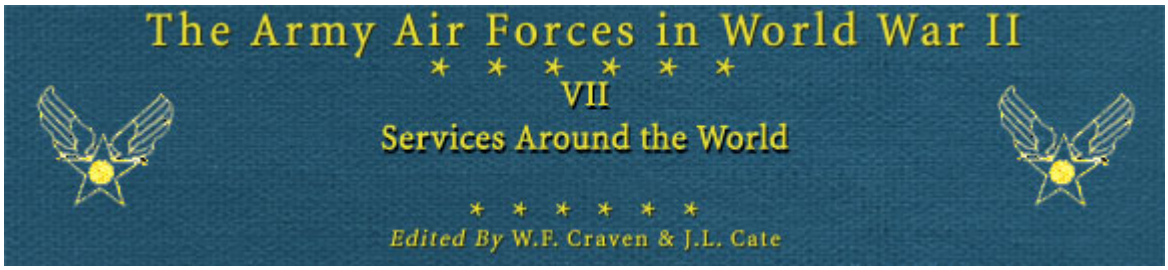

CHAPTER 15

AIR-SEA RESCUE

The rescue of airmen forced down at sea became for the AAF a problem of increasing importance in the course of World War II. This was especially true in the Pacific, where the first desperate fighting took place and where the AAF eventually committed no less than five air forces to operations which regularly demanded over-water flight, often for great distances. In the European and North African theaters air combat more commonly occurred over land, but there, too, provision had to be made for rescue of the many American airmen who were forced down into the waters around the British Isles or into the Mediterranean Sea. The expanding activity of the Air Transport Command reinforced the need to find, sustain, and rescue airmen who were down at sea for whatever cause—enemy action, want of fuel, mechanical failure, or human error.

Sentiment played an important part in the effort to provide rescue services, but there was much more involved than mere sentiment. Air-sea rescue paid off in distinct military advantages. Not only did it help sustain the morale of combat crews. It also saved for later combat service pilots and crewmen who had been trained at great expense of time and money and who often had the priceless advantage of combat experience.

In 1941 the AAF was poorly prepared in terms either of experience or of equipment to meet its need for rescue operations at sea. Fortunately, help was forthcoming from the U.S. Navy and from our Allies. Navy planes, surface vessels, and submarines drew no service lines when receiving a report that some flier was down at sea, and within the limits of its resources the Navy readily assumed responsibility in areas of its primary jurisdiction for the rescue of Army as well as Navy fliers. Similarly, in the European theater Britain's well-organized

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and experienced air-sea rescue service accepted the responsibility for saving U.S. aircrews who came down in the North Sea and the English Channel. By formal agreement between the RAF and the Eighth Air Force in September 1942 it was stipulated that the Americans would not duplicate the rescue services the British could provide. Instead, American crews would be protected by the existing British service, to which the AAF would contribute planes and other assistance as the scale of its operations expanded.[1] British agencies carried the same responsibilities in the waters off India and Burma. In the North African campaign the main burden fell on the U.S. and Royal navies and on the Royal Air Force. In all parts of the world the AAF's planes frequently participated in rescue searches, whether the flier were its own or some

other, but not until 1943 did the Army Air Forces seek a significant degree of self-sufficiency by training and equipping special air-sea rescue squadrons of its own.

The Question of Responsibility

Traditionally, the American military services had divided the responsibility for aircraft accidents as follows: in land areas they were handled by the nearest Air Corps base; at sea, by the Navy. Each service undertook to train and indoctrinate its own crews and to provide them with emergency equipment—parachutes, flares, life-preservers and life-rafts, special rations, and medical supplies. Within the AAF, provision for air-sea rescue had been considered a command rather than a headquarters responsibility. Each command was expected to provide for its own needs, including negotiation for such assistance as might be required of a sister service. The obligation resting upon AAF Headquarters was to provide needed material assistance and to see that crews received a necessary indoctrination as part of their regular training.

These limited responsibilities passed, during a reorganization of AAF Headquarters in the spring of 1942 that was distinguished by the establishment of a system of directorates for the control of operations,* to the Director of Traffic Control and Regulations. In a minor reshuffling of offices two months later, the job was given to the Director of Flying Safety. In March 1943, when AAF Headquarters experienced

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* See Vol. VI, 33-36. The system of directorates was an effort to separate the operating from the policy-making agencies in AAF Hq. When the experiment failed, the tendency was to move operations out of AAF Hq. and into the hands of subordinate field agencies.

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its third major reorganization in as many years, air-sea rescue was assigned to a newly activated Flight Control Command at Winston-Salem, North Carolina. This decision, however, was soon reversed.[2] On 25 August 1943 the responsibility was reassigned to a newly created Emergency Rescue Branch in the Pentagon office of the AC/AS, Operations, Commitments, and Requirements (OC&R).[3]

The decision to bring the job back to Washington has a simple explanation. Until the summer of 1943 the scale of AAF combat operations had been sufficiently limited to make possible a continuing dependence upon the assistance of friendly services or upon a policy of providing additional planes and equipment for those air forces which found it necessary to organize supplementary rescue services of their own. But it had now to be assumed that AAF commitments to combat operations by the spring of 1944 would reach a total that would impose upon the several air forces a new obligation to look out for their own airmen. Especially significant was the prospect that AAF forces in the Pacific, including those equipped with the cherished very-long-range B-29, would soon have a strength far exceeding the totals originally planned for 1944. No less important were proposals by the Navy which elevated the issue of air-sea rescue to the highest level of policy.

The problem of achieving some better co-ordination of effort between the Navy and the AAF, and a closer liaison with interested Allied services, had been under discussion by agencies of the Joint Chiefs of Staff since the spring of 1943.[4] Closer integration of existing services promised

savings in personnel and materiel. It was also felt that greater efforts were needed for the establishment of common rescue procedures among the several participating forces. But it proved easier to agree on the need for improvement than upon the best means for its achievement. The Navy argued that the rescue function should be turned over to the U.S. Coast Guard, a step that would represent a logical expansion of the latter's traditional mission and at the same time would release Army and Navy personnel for other duties. The AAF preferred to depend upon co-ordination of effort through a new liaison committee representing the several services and the Maritime Commission. On 18 August 1943 the Joint Chiefs of Staff instructed the Joint Administrative Committee (JAC) to study the problem.[5]

In the same month the AAF drafted plans to make itself as self-sufficient as was possible by organizing seven air-sea rescue squadrons,

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each to be equipped with PBY's for rescue operations, with L-5's for liaison, and with AT-7's or AT-11's for utility purposes.[6] The schedule called for completion of the program by the spring of 1944 in accordance with a plan to assign most of the new units to the Pacific air forces. The question of assignment was critical. Throughout most of the Pacific the Navy held the top commands, and Navy doctrine favored a principle of area coverage, with rescue units assigned for operational control to a variety of area or island commands. In opposition to this policy, the AAF insisted that its rescue units should serve as integral parts of a theater air force, in the belief that this practice would guarantee the greatest possible flexibility in their employment.[7]It was an old question of debate between the Navy and the AAF, and one that was never fully resolved.

