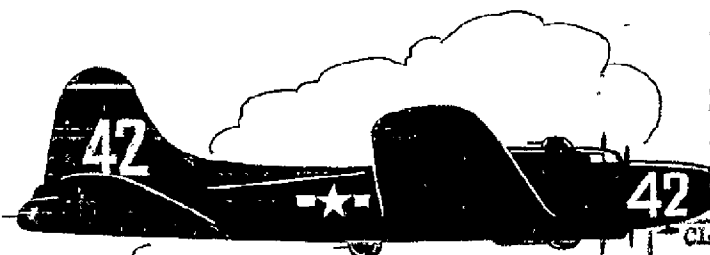


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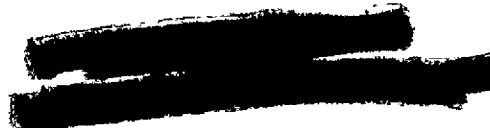
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1. REPORT DATE SEP 1944		2. REPORT TYPE		3. DATES COVERED 00-00-1944 to 00-00-1944	
4. TITLE AND SUBTITLE Pilot Transition to Combat Aircraft				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Historical Research Agency (AFHRA),600 Chennault Circle,Maxwell AFB,AL,36112-6424				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 272	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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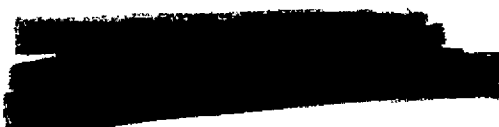

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PILOT TRANSITION TO COMBAT AIRCRAFT

Wesley B. McPhee
Prepared by
Assistant Chief of Air Staff, Intelligence
Historical Division
September 1944

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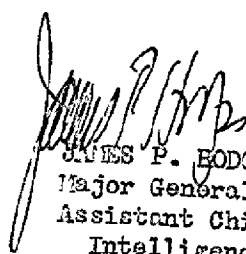
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FOREWORD

It is the desire of the President, the Secretary of War, and the Commanding General, AAF, that a solid record of the experiences of the Army Air Forces be compiled. This is one of a series of studies prepared as "first narratives" in the projected over-all history of the AAF.

The decision to make the information contained herein available for staff and operational use without delay has prevented recourse to some primary sources. Readers familiar with this subject matter are invited to contribute additional facts, interpretations, and constructive suggestions.

This study will be handled in strict compliance with AR 380-5.


JAMES P. HODGES

Major General, U. S. Army
Assistant Chief of Air Staff,
Intelligence

Note: Readers are requested to forward comments and criticisms, and to this end perforated sheets, properly addressed, are appended at the back of the study.

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Pilot Transition to Combat Aircraft

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INTRODUCTION

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Transition training, a stage in the development of a pilot's skill, begins when he first faces the controls of an unfamiliar airplane. It reoccurs as the first stage of progression to each new and more complex plane. Thus a pilot passes through a period of transition each time he learns to fly a specific type of aircraft. The necessity for transition to operational aircraft has existed since the time of the first employment of combat types. But as the airplane has increased in complexity and has become more specialized in use, the differences between the performance characteristics of training planes and those of the many different types designed for combat have become increasingly marked. To bridge these widening gaps, the period of transition training has become more prolonged. Transition training has also been influenced by other factors: the experience of the trainee, the press of time, the relative financial value of equipment in peace and war, and the administrative regulation provided by the governing agency.

Transition to combat types of planes has taken place either in specialized schools for the individual training of pilots or in tactical units. The majority of Air Corps pilots have received their first transition to combat planes in specialized schools either for training in a specific class of aviation or solely for transition to an individual type of plane. There have been times, however, when first transition has taken place in the tactical units--both training

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and operational. As the newest types of aircraft have always reached the tactical units first, the burden of the development of new transition methods has fallen to the tactical units. Thus the function of transition training has cut across all units--those primarily concerned with the training function, individual and operational, and those to which the training function is only preparatory to the performance of their primary mission.

From time to time, because of shifting training requirements and the aim and type of program of the conducting agency, the scope of transition has changed. It has been an informal step to further tactical training or a production-line program with the transition process the primary end. In its most refined definition, transition is familiarization with the plane's operation, but often actual familiarization and more advanced operating techniques are merged under the name of transition. It may be said that transition can be of two types: it may be only elementary familiarization with the operating characteristics of a plane, or it may include all individual training in a particular combat type.

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Chapter I

TRANSITION, 1917-1937

World War I

Out of World War I came the first combat aircraft and the first concepts of the employment of the several types of aviation, but the task of their development was that of other powers rather than of the United States. The contribution of American aviation was mass production of pilots and proven types of planes. Time did not exist for aeronautical experimentation. Until the last months of the war American pilots flew foreign aircraft. At the date of the Armistice, the De Havilland observation plane and day bomber, an adaptation from the British, had been in action but a short time, while the Martin¹ twin-engine bomber was just going into production.

Similarly, in 1917 the United States was without adequate facilities for the mass training of pilots, but a system of flying schools was soon established. After attending ground school and receiving primary training on training type airplanes, pilots progressed to advanced schools where they were given training on tactical equipment, specializing in one of three kinds of aviation, pursuit,

1. Maj. F. P. Lahm, "History and Development of the Air Service" (U-Stencil 370 A. S.), 11; Annual Report of the Director of Air Service (1919), 9.

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bombardment, or observation. Although advanced schools existed in the United States, it was not until the last months of the war that a few combat aircraft became available for training purposes. Consequently, the majority of primary graduates were shipped overseas and received their advanced training in specialized schools in France, England, or Italy. It was in the advanced schools that the first transition to² combat type aircraft occurred.

Establishment of the Peacetime Training Program

With the cessation of hostilities and the return to a peacetime basis, air training changed to the pattern it was to follow until the mobilization of America for another war. This system entailed the completion of individual training on service types of aircraft in the pilot schools and further tactical training in the operational units. But as newer type planes always reached the tactical units first, necessarily pilots learned to fly them in the tactical units. Thus transition to service type aircraft occurred both in the individual and operational training agencies.

Transition Training in the Advanced Schools, 1919-1926

On 11 November 1918 orders were issued to all flying schools to abandon training. Nevertheless, limited instruction, although undefined

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2. Annual Report of the Director of Air Service (1919), 46. A detailed discussion of training at one of the schools in France is given in Hiram Bingham, An Explorer in the Air Service.

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and uncoordinated, continued throughout 1919. Based on methods evolved during the war, advanced training was concentrated at three specialized schools on 7 January 1920. Bombardment training was given at Ellington Field, Tex., pursuit at Rockwell Field, Calif., and observation at Post Field, Okla. With further retrenchment and curtailment of expenditures, on 28 June 1922 all training was centralized in the San Antonio, Tex.,
³
 area. Advanced training was given at Kelly Field where primary
⁴
 graduates specialized in bombardment, pursuit, attack, or observation
 aviation.

During this postwar period Air Service equipment with a few exceptions was of World War I vintage. The training program was a refinement and expansion of that developed under the pressure of war-time training. Necessarily, the first phase of advanced training was transition, or transformation as it was sometimes called, to service type aircraft. In all types of aviation the step from training to operational aircraft was relatively simple, but some differentiation in transition to the various types is reflected in representative programs of instruction of the period.

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In pursuit, 8 to 12 hours were devoted to transition. One pro-

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3. Outline of Heavier-than-Air Training, Air Corps Training Center, 23 June 1937, in AAF Library.
 4. Annual Report of the Chief of Air Service (1922), 13. In 1922 the designation "attack" was officially adopted as a class of aviation. History of III Bomber Command, 1932-1941.
 5. Course of Instruction and Training for Pursuit Pilots, 1st Pursuit Group, 24 Oct. 1921, in MAG 552.11 C, Course of Instruction.

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gram of instruction prescribed that the first four hours were to consist of dual control airwork and landings in which the instructor was to teach the "student to hold up the nose and let him try a few landings to get used to the increased speed." If the instructor desired, a few dual control acrobatics were to be performed in order to increase the student's confidence. Upon completion of this phase the trainee was to devote four more hours to practice solo airwork and landings before he progressed to further individual training. Attack transition was

quite similar. One program specified that in the five transition hours the different performance characteristics of the new plane such as turning and climbing were to be pointed out to the trainee, and as soon as the instructor was confident of the student's ability, he was to be allowed to fly alone. Observation transition also differed little. In the allotted 10 hours, trainees were given both dual instruction and solo practice consisting of airwork, landings, and forced landings.

As the operational aircraft increased in size, weight, speed, and complexity, however, the gap between the performance characteristics of the training airplane and the combat type widened. The transition process therefore became more prolonged and detailed. In early

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6. U-98 A. S., Program of Air Service Training, Syllabus of Advanced Pursuit Training, June 1919.
 7. U-98 A. S., Program of Air Service Training, Curriculum for Depot Attack Squadron, June 1919.
 8. Program of Instruction, Airplane Observer and Observation Pilot, Air Service Observation School, Post Field, Okla., 1921, in AAG 352.11 C, Course of Instruction.

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bombardment training this factor, coupled with the fact that time was cheap and equipment more dear, caused more emphasis to be placed on the transition phase. An early program of instruction specified:

Under the present peacetime program, more time will be given to new arrivals in transformation and solo training on bombing type airplanes, which will eliminate to a great extent injury to personnel and destruction of equipment. Accurate flying on service types should be the aim of the student and instructor. Stalls, side slips, and spirals, intelligently taught and used, will give the student the limits of his new equipment, and proper and efficient handling thereof.

At Kelly Field, out of the total 30 hours of advanced training, bombardment transition was allotted 14. The first four consisted of dual work in both the rear and front seats; the following 10 of solo practice in airwork, take-offs, and landings.

In all types of aviation, ground instruction was coordinated with the separate stages of flying training. Ground instruction accompanying transition was designed to demonstrate to the student the purpose of transition and the desired results, to increase his interest in the type of aviation to which he had been assigned, and to afford an introduction to the other aspects of the ground course.

Transition at the Training Center, 1926-1939

During the period of retrenchment and curtailment of expenditures after the war, the Air Service was obliged to use wartime equipment.

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9. U-98 A. S., Program of Air Service Training for U. S. Depot Bombardment Squadron, June 1919.
 10. Aerial Bombardment Course for Pilots, prepared by 2d Bombardment Group, Kelly Field, Tex., 24 Oct. 1921, in /AS 352.11 C, Course of Instruction.
 11. U-98 A. S., Program of Air Service Training, June 1919.

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Gradually, however, these obsolete aircraft began to deteriorate beyond the point of economical repair. With the revitalization of the Air Corps in 1926 and the initiation of the Five Year Program, sirmen were at last able to turn to the development of the predecessors of modern type planes. Military airplanes were standardized into six types:
12
pursuit, bombardment, attack, observation, training, and cargo.

Replacements were secured. The Boeing PW-9 series and the Curtiss P-1 became standard pursuit types, while in 1927 the first supercharged pursuit, the P-2, came into general service. The De Haviland observation plane gave way to the Curtiss O-1 and Douglas O-2, while the A-3 attack plane was adopted as standard. In bombardment, the first of the modern bomber series to appear were the Keystone B-1 and the Curtiss B-2. These "stick and wire" bombers were standard operational
13
equipment from 1927 to 1934.

Slowly these new planes made their appearance at the Training
14
Center. Primary flying, now subdivided into primary and basic, covered a period of eight months, with transition to service type observation equipment at the end of this period. This enabled the student to continue specialization in any type of equipment in the
15
four-month advanced course. Presumably, these new planes did not

12. Annual Report of the Chief of Air Corps (1927), 49.

13. Ibid., 50, 51; Annual Report of the Chief of Air Service (1924), 52, 53; ibid. (1925), 25; The Aircraft Yearbook (1933), 66.

14. On 16 Aug. 1926 the Air Corps Training Center was created, consisting of Duncan, Brooks, and Kelly fields. In August 1928 Randolph Field was procured. Air Corps News Letter, 1 Aug. 1939.

15. Annual Report of the Chief of Air Corps (1927), 40.

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require as great a change in the transition program as was occasioned by later types. The advanced program of instruction was designed "to qualify graduates of the Air Corps Flying School in the basic duties common to junior officers of the Air Corps in the special duties of Attack, Bombardment, Pursuit or Observation Aviation." For all types, out of the 113 hours to be devoted to flying training, the first 15 were allotted to transition to the specific type of aviation for which the student was destined. In addition to flying training, the trainee¹⁶ received a comprehensive ground course of instruction.

Gradually during the 1930's, although appropriations were small, the Air Corps developed and received new types of planes. Biplanes were replaced by more high-powered monoplanes, outstanding examples of which were the B-10B Martin twin-engine bomber, the P-26 pursuit, and the A-17 attack plane.¹⁷ As tactical units were accorded first priority in the allocation of the latest types, and as the number of new planes was small, the supply of operational aircraft in the Training Center was not always adequate to meet the training need. For¹⁸ example, as late as 1939 pursuit training was conducted on P-12's. With one exception, throughout the 1930's the organization of the training program remained substantially the same. On 1 March 1937, as a result of a new Air Corps policy to assign new graduates only

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16. Program of Instruction for the Air Corps Advanced Flying School, Kelly Field, San Antonio, Tex., 17 Aug. 1926, and ibid., 1 Mar. 1928, in AGO 352.11 E, Course of Instruction; U-567 A. C., rev., 26 Aug. 1932, Program of Instruction for Advanced Flying School, Kelly Field, San Antonio, Tex.
17. Annual Report of the Chief of Air Corps (1933), 42; ibid. (1935), 31.
18. Air Corps News Letter, 1 Apr. 1939, 22.

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to single-engine tactical units, advanced training in bombardment aviation was discontinued. Trainees specialized in other types of aviation but were given some maintenance training on twin-engine air-
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 planes. A year later, however, bombardment training was re-estab-
 20
 lished. During these years, the depression dictated preservation
 21
 of equipment; training continued under the established program; and
 transition of trainees to service equipment was accomplished carefully.
 But in 1939 in connection with the Air Corps expansion program, the reorganization of the individual training agency and the great increase in the number of trainees forced specialized training out into the
 22
 tactical units. All transition to combat type aircraft became the function of the operational units.

Transition in the Tactical Units, 1919-1937

As transition is a continuing process, effective each time a pilot meets a new type of plane, pilots were given transition training for operational aircraft in the tactical units. Such flying was always subject to local station regulation; therefore, it was under the supervision and tutelage of the individual squadrons that pilots received such training. In the early days, although regulatory authority was completely decentralized, the procedure for checking off

19. Annual Report of the Chief of Air Corps (1937), 27.

20. Ibid. (1938), 29.

21. U-357 A. C., Program of Instruction for the Air Corps Advanced Flying School, Kelly Field, San Antonio, Tex., rev., 22 Jan. 1934.

22. C/AC to AG, 15 Mar. 1939, in AAG 352.11 F, Course of Instruction.

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pilots was similar throughout the Air Corps. Prior to the adoption of the more complicated types of planes, transition to a plane that differed only slightly in operating characteristics from other service equipment was a simple operation for an experienced pilot. It consisted of no more than an explanation of controls and individual flight characteristics of the plane. An early Bolling Field regulation simply stated that "No officer will fly ships of types which he has not flown before until he has been instructed in that particular type of ship, and turned loose by the direction of the Officer in Charge of Flying. The same will apply to men who have had no front seat work, if they are to fly from the front seat."²³

Throughout the period of tactical utilization of World War I equipment, transition remained subject only to the regulation of individual commanders. But in the late 1920's with the acquisition of the first models of the modern aircraft series, general regulation by higher authority first occurred. This was dictated by the traditional policy of preservation of equipment. Reports had reached the Office of the Chief of the Air Corps (OCAC) that lack of familiarity on the part of pilots with their equipment had caused a number of forced landings and accidents. It was therefore prescribed that "Station Commanders and commanding officers of separate Air Corps activities will take the necessary steps to insure that all Air Corps pilots are familiar with and have demonstrated an operating knowledge of all

23. U-206 A. 3., Rules and Regulations of the Flying Department, Bolling Field, D. C., July 1919.

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instruments, controls, starting ignition and fuel systems, and other special installations on all types of airplanes which these pilots are called upon to operate." Pilots were also to demonstrate a similar knowledge at factories or at stations other than their home airdromes. Thus, although general transition regulation had begun, final determination of the individual transition process remained with the unit commander.

The adoption of each more complicated plane presupposed a further definition of the transition process. Such was the case in 1928 when the three-engine C-2 cargo plane appeared in general service. The C-2 and its successors (C-3, C-4, C-5, and C-7) were soon subject to both instructional regulation and eligibility qualifications. The CCAC ruled that

Care will be taken to insure that pilots do not solo multi-engined airplanes until they have become thoroughly familiar with operation under various conditions of load and engine power through instruction received from more experienced pilots. Such instruction will include flying the airplane at a safe altitude for testing the flying characteristics using two of the three engines, varying the combinations. . . . Only those pilots whose records indicate good judgment, whose recent flying practice has been sufficient to insure skill, and who have received the instruction indicated . . . will be permitted to pilot multi-engined airplanes.

Aside from the three-engine cargo types, regulation of transition procedure did not change until more advanced aircraft--B-10's, B-12's, B-26's, A-17's, and C-46's--began to replace older service types.

24. AC Circular No. 60-8, 10 Aug. 1929.

25. Annual Report of the Chief of Air Corps (1928), 57.

26. AC Circular No. 60-2, 30 Apr. 1929.

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In 1936 the practice of using check lists was adopted, and gradually transition requirements became more defined and regulations more detailed. The General Headquarters Air Force Training Directive for the fiscal year 1937 prescribed that prior to individual tactical training, units must first give "training to familiarize the pilot with landings and take-offs with the type of equipment used by the combat organization to which he is assigned and to familiarize him with base and auxiliary air-drome facilities." In bombardment and attack aviation a minimum of 15 hours' transition, 10 day and 5 night, was prescribed; while 9 hours, 6 day and 3 night, were required for pursuit and observation. Further

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amplification was left to the discretion of unit commanders. Thus transition procedure, although similar throughout the Air Corps, differed in detail with the individual stations. A representative example of the growth of transition regulation is the method for transition to the B-10B used in the 9th Bombardment Group in 1936. In addition to familiarization with local flying regulations and communications procedure, pilots undergoing the checking-off process were required to pursue a definite training schedule:

29

- a. Fifteen (15) hours flying and one hundred (100) landings.
- b. 1st and 2nd hour: Wheels down, propeller low pitch, flaps up, ten (10) landings per hour.
- c. 3rd, 4th, and 5th hour: Wheels down, propellers low pitch, flaps down, ten - twenty - thirty and forty degrees, ten (10) landings per hour.

27. Ibid., No. 60-6, 28 Oct. 1936.

28. GHQ AF Training Directive, Heavier-than-Air for the Fiscal Year 1937, 25 Apr. 1936, in AAG 353.9 A, GHQ AF Training Directive.

29. Operations Memorandum No. 11, Hq., 9th Bombardment Gp., 20 Apr. 1936, in AAG 353.9, Transition Flying Instructions Issued by GHQ AF Units.

- d. 6th, 7th, and 8th hour: Wheels down, propellers variable pitch, single-engine flight, use of tabs, ten (10) landings per hours.
- e. 9th and 10th hour: Wheels up, propellers variable pitch, spot landings.
- f. 11th - 15th hour: Five (5) hours cross country, determine data on cruising speeds, fuel consumption, etc.
- g. Two (2) hours conference with Engineering Officer.
Two (2) hours conference with Communications Officer.
Two (2) hours conference with Armament Officer.

Summary

During the 20 years from 1917 to 1937 the Air Corps employed equipment ranging from the earliest combat types to the predecessors of modern aircraft. As these planes increased in performance, transition procedure became more complicated. This development was most discernible in the tactical units where transition moved from a simple check off on World War I equipment to a 15-hour program on the B-10B. Prior to the appearance of multi-engine types, all transition regulation remained in the individual unit. With more modern aircraft, however, for the first time higher headquarters proscribed general procedure and eligibility qualifications--a practice that was to increase in importance with the acquisition of modern aircraft.

Chapter II

THE HEAVY BOMBER AND ITS INFLUENCE ON TRANSITION,
1937-1939The Advent of the Heavy Bomber

While the B-10B was becoming standard equipment, the Air Corps was laying plans for an airplane that would revolutionize the employment of bombardment aviation. By mid-1937 the first of the long-range bombers, the Boeing four-engine B-17, had been delivered.¹ The advent of the B-17 and the new Douglas twin-engine B-18 exerted the most profound influence on transition method. In 1937 the Air Corps still had to practice strict economy, and the first step in the utilization of these new aircraft was the transition of pilots to equipment unprecedented in financial cost and operating complexity. Consequently, around the B-17 and B-18 a host of transition regulations and procedures sprang up. Governing authority became more centralized, methods more uniform. Not only did these new regulations and procedures affect bombardment aviation, but their force was felt by all types. They resulted in the further definition and standardization of the entire transition function.

