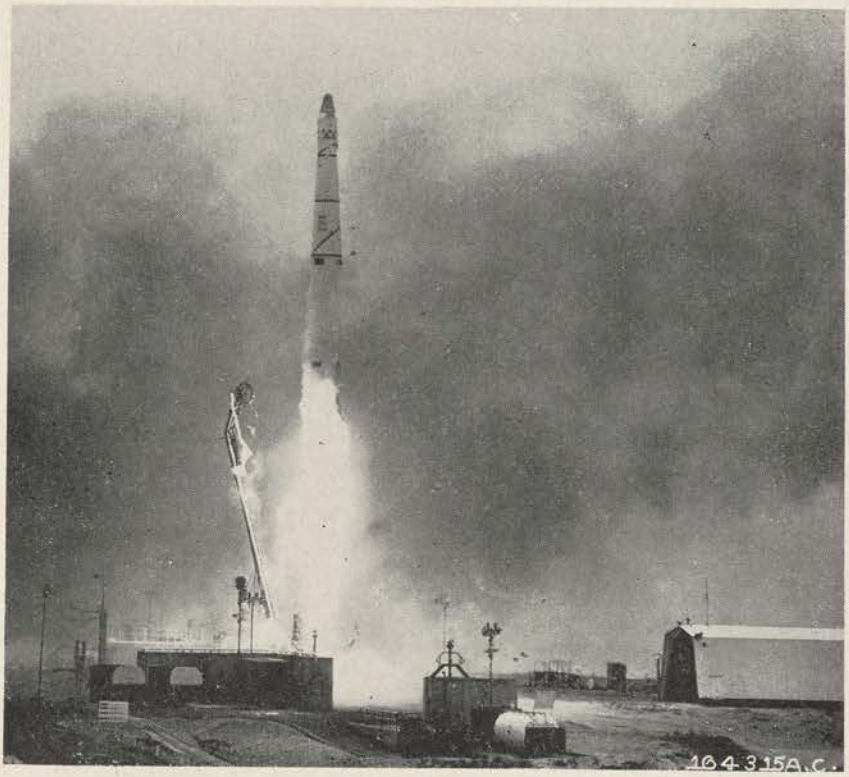

Figure 13. DISCOVERER launching at Vandenberg Air Force Base.

responsibility for the development, production, and launching of all boosters and integration of related systems. He also approved the transfer of the DISCOVERER, MIDAS, and SAMOS projects from the Advanced Research Projects Agency (ARPA) to the Air Force.

The DISCOVERER project, consisting of the THOR missile, the AGENA satellite as a second stage, and ground locations, was designed to provide basic components and techniques from which a diversified group of military satellite systems could be developed. It was intended to demonstrate orbital capability and obtain biomedical and engineering data from recoverable capsules. Five of the eight DISCOVERER research vehicles launched during the year went into orbit successfully.

On February 1, 1960, the 6549th Test Wing (Satellite), ARDC, the first of its kind, took over control of project DISCOVERER. The space wing included a squadron at Vandenberg AFB that would launch satellites under this program.

MIDAS, a system for detection and warning of missile attack, will include a network of satellites in polar orbit. Each vehicle will contain

infrared devices to detect ballistic missiles just after launching. A MIDAS flight test in May 1960 attained an almost perfect orbital path, but the data-link telemetry ceased functioning 2 days after launching.

The SAMOS reconnaissance system is designed to view the entire surface of the earth from a vehicle placed in a polar orbit. The Air Force gave top priority to this project. Progress was good, and the program was essentially on schedule.

The Air Force worked closely with the Navy on navigation satellites and with ARPA and the Army on communication satellites, supplying boosters and integrating the payloads into the over-all systems.

On June 22, 1960, a THOR-ABLE-STAR booster placed the first two-pack satellite into orbit, including the Navy's TRANSIT II–A navigation satellite, and a "piggyback" aluminum basketball-like research sphere.

The Air Force continued to support major NASA projects, providing boosters for the TIROS I weather satellite, the EXPLORER VI paddlewheel earth satellite, and the PIONEER V paddlewheel sun satellite. All these vehicles obtained much new and significant scientific data. PIONEER V succeeded in communicating with earth from areas of space never before traversed. For NASA's MERCURY (man-in-space) project, the Air Force furnished 14 ATLAS boosters, launching facilities, and technical assistance. In addition, the Air Force conducted balloon tests for NASA and provided various types of training equipment for the MERCURY astronauts.

Nuclear Systems

The Department of Defense deferred a proposed USAF program to build and test a nuclear-powered airplane. However, the Air Force and the Atomic Energy Commission are cooperating in the development of a propulsion system for an aircraft to fly at speeds of more than Mach 0.8, reach an altitude of 35,000 feet, and have a potential reactor life of about 1,000 hours.

Project PLUTO is a joint Air Force-Atomic Energy Commission effort to demonstrate the feasibility of a nuclear ramjet propulsion system for a supersonic low-altitude missile (SLAM). The Air Force provided engineering support as its portion of Project PLUTO and conducted research and studies on long leadtime components and subsystems for SLAM.

Research Aircraft

The first powered flight of the X–15 research aircraft took place in September 1959, followed by five more before the end of June

1960. The purpose of these flights was to reach ever higher speeds and altitudes, and by June 30, 1960, the X–15 had attained a speed of Mach 3 and an altitude of 107,000 feet. The X–15's interim engine, the XLR–11 with a 16,000-pound thrust, will be replaced by the XLR–99, designed to have a thrust of more than 50,000 pounds.

The Air Force has used a variety of technical approaches to meet the need for an aircraft that could take off vertically. The tilt-wing turboprop X–18 made its first flight as a conventional aircraft in November 1959. Buffeting was encountered in the transition to a 35-degree-angle flight, and the plane has been undergoing further ground testing.

In June 1960 the Air Force decided to modify two B–66's for use in a study of the boundary layer control principle. Equipment will be applied to the wings only to determine whether this technique can be used to improve range and endurance. A prime contractor has been selected and a 2-year applied research program is planned.

Weapon Development

Strategic Weapons

By the end of June 1960 the SM–65 ATLAS ICBM had made 30 completely successful research and development flights out of 47 attempted. On May 20, 1960, an ATLAS set a new long-distance record when it went 9,000 statute miles. By the end of June 1960, the SM–68 TITAN had completed 12 successful flights in 18 attempts.

Storable liquid propellants enabled the Air Force to proceed with development of an improved model of the SM–68, called TITAN II. These propellants will keep the missile fueled and in firing position for a long period at ordinary temperatures. The TITAN II will be launched directly from an underground silo almost immediately after the order to fire is given.

By May 1960, 8 consecutive test launches from silos of a full-scale model of the SM–80 MINUTEMAN proved so successful that the basic configuration of the MINUTEMAN silo was determined and the remaining 10 launches in the program were canceled. Months of development time and approximately $10 million were thus saved. Ground tests of the inertial guidance system also proved satisfactory.

In December 1959 the B–70 Valkyrie program was cut back from development of a complete weapon system to development of two prototype XB–70's without combat capability. The revised program is on schedule and manufacture of the first prototype has begun. The Air Force believes that B–70 development is necessary to obtain a successor to the B–52. Unlike a missile, the B–70 could be recalled after takeoff. It could travel its full range at speeds up to Mach 3.

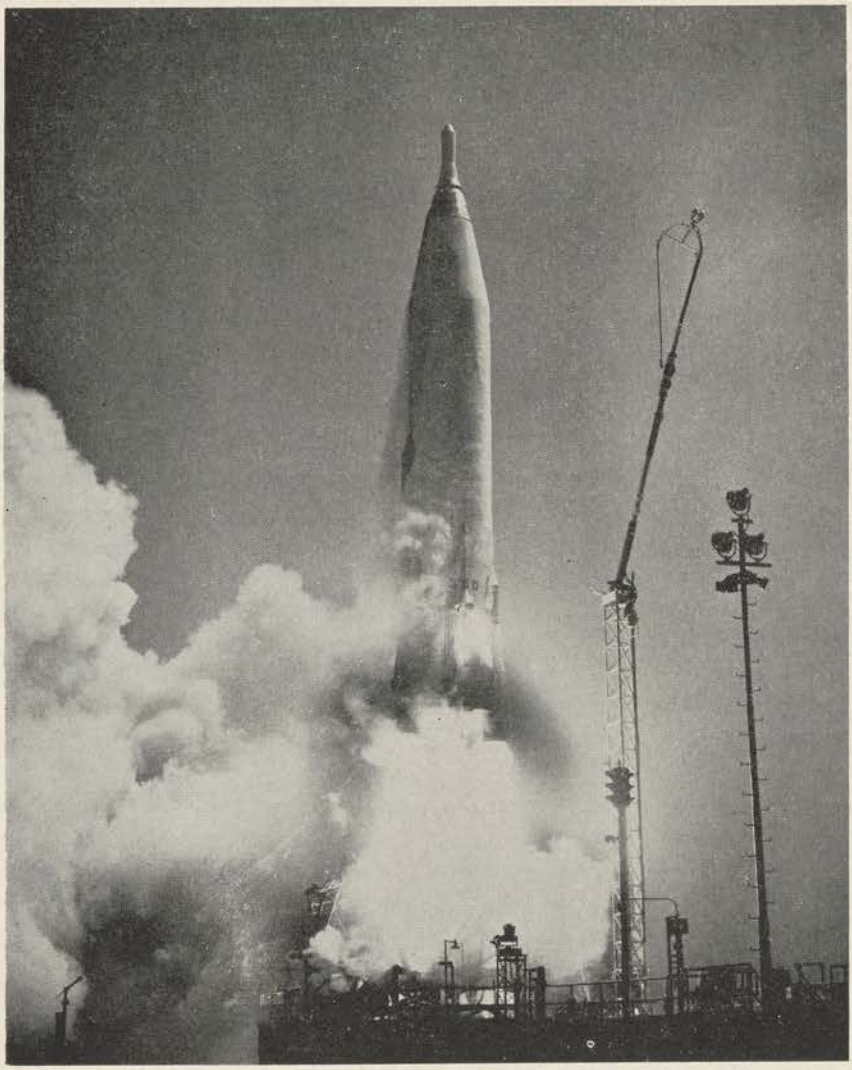

Figure 14. ATLAS takes off on 9,000-mile flight.

From an advanced position it could reach a target sooner than an ICBM launched from the United States. The Valkyrie could also launch ballistic missiles, serve as a first-stage booster for satellites, and provide a platform from which to intercept enemy satellites.

In February 1960 the Department of Defense approved a USAF proposal for development of the GAM–87 SKYBOLT, an air-launched ballistic missile using a two-stage, solid-propellant motor. A B–52 could launch a SKYBOLT to strike targets hundreds of

miles away and on the same mission, destroy targets directly with its own bomb load.

The Dyna-Soar, a rocket-boosted manned glider, will be able to reenter the atmosphere, return to a base chosen by the pilot, and land on a normal runway as accurately as a conventional aircraft. By controlled reentry from near-orbital velocities at the fringes of the atmosphere, the Dyna-Soar will provide the technological basis for development of later reliable and economical manned space systems. In November 1959 the Air Force selected a contractor for the Dyna-Soar and chose the TITAN booster for initial use.

Air Defense Weapons

The IM–99B BOMARC interceptor missile, with a range of more than 400 miles, was the only active defense system under development by the Air Force. Propulsion problems hampered initial testing, but have been solved. A test program on the IM–99B is being conducted at Eglin AFB, Fla., including successful interception of the supersonic REGULUS missile.

The F–108 long-range interceptor was canceled in September 1959 because of fiscal limitations. Development of the ASG–18 fire-control and the GAR–9 air-to-air missile subsystems for interceptors continued on a reduced scale. Because of the F–108 cancellation and a reduction in the BOMARC program, the Air Force initiated a modification program to improve current interceptors.

Testing of the GAR–11, a nuclear air-to-air rocket that would be guided by radar after launching, proceeded on schedule. The missile proved highly successful in these tests and was scheduled as primary armament for the F–102.

Tactical Air Weapons

Manufacturers undertook feasibility studies of the dispersed-site fighter to be used for tactical air operations including close support of ground troops. This airplane would operate from forward areas without a typical air-base complement. The Air Force considered development of an aircraft for short-field landings and takeoffs if it could be available by 1966. If not, a vertical takeoff aircraft was to be developed for the 1970's.

The Air Force continued work on the airframe and guidance system of the BULLPUP, an adaptation of a Navy air-to-surface missile. The BULLPUP, with a highly accurate guidance system and an all-weather capability, was to be used with the F–100 and similar tactical aircraft.

Supporting Developments

Transport and Training Aircraft

In May 1960 the Air Force established a requirement for an advanced medium-cargo aircraft to meet the strategic airlift needs of MATS, TAC, and AMC. To insure that the plane would be suitable for commercial purposes and that all military needs would be met, the Federal Aviation Agency and the Department of the Army participated in determining specifications for it.

In October 1959 the Air Force selected the Lockheed Jetstar as winner of the design competition for a jet utility-cargo transport to be used also for navigator and electronic countermeasure training. Five Jetstars, redesignated the C–140, were bought in May 1960 for use by the Airways and Air Communications Service in checking navigation aids.

The first T–38A basic pilot trainer, powered by the YJ–85–5 engine, flew in January 1960, and the production version of the engine completed its qualification test in June. The T–39 utility transport-trainer made its first flight in June. The Federal Aviation Agency expected to certify this aircraft for airworthiness at an early date.

Command and Control Systems

The Air Force uses all possible means of communications, including radio, microwave, teletype, and telephone. In March 1959 the Air Force selected an industrial team to modernize this global complex, known as AIRCOM. During the next 5 years, the Air Force will attempt to integrate the many types of equipment needed to meet the severe demands on AIRCOM in the 1965–70 period. Components and subsystems will be developed concurrently.

The command control subsystems and an integrated system for the BMEWS installation at Thule passed their tests. For the second site—Clear, Alaska—design of technical and supporting facilities and of equipment was almost completed. Initial design work for the third site at Fylingdales in the United Kingdom began in April 1960. In December 1959 the Air Force approved incorporation of a SAC display complex as part of BMEWS, to be ready when the Thule site and the NORAD central computer display facility become operational.