The AAF won a victory in the deliberations of the JAC, which concluded that the Coast Guard, despite its enviable tradition as a rescue agency, would face insurmountable obstacles should it have to expand its responsibilities to include all air-sea rescue. Instead, the committee recommended that the Navy and the AAF continue the development of separate services but that a new agency be established in Washington for their co-ordination. On 15 February 1944, the Joint Chiefs of Staff asked the Secretary of the Navy to establish such an agency. The new board was headed by the Commandant of the Coast Guard and included representatives of the Navy, the AAF, and the ASF. It undertook to advance pertinent research, to disseminate in- formation that would encourage a closer co-ordination of operations and procedures, and to maintain liaison with responsible agencies in Allied countries.[8]

AAF leaders still feared that the Navy wished to turn over full responsibility to the Coast Guard, and they objected to proposals that the new office station liaison officers in the several theaters with powers of direct communication on the ground that this would add executive functions to a body that had been intended to be no more than an advisory agency.[9] The continuing differences helped to strengthen the conviction among AAF leaders that an air force, in this as in other particulars, should be as self-sufficient as is possible, a development not without influence on the policies of the postwar Air Force. But during the war a very considerable disparity continued to exist between policy and achievement. Although the program of August 1943 for the creation of seven emergency rescue (ER) squadrons

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had been scheduled for completion by the spring of 1944, there were only two such units in operation in the following summer. Another had become operational by the end of the year, in the Southwest Pacific, but the others did not achieve that status until 1945 and some of them only at the very close of the war.* Thus the AAF's move for self-sufficiency in this particular respect began late and fell far short of the success attained in other fields. Perhaps it was this record that persuaded General George of ATC to advocate, as late as March 1945, the turning-over of full responsibility for rescue services along the transocean airlines to the Navy.[10]

An Evaluation

Despite the tardiness and incompleteness of the AAF's efforts to provide its own emergency rescue squadrons, the record suggests that a growing awareness at AAF Headquarters of the importance of air-sea rescue paid good dividends. It is impossible to gauge with mathematical accuracy the degree of success achieved in air-sea rescue during the war. Many airmen reported in distress were later lost to accident or enemy action without a chance to ditch or bail out. Others, who went down near hostile shores after broadcasting distress signals, were picked up by the enemy. Yet, however lacking in finality, available statistics for almost every theater showed a marked improvement in performance. In 1943 only 28 percent of Eighth Air Force crews reported as in distress were saved. By April 1944 the figure had risen to 43 per cent for bomber crews and to 38 per cent for fighter pilots. In September approximately 90 per cent of AAF crews forced down at sea in the ETO were recovered. By the end of March 1945 a total of 1,972 American airmen had been saved by British or U.S. rescue units in the North Sea, the English Channel, or other waters around Great Britain. Even then, on the eve of Germany's surrender, there could be no relaxing, for the Eighth Air Force still had ditchings involving some fifty lives per month.[11]

An equally impressive record was being achieved in the Pacific, in spite of the greater distances and areas involved. Between July 1943 and April 1945 air-sea rescue units working with the Fifth Air Force saved 1,841 persons, 360 of them in the month of January 1945, when the Fifth had its own emergency rescue squadron. During the three months before 1 March 1945 an average of two B-29's were ditched

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* See below, pp. 499-500.

in each strike against the Japanese home islands. During the preceding November and December 34.4 per cent of downed crewmen had been picked out of the water, but in January only 12.6 per cent were rescued. A complicated command system added to the natural difficulties, but closer liaison with the Navy was worked out, and greater stress was placed upon indoctrination of crews.[12] The record began to improve immediately, if, not steadily; in March rescues rose to 74 per cent, in May to 80 per cent, and in the whole nine months of missions from the Marianas just half—654 out of 1,310—of the Superfort crewmen reported down were rescued. No one grudged the effort involved, but it was on a scale as lavish as most matters connected with the VHB program. When the last B-29 strike was staged on 14 August 1945, about 2,400 men, or one-fourth of those participating in the mission, were on air-sea rescue duty.[13]

The chances of survival and rescue for airmen forced down at sea depended on a number of factors. The skill and coolness of individuals after a bail-out or forced landing at sea were of first importance. Weather conditions counted heavily. So did luck. So did the promptness with which rescuers came. The ditching characteristics of aircraft might spell the difference between survival and death; rescue equipment carried on the aircraft or used by the ASR units might be the deciding factor.

Some planes ditched better than others, chiefly because of basic design, though this was largely adventitious. Flying Fortresses ditched well because of a rugged structure and a hydrodynamic shape that prevented porpoising or diving under the surface as the plane hit the water. Since the low midwing absorbed part of the initial shock and added buoyancy, an undamaged B-17 might float half an hour or more. Even with one wing damaged, it usually floated topside up long enough for the crew to escape. The high wing design of the Liberators was conversely a disadvantage. In a forced landing at sea the fuselage had to absorb the whole impact, and often the bomb-bay doors would fly open and the plane would break in two, either just forward or aft of the wing roots. Thus the survival record in ditchings was much higher for B-17's than for B-24's. In ten ditchings under favorable conditions by Liberators belonging to the Thirteenth Air Force, there was an average of one death each.[14] It was 29 April 1944 before the ETO reported its first wholly successful B-24 ditching, when a Liberator went down forty miles northeast of Cromer, England

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and floated long enough for the whole crew to escape.[15] The very heavy B-29 was unpredictable; it might crack up in ditching, or it might remain afloat long enough to allow an orderly escape of the crew. Its basic design and high flotation, if the pressurized cabin remained undamaged, balanced against its huge weight and high landing speed. In the very first B-29 mission, against Bangkok on 5 June 1944, one Superfort, ditched in the Bay of Bengal, floated ashore next day.[16]