The Establishment and Effect of Eligibility Qualifications

So great was Army preoccupation with minimizing the accident rate

1. Annual Report of the Chief of Air Corps (1937), 38.

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on the new bombers and thereby preserving expensive equipment, that concurrent with the delivery of the first YB-17's, the Chief of Staff, Gen. Malin C. Craig, directed G-1 to conduct a study on airplane accidents. G-1 called upon the Commanding General, GHQ Air Force, in whose units the new planes were to be located, and the Chief of Air Corps to submit their recommendations on how this could best be accomplished. These recommendations and final consideration by G-1 and the Chief of Staff resulted in War Department Circular No. 18, 27 February 1937,² which regulated transition in a manner without precedent. In one swift step transition had progressed from loose, decentralized regulation to rigid requirements prescribed by the highest administrative authority. The circular specified the limitations under which the new aircraft were to be used and directed that Air Corps commanders exercise the closest supervision in regard to flying proficiency of pilots and crews. For the first time standard eligibility requirements for multi-engine pilotage were prescribed, and lower echelons were authorized to amplify these further with instructions designed to insure safe operation of the new planes. The prescribed qualifications for multi-engine pilotage were:³

No persons other than an active rated heavier-than-air pilot whose official record indicates that he is credited with not less than 2,000 pilot hours in military airplanes and who has held the rating of airplane pilot for not less than seven years and preferably officers holding a rating of military airplane pilot as prescribed by AR 95-60, with a normal

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2. Memo for Gen. Arnold by Chief, Inspection Div., OCAC, 24 Mar. 1937, in AAG 211 C, Pilots.
 3. WD Circular No. 18, 27 Feb. 1937.
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accident rate, will be permitted to perform duty as commander or principal pilot of any of the large multi-engined air craft, such as the A-18, B-17, B-18, and C-33 models or others of similar flying characteristics. . . .

Such specific regulation by the highest authority caused immediate and far-reaching effects both in the tactical units and headquarters offices. In the GHQ Air Force, training policies for all types of planes became more standardized and more strict, supervision increased, and greater emphasis was placed on familiarization. To eliminate flying errors, it was stipulated that the training of new Training Center graduates was to be more rigidly supervised by flight commanders. During their first year in the tactical units, their flying was to be restricted to operations in the base area or to flights directly controlled by element commanders. Furthermore, all newly rated pilots were to be assigned to single-engine units. They were not to serve in units equipped with multi-engine planes until they had logged 750 hours as rated pilots. In addition to the prescribed 2,000 hours and 7 years as rated airplane pilot for commanders of B-17 and B-18 airplanes, the GHQ Air Force specified a requirement of 750 hours and 2 years for co-pilots on these planes and for commanders of B-10 aircraft.⁴

Hardly had transition to the new planes begun before reports of training difficulties deluged the OCAC.⁵ The Air Corps had very few officers of the required experience, and those able to qualify were

4. Memorandum No. 5, Hq., GHQ AF, 6 Mar. 1937.

5. Memo for Chief, Plans Div., OCAC, by Asst. C/AC, 19 Mar. 1937, in AAG 300.5 E, WD Circulars.

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needed for staff and command positions. During 1937, while the number of new planes was small, the GHQ Air Force believed that it could continue operations,⁶ but specified that "when adequate airplane commanders were not available for primary assignment to the combat crews of B-17 and B-18 airplanes, such airplanes as have no commanders will be grounded."⁷ Such procedure was intolerable when the primary peacetime mission of the Air Corps was to train adequate pilots for wartime operations.

From the beginning the OCAC had felt that the requirements had been placed too high, and it conducted two lengthy studies to determine their effect. Contracts indicated that by the fall of 1938 the Air Corps would have 155 first-line combat planes, and even after extensive transfer of officers it was found that five years and 1,000 hours was the maximum requirement that could be effected to provide the necessary 200 flying officer.⁸ After considerable Headquarters discussion and planning, the Chief of the Air Corps recommended a revision of Circular No. 18. It was requested that specific regulatory authority be vested in the Chief of the Air Corps so that the ratio of qualified personnel to multi-engine airplanes could be determined in the best interests of the Air Corps mission.⁹ On 30 July 1937 the controversial paragraph of Circular No. 18 prescribing qualifications was rescinded, and the following was substituted:

No person, other than an active rated military airplane pilot, who, in addition to the rating of airplane pilot, possesses

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6. Memo for C/AC by Chief, Plans Div., OCAC, 27 Mar. 1937, in ibid.
7. Memorandum No. 5, Hq., GHQ AF, 6 Mar. 1937.
8. Memo for C/AC by Chief, Plans Div., 1 June 1937, in AAG 300.5 E, LD Circulars.
9. C/AC to AG, 14 July 1937, in ibid.
- [REDACTED]

such other minimum qualifications as may be from time to time prescribed by the Chief of the Air Corps, will be permitted to perform duty as commander or principal pilot of any of the large multi-engined aircraft, such as the B-15, B-17, B-18 and C-33 models, or others of similar flying characteristics.¹⁰

With delegation of authority to the Chief of the Air Corps, there followed a period of shifting eligibility requirements supposedly geared to the ratio of personnel to airplanes, but modified by training experience, by the necessity of minimizing accidents, and by disagreement among personnel in authority. On 9 August 1937 the first of a series of OCAC circulars specified a minimum of 1,250 pilot hours and four years' rating as airplane pilot for performance as principal pilot of the following airplanes: B-15, B-17, B-18, C-30, C-32, C-33, C-34, C-35, C-36, C-37, OA-5, and OA-8.¹¹ A few days later, upon the recommendation of the Chief of Staff, GHQ Air Force, although it was already in effect there,¹² the requirement of 750 hours and two years was officially established for A-18, B-10, B-12, B-14, OA-3, and OA-4 aircraft.¹³

Several months of training experience soon demonstrated that the new requirements achieved a substantial reduction in airplane accidents, but in April 1938 the GHQ Air Force proposed another revision. The supply of B-17's was limited, and in the hope of creating an elite organization out of the 2d Bombardment Group, an increase in the prerequisites for B-17's and B-15's was proposed. On the other hand,

10. WD Circular No. 51, 30 July 1937.

11. OCAC Circular No. 60-17, 9 Aug. 1937.

12. C/S, GHQ AF, to C/AG, 14 Aug. 1937, in AAG 211 C, Pilots.

13. OCAC Circular No. 60-17, 24 Aug. 1937.

experience indicated that the existing requirements for the B-18 and similar types were higher than reasonable safety precautions dictated. This fact, coupled with a shortage of experienced personnel and a desire to qualify able younger officers, suggested revision.¹⁴ The Chief of the Air Corps, however, in a desire to limit the accident rate, effected a compromise,¹⁵ and on 14 May 1938 the following new eligibility requirements were established:¹⁶

<u>1,250 hours, 4 years</u>	<u>1,000 hours, 3 years</u>	<u>750 hours, 2 years</u>
B-15	C-30 C-36	B-18 OA-3
B-17	C-32 C-37	B-10 OA-4
OA-8	C-33 C-38	B-12
	C-34 OA-5	B-14
	C-35	

Nevertheless, so great was the desire of the GHQ Air Force to maintain the elite status of the B-17 that in GHQ Air Force units the original requirement of seven years and 2,000 hours was imposed in addition to the CCAC prerequisite.¹⁷ There it remained until the 1939 expansion program forced revision.

Increased Regulation and Definition of Transition

The acquisition of modern equipment and the consequent establishment of eligibility requirements for all types of multi-engine planes presupposed a further definition and amplification of transition procedures. Air Corps policies influencing or pertaining to transition became both more numerous and more specific. After mid-1937 general

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14. C/S, GHQ AF to C/AC, (?) Apr. 1938, in AAG 300.5 P, AC Circulars.
 15. 1st ind. (CG, GHQ AF to C/AC Apr. 1938), C/AC to CG, GHQ AF, 28 Apr. 1938, in *ibid.*
 16. CCAC Circular No. 60-17, 14 May 1938.
 17. Memorandum No. 6, Hq., GHQ AF, 13 June 1938.

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regulatory authority emanated from higher echelons, and higher performance aircraft required stricter rules and more extensive programs of instruction. In July 1937 an Air Corps Circular specified that the commanding officer of each Air Corps activity would assume responsibility for the complete familiarization of all pilots under his command with the equipment assigned. Each pilot who was assigned to fly an airplane with flying characteristics and controls different from those to which he was accustomed was to be "required to pursue a definite course of transition flying instruction." The course was to be of sufficient scope and duration to make the pilot thoroughly capable of operating the plane safely and efficiently. To this end, the course was to "cover all maneuvers essential for the safe and efficient operation of the aircraft, including in the case of multi-engine aircraft, flying on the minimum number of engines required to maintain flight during the emergency."¹⁸

Actually such transition courses had always existed, but in keeping with the principle of increased supervision, the OCAC requested copies of these courses to ascertain their quality and efficiency.¹⁹ Tactical units coordinated their courses with Headquarters, GHQ Air Force, and transition proceeded under the established minimum qualifications through military channels of supervision. So pronounced was the tendency toward standardization that at one time the GHQ Air Force recommended that the OCAC establish uniform instructions for the various types of aircraft,²⁰ but as such instructions were administra-

18. AC Circular No. 60-6, 7 July 1937.

19. Exec., OCAC to CG, GHQ AF, 25 Oct. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

20. C/S, GHQ AF to C/AC, 7 Dec. 1937, in ibid.

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tive, it was believed that they should be issued through the normal chain of command, the GHQ Air Force. In actual practice the final determination of the transition program remained in the units, with the GHQ Air Force transmitting general instructions and sometimes further qualifications, such as the requirement that all pilots of bi-motor planes have at least five hours' flying "with one motor cut out, or in the case of the B-17 airplane with any two of the motors cut out."²¹

Transition Instruction in the Tactical Units, 1937-1939

Transition instruction for all types of planes in GHQ Air Force units was generally similar. Requirements included a complete operating knowledge of the aircraft, local flying and communications rules, and Department of Commerce regulations; some maintenance instruction; conduct of preflight inspection; and a written or oral examination conducted by a designated officer prior to actual flight training. Special emphasis was placed on the duties and responsibilities of the airplane commander--especially in the larger airplanes where the safety of expensive equipment and larger crews was concerned. In 1937, however, the number of pilots receiving transition was small, and time was not limited by the demands of war. There was no requirement for a program adapted to mass production. Each transition trainee received individual instruction and benefited from the personal advice of several experts. All trainees had considerable flying experience,

21. C/S, GHQ AF to CG, 1st Wing, GHQ AF, 15 July 1937, in ibid.

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and the instruction technique could be adapted to their individual qualifications. In this way transition maintained a certain flexibility.

Transition instruction differs with the type of aviation and with the individual plane within the type. Of necessity, bombardment transition has always been the most complex. The newest and most expensive type in 1937, the B-17, furnished an example of the most careful methods of transition. The 2d Bombardment Group was the first unit to be equipped with heavy bombers, and it was here that the technique of heavy bombardment transition was developed. Around this group and its equipment evolved a legend of high performance aircraft flown only by the most proficient pilots. For two years the minimum eligibility requirement in the GHQ Air Force was 2,000 hours and seven years, and during this period a selected group of pilots was carefully conducted through transition; so carefully that upon final checking off they received a certificate possessing all the physical attributes of a college diploma.²²

Upon first reporting to the 2d Bombardment Group, the prospective B-17 pilot underwent a period of initial training and indoctrination. The group commander explained the organization of the group and its position in the air force, as well as the principals of bombardment and what the group expected of the new pilot. The squadron commander gave the pilot further orientation and assigned him to a flight. If he reported from an organization equipped with the same type of aircraft,

22. A copy of the "Airplane Commanders' Certificate" may be found in ibid.

he first demonstrated to the squadron engineering, communications, and armament officers his familiarity with the equipment. After a study of post flying regulations, the student pilot received a five-hour local flight check before being assigned to missions away from the airdrome. Then, following an instrument check, the pilot was given a two-hour local night flight check.

If the pilot reported from an organization equipped with a different type of aircraft, the process was more detailed. First the trainee studied all available technical data and group engineering memoranda pertaining to the plane, and he received instructions from the squadron engineering officer on performance data, gas consumption, and the function and manipulation of each instrument and control of the airplane. Similar instruction was given on the radio by the squadron communications officer, and at least 10 hours' instruction by the armament officer in the use of the bombsight and other armament equipment.²³ Having received thorough ground familiarization, the candidate then participated in local flights, observed the teamwork of the airplane commander and the co-pilot, and made out the flight performance record. Now prepared to function as co-pilot, he received 20 hours' flying, during which he flew the airplane on various combinations of engines and made at least 10 landings and take-offs as first pilot.²⁴ After a check out on instrument flying, there followed two hours of local night

23. Training Memorandum No. 25, Hq., 2d Bombardment Gp., GHQ AF, 12 Nov. 1937.

24. 1st ind. (original unknown), Acting Group Commander, 2d Bombardment Gp., GHQ AF, to CG, 2d Wing, GHQ AF, 15 Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

25 flying. Upon successful completion, the candidate received the "Air-
plane Commanders' Certificate"; his transition to the B-17 was complete.²⁶

In the first days of modern bombardment, the B-18 was considered almost as precious an airplane as the B-17. For example, because of its unusually large number of instruments, adjustments, and controls, some flight characteristics not common to other types, and the larger number of lives and financial investment involved, an early operations memorandum emphasized the necessity for intensive instruction, practice in pilotage, and a check by the squadron commander prior to a pilot's assignment as airplane commander of a B-18.²⁷ Transition, however, being individually supervised, and final determination of the program lying in the unit, maximum and minimum instruction often differed.

In the 2d Bombardment Group, B-18 transition procedure was identical with that for the B-17--20 hours' flying instruction following ground indoctrination.²⁸

In the 19th Bombardment Group, on the other hand, only absolute minimum training was prescribed. Additional instruction was left to the discretion of the squadron commander, and training was adapted to the individual pilot's proficiency. All trainee pilots first engaged in "three hours careful ground study and inspection of the airplane and its engine including all accessory parts" in addition

25. Training Memorandum No. 25, Hq., 2d Bombardment Gp., GHQ AF, 12 Nov. 1937.

26. 1st ind., Acting Group Commander, 2d Bombardment Gp., GHQ AF, to CG, 2d Wing, GHQ AF, 15 Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

27. Operations Memorandum No. 47, Hq., 19th Bombardment Gp., 6 Oct. 1937.

28. Training Memorandum No. 25, Hq., 2d Bombardment Gp., GHQ AF, 12 Nov. 1937.

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to sufficient ground study to enable them to answer a detailed questionnaire on the plane's operating characteristics. Flying instruction consisted of three hours as co-pilot and one hour as pilot with check pilot present. This included 10 landings. Assignment as airplane commander was tentative until the pilot had qualified in night flying and day and night formation flying. Co-pilots were required to complete ground familiarization and participate in three hours' flying instruction.²⁹

Transition procedure for the B-10B, which had been worked out prior to the establishment of eligibility qualifications and the increase in administrative regulation, did not change materially.³⁰ For example, in the 9th Bombardment Group, hours and type of training were unchanged except for the addition of night flying and a reduction in the number of required landings. Increased emphasis, however, was placed on preflight indoctrination.³¹

Transition to other types of multi-engine airplanes for which eligibility requirements were established followed the same general pattern as that developing in bombardment units. Cargo aircraft, however, were not concentrated in specific tactical organizations; as a result, transition was scattered and the process did not attain such complete definition. At Barksdale Field prior to transition to the C-33, pilots were required to have 100 hours on multi-engine equipment and fly as co-pilots for approximately 50 hours.³² In the 2d Wing

29. Operations Memorandum No. 47, Hq., 19th Bombardment Gp., 6 Oct. 1937.

30. See above, Chap. I.

31. Operations Memorandum No. 20, Hq., 9th Bombardment Gp., 10 Dec. 1937.

32. 2d (Wrapper) ind., (AG, GHQ AF to CG, 3d Wing, GHQ AF, 4 Nov. 1937), Adjutant, Air Base Hq., Barksdale Field, La., to CG, 3d Wing, GHQ AF, 10 Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

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of the GHQ Air Force, prospective C-36 pilots were given two hours' ground instruction and 10 hours' flight check with an instructor.³³

At this time the twin-engine A-18 attack model was still experimental, first procurement having occurred in 1937.³⁴ Apparently transition followed the prescribed method for twin-engine aircraft at the station at which the plane was located. In the 3d Attack Group this entailed two hours' individual practice to achieve familiarity with flying characteristics, an individual navigation flight, practice flying with the element, a combat mission, and single-engine operation.³⁵

During this period new transition procedure development centered around multi-engine aircraft, but the establishment of definite familiarization methods for all types of planes had been prescribed. Furthermore, the imposition of eligibility requirements caused recent Training Center graduates to receive transition exclusively on single-engine planes. This transition followed the same general pattern, differing in detail with individual station regulation and the type of plane. The transition of a recent Training Center graduate, however, was more detailed and subject to more supervision than that of a more experienced pilot.

Standard pursuit equipment throughout the early 1930's had been single-seater P-12's and P-26's, but 1936 and 1937 brought the procurement of higher performance fighter aircraft, Seversky P-35's and

33. Memo for CG, 2d Wing, GHQ AF, by Operations Officer, Hq. and Hq. Sq., 2d Wing, GHQ AF, 10 Nov. 1937, in ibid.

34. Annual Report of the Chief of Air Corps (1937), 38.

35. Training Memorandum No. 22, Hq., 3d Attack Group, GHQ AF, 29 Nov. 1936.

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³⁶ Curtiss P-36's. Pursuit units were often equipped with a combination of types, and their transition programs demonstrated that the newer and higher performance planes required a somewhat more formal transition process. For all fighter types, aside from the usual familiarization with technical data pertaining to the airplane and local station regulations and procedure, in some units such as the 8th Pursuit Group, the new pilot was required to report to the group and squadron commanders for general indoctrination on the employment of pursuit aviation and its place in the GHQ Air Force. After familiarization, the pilot was given instruction by a designated transition officer in the peculiarities of the airplane and was required to pass either a written or an oral examination. In P-12 and P-26 transition, experienced pilots were then allowed to fly the airplane. But if the transition trainee was a pilot with less than two years' service, he had to fly "locally under the direct supervision of the Flight Commander, practicing landings and handling the airplane under normal flying conditions" until the flight commander was assured that he had achieved complete command of his machine. He was then required to make navigation flights to nearby airdromes and fly locally at night under the direct supervision of the flight commander. Having next qualified in instrument flying, the trainee made night navigation missions. These successfully completed, the individual was rated as an airplane commander and took his place in the tactical organization.³⁷ In the 20th Pursuit Group these

36. Annual Report of the Chief of Air Corps (1936), 38; ibid. (1937), 39.

37. Operations Memorandum No. 18, Hq., 8th Pursuit Gp., GHQ AF, 28 Aug. 1937.

engineering missions were worked out in exact detail. Their purpose was "to enable the pilots . . . to become familiar with the operating and flying characteristics of the P-26A airplane in as short a time as possible. The missions provide[d], therefore, a series of flights in which systematic method [was] followed in observing the flight and operating characteristics of the airplane and engine."³⁸

On the other hand, transition for the P-35 and P-36 was more systematized, although often it was somewhat modified for pilots having more than one year's flying experience. In the 1st Pursuit Group air transition on the P-35 entailed 4 hours of landings and take-offs, at least 10 of which were supervised, 6 hours of local orientation flights, and 5 hours of supervised familiarization landings on near-by airdromes.³⁹ Flight transition on the P-36A in the 8th Pursuit Group required 5 hours of local missions, 4 hours of navigation flights, proficiency in formation flying below 15,000 feet, sufficient gunnery practice to become familiar with guns and gun sights, and one flight to 25,000 feet to attain knowledge of oxygen equipment and flying characteristics.⁴⁰

In attack units the A-17 was standard equipment. In the transition process, the trainee first had to demonstrate knowledge of the operation of the plane, including radio and armament equipment, the use of flaps, design and flight limitations of the plane, technique of attack aviation, and necessary regulations and reports. In the

38. Check List for P-26, 20th Pursuit Gp., GHQ AF, Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

39. Schedule of Training for Transition to P-35 Airplane, Hq., 1st Pursuit Gp., GHQ AF, Selfridge Field, Mich., 1938, in AAG 210.11 B, Eligibility and Qualification.