Components are under development for an improved SAC control system that will provide its commander with immediate information on the disposition and status of his force. At the experimental test site for this system, located in Paramus, N.J., the installation of a traffic control center was half completed, and the first development model of a remote control center was also being installed.

Propulsion

In January 1960, the Air Force took over from ARPA management of a project to develop a small ion rocket engine. In another approach, an experimental dual plasmatron ion engine was demonstrated on a test stand during December 1959. Contracts were awarded for the study of a pulsed plasma engine and for design and test of an arc jet. Models of an electric wind-propulsion device were tested at high altitudes, pointing the way to further investigation of this possible means of propulsion. The Air Force also received from ARPA a project involving nuclear-pulse propulsion. The Air Research and Development Command submitted a research program for acquiring a theoretical understanding of this principle and the engineering requirements for its application.

In July 1959 the Air Force canceled the use of high-energy fuel for the B–70, but did not terminate research and development on boron fuel. Some materials derived from this program, such as pentaborane and decaborane, are potential rocket propellants, and an evaluation of these materials promised future results.

Lubricants and lubrication techniques were under development to withstand the severe temperatures, radiation, pressures, and speeds that will be encountered by future aerospace propulsion systems. The Air Force developed a solid film lubricant and two greases for use at very high temperatures.

Electronic Equipment

Significant progress has been made in the development of new techniques, materials, and components for electromagnetic warfare, including automatic jamming and deception transmitters and decoy devices. The number of electronic devices transmitting at the same time within a given geographic area has increased so rapidly that it has created an acute problem of interference among these devices. For several years the Air Force has made a major effort to develop techniques for better control of interference. Its proposals for improving spectrum usage received approval from the Office of the Secretary of Defense.

The performance of inertially guided ballistic missiles is proving comparable to that of radio-guided missiles. The Air Force continued to improve inertial guidance systems and reduce the size and weight of guidance subsystems. The importance of reliability has been especially emphasized in contracts for advanced guidance equipment. Sled tests at Holloman AFB, N. Mex., helped reveal deficiencies in guidance components, saving the large sums that would have been lost in test missiles.

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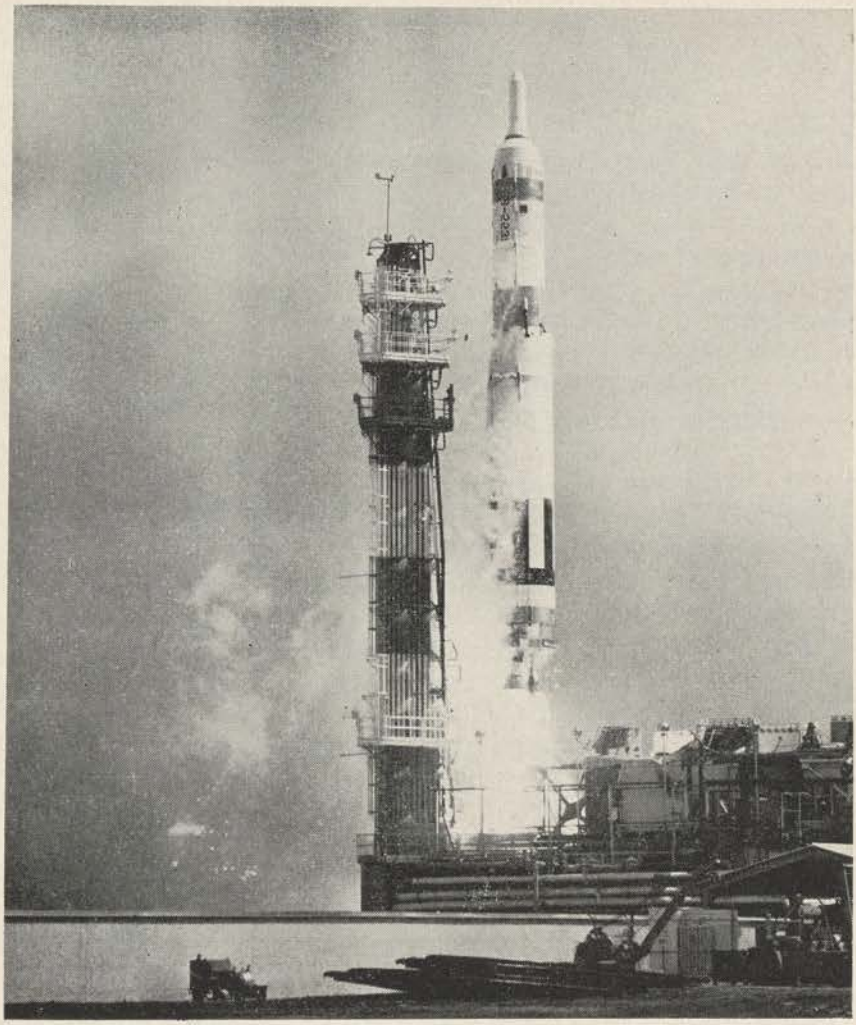

Figure 15. TITAN launching at Cape Canaveral.

Human Factors

Manned flight for prolonged periods above 80,000 feet will require a duplication of the earth's environment within a small space and with a minimum weight. The Air Research and Development Command developed a sealed, nonpressurized compartment simulating an ATLAS nose cone in order to test the equipment needed to enable a man to live for 7 days on recirculated oxygen, the latest space foods, and water reclaimed from body waste products. The compartment was designed to operate in the weightless and airless environment of space. On December 4, 1959, a monkey was fired 55 miles into space in a capsule

and recovered safely in the Atlantic Ocean. The capsule was identical to that intended for Project MERCURY's human passengers. In April 1960, Project HERMES, a 7-day test of the compartment by a man, proved successful.

To test means for bringing pilots down safely from extremely high altitudes in an emergency, Capt. Joseph W. Kittinger, Jr., parachuted from the open gondola of a balloon at altitudes of 76,400 feet and 74,700 feet in November and December 1959. Captain Kittinger wore an MC–3A partial-pressure suit, a bailout survival kit, and Arctic winter flying gear.

Basic Research

Technical progress, both military and national, depends on the strength of basic scientific research programs. Neglect of basic research can create a gap that could not be bridged even by larger expenditures of money and effort in later years. USAF fundamental research, primarily a responsibility of the Air Research and Development Command, is separated into six broad areas: Propulsion, materials, electronics, geophysics, biosciences, and aeromechanics.

In propulsion research, a workable laboratory plasma engine has obtained specific impulses for short periods of up to 1,000 seconds. There has also been an increased effort in electric propulsion, both ion and colloid. Basic research on ion propulsion has resulted in applied research on a 1/100-pound demonstrable ion engine.

Metallic materials are being developed to withstand extremely high temperatures. A new instrument—the plasmatron—can maintain an absolute temperature of 10,000°. Single crystals of various materials that have been developed indicate the possibility of alloys with far greater strength than present materials. These "whiskers" showed fantastic tensile strength on the order of 3,000,000 pounds per square inch.

In electronics, the principles of a virtually noise-free amplifier-oscillator known as Maser were extended into the infrared and optical fields. This has produced a major impact on communications and detection where extreme sensitivity and multichannel capacity are important.

In geophysics, additional emphasis was placed on projects to determine the water vapor content of the stratosphere. This information will be useful in employment of infrared above the tropopause. A series of rocket-borne magnetic-field investigations were undertaken to gather magnetic-field strength variations during auroral and solar prominences.

In the field of bioscience, ionization chambers and biopacks were carried into high geomagnetic latitude regions to study the environ-

mental dangers of space flights. A number of studies were begun to find out the energy conversion processes in men and animals that would be useful in space flight.

In aeromechanic research, the technical basis was established for the Mach 15, 9,000° Kelvin, gas dynamics facility. Research was also underway on thermochemical dynamics of gases under extreme environmental conditions. The principal areas of interest are ionization, molecular dissociation, and recombination phenomena.

VIII. Procurement and Production of Materiel

The Air Force is carrying out a realignment of the industrial complex supporting its programs as missile production grows in volume. Since it is neither economically sound nor in the national interest to retain production facilities operating at a fraction of their capacity, the Air Force is disposing of those Government-owned plants operating below marginal levels. Generally, these are plants designed and built during the World War II period for conventional aircraft and engines. The policy of utilizing Department of Defense plants and equipment where economically feasible has not changed, but the primary effort is to make maximum use of privately owned facilities.

By encouraging Government contractors to provide their own facilities, the Air Force decreased its own industrial readiness expenditures. Industrial facility funding for fiscal year 1960 fell to $69.2 million from $94.4 million during the preceding year. The bulk of the money supported missile development and production. Industry could not be expected to finance fully capital equipment in every instance. This was particularly true during the development of a weapon system when specialized test facilities were needed or when the product had little commercial application and there was no assurance that production would continue. For example, the Air Force will finance construction at Saltville, Va., of the only plant in the country with the capacity to manufacture hydrazine for the TITAN II program in the quantity required. The decision to finance this project was one of the few exceptions to the policy that the USAF production base will be privately capitalized.

The tax amortization program expired on December 31, 1959. This factor, together with USAF efforts to have contractors finance their own facility expansion, resulted in an unusually large number of tax amortization applications during the fiscal year. Of 156 applications reviewed, the Air Force approved 101 having a gross value of $92.6 million.

As a result of intensive effort, by June 30, 1960, the Air Force had reduced its ownership of machine tools to 77,000, with a value of $928 million, as compared with 88,900 valued at $1.09 billion 1 year earlier. The number of machine tools in actual use remained about the same—65,000.

The development of new production processes continued at a cost of $20 million per year. Significant projects involved such areas as the continuous mixing of solid-rocket propellants, further high-energy fuel development, high-temperature structures, and molecular electronics.

Supplies of raw materials proved adequate during the year except for temporary shortages resulting from the nationwide steel strike which began in July 1959 and lasted a total of 116 days. This strike affected missile base construction and delayed the construction of plants for the production of unsymmetrical dimethyl hydrazine and hydrazine to support the TITAN program.

Procurement Policies

USAF procurement experts sought to combat spiraling costs caused by technological changes and frequent changes in requirements. The Air Force launched a campaign to counteract these pressures. To improve contracting procedures, seminars and conferences with top-level management were conducted; certificates were required as to accuracy, completeness, and timeliness of costs; surveillance was strengthened over contractors' purchasing systems and cost-estimating procedures; and increased guidance was provided USAF field representatives.

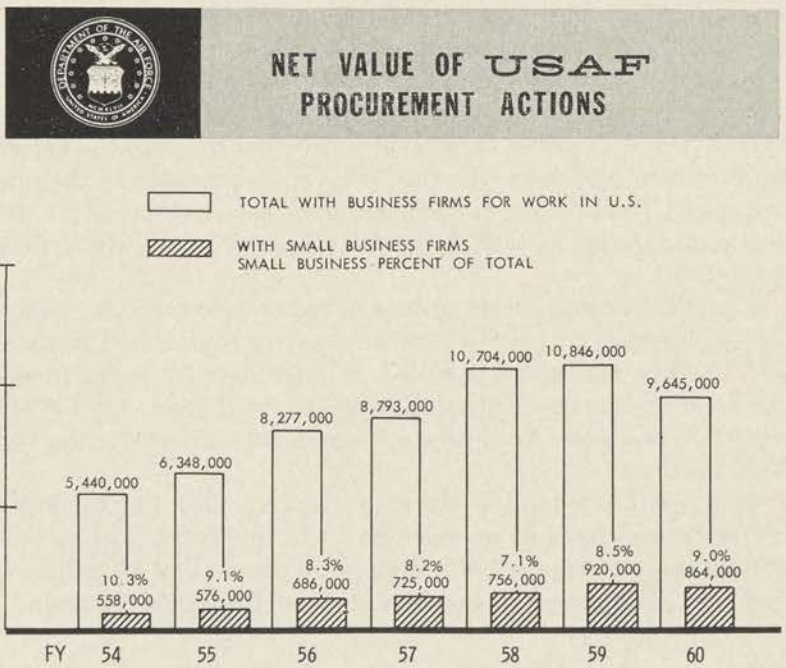

Figure 16

Industry cooperated in the effort to reduce costs. For example, by reducing the number of indirect employees from 529 to 441 per 1,000, one division of a major USAF contractor achieved a 6 percent reduction in indirect expenditures, amounting to approximately $6.5 million. Another company achieved a $1.7 million reduction in four subcontracting actions.

The Air Force negotiated contracts for approximately 90 percent of its procurement funds on items not susceptible to the use of formal advertising. The Air Force continued efforts to increase the use of advertising for bids. For repair and maintenance, advertising was used whenever possible to solicit fixed prices for services. Two-step formal advertising introduced in fiscal year 1959 proved a sound and useful way of buying and was adopted throughout the Department of Defense.

Prime contract awards to business concerns in the United States totaled $9.65 billion during fiscal year 1960, as compared with an average of $9.42 billion in the 9 previous years. Small business concerns received awards for $864 million, a decline from $920 million awarded in fiscal year 1959, but a percentage increase from 8.5 percent to 9 percent of the total prime contract awards. The numerical decline of $56 million in small business contracts awarded was caused by the reduction of $1.2 billion in total awards placed with industry during the year. The 9 percent awarded to small business in fiscal year 1960 compared favorably with the average of 7.5 percent awarded during the past 9 years.

Aircraft and Missile Production

During fiscal year 1960 the Air Force directed $8.05 billion for new procurement of materiel—38 percent for new aircraft and spares, 24 percent for missiles, and 38 percent for modifications, industrial facilities, components, and other items. Program changes permitted the Air Force to recoup $441.1 million during the fiscal year.

Aircraft deliveries for fiscal year 1960 totaled 70 percent of the 1959 procurement. This represented a planned reduction and was 100 percent of the final schedule. As the various missiles reached the production stage the greater cost of the newer weapons became more pronounced. During fiscal year 1959 the Air Force spent four times as much for manned aircraft as missiles; in fiscal year 1960 the ratio was less than 3 to 1.

Production of the B–52G continued to decline gradually in anticipation of its discontinuance and the introduction of the B–52H early in calendar year 1961. The B–58 program was cut from 40 to 32 aircraft, and the B version of the B–58 was eliminated completely.