Fighter craft were notoriously hard to ditch safely. Only once was the P-51 known to have ditched successfully, and this minor miracle could not be repeated deliberately, since the pilot lost consciousness and therewith all memory of his technique. Normally, the radiator scoop of the Mustang plowed the plane under at impact. The average time between impact and submersion for a fighter was less than twenty seconds, and in that short span the pilot had to recover from the shock of impact, release the canopy, climb from the cockpit, and inflate his life-jacket or life-raft. Hence it became the practice under most conditions for fighter pilots to bail out rather than risk ditching.[17]

With bombers and most other multi-engined planes, ditching was the preferred procedure. It gave the survivors a chance to get into life-rafts without being immersed in cold water. This was more important in the North Atlantic than in those Pacific Ocean areas where the water was warmer. It was rare that an airman survived more than two or three hours in the cold waters of the North Sea or English Channel, and, consequently, it was dangerous to parachute into the sea without a life-raft or a good chance of an early pickup. Conversely, if rescue ships were near at hand, bailing out might be less hazardous than trying to ditch a badly damaged plane or one with poor flotation qualities. Perhaps, most important of all, ditching, where even moderately successful, kept the crew together as a team, a physical and morale advantage.[18]

In both ditching and parachuting, many airmen were killed because prescribed safety equipment was not carried, or was not properly installed, or was not used according to instructions. Throughout the war there was a constant search for better survival equipment, but in this matter, as in so many others, it was easier to invent a new gadget or improve an old one than to train aircrew members to get the best out of whatever was currently available.

The importance of training is illustrated by the comparative record of Navy and AAF crews ditching multi-engined planes in the Pacific.

In this difficult feat the Navy was much more successful, putting down B-24's or B-34's without casualties under conditions similar to those costing AAF B-24's or B-25's losses up to 30 or 40 per cent. Navy pilots had a better understanding of the sea and could judge from its surface the direction of the wind. The proper approach was upwind across the waves if the wind were strong, but otherwise along the top of the swell. AAF pilots too often glided into the water instead of stalling in, tail down, which reduced the danger of bouncing on the rough surface. Too frequently outside openings, except those used for escape hatches, were not closed, and the doors between compartments, which if secured would check the flow of water from bow to stern, were left open. Poor air discipline made ditching very hazardous, especially when pilots put down without sufficient warning or when crew members failed to take their designated ditching station and posture. Crewmen were frequently injured during a ditching when unsecured equipment, which, if not essential to survival should have been jettisoned, was tumbled about inside the plane. Obviously, an airman if injured had less chance to make a successful escape from a sinking aircraft.[19]

Air-Sea Rescue Equipment

According to the view adopted by the Air Staff, the AAF, through whatever agency it might appoint, was responsible for the development and procurement of ASR equipment. This included the survival items carried on board each aircraft destined for flight over water, items carried on board rescue planes, and the rescue planes themselves. Little had been done in this respect before the eve of World War II. The Navy's jealous concern for its prerogatives discouraged Air Corps flights over the ocean. There was little money for research and development of any sort, and the procurement of rescue items had a very low order of priority. Nor was there much uniformity; identical aircraft often carried different types of equipment, sometimes ill suited to the requirements of a particular plane or locality; and it was consequently impossible to standardize procedure. The chief needs were means of keeping survivors afloat, provision of survival kits, ways of locating the airmen downed at sea, and means of bringing them home.[20] In spite of a late start, marked improvements were made in each of these categories

It was important to keep a ditched plane afloat as long as possible,

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certainly until the crew could enter their life-rafts. Attempts to build watertight compartments into the tail, wings, and fuselage of military aircraft had proved impractical by the mid-thirties.

The Air Corps had tried also equipping some planes with rubberized-fabric gas bags, to be inflated with carbon dioxide in the case of ditching. Thereafter, the search for built-in buoyancy remained dormant until 1943, when Second Air Force members suggested a similar gas-bag system for B-17's. The complete equipment weighed only 300 pounds and required no structural change in the bomber. Its advocates argued that the British use of flotation equipment had produced a much better record in rescues than that of the AAF.[21] The suggestion brought no results; by that time the AAF was more interested in developing a satisfactory life-raft than in experimenting with equipment to keep the whole plane afloat.

The ideal life-raft should be light in weight, small in bulk when deflated, and have stowage room for food, water, and other survival items. It—even the largest raft—should be easy to launch from ditched aircraft, be rugged enough to stand buffeting by rough seas, and be capable of being steered. To find a satisfactory balance of all these requirements took years. The first life-rafts procured for the Air Corps were a type used by sportsmen, bought on the open market in 1927. That year the Air Corps accepted a specially designed four-man raft, which was discarded in 1931 as too bulky for use. During the next five years the Materiel Division Equipment Laboratory at Wright Field developed a number of models of one- and two-man rafts, none wholly satisfactory. By 1938 most Air Corps planes were being equipped with such rafts.[22]

When the war came, the AAF followed the lead of Pan American Airways in changing to rubberized-fabric life-rafts without bladders. A five-man raft, Type A-3, was standardized in 1943. It had a design similar to that of a Navy raft and used the same fabric, a compound of natural rubber and cotton, considered more resilient than synthetic rubber and nylon. A change in the position of the bulkhead in the outer casing gave greater stability in case of a partial deflation. A newer model, Type A-3A, appeared in 1944. With one 10-inch seat, two water-ballast pockets, and a lifeline that doubled as a boarding ladder, the A-3A weighed only 36 pounds net; it measured 98 by 60 inches in size. By the end of 1944 about 150,000 Type A-3 and A-3A rafts had been delivered. Meanwhile, the AAF Materiel Center developed

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a seven-man raft, Type E, for dropping from rescue aircraft. It proved so satisfactory that it was soon made standard equipment for all planes making over-water flights with more than four men aboard.[23]

For some time before Pearl Harbor two-man rafts had been used in pursuit planes, but in August 1942 the AAF adopted a Navy one-man raft, Model AN-R-2A. Issued to each crew member in aircraft of three places or less, it was attached to the parachute harness either as a seat pack or back pad. It was not satisfactory; it had to be blown up by mouth, and it was hard to board under usual ditching conditions. Also its weather cover and patching kit were considered inadequate by some users. Modifications were hard to secure, since the design was Navy.[24]

Before the end of 1943, however, Wright Field had copies of and was testing an RAF individual dinghy, equipped with sail, water pocket, spray shield, collapsible hand pump, hand-held signals, and sea anchor. In the ETO American fliers had preferred this dinghy to any U.S. model, but in May 1944 the AAF adopted Type C-2, with a rated capacity of 350 pounds and with a wider range of accessories, including a sea anchor, keel, larger water pocket, and better sails.[25]