40. Operations Memorandum No. 18, Hq., 8th Pursuit Gp., GHQ AF, 30 Nov. 1938.

17th Attack Group a written examination with a passing grade of 100 was required,⁴¹ while in the Headquarters and Headquarters Squadron, 2d Wing, GHQ Air Force, pilots were only given 30 minutes' ground instruction by the check pilot.⁴² Flight instruction also varied. In the 17th Attack Group trainee pilots performed familiarization flights under an experienced pilot,⁴³ while in other organizations regulations were more concise. For example, at Selfridge Field trainees were first required to make at least 5 landings locally and then execute at least 10 landings and 10 hours of daylight flying before engaging in night flying. At least five local night landings were to be made prior to night landings on other airdromes.⁴⁴

Transition procedures for other standard single-engine aircraft entailed fewer problems. These airplanes were of lower performance, and their principal pilots were junior officers and members of the Reserve on active duty. At Barksdale Field, for example, the C-14 and C-15A were flown by junior pilots after familiarization with operating instructions and technical data. After some 50 hours' practice of landings and flying, they were authorized to carry passengers.⁴⁵ Mitchel Field regulations furnish a representative example of general

41. Operations Memorandum No. 26, Hq., 17th Attack Gp., GHQ AF, 1 Apr. 1937.

42. Memo for CG, 2d Wing, GHQ AF, by Operations Officer, Hq. and Hq. Sq., GHQ AF, Langley Field, Va., 10 Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

43. Operations Memorandum No. 26, Hq., 17th Attack Gp., GHQ AF, 1 Apr. 1937.

44. Operations Memorandum No. 10, Air Base Hq., Selfridge Field, Mich., 16 Nov. 1937.

45. 2d (Wrapper) ind., (AG, GHQ AF, to CG, 3d Wing, GHQ AF, 4 Nov. 1937), Adjutant, Air Base Hq., Barksdale Field, La., to CG, 3d Wing, GHQ AF, 10 Nov. 1937, in AAG 353.9, Transition . . . GHQ AF Units.

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transition procedure. After the usual ground indoctrination, pilots were required to undergo two hours' supervised daylight transition and a total of five hours of local missions before participating in flights away from the home airbase. At least two hours of local night flying including four landings were to be executed prior to night navigation training. This schedule of instruction also applied to members of the 97th Observation Squadron (Corps and Army) flying O-47 aircraft.⁴⁶

Summary

In the two years from 1937 to 1939, more so than in any other peacetime period, transition procedure underwent change and refinement. This development stemmed from the appearance of modern bombers, the B-17 and the B-18. The necessity for preservation of this expensive equipment caused the use of administrative transition practices, such as eligibility qualifications. In addition, the development of instructional techniques, involving a prolongation of the transition period and a further refinement of method, was made necessary by the higher performance characteristics of these planes. Although final determination of the transition process remained in the units, general administrative regulations by higher echelons increased. Not only did this apply to bombardment aviation but also to attack and pursuit. In time, with changing training conditions of the expansion program and World War II, the regulations evolved in this period disappeared, but the transition procedure which had been developed formed the basis for all future transition training on modern aircraft.

46. Operations Memorandum No. 4, Air Base Hq., Mitchel Field, N. Y., 20 Jan. 1937.

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Chapter III

TRANSITION PROCEDURE UNDER THE EXPANSION PROGRAM
(1939 THROUGH 1941)The Pattern of Training under the Expansion Program

The beginning of the expansion program in 1939 brought significant changes in the functioning of both the individual and tactical training agencies. No longer hindered by inadequate appropriations, the Air Corps turned to the activation of new units and the augmentation of old ones. Previously units had possessed varied equipment; now plans were made for groups equipped specifically with one type of airplane. Concurrently, unit expansion required increased personnel, both Reserve officers called to active duty and now graduates of the Training Center. With the great increase in individual pilot training in the Training Center, specialized training was forced out into the tactical units,¹ and the whole function of transition training to combat aircraft became the responsibility of the GHQ Air Force and the units in overseas departments.

By 1938 European aircraft development was already on a war basis, and adequate preparation for national defense required that the Air Corps have planes possessing comparable performance characteristics.

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1. Annual Report of the Training and Operations Division, Fiscal Year 1940, in AG 319.1 B, Annual Report of the C/AC.

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In the field of heavy bombardment the B-17 far surpassed any foreign achievement, but the United States lagged in the engineering of high-speed and high-altitude pursuit and light bombardment types. With the expansion program the Air Corps turned to the procurement and development of modern planes. Between January 1939 and December 1941 contracts were let for most of the planes with which the United States was to go to war--the B-24, B-25, B-26, A-20, P-38, P-39, P-40, P-47, and P-51.

The acquisition of modern aircraft far exceeding previous types in performance involved the growth of new transition techniques--techniques that became the basis for mass wartime training. However, because of the lag between first procurement and standard operational employment, their development was not immediate. Although plans and preparations were made from the first days of the expansion program, the training which was immediately necessary was conducted on 1938 standard aircraft--B-17's, B-18's, P-35's, P-36's, A-17's, A-18's, O-47's--and even earlier types. It was not until late in 1941 that the new planes began to reach the tactical units.

The first training necessity of the expansion program was the preparation of personnel to man the newly activated units. Efficiency required the transition training of personnel already assigned to GHQ Air Force prior to the receipt of large numbers of recent Training

2. Annual Report of the Chief of Air Corps (1938), 44.

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Center graduates. Once the initial transition of experienced personnel was completed, the tactical units were confronted with a dual training responsibility. They had to complete the individual training of the new graduates on operational aircraft and then give them unit combat training. But the existence of multi-engine qualification requirements necessitated either their assignment to single-engine units or the accumulation of flying time on basic combat types for as rapid qualification as possible under existing regulations for multi-engine duty. Concurrently, combat training of multi-engine organizations had to continue apace with a sustained transition program, as increased numbers of pilots became eligible or transferred from other Air Corps activities or as Reserve officers reported for active duty. The attainment of such a program would be difficult under the most favorable circumstances, but between 1939 and 1941 it was hampered by a lack of experienced personnel, inadequate numbers of modern aircraft, the confusion that came with unit reorganization, and by the demands of impending war.

Multi-Engine Eligibility Requirements and Their
Effect on Transition

The establishment of multi-engine eligibility requirements in 1937 had determined much of the course of the transition program. Similarly, from 1939 through 1941, the operating effect of these requirements and the successive downward revisions soon forced by unit personnel needs had an important influence on the course of training. In 1939 transition

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was subject to the eligibility requirements in effect prior to the
initiation of the expansion program, but successive revisions soon
occurred. Through increased multi-engine experience and further
amplification of training procedure, the operational training agency
found that high eligibility requirements did not always insure the
most proficient pilots or the most complete preservation of equipment.
Other factors, such as selection and transition instruction, had their
influence. Based on the recommendations of the GEC Air Force, the
revisions, in addition to lowering requirements for airplane commander
duty, provided a means by which specially qualified officers who other-
wise did not meet the requirements could be made eligible and also made
allowance for conducting transition. These revisions were:

15 September 1939:

<u>1,250 hours, 4 years</u>	<u>700 hours, 2 years</u>	<u>500 hours, 1 year</u>
B-15 (No change	A-18 All 2-engine	B-10 OA-3
B-17 from previous	B-21 cargo types	B-12 OA-4
OA-8 requirement.)	OA-9	B-18

25 May 1940:

<u>1,250 hours, 4 years</u>	<u>1,000 hours, 3 years</u>	<u>400 hours</u>
4-engine types	4-engine types, if specially recommended and last year of service as principal pilot of medium bombardment or reconnaissance types or 4-engine co-pilot.	2-engine types or individuals who had completed equivalent time on non-military types of 400 h.p. or over might upon passing test be recommended for a waiver by C/AC.

3. AC Circular No. 60-17, 2 Feb. 1939.
4. C/S, GEC AF to C/AC, 11 June 1941, in AAG 300.5 Y, Air Corps Circulars.
5. Exec., CCAC to CG, GEC AF, 26 Apr. 1940, in AAG 300.5 T, AC Circulars;
C/S, GEC AF to C/AC, 17 Sep. 1940, in AAG 300.5 V, AC Circulars.
6. AC Circular No. 60-17, 25 May 1940.

10 December 1940:⁷

<u>700 hours, 2 years</u> 4-engine types	<u>500 hours, 1 1/2 years</u> 4-engine types if on duty in multi- engine unit for 1 year and qualified pilot of multi- engine bombardment type.	<u>500 hours</u> 2-engine types	<u>No requirement</u> For purpose of transition training if principal pilot occupied one of pilot posi- tions.
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Finally, in July 1941, a few months before the entrance of the United States into World War II, all multi-engine eligibility requirements were rescinded.⁸ Prescribed transition courses were in effect; their completion was recognized as a better criterion of proficiency than selection based on flying time and length of service.⁹ Now that all pilots were at last eligible to become commanders of multi-engine aircraft, the personnel demands of expanding groups could be met.

The 1939 Transition Program for GHQ Air Force Personnel

In 1939 the first task of the GHQ Air Force was to train all assigned personnel preparatory to the activation of new units and the receipt of inexperienced pilots. This entailed the transition of approximately 600¹⁰ B-17 and B-18 pilots for the new groups and B-18 pilots for the training of the new graduates. In addition, the transition training of new pilots then assigned to single-engine units had to be completed.¹¹ To accomplish this task under shortages of personnel

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7. AG Circular No. 60-17, 10 Dec. 1940.
 8. AG Circular No. 60-17, 14 July 1941.
 9. C/S, GHQ AF to C/AS, 11 June 1941, in AAG 300.5 7, Air Corps Circulars.
 10. AG, GHQ AF to CG, 3d Wing, GHQ AF, 15 Mar. 1939, in History of the III Bomber Command, 1932-1941.
 11. CG, GHQ AF to C/AS, 1 Apr. 1939, in AAG 353.9 F, Training in Aviation, Pilot Training.

and equipment, expedient methods were employed. Wing commanders were authorized to assign qualified personnel under their control to combat units for transition to multi-engine aircraft.¹² For example, the 3d Attack Group was designated the transition agency in the 3d Wing, GHQ Air Force for personnel assigned to that headquarters.¹³ Because of the lack of modern aircraft, pilots were given transition training on twin-engine planes with operating characteristics similar to those scheduled for future employment. In the 3d Attack Group transition occurred on P-18's and C-40's, while the 20th Pursuit Group utilized B-10's.¹⁴ Through reassignment of personnel and substitution of aircraft, the GHQ Air Force met the first transition demands of the expansion program.

Transition Training of the Program Pilots

Concurrent with the initial transition program of experienced personnel, in June 1939 the program pilots, the new graduates of the Training Center, began to flow to the tactical units.¹⁵ These pilots reported with a limited number of flying hours and without the former thorough preparation for tactical training. It was therefore necessary to give them a special program of instruction. In effect, the last

12. Memorandum No. 12, Hq., GHQ AF, 11 May 1939.

13. 1st ind. (AG, GHQ AF to CG, 3d Wing, GHQ AF, 15 Mar. 1939), Adjutant, 3d Wing, GHQ AF, to CG, 3d Attack Gr., 17 Mar. 1939, in History of the III Bomber Command, 1932-1941.

14. AG, GHQ AF to CG, 3d Wing, GHQ AF, 15 Mar. 1939, in *ibid*; Adjutant, 20th Pursuit Gr. to CG, 3d Wing, GHQ AF, 15 Apr. 1939, in *ibid*.

15. CG, GHQ AF to C/AG, 1 Apr. 1939, in LAG 553.9 F, Training in Aviation, Pilot Training.

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phase of advanced training was transferred to another agency; pilots were regarded as students and eliminated for flying deficiency.¹⁶ In order to qualify these graduates for further tactical training, the tactical units instituted a 12-week program of specialized training. Trainees received from 60 to 68 hours of air instruction and 172 to 184 of ground, depending upon their specialization (bombardment, attack, pursuit, or observation aviation). The first 20 hours of air instruction, familiarization and transition, were common to all. Student pilots achieved familiarization with equipment and the local flying area and then progressed to further individual combat training. Similarly, all trainees received 15 hours of ground instruction consisting of the usual indoctrination accompanying air transition.¹⁷ In accordance with GHO Air Force policy, specialized training of recent graduates continued to maintain first priority through 1940 and early 1941.¹⁸ But as the imminence of war increased, training emphasis shifted. The 12-week course was reduced in accordance with the individual pilot's proficiency, the number of instructors, and the capacity of facilities. Expediency dictated that peacetime perfection must give way to minimum standards of proficiency and that combat training be accorded first priority.¹⁹

16. AG, GHO AF to C/AC, 10 Apr. 1939, in *ibid.*

17. Program, Specialized Training, GHO AF, 1939-1940, in AAG 353.9 A, GHO AF Training Directive.

18. GHO Air Force Training Directive, 1940-1941, 1 June 1940, in AAG 353.9 A, Training, General.

19. GHO Air Force Training Directive, 1941-1942, 1 June 1941, in Vol. II, Supporting Documents to History of Headquarters, Second Air Force.

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The specialized training of the program pilots occurred in the individual units, a small number of pilots being assigned to each organization. As in all training programs, the operational demands of each unit probably influenced the amount and quality of training received. In single-engine units trainees received transition training to service type equipment. Throughout the prewar period single-engine equipment flown by the program pilots was that in use prior to the expansion program. Transition technique and instructional methods did not change,²⁰ although the relative inexperience of the pilots required "strict policies, careful planning, and close supervision."²¹ In bombardment specialization, however, the policy of multi-engine eligibility requirements presented a difficult problem. While maintaining individual flying proficiency and accumulating hours in basic-training aircraft or the BC-1, new bombardment pilots received co-pilot transition on twin-engine types, principally the B-10,²² until able to meet the minimum eligibility requirements for first pilotage.

Administrative Regulation of Transition

From 1939 through 1941, in addition to the specialized training of the program pilots, the operational units were engaged in tactical

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20. A survey of transition to P-30, P-35, P-36, A-17, O-47 may be found in Chap. II.
21. 1st ind. (C/AC to CG, GHR AF, 12 Feb. 1940), C/S, GHR AF to C/AC, 26 Feb. 1940, in AAG 353.9 F, Training in Aviation, Pilot Training.
22. Ibid.; Training of Military Pilots, Jan. 1939, in AAG 353.9 A, Training, General.

training. Consequently, they conducted a sustained transition program for single-engine pilots as they joined single-engine units or as new types of planes made their appearance, while in multi-engine units transition training of personnel occurred as they became eligible under existing regulations. More pilots, often of less experience, required increased supervision and regulation on the part of the lower echelons.²³ Early in 1939 there was a move toward administrative standardization of transition curricula,²⁴ but headquarters regulation remained essentially the same as before the expansion program. Unit commanders were responsible for prescribing transition courses fitted to the trainee's previous experience when he was assigned to a plane having flying characteristics with which he was unfamiliar. The course was to accomplish thorough ground indoctrination and to qualify the pilot in "all maneuvers essential for the safe and efficient operation of the aircraft."²⁵

Throughout the prewar period administrative regulation of transition procedure did not change, although there were frequent reminders from headquarters of the necessity for close individual supervision and definite transition methods.²⁶ Administrative echelons of the GHQ Air Force further impressed unit commanders with

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23. 1st ind., (C/AC to CG, GHQ AF, 12 Feb. 1940), C/E, GHQ AF to C/AC, 26 Feb. 1940, in AAG 353.9 F, Training in Aviation, Pilot Training.
24. Exec., CGAS to CG, GHQ AF, 8 Apr. 1939, in AAG 210.11 B, Eligibility and Qualification.
25. AC Circular No. 50-4, 22 Apr. 1940.
26. CGAS Circular Letter No. 41-13, 14 Mar. 1941; AC Circular No. 50-4, 9 May 1941.

this necessity, and in the case of trainees not deemed suitable for check off, wing commanders were authorized to assign them to other duties or recommend transfer to other types of aviation.²⁷

Multi-Engine Transition Instruction

Tactical organizations, particularly bombardment, were seriously handicapped by the lack of experienced personnel. Single-engine units immediately utilized the program pilots, but eligibility qualifications forced the burden of multi-engine pilotage on the older and more experienced pilots.²⁸ The successive reductions of eligibility qualifications and the accumulation of multi-engine co-pilot hours, however, gradually enabled these new pilots to undergo transition and attain airplane commander status.

In heavy bombardment the need for more pilots forced the admittance of pilots with less than 2,000 hours and seven years' experience to the elite group. Individuals were given training in accordance with their experience. For instructional purposes they were divided into five classes:²⁹

	Class I	Class II	Class III	Class IV	Co-pilot
Years of service as a rated pilot	7	5	4	3	-
Total flying time	2,000	1,500	1,250	1,250	300
Time on multi-engine airplanes	500	500	400	500	50

27. Memorandum No. 55-1, Hq., Southwest Air District, GHQ AF, 27 Jan. 1941.

28. CGAC Circular Letter No. 40-1, 5 Jan. 1940.

29. Training Memorandum No. 8, Hq., 2d Bombardment Gp., GHQ AF, 24 Jan. 1939.

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An 8-week curriculum was established, Class I pilots and co-pilots becoming proficient at the end of the fourth week, Class II after 6 weeks, and Classes III and IV after 8 weeks. In number of hours, scope of instruction, and degree of standardization, this course was much longer and more detailed than previous B-17 transition curricula. Standardized by day and week, instruction entailed ground indoctrination; maintenance training; familiarization flights with the student observing; air familiarization; navigation, bombing, gunnery, formation flying, altitude performance, cross-country flights, and night flying.³⁰

Transition to other types of multi-engine aircraft, however, never attained such complete definition. In fact, there seems to have been a tendency toward less detail and more dependence upon the judgment of the unit commander and the check pilot. In B-18 transition, for example, procedure, although not essentially changed, became more personalized as minimum eligibility requirements decreased. Check pilots were carefully selected, and prospective pilots and co-pilots were personally estimated and required to undergo training commensurate with their proficiency. In the 9th Bombardment Group first-pilot training consisted of five hours' flying with the check pilot and 10 hours without the check pilot.³¹ Co-pilot transition entailed

30. Ibid., App. I.

31. Operations Circular No. 2-1, Hq., 9th Bombardment Gp., GHQ AF, 20 Apr. 1939.

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three hours with the check pilot and five hours' additional duty as
32 co-pilot. During this period, the volume of B-18 transition far
exceeded that for any other type. It was a comparatively easy plane to
fly and an excellent introduction to other multi-engine types, and
furthermore, during a period of acute scarcity of aircraft, it was the
Air Corps' most plentiful plane.

Other standard multi-engine aircraft were the B-10, C-33, C-36, C-39,
C-40, OA-3, OA-9, and A-18. Transition procedure to the B-10 did not

33 essentially change. During the expansion program, however, the cargo
types were employed more frequently than heretofore for multi-engine
transition purposes. Their transition programs, although essentially
the same, became more regularized. Between 40 and 50 hours' co-pilot

34 time was required before check off. Transition to amphibious
observation aircraft, OA-C's and OA-9's, approximated that of cargo

35 types. A-18 transition had developed somewhat, as this plane was
just coming into general service at the beginning of the expansion
program. Air transition consisted of 10 hours of individual practice
to achieve familiarity with the plane's flying characteristics and

32. Ibid., App. II.

33. Operations Memorandum No. 6, Hq., 20th Pursuit Gp., GEM AF,
18 Apr. 1939.

34. Operations Memorandum No. 14, Air Base Hq., Langley Field, 18
Apr. 1939, and schedule of instruction from Air Base Hq.,
Barksdale Field, 17 Apr. 1939, in AAG 210.11 B, Eligibility and
Qualification.

35. Operations Memorandum No. 14, Air Base Hq., Langley Field,
18 Apr. 1939, and Operations Memorandum No. 7, 18th Reconnaissance
Sq., GEM, Mitchel Field, 1 Mar. 1939, in ibid.

included 10 landings and single-engine operation. In addition, commensurate with the individual pilot's experience and adaptability, the trainee participated in individual navigation flights, practice flying with the element, and practice combat missions.

Perhaps one of the most interesting aspects of multi-engine transition under the expansion program was the use of standard multi-engine aircraft for the transition of personnel scheduled to pilot types not yet in general service or production. As new units were activated or redesignated, transition was the first necessity, and it occurred on whatever multi-engine planes could be made available. For example, in 1939 the 3d Attack Group was redesignated a light bombardment group, a type of aviation for which combat aircraft had yet to be procured and doctrines of employment had yet to be formulated. During the transition period, B-18's and A-18's were designated unit aircraft, but supervised transition actually occurred on B-13's and B-12's.