The USAF F–100 and F–104 production programs were completed. The West German Government, however, purchased 30 two-place F–104's under a mutual security military sales arrangement. A peak production rate of 20 F–101B aircraft per month was maintained, and the F–106's began arriving in the Air Defense Command. The last of 77 F–105B aircraft was delivered in December 1959, and deliveries of the all-weather F–105D began in February 1960.

As of June 30, 1960, the Air Force had received a total of 392 KC–135 tankers. The production rate of 11 aircraft per month at the beginning of the year leveled off at 7 in accordance with adjustments made in the bomber program. C–133 production continued at 1 per month. The last C–133A was delivered in November 1959 and the first C–133B in December. C–130B production remained on schedule throughout the year.

The procurement programs for the T–37 and T–38 remained much the same. A shortage of engines and the need for certain modifications slightly reduced the T–38 schedule. The last of 5,691 T–33's—produced over an 11-year period—was accepted during the year. The procurement of H–43's, helicopters used for local rescue missions, was completed.

Increased production of ICBMs reflected the expanded force structure for the ATLAS and TITAN. The Air Force curtailed production of the GAM–72 QUAIL decoy missile after a reevaluation of requirements. GAM–77 HOUND DOG air-to-surface missile production was increased as a result of the assignment of more HOUND DOGs to designated B–52 squadrons to provide them with greater striking power.

The BOMARC interceptor missile program was reappraised. Budgetary factors and a series of test failures, combined with the Soviet Union's shift in emphasis from manned bombers to ballistic missiles, entered into this study. On March 24, 1960, the USAF proposed a cutback in the development of BOMARC–B from $420 million to $50 million.

The FALCON series of guided air-to-air, supersonic missiles play an important air defense role. Five basic versions plus a number of improved models have already been developed and produced. During fiscal year 1960, the Air Force took initial deliveries of the GAR–4A infrared homing SUPER FALCON and the GAR–11, the Nation's first guided, nuclear-tipped air-to-air weapon. Procurement plans for fiscal year 1961 call for additional substantial deliveries of these missiles and of the GAR–3 radar-homing SUPER FALCON.

The Air Force has adapted the Navy-developed GAM–83 BULLPUP air-to-surface guided missile for use by the F–100 and F–105

tactical fighters. Guidance is provided by radio signals from the pilot of the launch plane. A number of advanced versions of BULLPUP are being developed, including one for the USAF that will have a nuclear capability. During fiscal year 1960, the Air Force purchased BULLPUPs through the Navy.

Among tactical air weapons, the TM–76B MACE program of the Air Force was further reduced, but production of additional quantities of this missile was scheduled for the West German Government.

Engine production for aircraft and air-breathing missiles totaled 2,702, including 1,990 turbojets, 368 ramjets, 322 turboprops, and 22 turbofans. This total was 1,844 less than for fiscal year 1959—a 41 percent reduction—caused primarily by the planned decline in air-

Figure 17. Test models of SKYBOLT missiles.

craft production and decreased procurement of aircraft engine spares. Engine production exceeded 97 percent of scheduled output. The value of aircraft engines in the USAF inventory approximated $6.5 billion.

Air Materiel Command received $794.4 million for the purchase of communication and electronic equipment during the year. Procurement for the BMEWS program made satisfactory progress, and the curtailed purchasing program for SAGE progressed according to revised schedules.

Military Assistance Program

The close of fiscal year 1960 marked the completion of 11 years of the Military Assistance Program. USAF aid to friendly countries transformed obsolescent air arms into modern and efficient air forces, some of which received missiles as well as aircraft. Additionally, the program facilitated access to oversea bases, without which the Air Force would have less over-all flexibility in its worldwide operations.

Grant-aid and mutual security sales remained the major avenues of USAF military assistance. During the year 35 of the 37 countries eligible for grant-aid were receiving either equipment or training assistance. Discretionary use by the President of a determination clause in the Mutual Security Act enabled 12 of 16 additional eligible countries to obtain emergency grant-aid. Various international organizations, such as regional alliance groups and United Nations agencies, were also eligible for grant-aid assistance or were permitted to make mutual security military purchases.

Of the $8.5 billion programed in the USAF MAP operation during the last 11 years, $7.7 billion, or 91 percent, was expended. More than $4.6 billion (60 percent) of all grant-aid materials went to NATO countries, and an additional $293.2 million (3.8 percent) was furnished to non-NATO European nations. Some $153.5 million (2 percent) was provided to non-NATO Middle East recipients; over $1.5 billion (19.5 percent) was granted to countries in the Far East; and $143.7 million (1.9 percent) was received by Western Hemisphere nations. The remaining funds were expended on programs not specifically for a particular country.

Approximately $4.6 billion of the $7.7 billion expended in the USAF Military Assistance Program was for aircraft. About $2 billion went for other materiel, including missiles, and for support purposes. The balance of $1.1 billion represents services rendered, including training assistance.

By the end of June 1960, aircraft shipments numbered 13,329—97 percent of the aircraft programed for the 11-year period. About 9,500 of the total were jets. Allied air forces were equipped with 246

squadrons provided under the USAF MAP. Of the 190 jet units, 140 were designated combat ready—the highest level in MAP history. More than 40 of the 56 squadrons of conventional aircraft were also rated in this category. Approximately 1,034,500 hours were flown in MAP-supported aircraft during the fiscal year. Jet flying accounted for 69 percent of the total. As in the past, the bulk of the combat-ready jet squadrons represented NATO forces, but units in other areas also made substantial progress.

Training assistance provided MAP countries was directed toward the proper maintenance and utilization of equipment. Under grant-aid and mutual security military sales arrangements during the 11-year period, the Air Force trained 3,791 pilots in the United States and 6,654 other flying specialists here and abroad. More than 49,000 foreign nationals received technical training in USAF training courses.

IX. Logistical Services

During fiscal year 1960, as the first ICBMs entered the inventory, the Air Force instituted a reflex logistical system for missile bases. This automatic resupply system required shipment of replacement parts as soon as consumption data was received, without the need for formal requisitions.

The Air Force participated in the establishment of the NATO Maintenance Supply Service Agency, intended to provide member countries with centralized management of procurement, maintenance, and supply services and to furnish technical assistance in support of NATO equipment. The Secretary of Defense designated the Air Force to manage the operations of the new agency until July 1961, by which time it was expected to stand on its own feet.

USAF planners stressed the importance of incorporating realistic nuclear-damage factors in all logistical planning. The postattack condition of the military establishment and the national economy may well prove to be the final determinant in a general war. The Air Force considered it essential that our mobilization base be appraised in the light of what might actually be available and attainable after a nuclear exchange.

Supply and Services

The expanded use of electronic data-processing equipment, high-speed communication techniques, and an efficient airlift helped improve the USAF supply system and reduced the need for oversea depots. By the end of the year the Air Materiel Command in the United States had taken over almost completely the responsibility for oversea supply. Prior to their discontinuance, the two oversea depots at Chateauroux, France, and Tachikawa, Japan—were performing only residual functions. An unprecedented simultaneous count of supplies and equipment at all USAF facilities throughout the world furnished a test of the efficiency and capability of the USAF supply organization. This inventory provided data upon which to base distribution of current Air Force resources, as well as information to compute future requirements and budgets.

Developing a satisfactory supply system for missiles had to contend with such problems as extreme compression of development time and

early attainment of operational capability, both of them within a framework of rapid technological change. The MOCP (missile out of commission for parts) rate for the early ICBMs under the automatic supply system was encouraging, and the rate for the SM–75 THOR continued to improve. Progress was also made in the MOCP rate for the MACE TM–76A, and the MATADOR TM–61C continued to maintain an average MOCP rate of less than 1 percent.

The Air Force continued to reduce its expenditures for spare parts by programing procurement of initial spares for each weapon system individually. During the year 17 percent of the flyaway costs of aircraft went for initial spares as compared with 20 percent for the previous year. Fund shortages coupled with late or piecemeal fund releases, however, definitely impaired the orderly and economical replenishment of aircraft spares. To make the best use of available assets, a special distribution control plan assured support for the highest priority aircraft while avoiding the degradation of support for specific lower priority aircraft.

During the year, the Air Force declared as excess to its needs property originally costing $2.9 billion and succeeded in disposing of $2.8 billion or 95 percent of this material. Disposal of the $2.8 billion was accomplished as follows:

$237 million withdrawn and utilized by the Air Force (includes reclamation)

$105 million transferred to other Department of Defense and Federal Agencies

$98 million donated to Department of Health, Education, and Welfare and Service Educational Activities

$1,867 million expended to scrap

$497 million sold as usable property

$6 million other dispositions

From the sale of $497 million of surplus property, the Air Force realized a return of $27.6 million, or 5.5 percent of original value.

Revenue from the sale of 370,228 tons of scrap and waste amounted to $15.8 million. Although the number of tons of scrap and waste sold in fiscal year 1960 was 13,788 tons less than for the previous year, the revenue received was approximately $1.0 million greater. The higher prices resulted from better preparation and segregation of scrap and waste for sale.

The Air Force saved money 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 $286 million.

Maintenance

The USAF inventory in fiscal year 1960 contained approximately 23,000 aircraft and ground-launched missiles valued at $24.6 billion and 90,000 engines valued at approximately $4.7 billion. Each year the Air Force overhauls more than 3 million aircraft and missile components made up of 95,000 different items. Additionally, the Air Force has to maintain some 200,000 major electronic items—ranging from radios to the huge computers of the SAGE system.

The cost of depot maintenance and modification totaled slightly less than $1.1 billion during fiscal year 1960. A little more than half of this amount—approximately $543 million—was for depot maintenance and almost $514 million for modification projects. Depot maintenance and modification of aircraft alone—exclusive of missiles, communications, etc.—cost $685 million—$221 million for maintenance and $437 million for modification.

Despite difficulties in maintaining and modifying modern weapon systems, the Air Force kept its combat forces in a high state of readiness. The operational readiness rate of USAF fighters rose significantly, with nearly all fighter aircraft showing substantial gains. Difficulty with the bomb-navigation system made the F–105B—the newest fighter to enter the inventory—the one exception to this trend. In July 1959, MATS established for its fleet a new operational readiness objective of 70 percent, with individual objectives ranging between 65 to 75 percent. By June 30, 1960, all MATS transport aircraft had met the stipulated degree of operational efficiency.

A major maintenance problem, the presence of ice in the fuel of high-flying B–52 and KC–135 jet aircraft, was temporarily solved by installing fuel filters with bypass valves that allowed the fuel to circulate around any stoppage. The permanent remedy was the development of fuel heat exchangers to maintain fuel temperatures above 32°, and by the end of the year such heaters were placed on every B–52 and KC–135 engine in the inventory.

Transportation

Despite the closing of USAF oversea depots and the supply of oversea forces directly from the United States by air to a greater extent than ever before, the number of transport aircraft in the inventory was reduced according to plan during the year. This reduction—representing the deletion of older and less efficient aircraft—was offset by an increase in the number of C–133's, whose greater load-carrying capacity maintained the airlift capacity at approximately the same level.

The program to reduce petroleum transportation and storage costs through the use of commercial pipelines at USAF bases continued

to show good results during the year. Three more bases were connected to commercial facilities, raising to 21 the number of installations thus served. These pipelines saved an estimated $3.5 million in transportation costs per year and provided storage for 1,300,000 barrels of fuel free of charge to the Government. In addition to the commercial facilities, six bases were served by military pipelines.

United States and Canadian commercial carriers supplying the DEW line sites increased their services during the year. U.S. carriers provided supplies for the Alaskan facilities, while Canadian commercial firms provisioned all Canadian sites. The commercial operation resulted in savings of several million dollars as compared with the former military operation. Canadian carriers agreed to resupply the Newfoundland and Labrador sites in fiscal year 1961.

X. Management

Comptroller Service to Management

The comptroller organization continued to be a major instrument in the Air Force effort to attain maximum utilization of its financial, manpower, and materiel resources. In addition to the great improvement of recent years in speed and accuracy of reporting, accounting, and auditing, increased attention was given to techniques by which masses of data could be marshaled quickly for use in making decisions.

Management Analysis

The comptroller strengthened and improved procedures for analyzing management. A current status report, published monthly, presented concise statements of the major problems in each functional area of the Air Force, including the status of weapon and support systems in operational use or under development and the Air Staff action being taken in connection with each problem. In addition, USAF management analysts each month singled out one major mission or command of the Air Force for more intensive study. The results were presented directly to the top officers of the Air Staff as an objective picture of the command concerned, including plans, policies, status of resources, operational readiness, and major problems.

Electronic data-processing procedures were developed for forecasting the calendar age of aircraft in the USAF air fleet as an aid in evaluating the degree of modernization of USAF existing and programed forces. A greatly expanded version of the general force structure costing model provided various summations of funds appropriated for USAF programs and forecast obligations and expenditures for any program year. Better integrated data systems permitted information produced in one program to be used in preparing related programs, thereby improving consistency among the many different elements of programs and plans. Further progress also occurred in the direct integration of electronic data processing between Headquarters USAF and AMC.

Financial Management

The Air Force continued efforts to simplify and increase the effectiveness of its accounting system and to implement the provisions of Title IV of the National Security Act and Public Law 863 of 1956. During fiscal year 1960, studies were in progress in the following accounting areas: Budget accounts, air attaché office, inventory (monetary), central procurement, expense and costs, military assistance program, report-of-survey processing, and stock fund. Publication of the new accounting and finance manual series concluded staff action to integrate the accounting and finance functions. The uniform systems described for the commands in these manuals have already brought about increased efficiency and considerable manpower savings.

More than 10,000 individual audit reports were issued during the year to major air commanders, base commanders, or tenant unit commanders. Twenty-one reports of a broader type summarized audit findings at depots and installations. Covering appropriated, nonappropriated, materiel, and stock funds, they contained recommendations designed to promote economy and efficiency through improved management. Auditor advisory assistance during the worldwide inventory of Air Force materiel—project COUNT—helped produce more accurate data for use in computing materiel requirements and in budgeting.

The audit workload increased greatly because of the requirement for contract auditors to participate in the review and evaluation of contractor estimates of future costs presented in support of price proposals. Since it was impossible to cope with this situation without seriously weakening the effort expended in auditing contractor historical costs, a special USAF study group recommended the allocation of 266 additional positions to the Auditor General.