The limited capacity of life-rafts made imperative a careful scrutiny of basic accessories. Designers weighed the relative emergency merits of navigational aids, signaling devices, food, water, and shelter. Most selections were the result of a series of compromises. Selections for the one-man raft were particularly difficult to make, since both the raft and its accessories were carried on the flier's person. In 1942 the one-man AN-R-2A raft's equipment was simple: repair kit, bailing bucket, two paddles, concertina pump, two bullet-hole plugs, sea anchor, can of drinking water, seat pad, and two hand paddles. No food was included. In 1944 distress-signal flares, a sponge, signaling mirror, and desalting kit were added. Standard multi-place raft accessories included also fishing tackle, first-aid kits, and a packet of religious booklets. Devices used to attract the attention of rescue searchers comprised signal mirrors, sea-marker dyes, colored smoke, and, where possible, a Gibson Girl radio.[26]

No item was more vital to the airman in a raft than a supply of drinking water; this was especially true in the hot reaches of the Pacific. After tests in December 1942, Arnold ordered the immediate procurement of the Delano Sunstill, "not something Materiel Command thinks is better."[27] This still, weighing only two and one-half

pounds and simple to operate, could produce under proper conditions about one pint of water per day. Unfortunately, deliveries were delayed for a whole year. Meanwhile, Materiel Command tried to incorporate into one unit the best features of all known solar stills but failed because of the reluctance of civilian manufacturers to share trade secrets. In December 1944 the U.S. government secured the patent rights to the Gallowhun Sunstill, and, in January, Wright Field invited bids on 350,000 units built to Gallowhun specifications. However, subsequent tests showed that the Higgins Sunstill could produce twice as much drinking water as the Gallowhun type, and efforts were made to standardize the Higgins still. Because of this series of delays, which Arnold's curt remark seems to have foreseen, sun stills did not come into general use until near the end of the war. Progress had been made earlier in the development of a desalting kit, and by September 1944 they were being issued. These kits took most of the salts from sea water by chemical precipitation and filtering, but the materials in the kit were subject to deterioration.[28]

Life-preservers must provide dependable buoyancy without too much bulk, and early preference had leaned toward the highly reliable kapok jacket which could not be deflated by a bullet hole or snag. After the middle thirties, however, the need to reduce bulk and the improvement of inflation devices turned the AAF to the use of pneumatic preservers. During the early part of the war the AAF was a common user of the Navy's Type B-4, but it proved unsatisfactory because it would not keep an airman in full flying clothes afloat. A new rubberized-fabric vest, Type B-5, was developed by the AAF in 1944, designed to keep the face of an unconscious person out of the water and to exert less pressure on the wearer's body.[29]

In November 1943 the Materiel Command's Equipment Laboratory began work on an airborne lifeboat, which could be dropped to survivors who could not be picked up by surface craft, submarines, or seaplanes. Specifications were released to the Higgins Company in the spring of 1944 for a 27-foot boat, with two engines which would give a speed of 8 knots. Delivery was slow, lagging behind orders until January 1945. The boat proved satisfactory in operation. When carried by a B-17, it could be faired into its belly so as to produce little additional drag, resulting

in a loss of only 6 miles per hour. Dropped by parachute, the boat was usually released at a speed of 120 m.p.h. from an altitude of 1,500 feet. Attempts to use the B-25 as a lifeboat

carrier proved unsuccessful. In March 1945 the AAF began the modification of B-29's to enable them to carry large lifeboats for use in connection with VHB operations against Japan. The British, too, produced, shortly before V-E Day, a large airborne boat, 30 feet long and 3,000 pounds in weight and carrying twenty men. It had a cruising radius of 300 miles and could be refueled from the air and sailed by an inexperienced crew.[30]

In the European theater the AAF, because of this tardy development of its own lifeboats, was long dependent upon the British Air/ Sea Rescue Service. The first rescue using an AAF airborne lifeboat was in early April 1945 off the coast of Denmark. Six men were adrift in a raft; the waves were high, whipped by a 50-knot wind. RAF Warwicks dropped three lifeboats, but all had broken in the rough water or drifted away. A B-17 of the 5th Emergency Rescue Squadron dropped its boat. Ninety seconds after it had hit the water, the six men were aboard. Twelve minutes later they had the engine running and were heading for England. They survived a bad storm but then, having run out of gas, drifted at the mercy of the seas. On the third day a torpedo boat homed in on the lifeboat's Gibson Girl and brought the men home.[31]

A second successful drop was made on 1 May by the 1st Emergency Rescue Squadron to a fighter pilot in the midst of a minefield outside Trieste harbor. The pilot rated the operation "perfect," and he spoke with some authority, having already been rescued twice in boats dropped by the British.[32]

This pilot's confidence in air-sea rescue procedures and and equipment and his own skillful cooperation, represented a change from the early days of the war. Perhaps half of VIII Bomber Command's crews had been accustomed to flying without parachutes, partly because the weight and bulk hampered their free movements about the ship at high altitudes. B-17 pilots and co-pilots felt it useless to comply with parachute regulations when their equipment offered them so little chance for survival. After testing the Pioneer model P3-B-24 chute in combat, the 82nd Bombardment Group found it suitable for most persons and conditions. By January 1943 the Eighth Air Force had received 400 of this type and 10,000 were on order. One-man rafts could be worn with the new model raft, though at some cost to comfort.[33]

Detachable breast-pack parachutes gave greater freedom of movement,

but crewmen preferred the greater security of the back pack. Men were sometimes thrown from a plane without having a chance to grab a chest chute or missed catching it in a bad spin. Sometimes the attachment snaps did not work. Late in 1943 the AAF adopted a four- point quick-release box, similar to the RAF type for use on seat and quick-attachable parachute harnesses, and modified the back-type B-8 harness for use with this box. All production of the new harnesses and parachutes was earmarked for combat theaters, and existing stocks of the old types were issued to units in the United States.[34]