The new twin-engine interceptor, the C-38, presented a peculiar problem. Prospective P-38 pilots had to have pursuit training, but they also had to have twin-engine transition. Consequently, the GHQ Air Force planned to process trainees through P-35 and P-36 types and thence to the C-40. The crack 1st Pursuit Group was designated the first

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56. Operations Memorandum No. 11, HQ, 3d Attack Group, Barksdale Field, 21 Apr. 1939, in ibid.
57. AG, GHQ AF to CG, 3d Wing, GHQ AF, 15 Mar. 1939, in History of the III Bomber Command, 1932-1941.
58. AG, GHQ AF to CG, 3d Wing, GHQ AF, 2 Nov. 1939, in ibid.
59. 1st ind. (C/AG to CG, GHQ AF, 12 Feb. 1940), C/S, GHQ AF to C/AG 26 Feb. 1940, in AG 355.9 P, Training in Aviation, Pilot Training.

unit to receive these aircraft, and late in 1939 pilots commenced C-40 transition, although the first P-38 delivery to the tactical units did not come until 1941.⁴⁰ Similarly, transition to the twin-engine A-20 light bomber was accomplished by initial B-18 orientation and then individual training through B-12's and A-18's.⁴¹

Single-Engine Transition Instruction

During the expansion program, apparently transition to service pursuit types, (P-26's, P-35's, and P-36's) did not change, but gradually, toward the end of this period, the new single-engine pursuit types began to make their appearance in the tactical units. By the first of 1941 three pursuit groups were partially equipped with early P-40 types, while within a few months the first P-39's and P-43's were delivered.⁴² For experienced pursuit pilots transition from the P-35 and P-36 was relatively simple. This was particularly true of the P-40, which was identical with the P-36A except for the engine installation.⁴³ But for some time Air Corps personnel had been concerned over the problem of transition training of inexperienced pilots to these planes of much higher performance. Early in 1940 the procurement of a transition air-

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- 40. C/S, GEC AF to C/AC, 30 Oct. 1939, in AAG 211 C, Pilots; Chart, Status of Planes in GEC AF, Jan. 1941, in AAG 452.1 D, Pursuit Planes.
 - 41. 1st Ind. (C/AC to CG, GEC AF, 12 Feb. 1940), C/S, GEC AF to C/AC, 26 Feb. 1940, in AAG 355.9 F, Training in Aviation, Pilot Training.
 - 42. Memo for C/S by Gen. H. H. Arnold, 7 Jan. 1941, in AAG 452.1 D, Pursuit Planes; Chart, Status of Planes in the GEC AF, Jan. 1941, in ibid.
 - 43. Chief, Materiel Div. to C/AC, 21 Nov. 1938, in AAG 452.1 A, Pursuit Planes.

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plane to bridge the widening gap between the advanced trainer and the combat type pursuit plane had been considered, but in view of the necessity for economy, this plane was not developed.⁴⁴ Instead, new pilots undergoing specialized training progressed through P-35 and P-36 transition to the higher performance types as they became available, transition entailing 20 hours of airwork with the usual ground indoctrination.⁴⁵

Transition under the Influence of impending War

By late 1940 and early 1941 the air arm was gradually approaching a wartime basis. Training emphasis shifted to the attainment of combat proficiency.⁴⁶ As projected heavy bombardment groups necessitated greater numbers of four-engine pilots, tactical units were directed to expedite the transition of four-engine first pilots and co-pilots.⁴⁷ But several factors--lack of eligible personnel, inadequate numbers of heavy bombers, insufficient spare parts, and location of stations in inclement weather regions--hindered four-engine training.⁴⁸ These

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- 44. Asst. C/AC to CG, GHQ AF, 4 Mar. 1940, in AAG 452.1 H, Training Planes; RAR, No. 4, Exec., CCAC, to T&O Div., 31 Mar. 1940, in ibid.
 - 45. 1st. ind. (C/AC to CG, GHQ AF, 12 Feb. 1940), C/S, GHQ AF to C/AC, 26 Feb. 1940, in AAG 353.9 F, Training in Aviation, Pilot Training; Memorandum No. 50-1, Hq., III Interceptor Command, 13 Aug. 1941.
 - 46. Memorandum No. 50-4, Hq., 2d AF, 16 June 1941; C/AC to AG, 19 Nov. 1940, in AAG 353.9 L, Training, Misc.
 - 47. Air Force Combat Command to 2d AF, 6 May 1941, in Vol. II, Supporting Documents to History of Second Air Force.
 - 48. Memo for Asst. Sec. of War for Air by CG, GHQ AF, 25 Apr. 1941, in AAG 353.9 B2, Training, General.
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problems were partially solved, but Lend-Lease operations and the necessity for equipping units in overseas possessions precluded the immediate increase of the GHO Air Force's 69 four-engine bombers. The dearth of eligible personnel was a result of years of inadequate production of experienced pilots, but all possible alleviation came in July 1941 with the abolition of eligibility requirements.⁴⁹

With the rescission of eligibility requirements the responsibility for selection of multi-engine pilots fell heavily on unit commanders. Individual differences in training, experience, and ability necessitated direct personal supervision.⁵⁰ The increased emphasis on combat crew proficiency and the pressure of time forced a shortening of the transition process from the 1930 standard and merged transition more closely with operational training. For example, in the Second Air Force emphasis was placed on ground instruction, 12 hours being allotted to indoctrination and familiarization. Air transition for both twin-engine and four-engine aircraft entailed 40 hours' flying, including familiarization, local day and night landings and take-offs, day and night cross-country flights, instrument flights, and one performance flight to the service ceiling of the plane. To maintain safety precautions, pilots were required to have six months' heavy bombardment service and 400 flying hours for four-engine duty, while for two-engine pilotage they

49. Memo for Asst. Sec. of War for Air by C/AC, 27 June 1941, in *ibid.*; AG, JCS to 2d AF, 15 July 1941, in Vol. II, Supporting Documents to History of Second Air Force.

50. Memorandum No. 50-5, HQ., 2d AF, 31 July 1941.

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had to have three months' multi-engine service and 300 flying hours.

In 1941 as the air force began to receive larger numbers of planes, the necessity arose for increased ferrying duty. Experienced pilots were few, and accidents occurred when pilots not properly checked off ferried new equipment. A plan was therefore developed whereby the most experienced personnel at an individual station delivered the first of a new type plane, and then the less experienced pilots were transition
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trained at the home station prior to ferrying duty.

The Question of the Responsibility for Transition Training

Throughout the last half of the expansion program there were two questions of policy that exerted a great influence on the course of transition. The first of these was concerned with the responsibility for the conduct of transition training. From the time the expansion program forced specialized training out into the tactical units, the Air Corps had planned to reinstate transition to combat aircraft in the individual training agency as soon as sufficient planes became available. In October 1940 a reorganized plan for individual flying
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training was approved; specialized training was to be incorporated in advanced. But the pyramiding increments of the expansion program and the necessity for equipping operational units kept postponing the realization of this transfer. Ideally, the Training Center was the proper transition agency, and the relegation of

51. Ibid.

52. C/AC to CG, GHQ AF, 13 Sep. 1940, in AAG 211 A, Titles, Grades--Officers.

53. Acting C/AC to CG, Southeast Air Corps Training Center, 12 Oct. 1940, in AAG 353.9 F, Training in Aviation, Pilot Training.

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this function to the tactical units disrupted their prime duty, tactical training of combat units. Repeatedly the tactical units recommended that individual training on all types of aircraft be conducted in specialized schools.⁵⁴ Early in 1941 a headquarters conference considered the question of training responsibility,⁵⁵ and its recommendations resulted in an official announcement by The Adjutant General. The responsibilities of the Chief of Air Corps were established as primary, basic, and advanced pilot training, to include individual military pilot training in combat type airplanes, and specialized non-pilot training. The responsibility of the Commanding General, G-2 Air Force and the commanders in overseas departments was prescribed as operational training, "training given in operational training squadrons for the purpose of bringing combat crew personnel to the desired degree of proficiency before they are assigned to combat units," and combat or unit training, "the training normally given within combat units to maintain personnel at a high degree of combat efficiency." To carry out this definition of responsibility, a gradual shift of function was to occur. Without curtailing operational or unit training, the G-2 Air Force was to transfer appropriate aircraft to the Chief of the Air Corps to allow the expansion of advanced and specialized non-pilot

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54. 1st ind. (CG, G-2 AF to CG, Northwest Air District, 6 Mar. 1941), CG, 2d AF, to CG, G-2 AF, 17 Apr. 1941, in Vol. II, Supporting Documents to History of Second Air Force; LTR, Gen. Dargue to TEO Div., 20 June 1941, in AAG 553.9 II, Training in Aviation, Pilot Training.
55. Memo for Deputy C/S for Air by Col. E. L. Padden, G-5, G-2 AF, Maj. E. T. Walker, Plans Div., CGAC, and Maj. L. S. Ruter, 26 Apr. 1941, in AAG 553.9 B2, Training, General.
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training as rapidly as possible. Thus training was gradually to return to a pre-expansion program basis, but throughout 1941 the shortage of operational aircraft precluded the transfer.

The second policy matter accorded much attention during this period was the question of establishing individual schools for combat crew training either in the GHP Air Force or under the Chief of the Air Corps. Majority opinion seems to have favored the establishment of operational training centers under the GHP Air Force for the training of complete combat crews prior to their attachment to a combat unit. But the fluid state of experienced personnel and modern equipment throughout this period would not allow the immediate establishment of such centers.⁵⁶ It remained for the influence of impending war to bring about the establishment of combat crew schools that were eventually transferred to the jurisdiction of the individual training agency.

The Establishment of Multi-Engine Transition Schools

Early in 1941 the American aviation industry began the delivery of substantial numbers of aircraft for the British government. The transatlantic ferrying of these airplanes required the use of English pilots

56. AG 353 Air Corps (4-24-41)II, 3 Nov 1941.

57. PWR, T&O to Exec. through Plans, 1 Jan. 1941, in AAG 353.9 E, Training, Misc.

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badly needed for combat duty; therefore, in February British officials approached the United States government in regard to the employment of American ferry pilots.⁵⁸ Several months of negotiation resulted in two plans. The first entailed the establishment of a multi-engine contract school by Jack Pryor, president of Transcontinental and Western Airlines.⁵⁹ Volunteer civilian pilots, many of whom were Reserve officers on inactive duty, were to receive four weeks' B-24 transition training at the TWA school at Albuquerque, N. M., prior to duty on the Atlantic ferry route.⁶⁰

Meanwhile, the air forces formulated plans to give transition training to pilots for ferrying duty on British planes between factories and stations in the northeastern United States. At first this training was to be conducted by the GHQ Air Force,⁶¹ but in June 1941 after the organization of the Ferrying Command, initial twin-engine transition was delegated to the Southeast Air Corps Training Center. During the late summer of 1941 advanced twin-engine graduates at Parksdale Field were given 20 hours of transition on whatever twin-engine tactical aircraft were available, principally B-18's, B-10's, B-12's, AT-8's, AT-7's, and Lockheed-Ludson Bombers.⁶²

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- 58. Memo for Gen. Arnold by Gen. Marshall, 14 Feb. 1941, in AAG 211 A, Titles, Grades--Officers.
 - 59. Memo for R. A. Lovett, Asst. Sec. of War for Air, by C/O, 25 Apr. 1941, in ibid.
 - 60. WD Press Release, 23 June 1941.
 - 61. Memo for CG, GHQ AF by Gen. Arnold, noting DC/S, 7 May 1941, in AAG 211 A, Titles, Grades--Officers.
 - 62. Chief, TIO Div. to CG, SMC/TCO, 2 June 1941, and 2d ind., TIO Div. to CG, SMC/TCO, 14 June 1941, in AAG 353.9 C1, Training, General.

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The organization of the Ferrying Command altered the plans for the TWA four-engine school. Army pilots were now to fly the entire ferry route, and in September 1941 TWA started training crews expressly for Ferrying Command employment.⁶³ First pilots were furnished by the Ferrying Command while new graduates of the training centers completed the crews. Production was dependent upon the number of B-24's assigned, and through 1941 only 36 crews completed the four-week course.⁶⁴ From the point of view of quantity and quality the accomplishments of the TWA school were not noteworthy; its significance lay in that it was the first specialized crew school. Thus, through aid to the British, tentative plans attained realization sooner than expected, and on 7 December 1941 a basis existed, however small, for the inauguration of wartime crew training, a type of training which later developed into specialized schools devoted solely to the transition process.

Summary.

The three years of the expansion program, 1939 through 1941, formed the bridge between peacetime and wartime transition procedure. Most of the aircraft types which the AIF was to use in World War II

63. Memo for Plans Sec., COMC by Ence., Ferrying Comd., 22 Nov. 1941, in AFG 211 A, Titles, Grades--Officers; memo for Gen. Arnold by Gen. Yount, 19 Feb. 1942, in AIF Training Comd. files.

64. RAR, Ferrying Comd. to Air Staff, 3 Oct. 1941, in AFTRC files.

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made their appearance and transition training procedures were developed. As the volume of transition increased, there was a slackening of administrative regulations and more dependence on unit commanders to insure efficient transition. Furthermore, two policies relating to transition received much attention. An attempt was made to reinstate transition in the individual training agency, and the first multi-engine crew school was established. A basis was laid for the course transition was to take during World War II.

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Chapter IV

WORLD WAR II AND THE TREND OF TRANSITION PROCEDURE

The Pattern of Training in World War II

On 7 December 1941 the United States was precipitated into World War II. The training agencies now had to meet the mass training demands of war. Through a training program designed to achieve the highest proficiency in the shortest time, inexperienced pilots had to be prepared for combat duty. For years air force personnel had been planning for this moment, but at its occurrence they were faced with many problems. Many of the new planes were just coming into general service; mass training of combat crews had never been undertaken. Some types of aviation were yet in their infancy, their employment not wholly defined. In addition, therefore, to the problems of mass individual and tactical training, the air force had to develop the means and methods for training these pilots. But as time did not exist for immediate reorganization, present facilities had to be operated at capacity before new and more efficient ones could be developed. Gradually, however, during 1942 the AAF built up a training establishment able to produce large numbers of well-trained personnel.

In keeping with the general training pattern, transition had to shift from its former individual basis to mass operation. Slowly, this had been occurring during the expansion program, but now it had to be effected immediately. Furthermore, it had to be done by the

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agencies best able to conduct it; therefore, during the war period transition took place under both the individual and operational training agencies.

The tactical training agency was composed of the four continental air forces.¹ During the first six weeks after Pearl Harbor they operated in the manner in effect prior to the war, but soon the demands of the theaters of operations and the defense areas stripped them of trained units and crews. It became evident that without an organized training program, equipment, facilities, and experienced personnel would be spread too thinly to allow the production of new units and replacement crews for some time to come.² Consequently, on 26 January 1942 the establishment of heavy bombardment combat crew training centers for the training of groups was directed.³ A similar program was directed on 8 February for medium and light bombardment groups.⁴ The heavy bombardment program, principally in the Second Air Force, was placed in operation by 1 March.⁵ Medium and light bombardment and pursuit, mainly in the Third Air Force, however, were slow in

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1. In December 1941 the Air Force Combat Command was charged with the operational and replacement training of all tactical units. Under it were the four continental air forces. A few days after Pearl Harbor the mission of the Second and Third Air Forces became exclusively training, while the First and Fourth Air Forces were placed under the jurisdiction of the Eastern and Western Defense Commands respectively. Training, however, remained their secondary mission. AG 371 (12-19-41) MSC-E-M, 20 Dec. 1941. On 9 March 1942 the Combat Command was dissolved, the Second and Third Air Forces reporting directly to the Commanding General, AAF. WD Circular No. 59, 2 Mar. 1942. On 10 September 1943 the First and Fourth Air Forces assumed the same status as the Second and Third. AG 381 (25 June 1943) OB-S-E-M, 10 Sep. 1943.
 2. CG, 3d AF to CG, AFCC, 20 Jan. 1942, in AFTHI files.
 3. Asst. AAG to C/AC, 26 Jan. 1942, in AAG 322.3, Operational Training Units.
 4. Asst. AAG to C/AC, 8 Feb. 1942, in ibid.
 5. CG, 2d AF to CG, AAF, 22 Mar. 1942, in AAG 321.9-3A Groups.
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getting under way.⁶ Both the Second and Third Air Forces were beset by serious shortages of equipment, personnel and other facilities; as a result, the First and Fourth Air Forces were charged with furnishing heavy, medium, and pursuit replacements.⁷ The established programs, however, were not accomplishing the desired ends, so under the directive of the Commanding General, AAF, in June 1942 the operational and replacement training establishment was reorganized.⁸

The Second Air Force was charged with the entire heavy bombardment development program, both operational and replacement, while the Third Air Force was delegated medium, light, and dive bombardment OTU⁹ as well as pursuit RTU. The first and Fourth Air Forces were to conduct fighter OTU training, and P-38 RTU was also placed in the Fourth Air Force.¹⁰ In September, the Third Air Force commenced medium and light bombardment RTU, which had not existed previously due to equipment and personnel shortages.¹¹ This system remained in effect until the end of 1943 when the responsibility of heavy bombardment training was distributed among the four air forces, and fighter groups were assigned to the Second Air Force to provide for combined unit training.¹² Generally, the several types of aviation conformed to these demarkations, although a few exceptions always existed, such as the

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6. C/AS to CG's, 2d and 3d AF's, 16 Mar. 1942, in AAG 322.3, Operational Training Units.
 7. CG, AAF to CG's, 2d and 3d AF's, 19 Mar. 1942, in *ibid*.
 8. R&R, Gen. Arnold to Gen. Fairchild, 5 June 1942, in AAG 321.9-3B Groups.
 9. Director of Military Requirements to CG, 3d AF, 11 June 1942, in AAG 322.3 B, Operational Training Units.
 10. AG 353 (5-29-42) MS-AF, 1 June 1942.
 11. Asst. AG, 3d AF to CG, AAF, 6 Sep. 1942, in AAG 322.3 B, Operational Training Units.
 12. Memo for Gen. Arnold by Gen. Harper, 7 Aug. 1943, in AFHFI files.

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night fighter program under the School of Applied Tactics¹³ and a photographic operational training unit in the Second Air Force.¹⁴ All transport training occurred under the separate I Troop Carrier Command which conducted its own operational and replacement training system.¹⁵

All OTU and RTU training, regardless of the type of aviation or the training agency, was conducted under a similar system. It was divided into two or more phases, the first being devoted to the completion of the pilot's individual combat training. For many months (until transition to some types was taken over by the individual training agency) the first necessity of individual combat training was transition to operational aircraft. Transition, therefore, maintained the same status it had held under the GHQ Air Force.

After Pearl Harbor the individual training agency also underwent reorganization. On 7 December 1941 the function of individual training was under the Chief of Air Corps. The flying training establishment was divided into three training centers, the Southeast, Gulf Coast, and West Coast. On 23 January 1942, however, the Flying Training Command was established with jurisdiction over the three training centers.¹⁶ On 7 July 1943 the Flying Training Command and the Technical Training Command were consolidated into the Army Air Forces Training Command,¹⁷ while the three training centers became the Eastern,

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13. Director of Air Defense to CG's, 1st, 2d, 3d, 4th AF's, 20 July 1942, in AAG 211 G, Grades, Titles--Officers.
14. Director of Photography to CG, 2d AF, 27 Apr. 1942, in AAG 322.3, Operational Training Units.
15. Memo for Gen. Harper by Lt. Col. L. B. Kelly, 31 May 1943, in AFTHI files.
16. AG 322.2 (1-14-42) MR-X-AAF/A-1, 23 Jan. 1942.
17. AAF Memorandum No. 20-5, 7 July 1943.
- [REDACTED]

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Central, and Western Flying Training Commands.¹⁸ The Training Command operated through separate schools for the various types of training. Transition in the command was of two types, either specialized schools for transition to a specific type of plane or transition to combat types in the last phase of advanced pilot training.