Contract Financing

Air Force financing of defense production gave special attention to job accomplishment with minimum financial risk. Progress payments at a level of about $900 million for the fiscal year continued to serve as a principal means of financial assistance. No losses were experienced in fiscal year 1960.

A second method of assistance, commercial bank loans under guarantee by the Air Force in the "V-loan" program, involved about $200 million this year and about $1.5 billion for the past decade. During fiscal year 1960 the first loss, amounting to $27,000, was incurred. It was easily covered from a reserve fund of $13 million which has been

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built up from the Air Force share of the banks' interest and committed fees on guaranteed loans.

Advance payments, the third type of financing, are providing 21 universities and other nonprofit research organizations with a means of carrying out research and development contracts.

Inspector General Activities

During fiscal year 1960 the Inspector General discharged his traditional surveillance function through searching inspections to determine the general efficiency, economy, and adequacy of Air Force operations. The Inspector General also carried out his recently expanded responsibilities for aircraft, missile, nuclear, and ground safety activities.

Inspection

An over-all inspection of SAC, including the entire operational and logistic mission area, was conducted in the fall of 1959 with results that warranted application of the same concept to other mission areas. Inspection of the missile effort, begun in 1956, was refined by 1959 to enable it to keep pace with operational progress. Other important inspections were made into officer and airman personnel quality-control measures taken by Headquarters USAF and by major commands. In all, during the year, the Inspector General carried out 122 full-scale surveys, inspections, and special investigations. Corrective measures taken as a result of them improved combat effectiveness, saved men, or saved money.

Safety

Fiscal year 1960 was the first year during which all USAF safety functions operated under a Deputy Inspector General for Safety. This change gave greater emphasis to the new safety problems arising as the Air Force moved into the missile-nuclear weapon era.

Accident prevention begins with the initial design of a weapon system and continues until it is phased out of the USAF inventory. Operational safety surveys, accident investigations, and safety education programs are the primary tools in the safety program. Safety surveys were the most effective means of preventing accidents. Teams of safety specialists visited USAF units throughout the world to identify every possible hazard to the safe maintenance and operation of a weapon system. The teams provided the commanders with reports requiring corrective action, to be followed up by checks to see that the hazards were eliminated.

Every major aircraft accident was considered a failure in preventive effort. Each accident was followed by a detailed investigation to identify the cause, by prompt corrective measures, and by review to insure that the measures were effective.

The number and rate of major aircraft accidents, as well as the number of fatalities, decreased. For fiscal year 1960 the major accident rate was 6.5 per 100,000 flying hours, a new alltime low, as compared with 9.7 for 1959. Of the 510 major accidents, 144 were fatal, as against 817 major accidents, including 222 fatal ones, during the preceding year. Aircraft accident fatalities dropped from 532 to 290 from 1959 to 1960, or 45 percent, and destroyed aircraft declined from

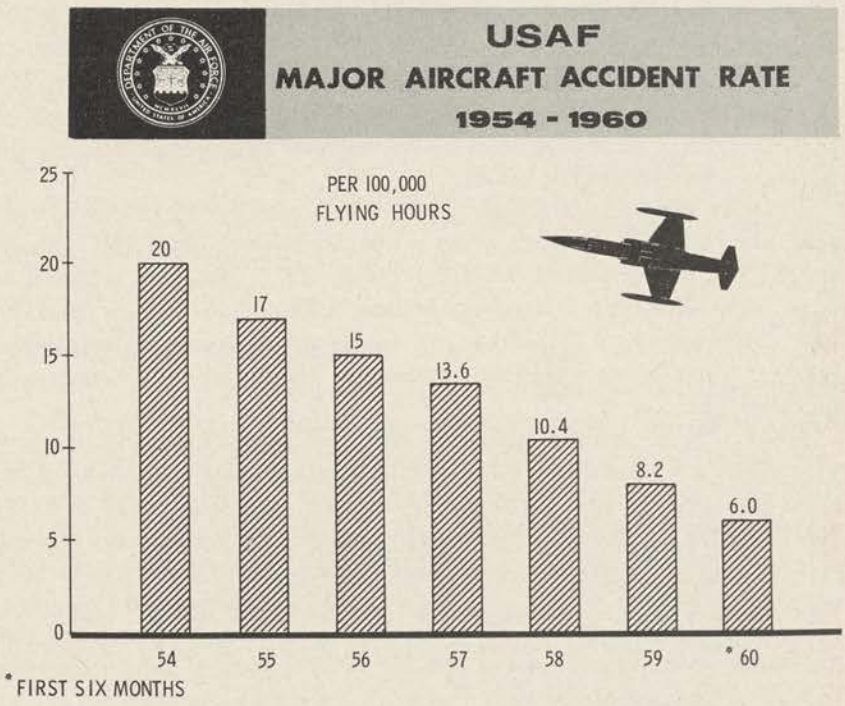


Figure 18

541 to 356. The drop in the major accident rate embraced all types of aircraft except utility and helicopter, with the most noticeable improvement in bomber and trainer types.

Operational missiles were still undergoing certain phases of development. These presented special safety problems because maintenance and service personnel were not completely familiar with them. Despite special measures taken by joint missile-nuclear safety teams

which surveyed each new missile unit during the first month following activation, missile accidents increased during the year. Operational safety surveys stressing missile safety were undertaken to correct this trend.

Nuclear safety represented a growing problem to the Air Force. All nuclear weapon installations were subjected to preoperational surveys by the Inspector General to insure that safety rules were being incorporated in their operational procedures. The Inspector General conducted postcompletion surveys to check compliance and adequacy.

These most rigorous safety measures were subject to the close monitoring of USAF nuclear safety policies and programs by the Directorate of Nuclear Safety Research, based at Kirtland AFB, N. Mex. In addition, a separate group, including representatives from USAF commands, the Defense Atomic Support Agency, and the Atomic Energy Commission gave special attention to the application of nuclear safety policies at the earliest stage practicable in the development of a weapon system.

A major accident involving nuclear weapons during the fiscal year took place on June 7 1960, when a nuclear-tipped BOMARC missile caught fire on its pad at McGuire AFB, N.J. The fire, believed to have been caused by a bursting helium bottle, provided an excellent test of the adequacy of USAF provisions and procedures for nuclear safety. Prompt and vigorous measures were taken and there were no casualties.

Total USAF ground accidents dropped 11 percent during fiscal year 1960 to a record low of 15,800, and dollar losses were down more than $2 million, or 7 percent. Although the number of military fatalities from ground accidents decreased from 611 to 601, the fatality rate per 100,000 man-days edged slightly upward, as did the fatality rate for civilians. USAF motor vehicle accidents dropped 9 percent in number and 11 percent in rate during the year. For the tenth consecutive year the success of the Air Force's ground safety program brought it the National Safety Council's Award of Honor.

Security

To guard against sabotage the Air Force emphasized the more effective use of air police, extensive use of sentry dogs, improved ground communication equipment, and development of criteria for secure construction. Staff visits to the commands identified areas for further guidance and gave the commander an evaluation of the work of his provost marshal.

In addition to the routine counterintelligence investigations identifying potential or actual espionage agents and security risks, the Directorate of Special Investigations made a special effort against enemy penetration by clandestine listening devices. Security studies also resulted in significant changes in procedures for the procurement of personnel. During fiscal year 1960 more than 315,000 personnel investigations were initiated, principally in connection with granting access to classified information, and the improved procedures permitted more expeditious action. All allegations of violations of public trust, irregularities connected with the procurement and disposal of USAF materiel, and major criminal actions were thoroughly investigated and called to the attention of commanders for necessary action.

The Air Force has achieved national recognition for the management of natural resources on its installations by provost marshals. The USAF fish and wildlife conservation program has been applied with enthusiasm by the major commands, and a close liaison with national and State conservation officials has been maintained. During the past fiscal year a wildlife management plan was completed for the Air Force Academy grounds in cooperation with the U.S. Fish and Wildlife Service and the Colorado Fish and Game Department.

Administrative Management

The Air Force reduced its record holdings and saved storage space and equipment by changing the retention period of procurement records from 6 to 3 years after final payment. The destruction of 37,000 cubic feet of World War II contract records stored at Wright-Patterson AFB, Ohio, released prime warehousing space valued at $96,000 in annual rental fees. Further savings in space and equipment resulted from a reduction of records in current files by 75,000 cubic feet. Transfer of the Air Force Records Center, St. Louis, Mo., to the General Services Administration on July 1, 1960, relieved the Air Force of an annual budgetary responsibility of $850,000 for a function that made no direct contribution to national defense.

The Air Force further improved its postal systems. Manpower savings resulted when the Post Office Department assumed responsibility for postal operations in Hawaii, Guam, Puerto Rico, and at the three main bases in Alaska.

The entire management of USAF publications came under critical examination. The examination sought to reduce the number of pub-

lications, the frequency of revisions, and the quantity of personnel, facilities, and costs involved, as well as to identify and delete items that might subject the Air Force to censure or ridicule. The revised regulations established controls and safeguards to insure that each is carefully reviewed and approved at high level before publication.

XI. Budget

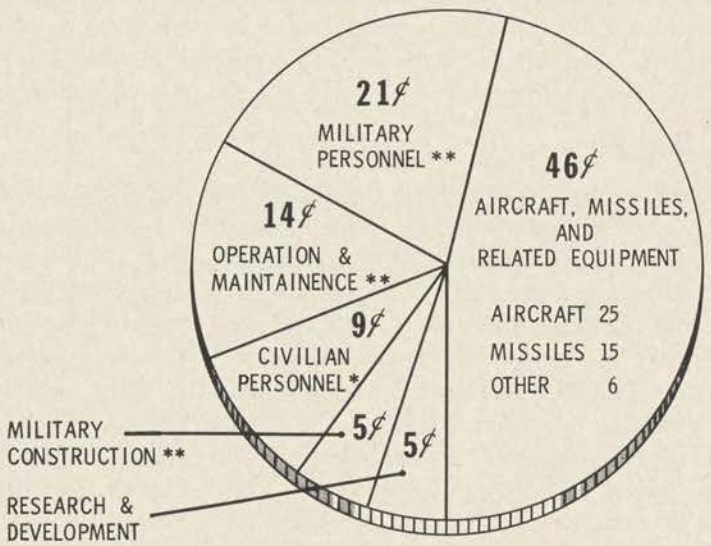
Air Force expenditures during the fiscal years 1955–60 ranged between $16 billion and $19 billion annually. Despite these substantial expenditures, the problems of making ends meet have intensified. Weapons and technical equipment have become more complex, and therefore, more costly. The personnel to operate and maintain them are harder to find, and when procured, need more training to discharge their duties. The Air Force has been squeezed between the unyielding national defense responsibility and the greater cost of discharging it.

1960 Budget

The 1960 budget itself reflects a changing emphasis to guided missile weapon systems upon which, in a few years, will rest the major burden for our national security. The Air Force budget request for fiscal year 1960 totaled $18.682 billion in new obligational authority, including $915 million for military construction. Congress appropriated more funds for certain items than requested, including $85 million for ATLAS and $87 million for MINUTEMAN. But these increases were more than offset by cutbacks in the MACE, BOMARC, and radar improvement programs, among others. The amount initially appropriated by Congress for fiscal year 1960 was $18.270 billion, or $412 million below the Presidential budget.

In April 1960, Congress appropriated $6 million in supplemental funds. With $18.276 billion in new obligational authority, approximately $3.614 billion in unobligated funds from previous years, anticipated reimbursements of $1.095 billion, and fund transfers—particularly of the space program from ARPA—the Air Force had $23.259 billion available for obligation in fiscal year 1960, as compared with $23.858 billion available for obligation in fiscal year 1959. The

HOW THE AF DOLLAR WAS SPENT



* INCLUDES DIRECT HIRE AND CONTRACT PERSONNEL

** INCLUDES RESERVE AND AIR NATIONAL GUARD COSTS

Figure 19

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 1960 as of June 30, 1960

	In millions
Department of Defense Appropriation Act, 1960, PL 86–166	$17,472.7
Military Construction Appropriation Act, 1960, PL 86–275	797.3
Second Supplemental Appropriation Act, 1960, PL 86–424	[a] 6.0
Total new obligational authority enacted	[b] 18,276.0
Unobligated balance of prior-year programs	3,614.0
Transfer from AF Stock Fund to Military Personnel, AF	50.0
Transfer from O&M, AF to O&M, Army	—1.1
Transfer from ARPA and DOD to R, D, T, and E	326.0
Transfer from ARPA to Military Construction, AF	7.0
Transfer from Missile Procurement to ARPA	—75.0
Transfer from Aircraft, Missiles, and Related Proc to DOD	—33.0
Anticipated reimbursements	1,095.1
Total available for obligation during fiscal year 1960	[b] 23,259.0

[a] For Military personnel.
[b] Represents nearest rounded figure.

Actual obligations for fiscal year 1960 amounted to $18.353 billion. Net expenditures came to $19.066 billion, a slight decrease from $19.084 billion in fiscal year 1959. The following table summarizes both accounts under principal fund categories:

USAF Actual Obligations and Net Expenditures for Fiscal Year 1960

Appropriation	*(In millions)* Actual Obligation	Net Expenditure
Military Personnel	$3,993.5	$3,856.5
Reserve Personnel	51.3	51.2
National Guard Personnel	47.9	40.6
Air National Guard (FY 1958 & 1959)	----------	2.9
O&M, AF	4,430.2	4,116.4
O&M, ANG	168.2	180.2
Aircraft Procurement	3,095.4	560.3
Missile Procurement	2,432.2	1,149.7
Other Procurement	797.2	175.6
Aircraft, Missiles, and Related Proc	602.9	5,317.8
Procurement O/T Aircraft	437.2	1,559.2
R, D, T, & E	1,480.5	1,089.3
Military Construction, AF	802.5	999.1
Military Construction, AF Reserve	2.6	.2
Military Construction, ANG	11.5	12.3
Miscellaneous	----------	—45.3
Total	*18,353.1	*19,066.2

*Represents nearest rounded figure.

1961 Budget

The President's revised Air Force budget for fiscal year 1961 totaled $17.579 billion, including $740 million for military construction. Expenditures were estimated at $18.614 billion. Congress appropriated $17.785 billion—an increase of $206 million over the President's budget. Additional appropriation transfers amounting to approximately $25 million boosted the new obligating authority for fiscal year 1961 to $17.791 billion.