Experiments with parachute emergency kits and rations had begun well before the war. The first kit, developed in 1934, proved unsatisfactory, and, between 1939 and 1941, separate kits were developed for the tropics and the Arctic. With the United States involved in literally world-wide war, the Equipment Laboratory began to look for a single universal parachute emergency kit. In June 1943, 25,000 new B-4 kits were ordered, but production difficulties and the decision to use up existing stocks of jungle and arctic kits delayed overseas delivery of the B-4's until well into 1944. Continued dissatisfaction with pad-type kits led to production of the C-1 Emergency Sustenance Vest in 1944. Easy to put on in a hurry, the vest did not restrict movement or interfere with the parachute harness and was relatively comfortable. Of some 200,000 ordered, nearly 16,000 were delivered during 1944. When standard survival kits were not available, substitutes were designed and procured locally and at times these were preferred to the regular issue.[35] In the first rescue of a B-29 crew from the Indian Ocean, survivors credited the recovery of the wounded to the drugs contained in a homemade vest worn by a flight engineer.*

Larger kits containing rations and supplies were designed for carrying in tactical planes or for dropping to crews in distress. Most kits contained items that were specialized according to climate and terrain. This specialization produced a confusing variety of kits, and, unfortunately, the early endeavors at standardization were hampered by delays and by misunderstandings between personnel overseas, in Washington, and at Wright Field. Eventually, in the spring of 1945, it was agreed to use one basic 25-pound kit for all areas, but the decision came too late to help. Larger aerial delivery kits, weighing from 110 to 210 pounds, were designed for dropping by parachute to men who were stranded. They contained rations, clothing, first-aid material,

* See Vol. V, 97.

gun, flares, tents, and water; the selection of items differed according to the area for which it was designed. As in most cases of resupply by air, much of the emergency sustenance material was lost or ruined in the drop.[6]

Responsibility for developing a ration suitable for stowage in life-rafts was shared by Wright Field and the Army Quartermaster Subsistence Research Laboratory in Chicago. The first bail-out ration, developed in 1934, was primarily for fliers forced down on land. It was compounded of bitter chocolate, powdered skimmed milk, oat flour, and cocoa fat and was packaged in four-ounce cakes, each with a food value of about 600 calories. Palatable and a source of quick energy, this cake remained the standard emergency ration until the appearance of the Army's K ration in 1941. The K ration, however, was too bulky, too poorly packaged for use at sea, and too thirst-provoking. In 1942 the Materiel Command developed a package containing an Army D ration bar, dextrose tablets, bouillon powder, and chewing gum. In developing life-raft ration A in 1943, the Quartermaster, profiting by Navy and British experience, doubled the calorie count of the K ration and reduced its tendency to provoke thirst. Ration A was unsatisfactory, however, because of its bulk, its deficiency of vitamins, and its poor packaging. In June of that year VIII Bomber Command was authorized to procure from the British 9,000 Mark II emergency rations for issue at the rate of ten per heavy bomber.[37] A year later the Ninth Air Force was still repacking U.S. life-raft rations in Mark II tins.

In January 1945 procurement specifications called for an AAF ration including the new type A candy unit (or equivalent), sugar-coated gum, and vitamin tablets. Rations were designed for five or six man-days. chewing gum was prized as a deterrent to thirst and as a handy mastic to plug a hole or seal a can. Benzedrine tablets were sometimes supplied to be used as last-resort stimulants. The rations issued Eighth and Ninth Air Force crews were calculated to last only seven days, considered the maximum period of endurance for airmen ditching in the waters around Britain. Rations carried in airborne lifeboats were more generous both in quantity and in food vale. One developed in 1944 contained about 1,500 calories per man per day.

The most difficult task in air-sea rescue was probably that of sighting the survivors. Various devices were used by those down at sea to attract the attention of searchers—flags, mirrors, sea markers, and

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flares. Each had some utility, and each could be carried in a small raft, but all were effective only at short range. The obvious need was a radio transmitter. This requirement was recognized early in the war and was emphasized by such dramatic episodes as the long voyage of Capt. Eddie Rickenbacker's party in 1942 and the six-day exposure of Brig. Gen. Nathan F. Twining and fourteen airmen between Guadalcanal and Espiritu Santo in 1943.[39]

The first portable radio transmitter for this purpose was the SCR-578, widely known as the Gibson Girl. By July 1942 this transmitter was being carried in bombers and transport planes leaving for combat theaters, but it was not universally used until a year later. Later improvements, tested in the spring of 1944, provided accurate fixes from bearings 1,000-1,500 miles away, roughly ten times the effective range of the standard model.[40] In practice, however, the value of the SCR-578 to men adrift in a life-raft depended less on the rated power of the transmitter than on the ability of the survivors to get the antenna up. When the kite or balloon, used to raise the antenna into the air, lacked sufficient lift, two to three hundred feet of antenna wire sagged into the water, and radiation was severely affected. The British had tried launching the antenna with a Very pistol, but this attempt was unsatisfactory and was abandoned in 1943 in favor of the American method. Even with the antenna up and the transmitter in working order, the set was useless if the detachable handle of the built-in hand generator was lost.[41]

To afford long-range navigational aids and fixes, the SCR-578 was modified in the spring of 1945 to broadcast distress signals automatically on two frequencies: 500 kilocycles for homing of search aircraft and 8280 kilocycles, the world-wide emergency frequency for aircraft. During the last few months of the war the SCR-578 was being replaced by the AN/ERT-3 automatic two-frequency transmitter, which was distributed in the Pacific theaters as rapidly as it became available.[42] American manufacture of a self-contained British radio transmitter, which could be homed on by aircraft equipped either with ASC Mark II or with US SCR-521 radios, was considered, but the plan did not go through.[43]

This continued search for a better homing device was not a confession of the utter failure of the Gibson Girl. It had admirable features, which offset its weaknesses, and many airmen owe their lives to it. Communication failures were often the result of poor air-sea

rescue indoctrination or of emotional strain. The crew sometimes neglected to broadcast its position before being forced down—often inadvertently or, in the case of B-29's off Honshu, for fear of disclosing their position to the enemy. Sometimes, too, a crew sent out a distress signal and then, after landing safely, failed to notify the rescue headquarters. In November 1944, for example, a B-25 was lost in bad weather over the Indian Ocean while hunting for a B-29 that had already landed at China Bay in Ceylon. In another incident two B-29 crews that had ditched were located by returning Superforts, yet 38 hours elapsed before the searching unit was notified. In a strike against Tokyo on 24/25 February 1945, sixteen B-29's were in distress at sea, but only one used the distress frequency prescribed by current directives.[44] In other instances B-29 crews discouraged rescue submarines, highly vulnerable to enemy action during a pickup, by broadcasting their positions in the clear. Practices such as these added unnecessarily to the already difficult labors of the rescue units, and the mutual confidence, necessary for good teamwork, of the rescuers and the distressed airmen was damaged.