The Transfer of Transition Training from the Tactical Units to the Training Command

During the war period there were several factors that affected the course of transition. Perhaps the most important administrative question was when and how the long-planned transfer of transition to the individual training agency would occur. For many years the air force mobilization plan had contemplated that after M-day, primary, basic, and advanced schools would complete individual pilot training, giving transition to combat aircraft in the advanced schools on old or obsolete planes. After graduation, the various crew members would be assembled at organizational training centers where they would receive unit or individual replacement training prior to combat.¹⁹ During 1941 this plan had been further developed,²⁰ but on the declaration of war it could not be effected. Available equipment had to be allocated where it was most dearly needed; practically all operational aircraft therefore remained in the tactical units. But as wartime training got under way, the need for the shift became increasingly apparent. Tactical units, whose primary mission was combat training, were forced to devote

18. WD Press Release, 23 Aug. 1943.

19. Memo for C/AC by Chief, Plans Sec., 16 Feb. 1937, in AAG 353.9 A, Training, General.

20. See Chap. III.

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much valuable time to transition. For example, in heavy bombardment, 90 days were required to prepare crews and units completely for combat duty, but the necessity for transition often reduced available time by one to one and a half months.²¹ A similar problem existed in other types of aviation,²² which led to repeated recommendations by the tactical units that transition be transferred to the Flying Training Command.²³ Early in 1942 it was suggested that special transition schools be established within the command, that a fourth stage be superimposed on advanced training. This was recommended in the belief that adequate transition could not be attained in the advanced stage along with regularly scheduled training.²⁴ At this time, April 1942, however, Headquarters, AAF, concerned over the scarcity of aircraft, apparently believed that transition in the OTU's would accomplish the desired ends and deemed the establishment of a fourth stage too "complicated." The plan of eventually placing transition in advanced schools was maintained.²⁵

Although during early 1942 this problem occasioned much discussion, it was not wholly centered around the question of availability of tactical aircraft. It became confused with the problem of providing

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- 21. R&R, No. 2, AC/AS, Training to C/AS, 16 Apr. 1943, in AFIHI files.
 - 22. Exec., III Bomber Comd. to CG, 3d AF, 11 Sep. 1942, in AFIHI files.
 - 23. R&R, AFDMR to C/AS, 27 Mar. 1942, in AAG 353.9 G1, Training, Misc.
 - 24. AC Technical Supervisor to Air Inspector, 22 Jan. 1942, in AAG 353.9 C2, Training, General; AF Technical Supervisor to Director of Technical Inspection, 3 Mar. 1942, in AAG 353.9 I, Training in Aviation, Pilot Training; AF Technical Supervisor to AFTSI, 31 Mar. 1942, in *ibid*.
 - 25. R&R No. 3, Director of Individual Training to AFDMR, 20 Apr. 1942, in AAG 353.9 I, Training in Aviation, Pilot Training; R&R, No. 4, AFDMR to AFTSI, 27 Apr. 1942, in *ibid*.

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replacement pilots and crews. The operational units were struggling to activate and train new units for overseas duty, but replacements had to be supplied for those groups already in the theaters of operation. In the interests of expediency, crews were withdrawn from groups in training, thereby seriously disrupting their activities.²⁶ Often these crews were brought to full strength by the assignment of recent school graduates, a practice which resulted in training accidents in areas where repair and replacement of materiel were extremely difficult.²⁷ This situation demanded immediate remedy.

Typical of the period, the replacement problem was complicated by conflicting directives and dissimilar action in the separate types of aviation. Both the air forces and the Flying Training Command were delegated the responsibility of providing replacement crews.²⁸ Actually, replacements were secured from whatever agency was best able to provide them. In heavy bombardment the immediate need for replacement crews was partially met when the Chief of the Air Corps took over the TWA School at Albuquerque late in December 1941. On 10 January 1942 the Flying Training Command was directed to establish heavy bomber crew schools which commenced operations in March²⁹ it was here that transition first became a function of the individual training agency. In this way, and through a small amount of training conducted by the First and Fourth

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26. Exec., III Bomber Comd. to CG, 3d AF, 6 July 1942, in AFHFI files.
27. Memo for C/AS by A-1, (?) Mar. 1942, in AAG 353.9 GI, Training, Misc.
28. Memo for AFDMR by Director of Bombardment, 31 May 1942, in AAG 322.3 B, Operational Training Units.
29. R&R, Asst. C/AC to Chief, Training Div., 22 Dec. 1941, in AAG 353.9 F, Training, Misc.; Asst. AAG to C/AC, 10 Jan. 1942, in AAG 353.9C2, Training, General; Project Book, CG, AFTRC.
- [REDACTED]

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Air Forces, the problem of heavy bombardment replacements was temporarily answered until Second Air Force crew training began in the summer of 1942.³⁰

In the other types of aviation, the problem of replacement crews was not adequately solved until late 1942 when the RTU programs were placed in operation in the various air forces.³¹ Small numbers of replacements were secured by robbing OTU groups and through limited production by the First and Fourth Air Forces.³² In May 1942 the Flying Training Command had been directed to establish combat crew schools for medium and light bombardment and had also been charged with the training of pursuit replacements. Such training, however, was never effected because tactical aircraft were not allocated to the command.³³

The planned and actual delegation of replacement training to the Flying Training Command caused much discussion in headquarters. The Director of Bombardment believed that replacement training could best be accomplished by regularly organized bombardment groups, inasmuch as he thought tactical units were better able to impart combat tactics and techniques than the production-line, individual type of training employed by the Flying Training Command. Five-week combat crew schools could not properly train crews which normally required two to three

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- 30. R&R, AFDMR to C/AS, 27 Mar. 1942, in AAG 353.9 GI, Training, Misc.; CG, 2d AF to CG, AAF, 23 May 1942, in History of the 18th Replacement Wing, 15 June 1942-31 Dec. 1942, Vol. I.
 - 31. Asst. AG, 3d AF to CG, AAF, 6 Sep. 1942, in AAG 322.3 B, Operational Training Units.
 - 32. R&R, AFDMR to C/AS, 27 Mar. 1942, in AAG 353.9 GI, Training, Misc.; Exec., III Bomber Comd. to CG, 3d AF, 6 July 1942, in AFIHI files.
 - 33. AFDMR to CG, AAF Flying Training Command, 23 May 1942, in AAG 353.9 Crew Training; CG, AFFTC to CG, AAF 18 June 1942, in ibid.
- [REDACTED]

months of training. The Second and Third Air Forces, therefore, were best suited to conduct replacement training provided they were relieved of the burden of transition. The Director of Bombardment recommended that transition training be conducted in specialized schools under the Flying Training Command. These schools would produce first pilots, co-pilots being provided from graduates of the advanced twin-engine schools.³⁴ The recommendation of a separate stage for transition training marked a significant step in the development of transition procedures.

The approval of this plan in July 1942 by the Director of Military Requirements brought an answer to the questions of replacement and transition training.³⁵ All replacement training was to be delegated to the air forces as soon as such programs could be placed in operation. First-pilot transition was to be a function of the Flying Training Command, taking place either in post-graduate transition schools or in the last part of advanced pilot training. In line with this policy, on 26 August 1942 the heavy bombardment combat crew schools were converted to first-pilot training and were redesignated pilot transition schools (four-engine).³⁶ A little over a month later, on 6 October, the first increment of medium bombardment transition was transferred to the Flying Training Command with a headquarters directive to establish a B-26 transition school.³⁷ During this same month the Flying Training Command

34. Memo for AFDMR by AFRDB, 31 May 1942, in AAG 322.3 B, Operational Training Units.

35. R&R, AFDMR to AFRDB, 4 June 1942, in AAG 322.3 B, Operational Training Units.

36. AFRIT to CG, AFFTC, 26 Aug. 1942, in AAG 353.9 F, Training, General; Project Book CG AFTRC.

was directed to establish a pilot transition school (transport) for transition on DC-2's and DC-3's, a plan which was cancelled in December.³⁸ Throughout the summer and early fall tentative plans for the institution of both P-38 and P-40 transition were discussed, but they did not become effective until early in 1943.³⁹

Gradually transition training was being transferred to the individual training agency, but directives were often conflicting, and their implementation was dependent upon the uncertain question of availability of aircraft. Finally on 15 November 1942 the Director of Military Requirements instructed the Director of Individual Training in collaboration with the "type directors" to formulate plans for the transfer to the Flying Training Command of all transition to specific types of airplanes.⁴⁰

With this final definition, transfer of the transition function was afforded increased impetus. On 22 December, B-25 transition by the Flying Training Command was directed. Training was conducted at an advanced twin-engine school, but on 4 March 1943, B-25 transition attained specialized school status.⁴¹ Early in January the Flying Training Command began producing advanced graduates with transition on P-322's (P-38's), while on 5 February the initiation of 10 hours' P-40

38. Project Book, CG, AFTRC; R&R, No. 2, AFRIT to AFDMR, 13 Nov. 1942, in AAG 353, Transition Training.

39. Project Book, CG, AFTRC.

40. Memo for AFRIT, AFRDB, AFRAD, and AFRAS, 15 Nov. 1942, in AAG 353 Transition Training.

41. AFRIT to CG, AFFTC, 22 Dec. 1942, in files of AC/AS, Training; AFRIT to CG, AFFTC, 4 Mar. 1943, in AAG 353 A, Pilot Training.

transition in advanced single-engine training was directed.⁴² Apparently, under the plans formulated by the type directors, transition to light and dive bombardment aircraft was also to be delegated to the command,⁴³ but this never occurred. Transition to other types of fighter planes, with the exception of the P-39, also remained a function of the training air forces. Training similar to that given on the P-40 was directed 29 February 1944.⁴⁴ Since August 1942 all multi-engine transition had been exclusively for first pilots, but in January 1944 heavy bombardment co-pilot transition became a function of the Training Command, and in February, B-26 co-pilot transition was authorized.⁴⁵ Despite the fact that transition to many combat aircraft had been transferred to the individual training agency, however, much of it still remained in the tactical units.

Summary

During World War II the majority of pilots were given transition training in either the Flying Training Command or the domestic air forces. But other agencies, whose primary mission was not training, utilized tactical aircraft and therefore conducted transition. Although the transition procedure employed by all activities was generally similar, each had its individual approach to the training problem and its particular difficulties and training problems.

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42. Project Book, CG, AFTRC; AFRTT to CG, AFFTC, 5 Feb. 1943, in AAG 353 A, Pilot Training.
43. R&R, AFRTS to AFRTT, 10 Dec. 1942, in AAG 353, Transition Training.
44. Project Book, CG, AFTRC.
45. Daily Diary, AFTRC, 18 Jan. 1944; AG/AS, Training to CG, AFTRC, 18 Feb. 1944, in AAG 353 B, Pilot Training.

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For many months the principal transition agencies were the training air forces. But the prime duty of these organizations was combat mission training; transition was merely a necessary step toward the achievement of this end. In such instances transition lost its individuality and became more closely merged with operational training. Under the press of wartime training the tendency toward decentralization of regulation for transition procedure, which had become evident in 1941, continued. Determination of procedures remained in the lowest echelon, only general control emanating from Headquarters, AAF and the headquarters of the various individual air forces. Headquarters direction remained essentially the same as during the expansion program, pilots being required to pursue a prescribed course of flying instructions.⁴⁶ The headquarters of the various air forces prescribed general training methods which were further amplified by the individual fighter and bomber commands, but the determination of the process remained on the group or squadron level. In keeping, however, with the policy of general standardization and supervision, the type directors in Washington issued general training standards for each kind of unit. These presented qualification requirements which were to be attained by the end of operational training.⁴⁷ In each of these, individual pilot and co-pilot qualifications were specified, which for the most part were to be reached during the transition period or at the end of first-phase OTU-RTU training. It was toward their attainment that transition

46. AAF Reg. No. 50-16, 26 Oct. 1942.

47. AAF Memorandum No. 50-6, 11 Sep. 1942.

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training was directed.

As transition shifted to the Flying Training Command, it lost its informal and individual characteristics, and in keeping with the particular organization and administrative procedure of that agency, assumed program status. This was especially true of the postgraduate transition schools. Training was in accordance with scheduled production quotas and because of the similar degree of experience of the trainees, followed a more defined instructional program. This production-line type of training, however, was pointed toward the same end as that employed in the air forces—the attainment of the proficiency standards prescribed by the type directors.

One other factor exercised a profound influence on the course of transition procedure. As the war training program progressed, there was an increasing tendency toward collaboration on training aims and methods between the individual and operational training agencies. Ideally, the Training Command aimed to produce pilots with a firm grounding in individual training so that upon assignment to the air forces they could progress rapidly and efficiently through operational or replacement training. After late 1942 a series of training conferences occurred, concerned with both training in general and the separate types of aviation. Through these conferences . continued improvement of training administration, methods, and aims was effected. The Flying Training Command learned what qualifications the air forces desired and amended its programs to meet them. Furthermore,

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methods of training, such as transition procedure, were decided upon and placed in operation in both agencies. Throughout the entire AAF training establishment, transition procedure became more efficient, standardized, and productive.

Chapter V

TRANSITION TRAINING IN THE TACTICAL UNITS IN WORLD WAR II

1. Heavy Bombardment

During the first two years of American participation in World War II the greater part of transition to heavy bombardment aircraft in the tactical units was conducted by the Second Air Force. This training occurred on two types of planes, the B-17 and the B-24. The B-17 had been in operational use since 1937, but the B-24, designed in 1938, did not begin to reach the tactical units in quantity until the first months of the war. Heavy bombardment transition procedure, therefore, had been developed around the B-17; the B-24 followed its lead. With a few exceptions, due to the somewhat greater difficulty faced by inexperienced pilots learning to fly the Liberator, their transition programs were quite similar, from both administrative and instructional points of view.

Personnel assigned to heavy bombardment were supposedly graduates of the advanced twin-engine flying schools. As late as September 1942, however, all advanced twin-engine schools had not been equipped with

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1. Report of the Commanding General of the Army Air Forces to the Secretary of War, 4 Jan. 1944, 4.

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twin-engine trainers; therefore, heavy bombardment units received both single-engine and twin-engine graduates.² As the specialized four-engine transition schools built up production, the flow of four-engine pilots gradually increased. Finally, by the fall of 1943, all first pilots reaching the Second Air Force had received this training, and the necessity for transition was greatly reduced.³ Early in 1944 a limited number of co-pilots with this training also began to flow to the tactical units.⁴

Transition Instruction. The first phase of heavy bombardment OTU-RTU was devoted to the individual combat training of the pilot, and it was here that transition occurred. Transition methods were determined by the individual units under general instructions issued by the Second Air Force.⁵ It may be assumed that procedure was generally the same, varying only with the availability and qualifications of instructors, weather conditions, and the proficiency of the individual trainee. One other procedure served to maintain standardized transition, the heavy bombardment training standards issued by the Directorate of Bombardment. Although these specified pilot and co-pilot qualifications to be attained at the end of first-phase training,⁶ transition training was pointed toward their attainment.

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2. R&R, AFRTT to Director of Military Personnel, 22 Sep. 1942, in AAG 353.9 F, Training, General.
 3. R&R, No. 2, AC/AS, Training to C/AS, 16 Apr. 1943, in AFTHI files.
 4. Daily Diary, AFTRC, 18 Jan. 1944.
 5. Memorandum No. 50-4, Hq., 2d AF, 1 July 1942.
 6. AAF Training Standard No. 20-1-1, 8 Feb. 1943.
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In first-phase training all effort was first devoted to checking off the new pilots. Trainees were employed as co-pilots for approximately 60 hours, and then upon demonstrating airplane commander capacity and passing a flight test satisfactorily, they became first pilots.⁷ In the 39th Bombardment Group (H), a parent OTU, transition instruction and check off for B-24 trainees included the following items:⁸

- a. Take-off
- b. Approaches and landing
- c. Partial stalls (minimum altitude 7000 ft. above ground)
 - (1) Power off and power on
 - (2) Gear up and down
 - (3) No flaps, half flaps, full flaps
- d. Two (2) and three (3) engine operation (minimum altitude 7000 ft. above the ground)
 - (1) Windmilling
 - (a) Straight flight
 - (b) Turns right and left
 - (2) Feathered
 - (a) Straight flight
 - (b) Turns right and left
- e. Three (3) engine landing (standard procedure)
 - (1) Windmilling
 - (2) Feathered
- f. Instrument Flying
 - (1) Primary instrument (turn and bank, air speed, rate of climb, altimeter, compass)
 - (a) Using only the primary instruments, perform the basic airwork prescribed in Second Air Force orientation and let-down.
 - (2) Secondary instruments (artificial horizon, gyro, altimeter, compass, airspeed)
 - (a) Same as (a) above.
 - (3) All instruments
 - (a) Perform complete Second Air Force instrument check.

7. History of the Fifteenth Bombardment Operational Training Wing Headquarters, 1 Jan. 1943.-1 Sep. 1943.

8. Memorandum No. 50-8, Hq., 39th Bombardment Gp. (H), 25 Apr. 1943.

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Accompanying flying instruction were the usual five to 10 hours of ground instruction and familiarization, such as preflight procedure, technical orders pertaining to the airplane, blindfold cockpit check, and local and CAA flying regulations.⁹ This, too, varied with the unit; for example, in the 39th Group, 10 hours above the minimum prescribed by the Second Air Force were given.¹⁰ Once the trainee pilots had been checked off, they engaged in further individual combat training.

On 1 March 1943 a system of model mission flight training for all heavy bombardment units and crews went into effect throughout the Second Air Force. Of the 27 missions in first-phase training, the first 5, 2 to 3 hours' in duration, were devoted to transition procedure similar to that outlined above. Co-pilots received the same training as first pilots, with more emphasis on co-pilot procedure and engineering.¹¹

Although the OTU-RTU system of the Second Air Force was the principal tactical agency conducting four-engine training, other activities utilized four-engine aircraft. Prior to June 1942 when all heavy bombardment OTU-RTU was delegated to the Second Air Force, some four-engine training was conducted by the other three continental air

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9. History of the Fifteenth Bombardment Operational Training Wing Headquarters, 1 Jan. 1943-1 Sep. 1943.
 10. Training Schedule, 39th Bombardment Group (H), May 1-July 1, 1942, in History of 39th Bombardment Group (H), 7 Dec. 1941-31 Dec. 1942.
 11. Model Mission Flight Training, Second Air Force, 10 Feb. 1943, in ibid.
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¹² forces. In addition, four-engine aircraft were used by photographic-reconnaissance units. Early in 1943 when it was decided to use B-17's and B-24's in photographic-reconnaissance squadrons (H), it was necessary for the photographic-reconnaissance OTU at Colorado Springs, Colorado, to give transition to four-engine pilots.¹³ After photographic-reconnaissance aviation was reorganized in August 1943 and came under the new III Reconnaissance Command of the Third Air Force, graduates of the Training Command who had completed transition training in B-17's and B-24's were provided.¹⁴ Presumably, transition programs approximated those in effect in the Second Air Force at the same period.

Problems. Of all operational training programs, heavy bombardment seems to have been less hindered by the usual problems of aircraft, personnel, and instructor shortages. Perhaps this was because it was accorded the highest priority. During the first half of 1942, however, the program experienced shortages of equipment and personnel. Many of the trainee pilots had no previous multi-engine experience, and to accomplish the long step between single-engine and four-engine aircraft,¹⁵ an excessive amount of time had to be devoted to transition. As

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12. CG, AAF to CG's, 2d and 3d AF's, 19 Mar. 1942, in AAG 322.3, Operational Training Units; AFDLIR to CG, 3d AF, 11 June 1942, in AAG 322.3 B, Operational Training Units.
 13. R&R, AFRDB to AFTSP, 4 Feb. 1943, in AAG 353 #2, Pilot Training; AFTSP to CO, Army Air Base, Colorado Springs, Colo., 4 Mar. 1943, in AAG 211 A, Pilots.
 14. AC/AS, Training to CG, 3d AF, 31 July 1943, in AFIHI files.
 15. CG, 2d AF to CG, AAF, 22 Mar. 1942, in AAG 321.9-3A, Groups.

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advanced twin-engine graduates and later four-engine graduates were supplied, this problem decreased. Throughout 1942 and 1943 the chief personnel difficulty seems to have been the necessity for the retransition of Training Command B-17 graduates to B-24's when they reached the Second Air Force.¹⁶ As late as November 1943 the Training Command did not have sufficient B-24's to effect the transition of pilots in the desired ratios, but early in 1944 this difficulty was also solved.¹⁷

During the early period transition instruction was also hindered by the lack of experienced check pilots.¹⁸ To accomplish transition, all assigned qualified pilots and co-pilots were used as instructors.¹⁹ As the heavy bombardment program began, the Second Air Force established B-17 and B-24 standardization schools for instructor training.²⁰ When the central instructors schools (four-engine), established in connection with the Training Command's four-engine program, began operations in October 1943, the Second Air Force sent its instructors there for training.²¹ By this means, trainees benefited from standard instructional procedures and check lists throughout their entire training.