The appropriation act made changes in the Presidential request. All major procurement appropriations received a 3 percent "across the board" decrease totaling $218 million. Military construction funds were decreased by $113 million and the BOMARC program by $50 million. At the same time $190 million added to the B–70 program brought appropriations for this Mach 3 bomber to $265 million, enabling the Air Force to plan full development of the airframe. An additional $100 million was to be made available if not used for fighter-interceptor procurement. The airborne alert program received an extra $85 million, and an additional $83.8 million was provided for the SAMOS, DISCOVERER, and MIDAS programs and the MINUTEMAN mobility program.

New budget structures were established for the Aircraft, Missile, and Other Procurement appropriations effective July 1, 1960. Budget accounts for Aircraft and Missile appropriations were made directly identifiable with the individual weapon systems, thereby making it possible to associate all procurement costs with the appropriate weapon system. Budget accounts for Other Procurement identify by support systems the equipment and materials procured for support of the various weapon systems. These new budget structures will provide improved financial reporting, permit better estimating and forecasting of financial requirements, and improve management of major procurement appropriations.

XII. Conclusion

Strong as it is, the Air Force has not reached a plateau. We are in an endless cycle of research, development, refinement, and test. From a military standpoint, science and technology must continue their rapid advance as fast as our very best efforts and money can expedite them.

Our haste must be deliberate, in a sense. Picking the right weapon system to invest money in is a most difficult and responsible task. Our success in it, however, will determine our future effectiveness.

There are no positive indications that the problems we face with respect to the continuing belligerence and obstructionism of the Communist bloc can be marked "solved" at any time in the foreseeable future. Whether it is called "cold war," "economic war," "psychological war," or "ideological war"—the basic task before us is still to prevent it from becoming a shooting war.

The proportion of manned vehicles and missiles in our force depends on the nature of the threat and the means at our disposal to meet that threat. The proportion will change as circumstances warrant. For one thing, we are reaching out toward the B–70 cycle of strategic bombers, which represents a major breakthrough in aerodynamic design and which offers an enormous growth potential. But this is by no means the end of the line for manned systems. Man has always been and will continue to be the essential element of any weapon system.

In the direction of controlled aerospace flight the X–15 and follow-on Dyna-Soar programs are even more advanced moves. It is a reflection of the speed at which new concepts are being developed in this technological age that serious Air Force thought is being given to aerospace systems that can orbit, reenter, and operate in the atmosphere and return to an orbital path at the will of the pilot. There is much research to be conducted before such concepts can become Air Force programs, but efforts are definitely aimed in that direction.

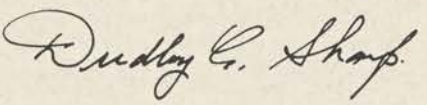
We have reached the end of an era. Eight years ago, on June 30, 1952, the Air Force was composed of 95 wings. The organization was then in the midst of an expansion and modernization program designed to cope with the operational problems posed by the Korean

war. In June 1952, it was announced that the United States planned to test a "true super bomb" with the fantastic explosive power equivalent to 2,000,000 tons of TNT, and the word "megaton" made its first impact upon the public consciousness.

Eight years later, the Air Force has come back to almost the identical numerical strength we had in 1952, but there is a tremendous improvement in the quality of this strength. These years have brought new and revolutionary technological advances. Breakthroughs in the scientific and industrial processes have been accomplished. The military application of this knowledge has compressed time, distance, and destruction into compact, lethal packages which can reach even the remote areas of the world. We have transitioned from piston engines to jets, from visual operations to radar, from machine guns to rockets, from piloted aircraft to guided missiles, and from conventional explosives to nuclear warheads of varying sizes and yields.

The continuing gravity of the international situation coupled with the technical advances behind the Iron Curtain provide concrete evidence that the United States must continue to invest a substantial portion of its national resources to maintain and even improve our military security.

With no less resolution than we faced our problems at the beginning of this era just passed, we must look to the job ahead. Everything points to the fact that this Nation must be preeminent in aerospace if free world security is to be guaranteed. This places an awesome responsibility on the Air Force. Our staff and commanders are, as they have been over the years, deeply aware of this. They are dedicated to one forthright purpose—America's national security.



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 1960

[Thousands of dollars]

Appropriation title	Amounts available for obligation fiscal year 1960								Total obligation for fiscal year 1960	Unobligated balance as of 30 June 1960				
	Unobligated balance brought forward 1 July 1959	New obligational availability			Other transfers	Reimbursements	Recoveries of prior year obligations	Total fiscal year 1960		Balance apportionment and funds otherwise available	Reserves	Other unobligated balance	Total preclosing balance	Unobligated balance available in fiscal year 1961
		Congressional appropriations	Transfers	Total										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
MILITARY PERSONNEL:														
Military Personnel, Army		3,233,063	252,125	3,485,188		171,236		3,656,424	3,640,913	8,497	6,577	437	15,511	
Military Personnel, Navy		2,476,700	75,000	2,551,700		26,361		2,578,061	2,575,639	8,361		−5,939	2,421	
Military Personnel, Marine Corps	51	620,600	12,000	632,600		7,301		639,952	604,684	1,759	32,700	809	35,268	5
Military Personnel, Air Force		3,918,000	50,000	3,968,000		28,399		3,996,399	3,993,455	2,944			2,944	
Reserve Personnel, Army		231,700	−4,000	227,700		741		228,441	221,532	2,287	4,881	−259	6,910	
Reserve Personnel, Navy		88,000	−3,000	85,000		3		85,003	83,968	1,045		−10	1,035	
Reserve Personnel, Marine Corps		24,300		24,300		277		24,577	24,343	336		−102	234	
Reserve Personnel, Air Force		54,000		54,000		47		54,047	51,337	1,998	1,465	−753	2,710	
National Guard Personnel, Army		234,961		234,961		1,191		236,152	232,266	2,035	1,500	351	3,886	
National Guard Personnel, Air Force		48,000		48,000		135		48,135	47,890	246		−1	245	
Retired Pay, Department of Defense		715,000		715,000				715,000	692,922	9,078	13,000		22,078	
TOTAL—MILITARY PERSONNEL	51	11,644,324	382,125	12,026,449		235,691		12,262,191	12,168,949	38,586	60,123	−5,467	93,242	5

See footnotes at end of table.

TABLE 1. OBLIGATIONS AND OBLIGATIONAL AVAILABILITY OF CURRENT GENERAL AND SPECIAL FUND APPROPRIATIONS, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for obligation fiscal year 1960								Total obligation for fiscal year 1960	Unobligated balance as of 30 June 1960				
	Unobligated balance brought forward 1 July 1959	New obligational availability			Other transfers	Reimbursements	Recoveries of prior year obligations	Total fiscal year 1960		Balance apportionment and funds otherwise available	Reserves	Other unobligated balance	Total preclosing balance	Unobligated balance available in fiscal year 1961
		Congressional appropriations	Transfers	Total										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OPERATION AND MAINTENANCE:														
Operation and Maintenance, Army	119,217	3,075,390	206	3,075,596	.....	436,507	.....	3,631,320	3,535,115	18,083	66,816	11,307	96,205	74,243
Operation and Maintenance, Navy	[a] 16,413	2,611,220	−610	2,610,610	.....	180,461	.....	2,807,484	2,761,191	42,157	6,210	−2,074	46,293	16,919
Operation and Maintenance, Marine Corps [b]	7,517	175,850	.....	175,850	.....	17,261	.....	200,627	190,117	2,525	4,500	3,485	10,511	4,366
Operation and Maintenance, Air Force	4,603	4,195,006	−1,074	4,193,932	.....	283,463	.....	4,481,998	4,430,249	34,976	41,000	−24,226	51,749	4,755
Operation and Maintenance, Army National Guard	.....	151,700	.....	151,700	.....	198	.....	151,898	150,964	796	.....	138	933	.....
Operation and Maintenance, Air National Guard	.....	169,000	.....	169,000	.....	333	.....	169,333	168,232	768	.....	333	1,102	.....
Promotion of Rifle Practice, Army	.....	300	.....	300	.....	.....	.....	300	298	2	.....	.....	2	.....
Operation and Maintenance, Alaska Communication System, Army	621	5,676	695	6,371	.....	4	.....	6,996	6,923	21	22	30	73	.....
Salaries and Expenses, Secretary of Defense	.....	20,500	.....	20,500	.....	.....	.....	20,500	20,454	46	.....	.....	46	.....
Claims, Department of Defense	.....	16,500	.....	16,500	.....	.....	.....	16,500	16,382	118	.....	.....	118	.....

Contingencies, Department of Defense		15,000		15,000				15,000	1,818	3,182	10,000		13,182	
Operation and Maintenance, Olympic Winter Games, Department of Defense		800		800				800	800					
Salaries and Expenses, Court of Military Appeals, Department of Defense		425		425				425	401	24			24	
Appropriated Receipts, Alaska Communication System, 1960		695	−695											
TOTAL—OPERATION AND MAINTENANCE	**148,370**	**10,438,062**	**−1,478**	**10,436,584**		**918,226**		**11,503,181**	**11,282,941**	**102,699**	**128,548**	**−11,007**	**220,240**	**100,282**
PROCUREMENT:														
Procurement of Equipment and Missiles, Army	503,535	1,407,300		1,407,300	−10,000	539,264		2,440,099	1,790,870	299,266	217,280	132,683	649,229	649,229
Aircraft and Related Procurement, Navy	1,444,259	1,961,644		1,961,644		−120	105,326	3,511,109	2,084,342	916,899	492,344	17,525	1,426,767	1,426,767
Shipbuilding and Conversion, Navy	1,100,634	1,330,700		1,330,700		49,191		2,480,525	1,674,709	264,791	532,060	8,964	805,815	805,815
Procurement of Ordnance and Ammunition, Navy	81,512	567,719	15,500	583,219	−4,433	62,277		722,576	616,759	67,292	33,946	4,578	105,816	105,816
Procurement, Marine Corps	157,220	133,850		133,850		−448		290,622	173,698	63,487	53,342	95	116,924	116,924
Aircraft Procurement, Air Force		4,284,600		4,284,600		369,272		4,653,872	3,095,431	844,569	1,042,683	−328,811	1,558,441	1,558,441
Missile Procurement, Air Force		2,540,550	−75,000	2,465,550	127,450	217,454		2,810,454	2,432,152	197,348	26,000	154,954	378,302	378,302
Other Procurement, Air Force		1,109,650		1,109,650		87,524		1,197,174	797,236	319,064	55,751	25,122	399,938	399,938
Aircraft, Missiles and Related Procurement, Air Force	2,182,323				−172,325	12,937		2,022,935	602,861	767,752	148,422	503,900	1,420,074	1,420,074
Procurement other than Aircraft and Missiles, Air Force	707,675					−39,231		668,445	437,181	229,750		1,514	231,264	231,264
TOTAL—PROCUREMENT	**6,177,158**	**13,336,013**	**−59,500**	**13,276,513**	**−59,308**	**1,298,121**	**105,326**	**20,797,810**	**13,705,240**	**3,970,218**	**2,661,829**	**520,524**	**7,092,570**	**7,092,570**
RESEARCH, DEVELOPMENT, TEST AND EVALUATION:														
Research, Development, Test and Evaluation, Army	57,442	1,035,715	38,413	1,074,128	10,000	4,068	4,051	1,149,689	1,048,239	98,192	5,561	−2,303	101,450	101,450
Research, Development, Test and Evaluation, Navy	44,975	1,015,920	50,604	1,066,524	4,433	26,831		1,142,764	1,059,905	82,982		−123	82,859	82,859

See footnotes at end of table.

TABLE 1. OBLIGATIONS AND OBLIGATIONAL AVAILABILITY OF CURRENT GENERAL AND SPECIAL FUND APPROPRIATIONS, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for obligation fiscal year 1960								Total obligation for fiscal year 1960	Unobligated balance as of 30 June 1960				
	Unobligated balance brought forward 1 July 1959	New obligational availability			Other transfers	Reimbursements	Recoveries of prior year obligations	Total fiscal year 1960		Balance apportionment and funds otherwise available	Reserves	Other unobligated balance	Total preclosing balance	Unobligated balance available in fiscal year 1961
		Congressional appropriations	Transfers	Total										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
RESEARCH, DEVELOPMENT, TEST AND EVALUATION—Continued														
Research, Development, Test and Evaluation, Air Force	85,532	1,159,900	288,950	1,448,850	48,875	130,903	.....	1,714,160	1,480,509	174,428	59,700	−477	233,651	233,651
Salaries and Expenses, Advanced Research Projects Agency, Department of Defense	112,146	455,000	−125,380	329,620	−4,000	800	.....	438,566	315,825	87,741	10,000	25,000	122,741	122,741
Emergency Fund, Department of Defense	.....	150,000	−144,712	5,288	.....	.....	.....	5,288	.....	5,288	.....	.....	5,288	.....
TOTAL—RESEARCH, DEVELOPMENT, TEST & EVALUATION	**300,095**	**3,816,535**	**107,875**	**3,924,410**	**59,308**	**162,602**	**4,051**	**4,450,467**	**3,904,478**	**448,631**	**75,261**	**22,097**	**545,988**	**540,700**
MILITARY CONSTRUCTION:														
Military Construction, Army	105,064	263,632	.....	263,632	.....	2,238	.....	370,934	232,489	125,183	20,508	−7,246	138,445	138,445
Military Construction, Navy	109,685	204,112	.....	204,112	.....	7,908	4,000	325,705	237,240	87,558	.....	908	88,466	88,466
Military Construction, Air Force	633,895	776,833	7,000	783,833	.....	3,845	.....	1,421,572	802,458	546,632	81,311	−8,830	619,114	619,114

Military Construction, Advanced Research Projects Agency, Department of Defense	15,968	23,545	−7,000	16,545				32,513	13,150	3,920	15,443		19,363	19,363
Military Construction, Army Reserve	12,066	20,000		20,000	−6,961	13		25,118	15,935	8,944	228	11	9,183	9,183
Military Construction, Naval Reserve	9,645	8,980		8,980		3		18,628	9,139	6,920	2,568		9,489	9,489
Military Construction, Air Force Reserve		4,000		4,000		(*)		4,000	2,637	1,363		(*)	1,363	1,363
Military Construction, Army National Guard		23,219		23,219	6,961			30,180	16,629	1,404	12,147		13,551	13,551
Military Construction, Air National Guard		16,440		16,440	[c] 44			16,484	11,455	4,986		44	5,030	5,030
Loran Stations, Department of Defense		23,200		23,200				23,200	23,200					
Construction, Alaska Communication System, Army	615							615	157	21	436	(*)	458	458
TOTAL—CONSTRUCTION	**886,937**	**1,363,961**		**1,363,961**	**44**	**14,006**	**4,000**	**2,268,949**	**1,364,489**	**786,930**	**132,642**	**−15,112**	**904,460**	**904,460**
TOTAL—DEPARTMENT OF DEFENSE	**7,512,611**	**40,598,895**	**429,022**	**41,027,918**	**44**	**2,628,646**	**113,378**	**51,282,597**	**42,426,097**	**5,347,064**	**2,998,403**	**511,034**	**8,856,501**	**8,638,018**
RECAPITULATION BY SERVICE:														
Department of the Army	798,559	9,683,351	286,744	9,970,096		1,155,459	4,051	11,928,165	10,892,329	564,731	335,955	135,150	1,035,836	986,559
Department of the Navy	2,971,911	11,219,595	149,494	11,369,089		377,305	109,326	14,827,632	12,095,736	1,546,110	1,157,672	28,115	2,731,897	2,657,425
Department of the Air Force	3,614,028	18,275,979	269,876	18,545,855	4,044	1,095,082		23,259,009	18,353,082	3,126,824	1,456,333	322,769	4,905,926	4,851,931
Office of the Secretary of Defense	128,113	1,419,970	−277,092	1,142,878	−4,000	800		1,267,791	1,084,950	109,398	48,443	25,000	182,841	142,104

SOURCE: DD Form 1176

NOTE: Amounts will not necessarily add to totals due to rounding.