Navy and AAF experiments with radar for air-sea rescue had little success. Neither service was able to develop light-weight radar sets sensitive enough to find a small rubber raft in rough water and simple enough maintenance. A device known as a corner reflector, requiring no field maintenance, was developed in 1944 and standardized for joint Army-Navy use. When installed in a dinghy, the radar echo could be detected by radar-equipped aircraft flying at an altitude of 800 feet 16 miles away. If the reflector had been dependable, it would have been a great improvement over visual search, but it was too fragile for use in rough seas. Moreover, it could be used only in connection with radar-equipped search planes, never available in sufficient numbers.[45]

The choice of aircraft for air-sea rescue operations was largely determined by what was available, with such modifications as were useful and possible. Almost all aircraft types were used, including single-engined liaison planes and fighters. For example, long-range P-51D's and P-47N's stationed on Iwo Jima proved valuable for spot searches for B-29's lost along the path to Honshu. But the workhorses of the rescue program were multi-engined planes—Navy Catalinas, British Warwicks, AAF Liberators, Flying Fortresses, and Superfortresses. Each type had advantages, but none combined in desired degree the

cardinal virtues: great cruising range and carrying capacity, slow speed for searching operations, ability to land in and take off from rough water, and defensive strength against intruders. Land-based planes always, and seaplanes frequently, teamed up with the surface vessels or submarines that made the actual pickups of survivors. Sometimes, especially during the early part of the war, tactical aircraft were used for search and rescue missions, but that practice was generally considered a stop gap that interfered with combat strikes without providing the best of air-sea rescue service. Increasingly, the more suit- able type aircraft were used by units organized and trained for the rescue mission, and the planes themselves underwent modifications of varying degrees of importance. During the war no serious effort was made to design from scratch a plane for air-sea rescue service.

The rescue record of the Catalinas was a spotty one, ranging from some of the most spectacular successes of the war to discouraging failures. Its range and load capacity were satisfactory, its cruising speed ideally slow, but the Catalina had trouble in landing in rough seas and in taxiing with a heavy load aboard. During one period in 1944, CBI's Eastern Air Command reported that half the Catalinas sent on rescue missions cracked up on landing, leaving two planes in trouble instead of one.[46] The Catalina, awkward in flight and lightly armed, was quite vulnerable to enemy attack.

Eastern Air Command used also RAF Warwicks, which could carry the droppable lifeboats possessed by the command. But the Warwicks did not have enough cruising range for the sprawling theater in which EAC operated. In range and in rugged dependability, the Liberator was more satisfactory, but it was too fast for meticulous searching, and its turning radius was so great that spotters on board could easily lose a sighted dinghy as the bomber came about. Nor could the B-24 carry a lifeboat. On balance, however, it was the best plane available, and by January 1945 most emergency rescue crews in the command had converted to Liberators, and in that month they did more flying in support of long-range combat operations than had been done in the previous seven months with twice as many Warwicks.[47] For the long-range work the British Air Ministry proposed to use Lancasters—which it was planning to redeploy in large numbers to the Pacific after victory in Europe—and in the spring of 1945 worked on an airborne lifeboat to fit that famous bomber.

AAF officers were dubious when the British tried to equate the Lancaster with the B-29 as a very-long-range aircraft, and on both performance and potentiality they were correct. The unique qualities of the Superfortress were as obvious when it was used for air-sea rescue as for bombing missions. It had the great range and staying power for a search mission of fourteen or fifteen hours, and it was so heavily armed that it could work where other search planes dared not go; in fact, on a number of occasions B-29 rescue planes were able to defend both the airmen in a life-raft and would-be rescuers in a submarine or surface craft from Japanese attacks. It was axiomatic that only a B-29 rescue plane could cover the whole radius of action of B-29 bombers, and the rescue mission became increasingly significant as the weight of attack from the Marianas against the Japanese home islands increased. The first Superforts so used were regular bombers or, more rarely, the F-13 reconnaissance model, fitted out locally with rescue equipment. In 1945 a special rescue model was developed, called the "Superdumbo"—the Catalina had been unofficially named the "Dumbo." The Superdumbo carried extra radio equipment and operators, rafts, provisions, survival kits, radios, and other supplies to be dropped to airmen in the water.[48] Eventually, the rescue B-29 was equipped with a large, powered lifeboat.

Perhaps the most significant addition to the rescuer's equipment late in the war was the helicopter. Its advantages were numerous. It could search minutely the local area in which the fliers were reported as down and could snatch men off a raft under almost any sea conditions. Although of limited range, the helicopter could take off from a small deck, a jungle clearing, or a beach and hence had a high degree of mobility. In May 1944 the Eighth Air Force asked for six helicopters, each capable of carrying a payload of 1,800 pounds, considering them especially valuable for service in foggy weather. During the next twelve months fifteen R-6 helicopters were sent to China and the Southwest Pacific. By June 1945 helicopters were a standard part of the equipment of emergency rescue squadrons, and AAF Headquarters was planning to use 140

of them by the end of the year. The full exploitation of the helicopter as a rescue instrument came after V-J Day, though fortunately before the Korean War.[49]

areas. But both the submarine and PBY had tactical and performance weaknesses, and the leading role in the climax of the complex rescue mission—the removal of men from the sea—was usually played by some surface vessel.

The surface-rescue vessels ranged in size from crash boats and motor launches to destroyers, and each type had its virtues and limitations. Because the prime responsibility for air-sea rescue fell to the British in the ETO and CBI and to the U.S. Navy in the Pacific areas, most of the surface craft were outside the purview of the AAF. Nevertheless, the AAF did procure and operate boats of its own.