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16. TFX, 2d AF to AC/AS, Program Planning, 11 Apr. 1943, in AAG 211 B, Pilots.
17. Project Book, CG, AFTRC.
18. CG, 2d AF, to CG, AAF, 22 Mar. 1942, in AAG 321.9-3A, Groups.
19. Training Schedule, 39th Bombardment Group (H), May 1-July 1, 1942, in History of 39th Bombardment Group (H), 7 Dec. 1941-31 Dec. 1942.
20. AG, 2d AF to CG, AAF, 21 Aug. 1943, in AAG 353, Transition Training.
21. AC/AS, Training to CG, AFTRC, 16 Aug. 1943, in ibid.
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The method for first-pilot progression through the OTU-RTU system remained relatively the same, differing only for pilots whose experience prior to reaching the air forces was dissimilar. But co-pilot training and progression varied greatly and presented both serious proficiency and morale problems. During the first half of 1942, when all trainees were of similar experience, one man was tagged as pilot, the other as co-pilot, and they engaged in operational training as a team.²² But so great was the shortage of experienced personnel, that it was decided that these co-pilots were too experienced and could be used more advantageously in the formation of new groups.²³ Consequently, on 7 July 1942 the Second Air Force was directed to replace trained co-pilots with new Flying Training Command graduates 15 days prior to unit departure. The co-pilots were then returned to new groups for employment as first pilots.²⁴ During the 15 days, the new command graduates received sufficient training to qualify them in the minimum individual training standards, but crew and unit training were completely lacking.²⁵

Apparently, however, as increased numbers of four-engine pilots, who had received transition training, and advanced twin-engine graduates reached the tactical units, this procedure was abandoned.

22. CG, 2d AF, to CG, AAF, 17 May 1942, in AAG 321.9 A, Groups.

23. R&R, No. 3, AFRDB to Director of Technical Services, 2 July 1942, in AAG 211 C, Grades, Titles--Officers.

24. AFRDB to CG, 2d AF, 7 July 1942, in AAG 211 D, Pilots.

25. CG, 2d AF to CG, AAF, 17 May 1942, in AAG 321.9 A, Groups.

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Many of the twin-engine graduates who showed promise during the transition period attained airplane commander status,²⁶ but the single-engine graduates were almost invariably relegated to the status of career co-pilot. Naturally these men, who had believed themselves destined for a pursuit career, experienced an appreciable drop in morale and were generally uninterested in co-pilot duties. As four-engine pilot production met quotas, advanced twin-engine pilots joined the ranks of career co-pilots. Furthermore, apparently there was a tendency to neglect co-pilot training in favor of first pilots; often co-pilots were not accorded a systematic training program emphasizing engineering and airplane construction.²⁷ Throughout 1943 various attempts were made to remedy the status of co-pilots through transfer of co-pilot transition to the Training Command. Finally this occurred in January 1944.²⁸

2. Very Heavy Bombardment

Out of the increasing trend toward long-range bombardment came the Boeing Superfortress. On 31 December 1942 the first XB-29 was delivered to the Army Air Forces, 14 YB-29's following in July of the next year.²⁹ As in the case of the B-17 in 1937, the B-29 was accorded special status.

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26. R&R, No. 3, AFRDB to AFDTIS, 2 July 1942, in AAG 211 G, Grades, Titles--Officers.
27. AC/AS, Training to CG, AFTRC, 27 Aug. 1943, in AAG 353 B, Pilot Training.
28. See below, Chap. VI, Sec. 5.
29. WS-1, Daily Aircraft Acceptance and Delivery Report, AAF Materiel Comd.
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A special training agency was established, and minimum eligibility requirements for pilot personnel were prescribed. In the spring of 1943 when the B-29 program (58th Bombardment Wing (H)) was initiated, it was a special project under the jurisdiction of Headquarters, AAF.³⁰ On 11 October 1943 the 58th Wing was redesignated very heavy and assigned to the Second Air Force.³¹ A little over a month later, the XX Bomber Command, composed of the 58th and 73d Wings, was activated. When the XX Bomber Command moved to the theater, one group was to remain in the Second Air Force to form a nucleus for another wing in order to provide further OTU-RTU training.³²

All pilot personnel for the B-29 program were required to meet eligibility qualifications. In the beginning it was decided that first pilots should have six months' tactical experience and 300 hours on multi-engine aircraft, while co-pilots should be qualified four-engine pilots.³³ At first pilots were secured from various agencies,³⁴ but after autumn of 1943 the Training Command furnished all co-pilots from the B-17 schools and all first-pilots³⁵ under the following qualifications and assignment preference:³⁶

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- 30. R&R, AC/AS, OC&R to AC/AS, Training, 18 May 1943, in AAG 353.01 B, Training Program.
 - 31. AG 322 (9 Oct. 1943), 11 Oct. 1943.
 - 32. History of the XX Bomber Command, 27 Nov. 1943-31 Jan. 1944.
 - 33. 2d ind. (AG, 4th District Technical Training Comd. to CG, AFTTC, 1 Apr. 1943), AC/AS, Training to CG, AFTTC, 21 May 1943, in AAG 322 B, Crews.
 - 34. C/AS to CG, Air Transport Comd., 12 Aug. 1943, in AAG 452.1 A, B-29 Bombers.
 - 35. R&R, AC/AS, Training to AC/AS, OC&R, 28 Dec. 1943, in AAG 353 B, Pilot Training.
 - 36. AC/AS, Training to CG, AFTRC, 20 Dec. 1943, in AAG 211 C, Pilots.
- [REDACTED]

1. B-17 pilots with a minimum of 1000 hours four-engine flying time.
2. B-24 pilots with a minimum of 1000 hours four-engine flying time.
3. Experienced pilots with a total of 1000 hours flying time, 300 or more of which have been on four-engine equipment, first preference B-17 type airplane and second preference B-24 type aircraft.
4. Experienced pilot personnel such as Bomb Approach and Navigation pilots with at least 1000 hours total flying time who have been given a course of instruction on the B-17 airplane, or second preference B-24.
5. Four-engine pilots with a minimum of 300 hours four-engine flying time, first preference B-17 and second preference B-24.

The flying characteristics that differentiated the B-29 from the other heavy bombers were its greater range, speed, service ceiling, and load capacity. But for an experienced four-engine pilot, the step to the larger ship was relatively easy, not unlike flying the B-17. At first, training was complicated by the lack of a central training directive. Each group commander operated his own training program and prescribed subject matter and proficiency standards. After 1 February 1944, however, the program of instruction was prescribed by higher echelons.³⁷ The 18 hours of air transition to the B-29³⁸ included:

	Hours
Day landings and air work	6
Emergency procedures demonstration check	3
Day landings and check	3
Instrument check, including instrument take-off and low approach let down	3
Night landings and check	3

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37. History of the XX Bomber Command, 27 Nov. 1943-31 Jan. 1944.
 38. Second Air Force Flight Directive for Combat Crews, B-29, Feb. 1944, in files of AC/AS, Training.

[REDACTED]

The principal problems encountered in the B-29 program centered around slow delivery of aircraft, a lagging modification program, and maintenance difficulties. Much of the combat mission training was done on B-17's.³⁹ Transition was accomplished by assigning two or three B-29's to new groups as they were activated,⁴⁰ but it too was slow. For example, by late December 1943 only 67 first pilots had been checked off on the B-29.⁴¹ When trained groups began moving to the combat zone, the same problem of lack of aircraft applied to the new groups remaining in the Second Air Force.⁴² Thus, in many ways the B-29 program was similar to early B-17 training--the new airplane was accorded an elite status, an individual training program was established, and minimum eligibility requirements were in effect.

3. Medium Bombardment

As in heavy bombardment, one agency was principally concerned with the conduct of transition training to medium bombardment aircraft, in this case the Third Air Force. Mass production of the two medium bombers with which the United States went to war, the North American B-25 and the Martin B-26, began in February 1941.⁴³ But at the time of the attack on Pearl Harbor only a few of these planes had reached GHQ

39. History of the XX Bomber Command, 27 Nov. 1943-31 Jan. 1944.

40. Brig. Gen. K. B. Wolfe to C/AS, 10 Aug. 1943, in AAG 380 E, Program-Project.

41. History of the XX Bomber Command, 27 Nov. 1943-31 Jan. 1944.

42. Daily Diary, AC/AS, Training, Unit Training Div., 26 Apr. 1944.

43. Report of the Commanding General of the Army Air Forces to the Secretary of War, 4 Jan. 1944, 4.

[REDACTED]


Air Force units,⁴⁴ and transition to them had just begun.⁴⁵ Consequently, the Third Air Force was left the task of developing a tactical training program, including transition procedure, for medium bombardment aircraft. The development of this program fell into two periods. The first, until about June 1942, was characterized by organization of facilities and attempt at solution of many personnel and operating problems; the second, after the medium bombardment development program had got under way, by relatively smooth functioning of the OTU-RTU system.

During this period, however, transitioning occurred under peculiar circumstances. As no organized medium bombardment groups remained in the United States, it was necessary for the first groups to train themselves.⁴⁶ Furthermore, because of lack of experience the trainee pilots necessarily required prolonged and detailed transition. This was particularly true in the B-26 units, for the Marauder required an unusual amount of skill and technical knowledge on the part of the pilot for its successful operation. In one B-26 group it was found that it took 16 hours to check off experienced pilots, and 50 for inexperienced.⁴⁷ A B-25 group, on the other hand, graduated co-pilots to supervised first piloting after 35 hours and to first pilots after 50 hours.⁴⁸

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44. Memo for Col. E. L. Naiden by G-3, AFCC, 4 Oct. 1941, in AAG 321.9-3A, Groups.
45. Exec., III Bomber Comd. to CG, 3d AF, 16 Oct. 1941, in AFHFI files.
46. Exec., III Bomber Comd. to CO, 21st Bombardment Gp., 20 Mar. 1942, in AFHFI files.
47. AC/AS, A-3 to AFDAS, 24 July 1942, in AAG 322.3 B, Operational Training Units.
48. AC/AS, A-3 to AFDAS, 11 May 1942, in AAG 322.3, Operational Training Units.
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Beset by organizational, personnel and equipment difficulties, apparently units did not always conduct transition that measured up to prescribed standards. An unusual number of accidents occurred, so many that the Third Air Force was forced to reiterate the need for thorough pilot indoctrination and supervision of transition. Ground indoctrination had to accomplish a 100 per cent knowledge of all technical aspects of the plane and include a blindfold cockpit test. Following this, all the flying characteristics of the plane had to be explained to the pilot, and then for at least five hours every take-off and landing had to be made under the supervision of an experienced flight leader operating the radio in the control tower. Before the trainee was considered competent to fly cross-country, he had to have at least 30 hours' experience in the airplane and execute at least 10 landings on strange airports. The need for thorough instrument training and full use of the link trainer was also stressed.⁴⁹

The actual determination of the transition process remained in the individual units, however; established standards for training and minimum qualifications were specified there.⁵⁰ Instructors' manuals, published by the III Bomber Command, were designed to standardize flying instruction and yet encourage the development of individual ideas along instructional lines. Illustrative problems and questions were suggested which were designed to "demonstrate to the student the

49. AG, 3d AF, to CO's, all units, 3d AF, 5 Mar. 1942, in AFTHI files.

50. Memorandum No. 50-51, Hq., 3d AF, 31 Aug. 1943.

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[REDACTED]

relationship of various instruments and the effect of operation of various controls." Certain procedures and outlines of points to be stressed were specified; for example:

51

Prior to the time that the student is given an opportunity to fly the airplane from the pilot's seat, the operation of all controls must be thoroughly demonstrated, and it will be ascertained that the student understands the proper use of all controls and accessory equipment. Check consists of the full operation by the student of the equipment in accordance with Pilot's Transition Progress Card. The Instructor Pilot will act in a supervisory capacity during the landing transition period forcing the student pilot to determine when and what action is required at all times.

From time to time higher echelons found it necessary to emphasize certain aspects of transition. This was particularly true of the B-26. In accordance with the desires of the Commanding General, AAF that all precautions necessary be taken to insure safe operation of the B-26 and to improve trainee morale, particular attention was accorded B-26 emergency procedure instruction: methods of abandoning the aircraft, flight and ground instruction in single-engine operation, other emergency procedures, and blindfold cockpit tests. 52 Selected officers from each B-26 OTU were sent to Wright Field for an intensive course in the operation of the B-26, including thorough instruction in single-engine flight and landings. Upon return to their groups they were able

51. Memorandum No. 50-7, Hq., III Bomber Comd., 15 Sep. 1942.

52. R&R, AFDAS to AFRDB, 10 Dec. 1942, in AAG 452.1 Bombers; (Heavy) B-26; R&R, No. 2, AFRDB to AFDAS, 8 Jan. 1943, in ibid.

[REDACTED]

[REDACTED]

to aid substantially in the conduct of Marauder transition.⁵³

For almost a year after the establishment of the coordinated OTU-RTU system, it was necessary for the Third Air Force to conduct transition training for new Flying Training Command graduates assigned to B-25 and B-26 units. Early in 1943 small numbers of graduates of the transition schools began to flow to these units, and by the summer of that year practically all first pilots had received transition to tactical types of aircraft. Thus transition in the tactical units became a rechecking-off process for first pilots. It was still necessary, however, for co-pilots to receive transition.

During the first months of medium bombardment training, pilots and co-pilots progressed through the training cycle as a team, receiving similar training. At the beginning of first phase, trainee pilots were divided into two sections according to proficiency, one section flying as first pilots, the other as co-pilots.⁵⁴ This method of training, however, occasioned a situation similar to that which had arisen in heavy bombardment units.⁵⁵ In view of the serious lack of experienced personnel, it was felt that the commitment of two fully qualified pilots in each crew was wasteful. Accordingly, in July 1942 headquarters directed that 15 to 30 days prior to the end of

53. R&R, AFRDB to AFALC, 12 Sep. 1942, in AAG 353.9 J, Training in Aviation, Pilot Training.

54. Asst. AG, 3d AF to CG, AAF 10 July 1942, in AFTHI files.

55. See above, Sec. 1.

[REDACTED]

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second phase, trained co-pilots would be replaced by new graduates of
the Flying Training Command.⁵⁶ The released co-pilots would be
returned to the new groups, thereby raising their experience level.⁵⁷
As a result of this method, co-pilots received little more than simple
transition prior to combat. By the summer of 1943, as medium groups
began to receive graduates of the transition schools, this practice
was abandoned. These graduates were used as first pilots, twin-engine
standard graduates as co-pilots, and they flew through the OTU-RTU
cycle as a team. In February 1944 a plan was placed in operation in
the Training Command whereby some B-26 transition-trained co-pilots
would also be provided for the tactical units.⁵⁸

Training Program. From February through June 1942, when medium
bombardment operational training began in the tactical units, training
was conducted under many difficulties--difficulties that greatly
hindered the complete operational training cycle and naturally had
their influence on the transition process. With the delegation to it
of medium bombardment training, the Third Air Force established a
two-phase OTU system. The first phase, under the supervision of the
parent group, was to be devoted to the completion of individual and
crew training. Personnel being assigned to medium bombardment groups,

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56. 1st ind. (Asst. AG, 3d AF to CG, AAF, 10 July 1942), AFRDB to CG,
3d AF, n.d., in AFIHI files.
57. 3d ind., Exec., III Bomber Comd. to CG, 3d AF, 29 July 1942, in
ibid.
58. See below, Chap. VII, Sec. 4.
- [REDACTED]

[REDACTED]

however, had not received individual training on tactical type aircraft; therefore, during the assembly period prior to scheduled operational training it was necessary for the parent group to conduct individual training. The Third Air Force prescribed that pilots would first receive 15 hours of air familiarization and transition, consisting of "detailed and progressive supervised instruction for all combat crew pilots and co-pilots on transition training to the 2-engine type airplane applicable." Further standards for training and minimum requirements were to be prescribed by the lower echelons.⁵⁹

After June 1942, when medium bombardment operational and replacement training became the exclusive function of the Third Air Force and the expanded OTU-RTU system was placed in operation, training underwent a process of standardization. In 18-week OTU training the organizational phase became known as Phase I, and during this six-week period pilot transition and individual training were completed.⁶⁰ During the first phase of 12-week RTU training, similar instruction was given.⁶¹ General training procedure was now more concisely prescribed by higher echelons. In addition, training in Phase I was pointed toward the training standards prescribed by the Directorate of Bombardment. Although including more than transition, they also served to standardize the process. In OTU groups the first

59. Memorandum No. 50-17, Hq., 3d AF, 2 May 1942.

60. Memorandum No. 50-1, Hq., III Bomber Comd., 27 Oct. 1942.

61. Memorandum No. 50-23, Hq., III Bomber Comd., 22 Mar. 1943.

[REDACTED]

stage, transition and familiarization, conducted under the supervision
⁶²
 of a check pilot, included in November 1942:

	Pilot		Co-pilot	
	Day	Night	Day	Night
Familiarization and Transition				
Landings and Take-offs	10	5	10	5
Air Work (Single-engine	3	2	3	2
Operation, Fire Drill,				
Propeller Feathering)				
Instrument (Airwork,	2		2	
Orientation, Low				
Approaches)				
Performance Flight	<u>3</u>	<u> </u>	<u>3</u>	<u> </u>
	18	7	18	7

In April 1943 prescribed transition time for first pilots was increased
 to a total of 50 hours, 40 day and 10 night. Co-pilots, on the other
⁶³
 hand, received but 12 hours of day transition. In RTU groups for the
 same period (early 1943), although covering the same instructional
 scope, only 25 hours of day transition and 10 of night for both pilots
⁶⁴
 and co-pilots were prescribed.

In Phase I OFU-RTU, ground training was given concurrently with
 flight training. The first 25 hours of the total of 166 consisted of
 indoctrination and familiarization with the airplane and its equipment
 for both pilots and co-pilots. Instruction included: familiarization
 with the airplane and auxiliary equipment in accordance with the
 instructor's check lists, instruction in operation, discussion of
 performance characteristics, instruction in weight and balance data,
 pertinent sections of the pilots' information file, and a written

62. Memorandum No. 50-1, App. A, Hq., III Bomber Cmd., 27 Oct. 1942.

63. Ibid., 9 Apr. 1943.

64. Memorandum No. 50-23, App. A, Hq., III Bomber Cmd., 22 Mar. 1943.

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questionnaire. In addition, trainees were given a blindfold cockpit
65
test.

While the Third Air Force was the principal agency for medium bombardment training, other activities such as the air support commands and the Antisubmarine Command utilized medium bombers. It was necessary for them to conduct medium transition until such time as their needs could be supplied by graduates who had received transition in the Flying Training Command. Presumably this transition was similar to that conducted in the Third Air Force. There was one activity, however, which late in 1942 conducted a substantial amount of B-25 transition. In April 1942 a photographic-reconnaissance OTU was established under the Second Air Force for the training of photographic-reconnaissance squadrons for heavy and medium bombardment groups and ground-air support
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units. Late in 1942, because of a change in the activation schedule for photographic aviation, there existed a surplus of pilots in the photographic-reconnaissance OTU at Colorado Springs, Colo. Arrangements were made for this agency to give transition to pilots for B-25 groups of the Third Air Force and incidentally to train its own combat and
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ground crews. Late in 1942 and early in 1943 some 200 to 300 B-25 pilots were given transition, thereby aiding the Third Air Force's medium bombardment program and providing transition-trained pilots

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65. Memorandum No. 50-1, App. A, Hq., III Bomber Comd., 27 Oct. 1942; R&R, No. 2, AFRDB to AFDAS, 8 Jan. 1943, in AAG 452.1 Bombers (Heavy) B-26.
66. AFTSP to CG, 2d AF, 27 Apr. 1942, in AAG 322.3, Operational Training Units.
67. R&R, AFTSP to AFRDB, 9 Nov. 1942, in AAG 452.1 Bombers (Heavy) B-25.
- [REDACTED]

[REDACTED]

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until graduates of the Flying Training Command schools were available. Upon determination of the program of instruction through collaboration with the Third Air Force, these pilots were given a 60-hour, four-week course, consisting of air instruction in day and night transition, including familiarization, blind flying, single-engine performance, and navigation pilotage; and ground instruction in aircraft maintenance, communications, and allied subjects.

69

Problems. For many months the medium bombardment program was hindered by problems of aircraft availability and maintenance, a lack of check pilots and experienced supervisory personnel, inexperienced trainees, and in the case of the B-26, a complicated and for a while dangerous airplane which brought with it a serious morale problem. Although most of these factors affected the operational training program as a whole, transition procedure was also influenced. During the period prior to the establishment of the coordinated OTU-RTU system these problems were acutely felt, but they continued to maintain their influence through the summer of 1943.