*Less than $500.

[a] Comprised of anticipated reimbursements formerly carried under the following accounts:

Navy Personnel, General Expenses	$3,175 thousand
Aircraft and Facilities, Navy	1,467 thousand
Ships and Facilities, Navy	8,098 thousand
Civil Engineering, Navy	3,374 thousand
Service-Wide Supply and Finance, Navy	299 thousand

[b] Formerly "Marine Corps Troops and Facilities."

[c] Represents restoration from the appropriation "Air National Guard, 1959" to cover upward adjustments in unpaid obligations transferred from that account pursuant to Public Law 86-275.

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE

FISCAL YEAR 1960

[Thousands of dollars]

Appropriation title	Amounts available for expenditure, fiscal year 1960						Total expenditures for fiscal year 1960	Preclosing unexpended balance 30 June 1960	Unobligated balance withdrawn (−) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961 [a]
	Unexpended balance carried into fiscal year 1960	New obligational availability			Other transfers	Total fiscal year 1960					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
MILITARY PERSONNEL:											
Military Personnel, Army	226,878	3,233,063	252,125	3,485,188	.....	3,712,066	3,414,052	298,014	−23,044	274,970	300,280
Military Personnel, Navy	47,279	2,476,700	75,000	2,551,700	.....	2,598,979	2,523,074	75,905	+11,276	87,182	87,182
Military Personnel, Marine Corps	23,471	620,600	12,000	632,600	.....	656,071	596,098	59,973	−38,195	21,778	23,481
Military Personnel, Air Force	55,180	3,918,000	50,000	3,968,000	.....	4,023,180	3,856,522	166,658	−7,046	159,612	218,516
Reserve Personnel, Army	35,502	231,700	−4,000	227,700	.....	263,202	220,109	43,092	−7,122	35,971	35,971
Reserve Personnel, Navy	16,053	88,000	−3,000	85,000	.....	101,053	82,334	18,719	−1,349	17,370	17,370
Reserve Personnel, Marine Corps	3,279	24,300	.....	24,300	.....	27,580	24,363	3,217	+97	3,314	3,333
Reserve Personnel, Air Force	6,577	54,000	.....	54,000	.....	60,577	51,190	9,387	−3,414	5,973	5,980
National Guard Personnel, Army	56,986	234,961	.....	234,961	−19,089	272,858	232,291	40,567	−3,841	36,726	36,726
National Guard Personnel, Air Force	53,700	48,000	.....	48,000	−49,443	52,257	43,502	8,755	−947	7,808	8,011
Retired Pay, Department of Defense	10,614	715,000	.....	715,000	.....	725,614	694,241	31,373	−22,085	9,289	9,289
Total—Reported on DD Form 1176	535,519	11,644,324	382,125	12,026,449	−68,532	12,493,437	11,737,775	755,662	−95,669	659,992	746,138
Adjustment to Monthly Treasury Statement and Annual Combined Statement	.....	.....	−430,000	−430,000	430,000	.....	.....	.....	.....	.....	.....
TOTAL—MILITARY PERSONNEL	**535,159**	**11,644,324**	**−47,875**	**11,596,449**	**361,468**	**12,493,437**	**11,737,775**	**755,662**	**−95,669**	**659,992**	

OPERATION AND MAINTENANCE:											
Operation and maintenance, Army	727,165	3,075,390	206	3,075,596	−15,000	3,787,761	3,093,356	694,405	−62,719	631,686	778,242
Operation and Maintenance, Navy		2,611,220	−610	2,610,610		2,610,610	2,137,740	472,870	−29,374	443,496	499,939
Aircraft and Facilities, Navy	238,122					238,122	172,860	65,261	−11,474	53,787	53,991
Civil Engineering, Navy	27,132					27,132	24,275	2,857	−687	2,170	2,399
Medical Care, Navy	7,752					7,752	7,717	35	+569	603	9,200
Navy Petroleum Reserve	282					282	286	−4	+4		
Navy Personnel, General Expenses	11,208					11,208	10,372	836	−200	636	860
Ordnance and Facilities, Navy	52,343					52,343	33,657	18,686	−998	17,688	17,743
Service-Wide Operations, Navy	29,477					29,477	22,706	6,771	+1,765	8,537	8,564
Service-Wide Supply and Finance, Navy	21,350					21,350	20,004	1,346	(*)	1,346	1,397
Ships and Facilities, Navy	199,783					199,783	161,756	38,027	−3,810	34,217	35,229
Operation and Maintenance, Marine Corps [b]	35,685	175,850		175,850		211,535	168,658	42,877	−12,296	30,581	39,164
Operation and Maintenance, Air Force	907,613	4,195,006	−1,074	4,193,932	−15,000	5,086,545	4,116,396	970,149	−105,291	864,858	908,314
Operation and Maintenance, Army National Guard		151,700		151,700	19,089	170,789	148,657	22,132	−1,563	20,568	20,568
Operation and Maintenance, Air National Guard	929	169,000		169,000	30,835	200,765	180,202	20,562	−2,113	18,450	18,583
National Board for Promotion of Rifle Practice, Army	111	300		300		411	333	78	−9	69	69
Operation and Maintenance, Alaska Communication System, Army	1,256	5,676	695	6,371		7,627	5,730	1,896	−220	1,677	1,677
Appropriated Receipts, Alaska Communication System, Army		695	−695								
Salaries and Expenses, Secretary of Defense	3,426	20,500		20,500	3	23,929	19,636	4,293	−210	4,083	4,083
Claims, Department of Defense	769	16,500		16,500		17,269	15,879	1,390	−207	1,183	1,183
Contingencies, Department of Defense	197	15,000		15,000		15,197	104	15,093	−13,223	1,870	1,870
Operation and Maintenance, Olympic Winter Games, DOD		800		800		800	505	295		295	295
Salaries and Expenses, Court of Military Appeals, DOD	32	425		425		457	385	73	−27	46	46
Office of Public Affairs, Salaries and Expenses	57				−3	55	50	5	−4	1	1
Preparation for Sale or Salvage of Military Property, Army	244	−151 [c]		−151		93	59	34		34	34

See footnotes at end of table.

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for expenditure, fiscal year 1960						Total expenditures for fiscal year 1960	Preclosing unexpended balance 30 June 1960	Unobligated balance withdrawn (−) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961 [a]
	Unexpended balance carried into fiscal year 1960	New obligational availability			Other transfers	Total fiscal year 1960					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OPERATION AND MAINTENANCE—Continued											
Preparation for Sale or Salvage of Military Property, Navy	9	−1 [c]		−1		9	*	9		9	9
Preparation for Sale or Salvage of Military Property, Air Force	675	−165 [c]		−165		511	19	492		492	492
Miscellaneous Expired Accounts, Army [d]	989					989	1,467	−477	+855	377	377
Miscellaneous Expired Accounts, Navy [e]	5,890					5,890	1,491	4,399	−1,655	2,744	2,744
Miscellaneous Expired Accounts, Air Force [f]	15					15	1	13	−13		
Miscellaneous Expired Accounts, OSD [g]							1	−1	1		
Total—Reported on DD Form 1176	2,272,511	10,437,746	−1,478	10,436,269	19,924	12,728,704	10,344,303	2,384,401	−242,899	2,141,502	2,407,072
Adjustment to Monthly Treasury Statement and Annual Combined Statement		316		316	30,000	30,316		30,316	−30,316		
TOTAL—OPERATION AND MAINTENANCE	**2,272,511**	**10,438,062**	**−1,478**	**10,436,584**	**49,924**	**12,759,020**	**10,344,303**	**2,414,716**	**−273,215**	**2,141,502**	

PROCUREMENT:											
Procurement of Equipment and Missiles, Army	2,175,761	1,407,300	----------	1,407,300	−10,000	3,573,061	1,604,886	1,968,175	----------	1,968,175	2,322,823
Aircraft and Related Procurement, Navy	3,897,301	1,961,644	----------	1,961,644	----------	5,858,945	2,027,098	3,831,847	----------	3,831,847	2,515,405
Shipbuilding and Conversion, Navy	3,693,191	1,330,700	----------	1,330,700	----------	5,023,891	1,362,953	3,660,939	----------	3,660,939	2,947,504
Procurement of Ordnance and Ammunition, Navy	392,875	567,719	15,500	583,219	−4,433	971,661	290,342	681,319	----------	681,319	708,374
Procurement, Marine Corps	435,822	133,850	----------	133,850	----------	569,672	139,496	430,176	----------	430,176	323,060
Aircraft Procurement, Air Force	----------	4,284,600	----------	4,284,600	----------	4,284,600	560,283	3,724,317	----------	3,724,317	2,394,404
Missile Procurement, Air Force	----------	2,540,550	−75,000	2,465,550	127,450	2,593,000	1,149,745	1,443,255	----------	1,443,255	1,251,802
Other Procurement, Air Force	----------	1,109,650	----------	1,109,650	6,373	1,116,023	175,616	940,407	----------	940,407	626,252
Aircraft, Missiles and Related Procurement, Air Force	8,990,845	----------	----------	----------	−172,325	8,818,520	5,317,841	3,500,679	----------	3,500,679	2,234,374
Procurement other than Aircraft and Missiles, Air Force	2,688,817	----------	----------	----------	----------	2,688,817	1,559,232	1,129,585	----------	1,129,585	1,082,276
Construction of Ships, MSTS, Department of Defense	1,598	----------	----------	----------	----------	1,598	892	706	−599	108	108
Total—Reported on DD Form 1176	22,276,211	13,336,013	−59,500	13,276,513	−52,935	35,499,788	14,188,383	21,311,405	−599	21,310,807	16,406,383
Adjustment to Monthly Treasury Statement	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
TOTAL—PROCUREMENT	**22,276,211**	**13,336,013**	**−59,500**	**13,276,513**	**−52,935**	**35,499,788**	**14,188,383**	**21,311,405**	**−599**	**21,310,807**	----------
RESEARCH, DEVELOPMENT, TEST AND EVALUATION:											
Research, Development, Test and Evaluation, Army	360,390	1,035,715	38,413	1,074,128	10,000	1,444,518	705,079	739,439	+4	739,442	650,798
Research, Development, Test and Evaluation, Navy	378,990	1,015,920	50,604	1,066,524	4,433	1,449,947	766,532	683,416	----------	683,416	626,625
Research, Development, Test and Evaluation, Air Force	457,632	1,159,900	288,950	1,448,850	48,875	1,955,357	1,089,295	866,062	----------	866,062	745,450
Salaries and Expenses, Advanced Research Projects Agency, Department of Defense	299,230	455,000	−125,380	329,620	−4,000	624,850	313,674	311,176	----------	311,176	188,435
Emergency Fund, Department of Defense	----------	150,000	−144,712	5,288	----------	5,288	----------	5,288	−5,288	----------	----------
Total—Reported on DD Form 1176	1,496,241	3,816,535	107,875	3,924,410	59,308	5,479,959	2,874,580	2,605,380	−5,284	2,600,096	2,211,308

See footnotes at end of table.