In 1943 responsibility for operating Army surface vessels in air-sea rescue service was transferred from the Quartermaster Corps to the Army Air Forces. This change in policy, though not at the instance of AAF Headquarters, was in keeping with its doctrine that airmen should have full control of facilities used in emergency rescue. The equipment ranged from 16-foot swamp gliders and 22-foot shallow-draft boats to seagoing vessels up to 104 feet in length. Delivering the largest boats to overseas units proved a difficult problem. To save the wear and tear of a long, rough voyage under their own power, they were shipped as deck loads on larger vessels. Such passage was not always easy to arrange, for there was a constant shortage of deck space, and some overseas ports lacked necessary facilities for the unloading. The AAF accordingly tried to exchange its 104-foot rescue boats for 63-foot high-speed Navy craft, some of which Arnold had already obtained from Admiral King. Eventually, from the several types the AAF developed a standard 85-foot emergency rescue craft.[50] But no craft was ever designed that combined in satisfactory degree the high speed, long cruising range, and seaworthiness that the AAF sought, and the performance of standard boats was never wholly adequate, even when they worked out of secret harbors or from mother ships far in advance of the bases used by the aircraft whose missions they supported.[51]

Training rescue boats crews was at first left to the appropriate theater commands. But late in 1943 all Quartermaster Corps rescue-boat activities were reassigned to the AAF, and Training Command assumed responsibility for individual training for Emergency Rescue Boat operations. Unit training of boat crews, ranging from four to thirteen men, fell first to the Fourth Air Force, later to the Third.[52]

Rescue Operations

When in September 1942 the Air Ministry agreed to provide air-sea rescue services for the Eighth Air Force, the Eighth was relieved of any immediate necessity of building a service of its own. The British in March 1940 had established a unified system of communications, assuring speedy transmission of emergency calls from airmen forced down in the English Channel or in the North Sea to the closest rescue agencies. In the following August, just as the Battle of Britain

approached its peak, a more formal organization of air-sea rescue services was achieved by agreement between the RAF and the Royal Navy. The airplane, used chiefly for search and spotting, was teamed with the surface craft, which usually effected the actual rescue of airmen forced down in waters adjoining the British Isles. An improved communication network made it possible for joint command posts to mobilize the full resources of the services as the emergency might require.[53] Deep-sea searches were made by the Coastal Command, which in January 1943 deployed about forty Hudsons and Ansons in this mission. Searches less than forty miles offshore were handled by RAF Fighter Command groups using Spitfires, Ansons, and Walruses.[54]

In Europe AAF units devised their own ditching procedures and emergency training methods, adapting current RAF practices. Whatever virtue the Eighth Air Force directives may have had, they were ineffective in operation. Ditching drills were often perfunctory, and aircrew indoctrination remained imperfect. Some pilots put an unnecessary strain upon a hard-working service by their reluctance to admit they were in trouble until it was too late to render help easily. There was a widespread feeling that airmen should always bail out of a doomed plane rather than try ditching even when parachuting would mean almost certain death from cold or drowning. Some air crews were ill informed about their duties in a ditching or crash landing; others lacked skill in the use of life-raft equipment; others were remiss in the use and care of flying clothes. There was little coordination between the agencies responsible for the procurement of emergency equipment and the operational units that used it. In time-honored military fashion, some crews hoarded scarce equipment while others suffered serious shortages. Medical officers noted these weaknesses in the air-rescue program with concern, for at times the consequent medical problems almost dwarfed those that were standard among combat fliers.[55]

The fault lay partly with procedure, partly with the equipment. Late in 1942 the life-raft situation was described as "critical, deplorable and confused." In theory an entire bomber crew could get into the large life-raft and help each other while awaiting rescue, but in practice too many airmen who bailed out were drowned because they were unable to reach the raft. Those who parachuted seldom landed close together, especially in bad weather. There was a pressing need for a dependable multi-place raft for the bomber crew that ditched and for a one-man raft or dinghy—in addition to the life-preserver—that could be worn in flight and inflated quickly after hitting the water in a bail-out. British dinghies, though liked by U.S. fliers, were not readily adaptable to their crew positions and were in short supply. For want of standard equipment, Eighth Air Force crews had to get along with makeshifts.[56] Time provided the answer to many of these problems, but, meanwhile, losses of American crews were high when compared with those of British airmen, who depended upon the same rescue agencies.

As the Eighth Air Force surmounted its own peculiar problems of equipment and training, it began to take a share in the actual work of rescue. By the summer of 1943 the 65th Fighter Wing was charged with the operation of a rescue-control station for the specific purpose of fixing the location of American aircraft in distress. In September VIII Bomber Command assigned one bomber per group for search along the routes of its bomber missions upon request for this assistance by Air Sea Rescue. Early in 1944 the 65th's rescue-control detachment, located at Saffron Walden, used fighter aircraft to patrol routes followed by returning bombers. Later, in the spring, the AAF agreed to provide 25 P-47's for these patrols, and the RAF placed 8 Walrus

bombers and amphibians on call from Saffron Walden for the rescue of American crews. The Americans at no time undertook the development of a separate rescue service, but they did add over 200 emergency rescue personnel to the theater's troop basis late in 1944 and supplemented available equipment with 6 OA-10A aircraft, the Army's version of the Catalina. The rescue control detachment of the 65th Fighter Wing became the 5th Emergency Rescue Squadron early

Similarly, in North Africa and throughout the Mediterranean the AAF depended heavily upon the RAF's superior experience and organization. Not until the summer of 1943 did the AAF have a rescue

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organization of its own—a detachment equipped with three or four worn-out Catalinas, which had been flown by ATC from Florida.

Planes and crews belonged to the Twelfth Air Force, but they operated closely with British units under NAAF's Coastal Command. At the end of the year the crews of this detachment, no doubt because of their experience, were ordered home to serve as instructors at the newly established Emergency Rescue School at Keesler Field in Mississippi, where the AAF now undertook to organize and train its own rescue units. Appropriately, the 1st Emergency Rescue Squadron was assigned to the Mediterranean, where it began operations in April 1944. Early in 1945 two of its three flights were reassigned to India as the nucleus of a newly established 7th Emergency Rescue Squadron.[58]

Thus from the beginning to the end of the European phase of the war, the AAF depended heavily upon its British allies for the rescue

of American airmen. It was from the British that the AAF borrowed many of the ideas that shaped the organization of its own emergency rescue service. Since in Europe and Africa the problem was to rescue airmen forced down in the relatively narrow limits of the English Channel, the North Sea, and the Mediterranean, it was natural that rescue services emphasized the partnership of airplane and surface craft. Equally natural, perhaps, was the AAF's tendency to assume that in the development of its own services this partnership should be perpetuated, even to the extent of committing the Air Force to the procurement and operation of a large number of surface craft. But experience—especially in the Pacific, with its much greater distances— was to call this assumption into question before the war had ended.^{5^{9 }In the war against Japan the U.S. Navy, like the Royal Navy in the North Atlantic and the Mediterranean, carried the main burden of air-sea rescue. Only in the Southwest Pacific did the Army have the top command and thus, in a sense, the primary responsibility. There, until the summer of 1942, air-sea rescue was handled on an emergency basis with whatever equipment was available. Fortunately, the Royal Australian Air Force possessed a few PBY's, and in August the Fifth Air Force received four of its own. These planes were of great aid in the current attempt to develop a systematic pattern of search in the interest both of reconnaissance and of rescue. As a makeshift air-sea rescue service developed, the responsibility fell largely to the V Fighter Command, which also took the lead in the preparation of

manuals for the guidance of pilots forced down in the New Guinea jungles. The Fifth Air Force received its first emergency rescue squadron (2d ERS) only in July 1944. Meanwhile, units of the Seventh Fleet and Navy PBY's had supplemented the resources of the Fifth.[60]