Although ideally personnel reaching medium bombardment units should have already received transition to B-25 and B-26 aircraft, until mid-1943 the newly established Training Command transition schools

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68. R&R, AFRDB to AFFMP, 23 Feb. 1943, in AAG 211 A, Pilots; 1st ind. (Asst. AG, 3d AF, to CG, AAF, 4 Dec. 1942), AFRDB to CG, 3d AF, 13 Jan. 1943, in AAG 353, Transition Training.
69. Asst. AG, 3d AF to CG, AAF, 4 Dec. 1942, in AAG 353, Transition Training.
- [REDACTED]

[REDACTED]

70

were not meeting the requirements of the Third Air Force. If these graduates were not available, the next most desirable source of medium bombardment pilots was advanced twin-engine graduates.⁷¹ Apparently, however, many of those assigned to the air force were single-engine graduates. Furthermore, insufficient numbers of pilots were being assigned to medium units and they arrived at irregular intervals. This situation forced the groups to maintain a sustained and prolonged transition program, crew and unit training thereby suffering proportionately.⁷² Repeatedly, units requested that they be given more and better qualified pilots.⁷³ Headquarters, AAF, on the other hand, kept reminding the units that too much time was being devoted to transition at the expense of bombing and gunnery operations in first-phase training.⁷⁴

Coupled with inexperienced trainees was a shortage of qualified supervisory and instructor personnel. There were few men with the requisite medium bombardment experience, and training operations were made even more difficult by continued withdrawal of this personnel for other duty. For example, in July 1942 there were 12 check pilots in one organization and 10 in another.⁷⁵ Apparently, by the

70. Project Book, CG, AFTRC.

71. R&R, AFRTT to AFFMP, 22 Sep. 1942, in AAG 353.9 F, Training, General.

72. AC/AS, A-3 to AFDAS, 11 May 1942, in AAG 322.3, Operational Training Units.

73. 1st ind. (AFDAS to CG, 3d AF, 15 May 1942), CG, 3d AF to CG, AAF, 2 June 1942, in ibid.

74. AFDAS to CG, 3d AF, 15 May 1942, in ibid.

75. AC/AS, A-3 to AFDAS, 24 July 1942, in AAG 322.3 B, Operational Training Units.

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end of 1942 sufficient instructors for the parent groups were obtained. To improve their quality, special courses were given at Wright Field and at manufacturers' plants, instruction was standardized, and instructors were provided with handbooks and teaching guides.⁷⁶

For many months the medium bombardment program suffered from a lack of airplanes. Groups, although activated on scheduled dates, did not receive their equipment at the correct times. Consequently, training was delayed, transition prolonged, and prior to commitment units did not receive their full quota of combat training. Throughout 1942 there was a particular shortage of B-25's.⁷⁷ In the spring, the necessity for getting medium bombardment groups into combat forced substitution of B-26's for B-25's in the middle of the training period. This necessitated retransition, a situation that was further aggravated by a lack of qualified B-26 check pilots.⁷⁸ By mid-1943, however, there was a relative surplus of both B-25's and B-26's.⁷⁹ Tied in with the non-availability of aircraft was an exceptionally acute maintenance problem. This was particularly true of the B-26. The first groups conducting B-26 training could not, in spite of 24-hour maintenance, keep enough planes in operation to accomplish the

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76. R&R, No. 2, AFAMC to AFRDB, 6 Oct. 1942, in AAG 353.9 J, Training in Aviation, Pilot Training; Lt. W. R. Welch, 21st Bombardment Gp., to A-3, III Bomber Comd., 14 Oct. 1942, in AFTHI files; Memorandum No. 50-7, Hq., III Bomber Comd., 15 Sep. 1942.
77. Exec., III Bomber Comd. to CG, 3d AF, 6 July 1942, in AFTHI files; Exec., III Bomber Comd. to CG, 3d AF, 23 Sep. 1942, in AAG 452.1 E, Bombers.
78. Hq., III Bomber Comd. to CG, 3d AF, 10 May 1942, in AAG 452.1 E, Bombers.
79. AC/AS, OC&R to Gen. B. M. Giles, 1 July 1943, in AAG 452.1 G, Bombers.

[REDACTED]

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required training. Apparently, as mechanics, spare parts, and tools became available for B-26's, this problem decreased in importance.

One other problem impeded the medium bombardment program, the low morale of B-26 trainees. The Marauder was considered a "hot" plane, possessing some dangerous flying characteristics. In training inexperienced pilots, an unusual number of accidents occurred, and trainees became afraid of the "flying coffin." 81 In mid-1942 this serious morale problem, coupled with other operating difficulties, led

to certain modifications of the B-26, such as increased wing span and armament. 82 But modification did not alter the bad name the Marauder had received; concentrated effort was made therefore to improve its reputation with both the public and the military. In September 1942 the practice was instituted of having B-26 crews visit the advanced twin-engine schools of the Flying Training Command for the purpose of winning support for the B-26. These crews gave lectures and demonstrations on the B-26 and a small amount of transition to selected supervisory personnel. 83

At first the crews encountered "complete skepticism as to whether as a combat type airplane it was worth the

80. 1st ind. (CG, 21st Bombardment Gp. to CG, III Bomber Comd., 23 Mar. 1942), CG, III Bomber Comd., to CG, 3d AF, 27 Mar. 1942, in AAG 452.1 A2, Bombers.

81. AC/AS, A-3 to AFDAS, 24 July 1942, in AAG 322.3 B, Operational Training Units.

82. AFDLR to CG, AFAMC, 12 Apr. 1942, in AAG 452.1 A2, Bombers.

83. R&R, AFRDB to AFRIT, 28 Sep. 1942, in AAG 373.3, Aerial Demonstrations at Fairs, Cities, etc.

[REDACTED]

[REDACTED]

service rendered when actually it was so extremely dangerous to fly,"⁸⁴
 but many cadets were impressed with the performance of the plane and
 convinced of its merits when properly flown. After such visits, trainee
 attitudes toward the B-26 definitely improved, and they were continued
 for each advanced twin-engine class.⁸⁵ Throughout 1942 and 1943 there
 was much discussion of the value of the B-26, and toward the end of
 1943 B-26 production began to taper off.⁸⁶

4. Light Bombardment

With one exception, the administration of the wartime training
 program for light bombardment aviation followed closely the pattern
 established for medium bombardment. Its OTU-RTU system was set up at
 the same time and in the same manner, but although early plans con-
 templated the transfer of light bombardment transition to the
 individual training agency, it never occurred. All transition to the
 light bombardment airplane, the Douglas A-20, remained a function of
 the tactical units.⁸⁷ The first contracts for A-20 production had
 been let in 1939, and it had made its first appearance in GHQ Air
 Force units early in 1941.⁸⁸ A-20 transition procedure, which had
 been worked out by the 3d Light Bombardment Group, was therefore

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- 84. Lt. John L. Armor, 336th Bombardment Gp., to CO, 480th Bombardment Sq., 6 Nov. 1942, in AAG 353.02 #1, Instruction Visits.
 - 85. 4th ind. (to above ltr), AG, SEAFTC to CG, AFFTC, 7 Feb. 1943, and 6th ind., AFRIT to CG, AFFTC, 2 Mar. 1943, in *ibid*.
 - 86. AG/AS, Materiel, Maintenance, and Distribution to AFAMC, 24 Sep. 1943, in AAG 452.1, Bombers (Heavy) B-26.
 - 87. See above, Chap. IV.
 - 88. WD Press Release, 20 May 1939; Chart, Status of Airplanes in the GHQ AF, 31 Mar. 1941, in AAG 352.11, Course of Instruction.
- [REDACTED]

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carried over into wartime training.

Light bombardment training was concentrated principally in the Third Air Force, although some training occurred under the air support commands of the other air forces. The II Air Support Command of the Second Air Force had been activated in September 1941, but on 27 April 1942 its personnel was moved to the new III Air Support Command of the Third Air Force. Here the OTU-RTU system for light bombardment was established and remained until light bombardment training was assigned to the III Bomber Command, 6 August 1943.⁸⁹

Training Program. Transition to A-20 aircraft entailed the conversion of a new Flying Training Command graduate, either single- or twin-engine standard, into a qualified A-20 pilot. The principal difficulty lay in the transfer to a faster, heavier, single-pilot, twin-engine plane; there was a necessity for some co-pilot practice on tactical twin-engine aircraft prior to solo in the A-20. When the A-20 first appeared in the tactical units, B-13's were used for this intermediate step; later, co-pilot instruction on the B-25 was employed.⁹⁰ Apparently, during the first months of the war when aircraft of all types were scarce, it was necessary for air support units to send pilots to the Flying Training Command for twin-engine transition training prior to instruction on the A-20.⁹¹ This difficult initial

89. History of the III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943.

90. Memorandum No. 50-1, Hq., 56th Bombardment Training Wing (L), 20 July 1943.

91. AFRIT to CG, Gulf Coast Training Center, 4 Jan. 1942, in AAG 353, Transition Training.

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transition was aided by flying the aircraft as lightly loaded as possible during the first hours, gradually increasing the loads as the student progressed "in order to familiarize pilot personnel with the flying characteristics of the airplane under all conditions of loading." ⁹² Noteworthy was the fact that, due to the concentration on quality rather than quantity production in light bombardment units, the training program received more regularization and definition by ⁹³ higher echelons than was customary for other types of aviation.

During the first part of 1942, when light bombardment OTU was under the II Air Support Command, determination of transition procedure remained with the individual unit. On the command level, transition regulation prescribed only ground instruction prior to check off including at least four hours of cockpit instruction and a blindfold test. Flight transition entailed 10 hours' "thorough familiarization with the airplane and auxiliary equipment and the development of proficiency in landings, take-offs, and airwork in the local flying ⁹⁴ area." After November 1942 when the III Air Support Command found it necessary to activate bombardment training wings, light bombardment OTU-RTU came under the 23d Bombardment Training Wing (15 November 1942) ⁹⁵ and the 56th Bombardment Training Wing (L) (7 April 1943). Light bombardment OTU was divided into three phases. Transition occurred during Phase I, the 12-week assembly and manning period, and

92. AFRAS to CG's, 2d and 3d AF's, 25 Nov. 1942, in ibid.

93. History of the 56th Bombardment Training Wing (L), Activation to Jan. 1944.

94. Memorandum No. 50-6, Hq., II Air Support Comd., 6 Apr. 1942.

95. History of the III Reconnaissance Comd., 7 Dec. 1941-30 Sep. 1943.

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Phase II, the four-week supervised training period.⁹⁶ In RTU training, although the total training period was only 12 weeks, identical transition⁹⁷ occurred during Phase I.

After the activation of the bombardment training wings, the determination of much of the training procedure still remained in the individual OTU-RTU, but the intermediate wing level prescribed transition procedure in more detail. This was particularly true of flight instruction. For example, the 56th Wing prescribed both the schedule and general procedure for the first four weeks of A-20 training. Transition⁹⁸ was interspersed with instrument training:

First Week	Hours
Co-pilot B-25	6:00
Six take-offs	
Six landings	
One hour instrument flying	
One hour single-engine operation	
A-20 transition	4:00
Second Week	
A-20 transition	10:00
Instrument	2:00
Third Week	
A-20 transition	4:00
Instrument	4:00
Night (must have a minimum of 20 hours in A-20 prior to flying at night)	4:00
Fourth Week	
A-20 transition	4:00
Instrument	4:00
Night	6:00

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96. Memorandum No. 50-1, Hq., 56th Bombardment Training Wing (L), 20 July 1943.
97. Memorandum No. 50-14, Hq., 56th Bombardment Training Wing (L), 25 June 1943.
98. Memorandum No. 50-1, Hq., 56th Bombardment Training Wing (L), 20 July 1943; Memorandum No. 50-14, Hq., 56th Bombardment Training Wing (L), 25 June 1943.

[REDACTED]

In September 1943, after the 56th Wing was assigned to the III Bomber Command, the schedule of training was altered. All day transition was concentrated in the first three weeks, and the content of each hour's instruction was more precisely prescribed. Night transition came in the fifth week.⁹⁹

The most important innovation in A-20 transition instituted by the 56th Bombardment Training Wing was "piggy-back" instruction.¹⁰⁰ Similar to the method developed in P-38 transition in the Fourth Air Force, a one-hour flight with the instructor piloting and the student riding "piggy-back" was given prior to the first solo A-20 flight. Its purpose was to demonstrate proper cockpit procedure and to indoctrinate the trainee pilot in the plane's flying characteristics. The second "piggy-back" ride, on the twentieth hour of transition, with the instructor riding "piggy-back," was "to check on the transition pilot's cockpit procedure and flying technique and to eliminate any dangerous tendencies which the pilot might have developed."¹⁰¹

The 56th Bombardment Training Wing (L) prescribed that ground training should consist of a two-hour orientation lecture by the group commander and 11 hours of familiarization with the airplane and equipment, which consisted of the usual pertinent sections of the pilot's

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99. Memorandum No. 50-1A, Hq., 56th Bombardment Training Wing (L), 27 Sep. 1943; Memorandum No. 50-14B, Hq., 56th Bombardment Training Wing (L), 9 Sep. 1943. For a fuller schedule of A-20 transition see Appendix 2.
100. History of the 56th Bombardment Training Wing (L), Activation to Jan. 1944.
101. Memorandum No. 50-22, Hq., 56th Bombardment Training Wing (L), 18 Oct. 1943.
- [REDACTED]

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information file, operating instructions, technical orders and manuals, five hours of cockpit instruction and blindfold test, and oral and written questioning. ¹⁰² Further definition of instruction lay in the individual unit. For example, in the 46th Bombardment Group (L), immediately upon assignment to a flight, the student was interviewed by the flight commander who determined his suitability for A-20 pilotage and stressed tactical orientation and the necessity for air discipline. Instructors were provided with manuals which detailed the procedure for proper preflight indoctrination, and trainee pilots were required to pass a lengthy pilot's proficiency examination with a grade of 100. ¹⁰³

In addition to A-20 training in the light bombardment OTU-RTU system of the Third Air Force, other organizations employed A-20's. As observation units in the III Air Support Command were equipped with A-20's late in 1942, the 21st Observation Squadron was designated a transitional training squadron and conducted transition for other observation units. ¹⁰⁴ Observation and light bombardment squadrons in the I, II, and IV Air Support Commands (redesignated Tactical Air Divisions, 28 August 1943) were also equipped with A-20's, and conducted transition in accordance with general regulations prescribed

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102. Memorandum No. 50-1, Hq., 56th Bombardment Training Wing (L), 20 July 1943; Memorandum No. 50-14, Hq., 56th Bombardment Training Wing (L), 25 June 1943.
103. Memorandum No. 50-12, Hq., 46th Bombardment Gp. (L), 12 Sep. 1943; Memorandum No. 50-10, Hq., 46th Bombardment Gp. (L), 24 Mar. 1944.
104. History of the III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943.
- [REDACTED]

[REDACTED]

105
by the command headquarters. After observation was redesignated reconnaissance and the III Air Support Command became the III Reconnaissance Command in August 1943, transition to A-20 observation aircraft became its responsibility. 106
Apparently transition was similar to that conducted in the light bombardment OTU-RTU system.

Problems. In comparison with other types of aviation, the light bombardment program was small; OTU-RTU training was concentrated and conducted with a minimum of operating problems. It was slow in getting started, however, for immediately after Pearl Harbor all trained light groups were committed to combat by 1 April 1942. In order to establish an OTU-RTU system, it was necessary to withdraw 107
small numbers of experienced personnel from these groups. After the program got under way, apparently the only real difficulty was a 108
delay in the delivery of A-20's. Instructors were trained in the groups; for example, in the 411th Bombardment Group (L) instructor pilots were required to complete a 73-hour course in the A-20 prior to 109
being designated competent to teach. Thus, in light bombardment, no real necessity for the transfer of the transition process to the individual training agency seems to have existed.

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105. AG 322 (27 Aug 43) OB-I-AFRFG-M, 28 Aug. 1943; Circular No. 50-12A, Hq., I Air Support Comd., 5 Jan. 1943; AG, II Air Support Comd. to CG, 2d AF, 23 Dec. 1942, in AAG 353, Transition Training.
106. History of III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943.
107. Asst. AAG to C/AC, 8 Feb. 1942, in AAG 322.3, Operational Training Units.
108. R&R, AFRDB to AFDLR, 16 June 1942, in AAG 321.9-3B, Groups.
109. Memorandum No. 50-18, Hq., 411th Bombardment Gp. (L), 1 Sep. 1943.
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5. Dive Bombardment

Out of the notoriety that the dive bomber received through German employment in the early years of World War II, came the AAF dive bombardment program. But AAF attempts to develop a satisfactory dive bomber proved unsuccessful. Aircraft employed were the Douglas A-24, a version of the Navy SBD, and the A-31, neither of which were considered operational.¹¹⁰ Finally dive bombardment units were equipped with A-36's, converted P-51's.¹¹¹ But during the early months of the war, while dive bombardment units were in training, delivery of these planes was slow and much of the training occurred on substitute aircraft, principally P-39's.¹¹² Thus transition in dive bombardment units closely resembled that given on pursuit aircraft.

In administration the program was closely tied to the light bombardment program. Training was chiefly conducted under the III Air Support Command of the Third Air Force until 6 August 1943, when dive bombardment units were redesignated fighter-bomber units and were placed under the III Fighter Command.¹¹³ After mid-1943, both in transition procedure and administration, the program was identical with the fighter program.

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110. Jane's All the World's Aircraft, 1941, 165c; R&R, No. 3, AFDMR to AC/AS, A-3, 2 Aug. 1942, in AAG 452.1 G, Pursuit Planes.
111. R&R, No. 5, AFDAS to AC/AS, A-3, 7 Aug. 1942, in AAG 452.1 G, Pursuit Planes.
112. R&R, No. 1, Dir. of Ground-Air Support to AFDMR, 27 July 1942, in ibid.
113. General Order No. 296, Hq., 3d AF, 6 Aug. 1943.

Training Program. Dive bombardment trainees were single-engine standard Flying Training Command graduates. In first phase training under the III Air Support Command, the following governed their transition period:

1. Flying during this phase will be supervised by an experienced pilot having visual and radio contact from a control tower or a formation leader's airplane. Preflight training will include errorless written answering of questionnaire, a blindfold cockpit instrument and equipment location test, a recitation to an instructor of the proper use of all instruments and equipment on the airplane, discussions by the instructor pilot on flying technique for the airplane, general behavior and characteristics of the airplane under normal and unusual conditions.
2. If any dual control airplane is available, each trainee will be given a check ride prior to soloing to determine that it is reasonable to expect a successful solo flight by the trainee. . . .

The first 14 hours of the total 206 hours of ground training were devoted to thorough indoctrination and familiarization, with particular emphasis on cockpit instruction. Of the 74 hours of air instruction in first phase, the first 15 were devoted to familiarization and transition, which included:

	Day	Night
a. Dual - Take-offs, landings, air work	1	
Solo - Take-offs, and landings	3	
b. Dual - Formation	1	
Solo - Formation	2	2
c. Dual - Night flying		1
Solo - Night flying		4

114. Memorandum No. 50-7, Hq., III Air Support Comd., 20 Nov. 1942.

115. Ibid., App. I.

116. Ibid.

[REDACTED]

Transition procedure for the different kinds of dive bombers differed little between the types and from that given on other single-engine aircraft. For example, transition to the A-36 was similar to that employed for the P-51.¹¹⁷ In transition to the non-operational dive bombers, the A-24 and A-31, which were used for much of unit training, the principal necessity was to impress the trainees with the fact that they were now flying a much heavier airplane and that check lists had to be carefully completed. A trainee first received an hour's ride as passenger in the rear seat and was not allowed to engage in night transition until he had completed 10 day hours and 20 landings.¹¹⁸

After mid-1943, when the dive bombardment program was redesignated fighter-bomber and transferred to the III Fighter Command, transition regulation and procedures were identical to those in effect in fighter units. Organizations training on P-39's and P-40's gave transition to pilots through an hour of bi-place check and 8 hours' of engineering missions with the usual preflight indoctrination.¹¹⁹

When final type aircraft (A-36's) were secured, an additional two-hour period of transition was given.¹²⁰ When fighter-bomber units began receiving Training Command graduates with 10 hours of P-40 transition, a similar reduction in transition training as effected in

117. See below, Sec. 6, Pursuit.

118. Memorandum No. 50-10B, Hq., III Air Support Comd., 18 Nov. 1942; Memorandum No. 50-3, Hq., III Air Support Comd., 15 Feb. 1943.