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for expenditure, fiscal year 1960						Total expenditures for fiscal year 1960	Preclosing unexpended balance 30 June 1960	Unobligated balance withdrawn (−) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961 [a]
	Unexpended balance carried into fiscal year 1960	New obligational availability			Other transfers	Total fiscal year 1960					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RESEARCH, DEVELOPMENT, TEST AND EVALUATION—Continued											
Adjustment to Monthly Treasury Statement											
TOTAL—RESEARCH, DEVELOPMENT, TEST, AND EVALUATION	**1,496,241**	**3,816,535**	**107,875**	**3,924,410**	**59,308**	**5,479,959**	**2,874,580**	**2,605,380**	**−5,284**	**2,600,096**	
MILITARY CONSTRUCTION:											
Military Construction, Army	324,162	263,632		263,632		587,794	247,041	340,753		340,753	202,308
Military Construction, Navy	451,589	204,112		204,112		655,702	276,833	378,869		378,869	294,223
Military Construction, Air Force	1,585,266	776,833	7,000	783,833		2,369,099	999,132	1,369,966		1,369,966	751,339
Military Construction, Advanced Research Projects Agency, Department of Defense	25,162	23,545	−7,000	16,545		41,707	14,624	27,083		27,083	7,720
Military Construction, Army Reserve	45,885	20,000		20,000	−24,095	41,790	18,562	23,228	+5	23,233	14,050
Military Construction, Naval Reserve	17,279	8,980		8,980		26,259	10,374	15,885		15,885	6,397

Military Construction, Air Force Reserve		4,000		4,000		4,000	230	3,770		3,770	2,407
Military Construction, Army National Guard		23,219		23,219	24,095	47,314	14,884	32,430		32,430	18,879
Military Construction, Air National Guard		16,440		16,440	12,235	28,675	12,294	16,380	h 44	16,425	11,395
Loran Stations, Department of Defense		23,200		23,200		23,200	23,200				
Olympic Winter Games, Department of Defense	790					790	790				
Construction, Alaska Communication System, Army	615					615	7	608		608	150
Military Construction, Foreign Countries, DOD	42,810					42,810	7,660	35,150		35,150	35,150
Access Roads, Department of Defense	1,690					1,690	892	798	−2	796	796
Family Housing, Department of Defense	139					139	3	136	−94	42	42
Total—Reported on DD Form 1176	2,495,389	1,363,961		1,363,961	12,235	3,871,585	1,626,529	2,245,055	−47	2,245,008	1,344,855
Adjustment to Monthly Treasury Statement											
TOTAL—MILITARY CONSTRUCTION	**2,495,389**	**1,363,961**		**1,363,961**	**12,235**	**3,871,585**	**1,626,529**	**2,245,055**	**−47**	**2,245,008**	
REVOLVING AND MANAGEMENT FUNDS:											
Acquisition, Rehabilitation and Rental of Wherry Act Housing, Department of Defense	131,899		30,000	30,000		161,899	22,796	139,103		139,103	42,264
Defense Housing, Army	430				−450	−20	−137	117		117	102
Defense Housing, Navy	426				−150	276	−248	524		524	139
Laundry Service, Naval Academy	72					72	−31	103		103	56
Army Stock Fund	526,820				−281,000	245,820	−314,254	560,074		560,074	NA
Navy Stock Fund	234,936				−75,000	159,936	−54,695	214,631		214,631	NA
Marine Corps Stock Fund	42,937				−24,000	18,937	−4,210	23,147		23,147	NA

See footnotes at end of table.

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for expenditure fiscal year 1960						Total expenditures for fiscal year 1960	Preclosing unexpended balance 30 June 1960	Unobligated balance withdrawn (−) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961 [a]
	Unexpended balance carried into fiscal year 1960	New obligational availability			Other transfers	Total fiscal year 1960					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
REVOLVING AND MANAGEMENT FUNDS—Continued											
Air Force Stock Fund	276,058				−50,000	226,058	−35,373	261,431		261,431	NA
Army Industrial Fund	186,620					186,620	7,130	179,490		179,490	NA
Navy Industrial Fund	133,503					133,503	−14,473	147,976		147,976	NA
Air Force Industrial Fund	42,726				−11,613	31,113	−10,443	41,557		41,557	NA
Army Management Fund	−3,134					−3,134	−10,065	6,931		6,931	14,515
Navy Management Fund	960,587					960,587	855,015	105,572	−93	105,479	855,838
Air Force Management Fund	6,964					6,964	568	6,396	−1,189	5,207	3,916
Naval Working Fund	12,088					12,088	−825	12,913		12,913	6,306
Consolidated Working Funds, Army	5,905				[i] 3	5,908	2,517	3,391	−29	3,362	1,607
Consolidated Working Funds, Air Force	113					113	−59	172	−26	146	131
Total—Reported on DD Form 1176	2,558,951		30,000	30,000	−442,209	2,146,741	443,212	1,703,529	−1,338	1,702,192	924,874

Adjustment to Monthly Treasury Statement and Annual Combined Statement					12,209	12,209		12,209	−12,209		
TOTAL—REVOLVING AND MANAGEMENT FUNDS	**2,558,951**		**30,000**	**30,000**	**−430,000**	**2,158,951**	**443,212**	**1,715,739**	**−13,548**	**1,702,192**	
TOTAL—DEPARTMENT OF DEFENSE:											
Reported on DD Form 1176	31,634,822	40,598,579	459,022	41,057,602	−472,209	72,220,214	41,214,782	31,005,432	−345,836	30,659,596	24,040,629
Adjustment to Monthly Treasury Statement and Annual Combined Statement		316	−430,000	−429,684	472,209	42,525		42,525	−42,525		
TOTAL—DEPARTMENT OF DEFENSE	**31,634,822**	**40,598,895**	**29,022**	**40,627,918**		**72,262,739**	**41,214,782**	**31,047,957**	**−388,361**	**30,659,596**	
RECAPITULATION BY SERVICE: DEPARTMENT OF THE ARMY:											
Reported on DD Form 1176	4,672,584	9,683,201	286,744	9,969,945	−296,447	14,346,082	9,391,704	4,954,378	−97,684	4,856,694	4,399,177
Adjustment to Monthly Treasury Statement and Annual Combined Statement		151	−281,000	−280,849	296,447	15,597		15,597	−15,597		
TOTAL—DEPARTMENT OF THE ARMY	**4,672,584**	**9,683,351**	**5,744**	**9,689,096**		**14,361,679**	**9,391,704**	**4,969,975**	**−113,281**	**4,856,694**	
DEPARTMENT OF THE NAVY:											
Reported on DD Form 1176	11,370,713	11,219,595	149,494	11,369,089	−99,150	22,640,651	11,641,550	10,999,101	−86,420	10,912,681	9,086,531
Adjustment to Monthly Treasury Statement and Annual Combined Statement		1	−99,000	−98,999	99,150	151		151	−151		
TOTAL—DEPARTMENT OF THE NAVY	**11,370,713**	**11,219,595**	**50,494**	**11,270,089**		**22,640,802**	**11,641,550**	**10,999,252**	**−86,571**	**10,912,681**	

See footnotes at end of table.

TABLE 2. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE—Continued

FISCAL YEAR 1960—Continued

[Thousands of dollars]

Appropriation title	Amounts available for expenditure fiscal year 1960						Total expenditures for fiscal year 1960	Preclosing unexpended balance 30 June 1960	Unobligated balance withdrawn (−) or restored (+) per Public Law 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961 [a]
	Unexpended balance carried into fiscal year 1960	New obligational availability			Other transfers	Total fiscal year 1960					
		Congressional appropriations	Transfers	Total							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RECAPITULATION BY SERVICE—Continued											
DEPARTMENT OF THE AIR FORCE:											
Reported on DD Form 1176	15,073,110	18,275,814	269,876	18,545,690	−72,613	33,546,187	19,066,194	14,479,993	−119,995	14,359,998	10,263,642
Adjustment to Monthly Treasury Statement and Annual Combined Statement		165	−50,000	−49,835	76,613	26,777		26,777	−26,777		
TOTAL—DEPARTMENT OF THE AIR FORCE	**15,073,110**	**18,275,979**	**219,876**	**18,495,855**	**4,000**	**33,572,964**	**19,066,194**	**14,506,771**	**−146,772**	**14,359,998**	
OFFICE OF THE SECRETARY OF DEFENSE:											
Reported on DD Form 1176	518,416	1,419,970	−247,092	1,172,878	−4,000	1,687,294	1,115,334	571,960	−41,737	530,223	291,279

Adjustment to Monthly Treasury Statement											
TOTAL—OFFICE OF THE SECRETARY OF DEFENSE	518,416	1,419,970	−247,092	1,172,878	−4,000	1,687,294	1,115,334	571,960	−41,737	530,223	

Source. DD Form 1176.

Note. Amounts will not necessarily add to totals due to rounding.

NA—Not Applicable.

[a] Amounts in this column are gross, i.e., inclusive of reimbursements receivable and antitipated, and thus, may exceed cash unexpended balances in column (22).

[b] Formerly "Marine Corps Troops and Facilities."

[c] Represents adjustments to prior year appropriations as follows:

	Army	*Navy*	*Air Force*
Preparation for Sale or Salvage of Military Property, 1958	−67,997	−520	−114,649
Preparation for Sale or Salvage of Military Property, Prior Years	−82,704	−1	−49,904
Total	−150,701	−521	−164,553

[d] Signal Service; Department of the Air Force Prior Years; Ordnance Service and Supplies; Expediting Production; Expenses, Army of the Philippines.

[e] Construction of Ships; Facilities; IRNV: Armor, Armament and Ammunition; IRNV: Construction and Machinery: Ordnance for New Construction; Public Works, Bureau of Yards and Docks; Research.

[f] Special Procurement; Replacement of Personal Property Sold.

[g] Expenses of Liquidation, Office of Scientific Research and Development Function, OSD.

[h] Restored from Air National Guard (5793870).

[i] Represents restoration of amount written off on 30 June 1959 in anticipation of reappropriation in FY 1960.

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 1960

[Thousands of dollars]

Appropriation title	Amounts available for obligation fiscal year 1960						Obligations fiscal year 1960	Unobligated balance as of 30 June 1960		
	Unobligated balance carried into fiscal year 1960	New obligational availability			Reimbursements	Total fiscal year 1960		Total preclosing balance	Expired balance withdrawn 30 June 1960	Unobligated balance available fiscal year 1961
		Congressional appropriations	Transfers	Total						
DEPARTMENT OF DEFENSE—TOTAL	**82,926**	**904,883**		**904,883**	**3,027**	**9,990,836**	**903,385**	**87,451**	**−155**	**87,296**
DEPARTMENT OF THE ARMY:										
Corps of Engineers:										
Flood Control, Mississippi River and Tributaries	1,270	69,069		69,069	399	70,738	70,089	648		648
General Investigations	1,634	10,481		10,481	1	12,116	10,683	1,434		1,434
Construction, General	62,402	661,356		661,356	1,039	724,798	674,956	49,842		49,842
Operation and Maintenance, General	3,877	117,685		117,685	1,557	123,119	118,817	4,302		4,302
General Expenses		12,324		12,324	14	12,338	12,316	22	−22	
Hydraulic Mining in California, Debris Fund	15	18		18	(*)	33	22	10		10
Niagara Remedial Works	158					158	−177	335		335
Maintenance and Operation of Dams and Other Improvements of Navigable Waters	152	154		154		306	152	154		154
United States Section, St. Lawrence River Joint Board of Engineers		39		39		39	13	26	−26	
Payments to State Flood Control Act, 1954	1,435	1,511		1,511		2,946	1,454	1,492		1,492
TOTAL, CORPS OF ENGINEERS	**70,943**	**872,637**		**872,637**	**3,011**	**946,591**	**888,326**	**58,265**	**−48**	**58,217**

Salaries and Expenses, Cemeterial Expenses	.....	8,964	.....	8,964	8	8,972	8,888	84	−84	.....
Payments to Claimants, Disaster at Texas City, Texas	11,450	.....	.....	.....	.....	11,450	629	10,821	.....	10,821
Construction of Power Systems, Ryukyu Islands	180	18,000	.....	18,000	.....	18,180	150	18,030	.....	18,030
Construction of Water System, Ryukyu Islands	354	.....	.....	.....	.....	354	127	227	.....	227
Administration, Ryukyu Islands	.....	5,282	.....	5,282	8	5,290	5,266	23	−23	.....
TOTAL—DEPARTMENT OF THE ARMY	**82,926**	**904,883**	.....	**904,883**	**3,027**	**990,836**	**903,385**	**87,451**	**−155**	**87,296**
DEPARTMENT OF THE NAVY	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
DEPARTMENT OF THE AIR FORCE	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Note. Amounts will not necessarily add to totals due to rounding.
*Less than $500.

TABLE 4. EXPENDITURES AND EXPENDITURE AVAILABILITY, BY APPROPRIATION TITLE

FISCAL YEAR 1960

[Thousands of dollars]

Appropriation title	Amounts available for expenditure fiscal year 1960				Expenditures fiscal year 1960	Preclosing unexpended balance	Unobligated balance withdrawn (−) or restored (+) per PL 798	Total unexpended balance carried into fiscal year 1961	Gross unpaid obligations carried into fiscal year 1961
	Unexpended balance carried into fiscal year 1960	New obligational availability		Total fiscal year 1960					
		Congressional appropriations	Transfers	Total					
DEPARTMENT OF DEFENSE—TOTAL	**285,797**	**904,910**		**904,910**	**1,190,706**	**879,981**	**310,726**	**−99**	**310,627**	**214,157**
DEPARTMENT OF THE ARMY:									
Corps of Engineers:									
Flood Control, Mississippi River and Tributaries	13,116	69,069		69,069	82,185	69,882	12,303		12,303	11,654
General Investigations	2,709	10,481		10,481	13,191	10,818	2,373		2,373	918
Construction, General	191,132	661,356		661,356	852,489	658,533	193,956		193,956	144,155
Operation and Maintenance, General	18,005	117,685		117,685	135,690	113,484	22,206		22,206	17,990
General Expenses	714	12,324		12,324	13,038	12,390	649	−49	600	600
Hydraulic Mining in California, Debris Fund	15	18		18	33	21	12		12	2
Niagara Remedial Works	155				155	−176	331		331	
Maintenance and Operation of Dams and Other Improvements of Navigable Waters	152	154		154	306	152	154		154	
United States Section, St. Lawrence River Joint Board of Engineers	2	39		39	41	15	27	−26	1	1
Payments to State Flood Control Act, 1954	1,435	1,511		1,511	2,946	1,454	1,492		1,492	
Revolving Fund	24,271				24,271	584	23,687		23,687	34,911
TOTAL—CORPS OF ENGINEERS	**251,708**	**872,637**		**872,637**	**1,124,345**	**867,156**	**257,189**	**−75**	**257,114**	**210,231**

Salaries and Expenses, Cemeterial Expenses	844	8,964		8,964	9,809	8,386	1,423	−90	1,333	1,333
Civil Relief in Korea	27				27	2	25	−20	5	5
Payments to Claimants, Disaster at Texas City, Texas	11,450				11,450	607	10,843		10,843	22
Defense Production Guarantees	2,787				2,787	58	2,729		2,729	
Construction of Power Systems, Ryukyu Islands	314	18,000		18,000	18,314	216	18,098		18,098	67
Construction of Water System, Ryukyu Islands	593				593	248	345		345	118
Administration, Ryukyu Islands	331	5,282		5,282	5,613	3,321	2,292	+87	2,379	2,379
TOTAL—DEPARTMENT OF THE ARMY	**268,054**	**904,883**		**904,883**	**1,172,937**	**879,994**	**292,943**	**−99**	**292,845**	**214,155**
DEPARTMENT OF THE NAVY:										
Defense Production Guarantees	9,062				9,062	937	8,126		8,126	
DEPARTMENT OF THE AIR FORCE:										
Defense Production Guarantees	8,662				8,662	−973	9,635		9,635	
Wildlife Conservation, Eglin Field Reservation	19	26		26	45	24	22		22	2
TOTAL—DEPARTMENT OF THE AIR FORCE	**8,680**	**26**		**26**	**8,707**	**−950**	**9,656**		**9,656**	**2**

Note. Amounts will not necessarily add to totals due to rounding.