It was in the South Pacific that the Navy's PBY won its fame as the Dumbo. The "Dumbo was used to attempt the most hazardous of rescues, and in an astonishing number of instances plane and crew came through the venture successfully.* The courage and dedication of the Dumbo crews helped in a real measure to overcome the shortage of rescue aircraft and survival equipment. The shortage of the latter was so serious that General Twining, commanding the Thirteenth Air Force, was down at sea for six days in January 1943 without the means for radio contact with those who sought his rescue,† After the Thirteenth had completed the successful campaigns of the Solomon Islands and had joined forces with the Fifth under the newly created Far East Air Forces (FEAF), the 2d ERS was assigned to the Thirteenth in October 1944, when the Fifth received the newly arrived 3d ERS.[61] Despite the unaccustomed degree of self-sufficiency made possible by the presence of two AAF rescue units, FEAF continued to receive the assistance of Navy Dumbo squadrons.

On 24 November 1944 the XXI Bomber Command began long-range operations against Japan from Saipan, and the 4th ERS was sent to the central Pacific for support. But it was April 1945 before the 4th ERS was in operation with three of its PBY's at Peleliu. Meanwhile, the rescue service for the B-29's, which had to fly from the Marianas across 1,400 miles of open sea to reach their targets on Honshu, was the subject of negotiation between the AAF and the Navy.

By 1944 the AAF would have liked to have been more independent of the Navy in rescue aid in the Pacific Ocean area than it was prepared to be. It would have preferred to have its own rescue agencies operating under its own command, but this was out of the question. By decision of the Joint Chiefs of Staff, Admiral Nimitz, CINCPOA, was responsible for air-sea rescue. Responsibility in turn was assigned to Vice-Admiral John H. Hoover, who as commander of the Forward Area established the Air-Sea Rescue Task Group under Capt. H. R. Horney, with units at Saipan, Guam, Peleliu, Ulithi, and, after

* For accounts of two of the more daring rescues, see Vol. IV, 265-66, 355.
† See Vol. IV, 79.

February 1945, on Iwo Jima. Surface craft and submarines were made available on request from Captain Horney in accordance with the schedule of B-29 strikes as reported by Headquarters, XXI Bomber Command.* The submarines served as lifeguard stations at regular intervals along the route. Normally, they reached their rendezvous points approximately two hours before the aircraft were due and stayed in position until all planes were accounted for or until further participation in the search seemed unjustified. It was a costly business, for the submarine might be drawn from its regular patrol with a consequent weakening of the blockade that constituted its chief mission. Necessarily, employment of the submarines was restricted to exceptional missions.

The 4th ERS performed valiantly during the few months of combat that remained after its deployment. Its planes and the B-29's of the XXI Bomber Command contributed significantly to the development of a technique of "escort and orbit" that had grown out of a long experience in the Pacific. By providing an escort of rescue planes and by stationing others at stated intervals on the homeward route, the escort and orbit system added greatly to the total effectiveness of rescue efforts. Before the war ended, the AAF had provided eight B-17's equipped for dropping motorboats and a number of B-29 Superdumbos. But it was the Navy—its Dumbos, its surface craft, and its submarines—that did the major part of the work; and it was the U.S. Marine Corps, at a cost of 20,000 casualties, that gave a crippled B-29 a chance to land at Iwo Jima on its way home.

As the end of the war approached, plans for the invasion of Japan called for new efforts to increase rescue forces and to co-ordinate even more effectively rescue activities. The 5th ERS was scheduled for re-deployment from ETO to the Pacific. The 6th ERS was assigned to the Fifth Air Force, which put part of the squadron on Okinawa in July. In August two flights of the 7th ERS were transferred to Okinawa from India, where they had assisted the RAF emergency service for the past few months. On 5 August representatives of AAF Headquarters and of the Fifth, Seventh, Thirteenth, and Twentieth Air Forces conferred at Manila. Agreement was reached for publication, after co-ordination with Admiral Nimitz, of instructions that would standardize all procedures in rescue operations during the coming invasion.[62] But on the next day the first A-bomb was dropped on Hiroshima.

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* The subject of rescue is fully discussed in Vol. V, 598-607.

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Footnotes

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[52]Daily diary, Mil. Req. Div., 19 Feb. 1943; AC/AS, OC&R, Daily diary, 6 Jan. 1944.

[53]Historical essay on air rescue service by Dr. Charles H. Hildreth, Air Historical Office (hereinfafter cited as Hildreth Essay).

[54]Memo for Comdy. Prov. Med. Fld. Service Sch., 8th AF from Hq. Prov. Med. Fld. Service Sch., 8th AF, 24 Jan. 1943; ltr., Hq. USSTAF to CG 8th AF, 30 Aug. 1944.

[55]USSTAF, Dir. on ASR, 30 May 1944; rpt. by 1st Central Med. Establishment, 8th AF, history and evaluation of 8th AF personel equipment program (n.d.).

[56]Memo for Col. M. R. Wood, Ch., Supply Sec., 8th AFSC from Capt. R. W. Chaffee, Req. Sec., 8th AFSC, 21 Nov. 1942; ltr., 8th AFSC to CG ASC (received 27 Apr. 1943); msg., 8th AF to CG AAF, 11 June 1943.

[57]Hildreth Essay; ltr., Hq. 8th AF to CG VIII BC, 10 Sept. 1943; ltr., Hq. II Air Div. to A-2 Secs., all Wings *et al*., 15 Mar. 1945; ltr., Hq. USSTAF to CG 8th AF, 30 Aug. 1944.

[58]Hildreth Essay; memo by Maj. Charles H. Williams, 12th Ftr. Gp., 29 Apr. 1944.

[59]See discussion in Hildreth Essay.

[60]*Ibid*.; see also, account of operations in SWPA in *AAF in WW II*, Vol. IV.

[61]Hist. 5th AF, 15 June 1944—2 Sept. 1945.

[62]AC/AS, A-3, Daily acty. rpt., 22 Aug. 1945; Hildreth Essay.