TABLE 5. MILITARY ASSISTANCE PROGRAM OBLIGATIONS/RESERVATIONS BY BUDGET ACTIVITY

[Millions of dollars]

Major classification	Obligations/Reservations		
	Fiscal years 1950–59	Fiscal year 1960	Total as of June 30, 1960
TOTAL	**$25,296.9**	**$1,358.4**	**$26,655.3**
Equipment and Supplies	20,673.2	878.1	21,551.3
Accessorial Charges	1,190.3	114.9	1,305.2
Training	568.6	81.5	650.0
Weapons Production Program	82.4	46.0	128.3
Development of Advance Design Weapons	181.6	35.5	217.1
Infrastructure	667.5	102.0	769.5
Administrative Expenses	275.9	24.1	300.0
International Military Headquarters	42.6	7.8	50.5
Other Services	1,614.7	68.6	1,683.4

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 $82.1 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 1950–59	Fiscal year 1960	Total as of June 30, 1960
TOTAL	**$22,786.0**	**$1,638.2**	**$24,424.2**
Equipment and Supplies	18,699.2	1,144.3	19,843.5
Accessorial Charges	1,160.1	129.5	1,289.5
Training	509.7	82.2	592.0
Weapons Production Program	55.0	8.9	63.9
Research and Development	111.1	41.9	153.0
Infrastructure	506.8	82.6	589.4
Administrative Expenses	269.4	23.7	293.1
International Military Headquarters	38.0	7.3	45.3
Other Services	1,436.7	117.9	1,554.6

Note. Includes "Common Use Item" appropriation administered by International Cooperation Administration. Includes $2.9 million expended against $15.0 million allocated to MAP from the President's Contingency Fund. Includes reimbursements of $82.1 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, 1959	Total as of June 30, 1960	Total as of June 30, 1959	Total as of June 30, 1960
TOTAL	**$25,296.9**	**$26,655.3**	**$22,786.0**	**$24,424.2**
Army	12,796.2	13,360.0	11,711.5	12,467.3
Navy	2,921.2	3,062.1	2,441.6	2,660.9
Air Force	7,469.8	7,979.8	6,773.5	7,306.4
OSD	988.9	1,124.2	753.5	870.9
Other Agencies	1,120.8	1,129.3	1,105.9	1,118.8

TABLE 8. ACTIVE DUTY MILITARY PERSONNEL

Date	Total, Department of Defense	Army	Navy	Marine Corps	Air Force
TOTALS					
June 30, 1959	2,504,310	861,964	626,340	175,571	840,435
July 31	2,505,829	863,192	629,184	174,751	838,702
Aug. 31	2,499,876	861,288	627,901	174,580	836,107
Sep. 30	2,492,449	867,437	618,191	173,654	833,167
Oct. 31	2,494,893	872,485	616,658	173,169	832,581
Nov. 30	2,500,567	878,811	616,306	172,665	832,785
Dec. 31	2,487,096	876,258	610,644	170,772	829,422
Jan. 31, 1960	2,491,284	880,341	612,075	171,618	827,250
Feb. 29	2,487,366	877,177	613,228	171,904	825,057
Mar. 31	2,478,466	873,977	612,130	171,853	820,506
Apr. 30	2,472,119	870,244	613,058	171,593	817,224
May 31	2,465,065	868,116	611,500	171,296	814,153
June 30	2,476,435	873,078	617,984	170,621	814,752
OFFICERS					
June 30, 1959	319,152	101,690	69,795	16,065	131,602
July 31	318,455	101,878	69,332	15,876	131,369
Aug. 31	317,689	101,147	69,101	15,994	131,447
Sep. 30	317,235	100,995	68,710	16,093	131,437
Oct. 31	317,460	101,192	68,581	16,045	131,642
Nov. 30	316,690	100,966	68,213	15,941	131,570
Dec. 31	315,992	100,564	68,056	16,041	131,331
Jan. 31, 1960	316,152	100,753	68,368	15,971	131,060
Feb. 29	315,947	100,805	68,731	15,941	130,470
Mar. 31	314,550	100,744	68,219	15,802	129,785
Apr. 30	314,878	101,085	68,299	15,931	129,563
May 31	314,065	100,840	67,804	16,116	129,305
June 30	316,687	101,236	69,559	16,203	129,689
ENLISTED					
June 30, 1959	2,174,728	758,458	552,221	159,506	704,543
July 31	2,174,482	758,769	553,817	158,852	703,044
Aug. 31	2,169,310	757,588	552,788	158,537	700,397
Sep. 30	2,161,995	763,921	543,017	157,482	697,575
Oct. 31	2,164,239	768,800	541,705	157,023	696,711
Nov. 30	2,171,092	775,361	541,984	156,592	697,155
Dec. 31	2,158,442	773,218	536,715	154,588	693,921
Jan. 31, 1960	2,162,344	777,122	537,825	155,509	691,888
Feb. 29	2,159,336	774,018	539,167	155,805	690,346
Mar. 31	2,152,303	770,883	538,699	155,894	686,827
Apr. 30	2,145,879	766,812	539,772	155,491	683,804
May 31	2,139,617	764,932	538,781	155,001	680,903
June 30	2,149,033	770,112	544,040	154,242	680,639

TABLE 8. ACTIVE DUTY MILITARY PERSONNEL—Continued

Date	Total, Department of Defense	Army	Navy	Marine Corps	Air Force
OFFICER CANDIDATES[1]					
June 30, 1959	10,430	1,816	4,324	----------	4,290
July 31	12,892	2,545	6,035	23	4,289
Aug. 31	12,877	2,553	6,012	49	4,263
Sep. 30	13,219	2,521	6,464	79	4,155
Oct. 31	13,194	2,493	6,372	101	4,228
Nov. 30	12,785	2,484	6,109	132	4,060
Dec. 31	12,662	2,476	5,873	143	4,170
Jan. 31, 1960	12,788	2,466	5,882	138	4,302
Feb. 29	12,083	2,354	5,330	158	4,241
Mar. 31	11,613	2,350	5,212	157	3,894
Apr. 30	11,362	2,347	4,987	171	3,857
May 31	11,383	2,344	4,915	179	3,945
June 30	10,715	1,730	4,385	176	4,424

[1] Consists of cadets, U.S. Military Academy (Army); midshipmen, U.S. Naval Academy, aviation cadets, and enlisted officer candidates (Navy); marine aviation cadets (Marine Corps); and cadets, U.S. Air Force Academy and aviation cadets, including enlisted aviation students (Air Force).

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TABLE 9. RESERVE COMPONENTS PERSONNEL

[Excludes personnel on extended active duty]

	June 30, 1959		June 30, 1960	
	Total enrollment	Drill pay and 3–6 months trainees [a]	Total enrollment	Drill pay and 3–6 months trainees [a]
TOTAL—DEPARTMENT OF DEFENSE	**4,354,005**	**1,006,588**	**4,147,294**	**997,162**
DEPARTMENT OF THE ARMY	**2,686,586**	**713,600**	**2,625,021**	**702,846**
National Guard	[b] 404,036	399,427	[b] 407,549	401,765
Officers	40,156	37,884	39,484	37,142
Enlisted	363,880	361,543	368,065	364,623
Army Reserve	2,282,550	314,173	2,217,472	301,081
Officers	244,809	50,945	254,047	50,462
Enlisted	2,037,741	263,228	1,963,425	250,619
DEPARTMENT OF THE NAVY	**1,043,657**	**165,230**	**930,704**	**165,126**
Naval Reserve	727,727	120,371	672,227	120,294
Officers	181,454	25,454	173,873	26,092
Enlisted	[c] 546,273	94,917	[c] 498,354	94,202
Marine Corps Reserve	315,930	44,859	258,477	44,832
Officers	23,845	3,537	23,710	3,568
Enlisted	292,085	41,322	234,767	41,264
DEPARTMENT OF THE AIR FORCE	**623,762**	**127,758**	**591,569**	**129,190**
Air National Guard	70,994	70,994	70,820	70,820
Officers	8,473	8,473	8,570	8,570
Enlisted	62,521	62,521	62,250	62,250
Air Force Reserve	552,768	56,764	520,749	58,370
Officers	134,389	21,209	140,077	21,621
Enlisted	418,379	35,555	380,672	36,749

[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.

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]					
1959					
June 30	1,078,178	405,848	357,108	313,466	1,756
July 31	1,077,928	405,242	356,815	314,109	1,762
Aug. 31	1,070,505	396,820	356,710	315,205	1,770
Sep. 30	1,063,700	392,610	354,089	315,263	1,738
Oct. 31	1,059,674	389,888	352,387	315,614	1,785
Nov. 30	1,056,374	387,618	350,690	316,302	1,764
Dec. 31	1,052,262	385,905	348,304	316,294	1,759
1960					
Jan. 31	1,048,239	385,218	346,120	315,137	1,764
Feb. 29	1,047,103	385,737	345,063	314,529	1,774
Mar. 31	1,045,632	385,744	344,890	313,232	1,766
Apr. 30	1,043,358	386,988	344,923	309,704	1,743
May 31	1,044,307	388,364	345,471	308,690	1,782
June 30	1,047,120	390,046	347,760	307,449	1,865
B. INDIRECT HIRE PERSONNEL [b]					
1959					
June 30	188,472	120,452	17,392	50,628	----------
July 31	185,222	116,433	18,397	50,392	----------
Aug. 31	184,369	115,125	18,533	50,711	----------
Sep. 30	183,052	114,234	18,391	50,427	----------
Oct. 31	182,588	113,861	18,207	50,520	----------
Nov. 30	181,729	113,988	17,934	49,807	----------
Dec. 31	180,734	113,184	17,941	49,609	----------
1960					
Jan. 31	179,286	112,994	17,509	48,783	----------
Feb. 29	179,479	113,041	17,463	48,975	----------
Mar. 31	179,191	113,322	17,482	48,387	----------
Apr. 30	177,876	112,883	17,526	47,467	----------
May 31	178,299	113,429	17,617	47,253	----------
June 30	177,884	112,963	17,442	47,479	----------

[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 oversea areas under contracts or agreements with foreign governments.

TABLE 11. PERSONNEL

OFFICE OF THE SECRETARY OF DEFENSE AND JOINT CHIEFS OF STAFF

	June 30, 1959		Aug. 31		Oct. 31		Dec. 31		Feb. 29, 1960		April 30		June 30	
	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military	Civilian	Military
TOTAL, OFFICE OF THE SECRETARY OF DEFENSE	**1,262**	**393**	**1,283**	**394**	**1,259**	**386**	**1,259**	**393**	**1,269**	**402**	**1,277**	**410**	**1,344**	**404**
Office of the Secretary [a]	144	46	144	43	144	43	145	45	143	43	145	45	145	45
Director of Defense Research and Engineering	203	80	215	84	219	82	227	83	234	85	235	90	242	91
Assistant Secretary (Comptroller)	165	3	165	3	162	3	165	3	167	3	167	3	172	2
Assistant Secretary (Health and Medical)	11	8	11	9	11	9	11	9	11	9	11	9	11	8
Assistant Secretary (International Security Affairs)	206	97	209	94	204	88	201	90	200	94	204	94	213	95
Assistant Secretary (Manpower, Personnel, and Reserve)	84	46	82	47	79	46	80	46	81	49	81	49	85	45
Assistant Secretary (Properties and Installations)	61	----	61	----	62	----	61	----	61	----	63	----	62	----
Assistant Secretary (Public Affairs)	78	57	78	57	77	57	75	57	74	57	77	58	77	58
Assistant Secretary (Supply and Logistics)	186	14	190	15	188	14	185	15	186	15	185	15	184	14
General Counsel	58	----	59	----	58	----	58	----	57	----	55	----	58	----
Assistant to the Secretary (Atomic Energy)	13	16	13	18	13	17	12	17	12	19	12	18	11	17
Assistant to the Secretary (Legislative Affairs)	9	7	10	8	9	7	10	8	10	8	8	8	7	8
Assistant to the Secretary (Special Operations)	13	6	14	6	16	6	13	6	16	6	16	7	18	7
Special Programs	31	13	32	14	17	14	16	14	17	14	18	14	59	14

TOTAL, JOINT CHIEFS OF STAFF ORGANIZATION	303	594	303	579	304	574	305	579	304	589	300	600	311	635
Office of the Chairman	10	8	9	8	10	8	10	8	10	8	9	8	8	8
Joint Staff	173	430	179	420	182	417	181	423	183	424	180	431	191	470
Other Joint Chiefs of Staff Activities	120	156	115	151	112	149	114	148	111	157	111	161	112	157
TOTAL, OTHER ACTIVITIES [b]	139	82	143	84	145	87	144	86	140	88	130	91	149	104
Advanced Research Projects Agency	48	13	56	16	57	19	58	18	52	19	44	20	60	21
Standing Group, North Atlantic Treaty Organization	42	69	41	68	43	68	42	68	41	69	41	71	40	70
U.S. Court of Military Appeals	41	----	39	----	38	----	37	----	40	----	38	----	41	----
Interdepartmental Activities	8	----	7	----	7	----	7	----	7	----	7	----	8	13
TOTAL, FULL-TIME PERSONNEL	1,704	1,069	1,729	1,057	1,708	1,047	1,708	1,058	1,713	1,079	1,707	1,101	1,804	1,143
Intermittent Consultants	52	----	41	----	77	----	51	----	61	----	36	----	61	----
TOTAL PERSONNEL	1,756	1,069	1,770	1,057	1,785	1,047	1,759	1,058	1,774	1,079	1,743	1,101	1,865	1,143

[a] Includes Offices of the Deputy Secretary and Administrative Secretary, and the Administrative Office of the Secretary.
[b] Includes activities receiving administrative support from the Office of the Secretary of Defense.

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