119. Operations Memorandum No. 50-1, Hq., 406th Fighter-Bomber Gp., 20 Sep. 1943.

120. Flight Training Program, Hq., 407th Fighter-Bomber Gp., in History of 407th Fighter-Bomber Group, Activation to 30 Sep. 1943.

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the fighter OTU-RTU's occurred.

Problems. In dive bombardment training the main problem was the availability of satisfactory operational type dive bombers. Early in 1942 the A-24 and A-31 proved to be unsatisfactory, and a decision was

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taken to convert P-51's to A-36's. But delivery of the A-36 was slow; it was even necessary to delay the commitment dates of dive

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groups. This aircraft shortage had some effect on transition in that it prolonged the process. Units were forced to conduct training on substitute aircraft, P-39's and P-40's. This caused transition on two types, but transition to final type aircraft did not always occur at the end of the training period. After the first few months, groups usually had enough A-36's to permit all trainees to have some time on the Invader during the individual training period.

6. Pursuit

During the early years of World War II there were five main types of fighter aircraft, the P-39, P-40, P-38, P-47, and P-51. The development of these airplanes had begun during the first years of the expansion program, and during the last part of 1940 and early in 1941 P-39 and P-40 types had made their first appearance in the

121. Operations Memorandum No. 50-1, Hq., 406th Fighter-Bomber Gp., 20 Sep. 1943.

122. R&R, No. 2, AFRAD to AFDMR, 29 July 1942, in AAG 452.1G, Pursuit Planes.

123. R&R, AFRAS to AFDFU, 24 Oct. 1942, in AAG 321.9-3D, Groups.

[REDACTED]

tactical units, with twin-engine P-38's following a few months later.¹²⁴

Development of the two other principal pursuit aircraft, the Republic P-47 and the North American P-51, was started in 1940, but quantity production did not begin to reach the tactical units until late in 1942.¹²⁵ Thus, transition procedure for modern fighters had first been formulated prior to the pressure of mass wartime training, and its basic method was carried over to the new period. But where in peacetime a somewhat longer period of transition, greater precaution, and progression through lower performance types characterized transition to the newer type planes, in wartime, transition to all types assumed the same pattern of regulation. Although their performance characteristics differed, and to some extent transition procedure had to be adapted thereto, the method employed for each type was generally similar.

The prime employers of fighters were the fighter commands, conducting pursuit OTU-RTU training in the First, Third, and Fourth Air Forces, and after January 1944 in the Second Air Force. For many months, until the spring of 1943, all new personnel reaching fighter units were advanced single-engine graduates of the Flying Training Command. The principal factor in transition from training aircraft

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124. Chart, Status of Planes in the GHQ AF, Jan. 1941, in AAG 452.1 D, Pursuit Planes; memo for Col. E. L. Naiden by G-3, AFCC, 4 Oct. 1941, in AAG 321.9-3A, Groups.
125. 1st ind. (C/AC to Asst. Sec. of War for Air, 8 Jan. 1940), Office of Asst. Sec. of War for Air to C/AC, 18 Jan. 1940, in AAG 452.1C, Pursuit Planes; Jane's all the World's Aircraft, 1941, 197c; R&R, A-3 to AFROM, 15 June 1942, in AAG 452.1 G, Pursuit Planes; R&R, AFRAD to AFRAS, 12 Sep. 1942, in AAG 321.9-3D, Groups.
- [REDACTED]

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to a tactical pursuit ship was "the change from a light, small plane with limited horsepower, to a large, heavy plane with considerably greater power."¹²⁶ Until pilots with this change already accomplished began reaching the tactical units, the entire process had to be performed in the OTU-RTU organizations prior to tactical training. But with the appearance of P-40 and P-38 transition graduates, transition was not wholly deleted from operational training. Actually, P-40 transition in the individual training agency was not so valuable for the transition training as such, but as an insurance that the fighter units would receive the most proficient single-engine trainees. Upon reaching the tactical units, some graduates had to be retransition trained to the P-39, P-47, and P-51 types, while others who were to fly P-38 or P-40 types were rechecked during the transition period. This previous tactical transition, however, noticeably lightened the task of the operational units and enabled trainees to progress more rapidly and efficiently through the preliminary phases of tactical training.

Training Program. The actual determination of the method of transition, although certain general procedures were prescribed, remained for the most part on the group or squadron level. Furthermore, in fighter training the aim of the transition period was

126. Outline of Pilot Training, 327th Fighter Gp., by Maj. W. H. Walling, 13 Apr. 1944, in AFIHI files.

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without detailed headquarters definition for almost a year. On 1 December 1942, however, the first day fighter training standard, developed by the Directorate of Air Defense, was published. Here, the purpose of transition as part of the training of fighter units and crews was defined. Ground and air transition was to accomplish thorough familiarization with the controls, instruments, engine, accessories, flying characteristics, and performance of the aircraft. The pilot was also to be able to take off and land in 1.5 times the minimum distance listed for the airplane assigned. Certain procedures for the attainment of this end were also prescribed:

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The closest supervision must be exercised during this period. Instructors must insure that pilots are thoroughly familiar with arrangement and proper use of instruments and controls in the cockpit and that a definite and correct cockpit routine is developed prior to flight. Characteristics and performance of the airplane must be thoroughly understood by the new pilot and in the case of two-engine fighters he must have a thorough knowledge of single-engine operating procedure prior to the first take-off. Local traffic regulations and radio procedure must be explained and understood. Take-offs and landings must be closely observed and controlled, and mistakes and methods of correction pointed out in detail. This original transition to the fighter type is a crucial period. Definite restrictions and safety precautions with reference to weather conditions, winds, and use of runways must be applied. The new pilot must be given a chance at this time to become familiar with his fighter airplane without being bothered by heavy traffic, cross winds, poor visibility, and other distractions. Such restrictions must, of course, be relaxed as training progresses in order to attain the

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127. On 4 Dec. 1943 this was changed to "ability to operate from small airdromes" by AAF Training Standard No. 10-1-1, 4 Dec. 1943.
128. AAF Training Standard, No. 10-1-1, 1 Dec. 1942.
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standard set forth herein; however, their application during the transition period will eliminate many accidents both now and later.

Toward the attainment of this end, all directives of the lower echelons were pointed. First, Third, and Fourth Air Force directives, and the directives of the separate fighter commands, prescribed general procedure for the conduct of OTU-RTU training, including transition. Regardless of whether the final product was an OTU pilot trained with a group or a 40-, 60-, or 80-hour replacement pilot, in first phase the first hours of his training were devoted to simple transition. From there he progressed to individual combat training which included about three hours of transition in night flying.

Although final determination of the transition process for pursuit aircraft lay with the individual unit, throughout the air forces the procedure employed was generally the same. The fact that the trainee's first flight was necessarily solo required intensive ground indoctrination preparatory to transition flights. This instruction first consisted of tactical orientation and brief lectures on general requirements and purposes of training and the necessity for air discipline. After study of the pilot's information file, technical orders pertaining to the specific airplane, its engine and equipment, and general and specific operating instruction on the type of plane to be flown, the trainee engaged in cockpit study and was required to pass a blindfold cockpit test. In some units this was accomplished in a plane placed on jacks, the student thereby being able to familiarize himself with the routine procedure of handling the aircraft.

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Through training films, lectures, and manuals the trainee received instruction in performance and characteristics of the plane, its reactions and capabilities. The pilot was also instructed in local terrain features, flying regulations, and communications procedure and was given special instruction in emergency procedures and methods of abandoning the aircraft. Usually he was given a written examination at the end of the indoctrination period, or in some units at the end of each specific subject.

For a pilot fresh from school and attempting to orient himself, so much intensive technical data was difficult to assimilate. Late in 1942, in an attempt to provide trainees with sufficient knowledge to meet any conceivable emergency, some units were giving as much as three days of this type of instruction. This attempt to provide within a few days knowledge that only came with experience resulted in confusing trainees and indoctrinating them with fear rather than confidence. In January 1943, therefore, the Director of Air Defense prescribed that preflight instruction should only be designed to acquaint trainees with the use of controls and instruments and the "contingencies that may be reasonably expected to arise." It was believed that this could be accomplished within 8 to 10 hours.

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129. Memorandum No. 50-3, Hq., 4th AF, 16 Apr. 1944; Circular No. 5-12, Hq., I Fighter Comd., 27 Aug. 1943; Memorandum No. 50-50, Hq., III Fighter Comd., 1 July 1943; Memorandum No. 50-2, Hq. 337 Fighter Gp., 12 June 1943; Operations Memorandum No. 3-8, Hq., 338 Fighter Gp., 1 Dec. 1942; Outline of Pilot Training, 327 Fighter Gp., by Maj. W. H. Walling, 13 Apr. 1944.
130. AFRAD to CG's, 1st, 3d, 4th AF's, 16 Jan. 1943, in AAG 353, Ground Duty Training.
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Time devoted to ground familiarization usually varied from 5 to 10
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hours, depending upon the unit.

After the completion of ground instruction, trainees usually received about an hour's bi-place check in which they demonstrated their proficiency in take-off, climbing turns, medium and steep turns, chandelles, stalls (power on and off), gliding turns, and landings.
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In P-38 units of the Fourth Air Force, trainees were given an hour's demonstration ride, including single-engine operation during maneuvers and landing, in the "piggy-back" P-38.
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In 1944, with the arrival of pilots already transition trained on P-322's, this was reduced to
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one-half hour.

With ground familiarization and bi-place check completed, the trainee pilot was ready to start transition flights. Transition instruction was imparted through a series of flights known as engineering missions. The purpose of these engineering missions was "to thoroughly familiarize the trainee with the airplane, engine, and instruments."
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Although differing in total hours and number in different organizations and for various types of fighter aircraft,

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131. Memorandum No. 50-3, Hq., IV Fighter Comd., 16 Apr. 1944; 2d ind. (AFRAD to CG's, 1st, 3d, 4th. AF's, 16 Jan. 1943), CG, III Fighter Comd. to CG, 3d AF, 30 Jan. 1943, in AAG 353, Ground Duty Training.
132. Memorandum No. 50-50, Hq., III Fighter Comd., 1 July 1943.
133. Memorandum No. 50-3, App. 1, Hq., IV Fighter Comd., 14 Apr. 1943.
134. Memorandum No. 50-3, Hq., IV Fighter Comd., 16 Apr. 1944.
135. Memorandum No. 50-50, Hq., III Fighter Comd., 1 July 1943.
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their scope and form were generally similar. In a progressive series, each mission prescribed exactly what the trainee should do, how he should do it, what particular features of airplane and engine operation he should watch for, as well as questions to check his knowledge at the end of the flight. In general, the five to eight missions covered flights to achieve practice in various maneuvers and familiarization with the aircraft's flying characteristics, landings, and take-offs; flights to secure engine performance data and altitude performance data, and usually a cross-country flight. All engineering missions were closely supervised by the flight commander from the control tower or truck with particular attention given to intelligent criticism after each flight.

After the trainee had received further operational training, night transition was given. In the First Air Force it occurred during the sixth week of training, while in the Third Air Force the trainee must have at least 30 hours' fighter time, 1 hour on fighter instruments, and 2 homing missions before engaging in night transition. This, too, varied with the unit, for in the 338th Fighter Group (Third Air Force) the minimum was 60 hours. Three

136. See Appendix 3 for outline of engineering missions.

137. Memorandum No. 50-2, Hq., 337 Fighter Gp., 12 June 1943.

138. Hq., 326 Fighter Gp., Operations and Training, Basic Training Phase. n. d., in AFTHI files.

139. Memorandum No. 50-16, Hq., 59th Fighter Gp., 24 Mar. 1944.

140. Operations Memorandum No. 3-28, 338th Fighter Gp., 18 Feb. 1944.

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hours was the usual scheduled time; sufficient training was given to insure ability to proficiently operate the type airplane safely during the hours of darkness, and to include landings and take-offs under minimum conditions of lighting."¹⁴¹

This transition procedure, both flight and ground, applied to the complete transitioning of a pilot who had formerly flown only trainer-type aircraft. If (as was the case after mid-1943) he had been checked off on the airplane in the Training Command, the necessity for such thorough transition was diminished. Units were authorized to reduce the time spent on preflight indoctrination "somewhat." It was not to be assumed, however, that the trainees had been thoroughly indoctrinated; pilots were to be given sufficient instruction to insure that they were "completely conversant with all the topics covered" in the ground school course. Similarly, time spent on engineering missions could be reduced to the amount necessary to insure that the pilot was thoroughly familiar with the airplane and engine, had covered all the material in the engineering missions,¹⁴² and could answer all the questions pertaining to them.

While the fighter commands were the principal employers of fighter-type aircraft, other units, such as dive bombardment, observation, and photographic-reconnaissance, utilized pursuit airplanes. Training of dive bombardment and observation units occurred under the

141. Memorandum No. 50-3, App. I, Hq., IV Fighter Cmd., 14 Apr. 1943.

142. Memorandum No. 50-50, Hq., III Fighter Cmd., 1 July 1943.

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I, II, III, and IV Air Support Commands, principally the III, until August 1943, when dive bombardment, redesignated fighter-bomber, was transferred to the III Fighter Command, and observation, redesignated ¹⁴³ reconnaissance, to the now III Reconnaissance Command. Although transition did not differ materially, sometimes this scattering of pursuit aircraft caused administrative problems. Shortly after Pearl Harbor the prewar observation plane series was replaced by pursuit aircraft and A-20's. As pilots assigned to observation units had been flying B-47's, the necessity for carefully supervised transition ¹⁴⁴ arose. Apparently, however, during the first part of 1942 it was necessary to conduct training on old equipment until airplanes suitable for combat employment (P-39's, P-40's, P-51's) could be ¹⁴⁵ furnished prior to overseas movement. But after November 1942 the 21st Observation Squadron, designated a transitional training squadron, conducted transition for all observation units under the ¹⁴⁶ III Air Support Command. When observation units were transferred to the III Reconnaissance Command, the transition function also shifted. In December 1943 the Third Air Force found it necessary, due to the rising accident rate in the command, to depart from the customary practice of allowing subordinate commands to establish

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143. History of the III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943.
144. AFRAS to CG's, 1st, 2d, 3d, 4th, 8th, 9th AF's, 6 April 1942, in AAG 353.9 I, Training in Aviation, Pilot Training.
145. AFRAS to CG's, 1st, 2d, 3d, 4th AF's, 29 May 1942, in AAG 353.9 B, Observer Training.
146. History of the III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943.

[REDACTED]

specific requirements. It was directed that pursuit pilots must complete a minimum of 20 hours' transition before engaging in acrobatics or night flying.
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Similarly, the employment of the F-5 (P-38) for photographic-reconnaissance required the transition of P-38 pilots by the Second Air Force at the photographic-reconnaissance OTU. When the reconnaissance program was revised in the summer of 1943 and photographic-reconnaissance aviation was placed under the new III Reconnaissance Command, F-5 pilots were provided from the P-38 RTU of the Fourth Air Force after 60 to 80 hours of fighter training.
148 But after January 1944 these pilots came straight from the Training Command,
149 having received transition on P-322's.

Problems. Fighter transition, with the possible exception of the P-38, seems to have been little hampered by the problems usually encountered in first-phase operational training. In addition, there were few changes in instructional method except those occasioned by reasons of safety. For example, in May 1942 the Director of Air Defense, upon receipt of information that the initial period stressed landings, directed that the first five hours of transition
150 be devoted to airwork with landings held to a minimum. In 1942 when the demands of the theaters of operations necessitated the

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147. History of the III Reconnaissance Command, Dec. 1943.
148. AG/AS, Training to CG, 3d AF, 23 Oct. 1943, in AFIHI files.
149. See below, Chap. VIII, Sec. 2.
150. AFRAD to CG's, 1st, 3d, 4th AF's, 23 May 1942, in AAG 353.9 I, Training in Aviation, Pilot Training.
- [REDACTED]

commitment of replacement pilots with as little as 35 hours in tactical
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 aircraft, there were many complaints on the quality of the pilots,
 but these rarely pertained to the transition process. In a few cases
 pilots complained that they were improperly checked off. Inexperienced
 instructors with little time on tactical aircraft instilled fear rather
 152
 than confidence in the trainees. But as the shortage of experienced
 personnel became less acute, it seems that instructors improved in
 quality. Units provided them with detailed manuals and training
 153
 guides.

Pursuit training was also relatively unhampered by morale problems.
 For a while in 1942 unfavorable rumors circulated concerning the com-
 bat performance of the P-40 and the P-38, but later they seem to have
 154
 been dissipated. P-38 training, however, did present a peculiar
 morale problem. The plane had gained the reputation of a "hot"
 fighter, and trainees often admitted that they were afraid at check
 155
 off. Furthermore, in mid-1942 when standard twin-engine graduates
 were being assigned to P-38 units, they were frequently quite
 disappointed on being diverted to fighters when they had expected a

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- 151. C/AS to CG's, 1st, 3d, 4th AF's, 15 June 1942, in AAG 353.9 D, Training, General. The existing 60-hour flying time requirement in fighter aircraft for overseas service was reduced to 40 hours, and when the 40-hour minimum could not be met, 35 hours was authorized.
 - 152. CO, V Fighter Comd. Reception Center to CG, V Fighter Comd., 23 May 1942, in AAG 353 B, Pilot Training.
 - 153. Memorandum 50-2, Hq., 337th Fighter Gp., 12 June 1943.
 - 154. AFDAS to AC/S, G-2, 6 Aug. 1942, in AAG 353 9 E, Training General.
 - 155. CO, V Fighter Comd. Reception Center to CG, V Fighter Comd., 23 May 1943, in AAG 353 B, Pilot Training.

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bombardment career. On occasion, pilots requested transfer. This
problem was solved when a special twin-engine trainer course, and
later P-322 transition, was instituted in the Flying Training Command.

Late in 1943 the method of P-38 training had to be radically
changed because of a serious shortage of P-38-type aircraft. It became
necessary for the Fourth Air Force to employ P-39's for the first 60
hours of training and then transfer trainees to the P-38. 157 Such pro-
cedure required double transition--trainees were given five hours of
engineering missions on the P-39 and three more hours when transferred
to P-38's in second-phase operational training. 158 This substitution
of aircraft had a far-reaching effect; it caused complete revision of
P-322 transition and the initiation of P-39 transition in the Training
Command. 159

7. Night Fighter

One program cut across all agencies conducting transition train-
ing, the night fighter program. Out of World War II and the require-
ments of specialized air warfare came the night fighter. The British
had found a need for a specialized machine, and the AAF, too, laid

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156. R&R, AFDMR to AFRIIT, 21 Aug. 1942, in AAG 211 C, Titles, Grades--
Officers.
157. Report of Training Conference, Hq., AFTRC, 10-12 Jan. 1944, in
AAG 337, Bulk.
158. Memorandum No. 50-2 Hq., 4th AF, 16 Apr. 1944.
159. See below, Chap. VIII, Sec. 3.
- [REDACTED]

plans for the development of night fighter aircraft and the training of pilots for their operation. During December 1940 the problem of the type of plane had to be decided, and a decision was taken that a "stop gap" aircraft must be procured until a plane specifically designed and built for night fighter operations could be obtained. The A-20 was designated as the plane to be converted; it became the P-70. One month later the first experimental contracts were negotiated with Northrup for the twin-engine P-61, the Black Widow night fighter. But conversion of the A-20 was slow, and the P-61 did not attain service status until the first months of 1944.

Nevertheless soon after Pearl Harbor plans were laid for the training of night fighter pilots. In July 1942 the Fighter Command School at Orlando, Fla., was designated as the training agency, and AAF units were canvassed for specially qualified pilots with twin-engine time. The mission of the night fighter pilot was evolved as

the interception and destruction of hostile aircraft at night while operating in accordance with the instructions of a ground controller and the airborne radar operator in the night fighter. The night fighter pilot is therefore required to operate mainly at night under blackout conditions, flying entirely by instruments until within visual range of

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- 160. Memo for Gen. Arnold by Maj. Gen. Brett, 5 Dec. 1940, in AAG 452.1 D, Pursuit Planes; R&R, AFROM to AFALG, 17 Jan. 1943, in AAG 452.1 Bombers (Light), A-20; Exec., OCAG to William S. Knudsen, 22 Jan. 1941, in AAG 452.1 D, Pursuit Planes; WD Press Release, 21 Jan. 1944.
 - 161. AFRAD to CG's, 1st, 2d, 3d, 4th AF's, 20 July 1943, in AAG 211 C, Titles, Grades--Officers.
 - 162. R&R, AFRIT to AFRAD, 13 Oct. 1942, in AAG 353.9 G, Training, Misc.

[REDACTED]

unlighted hostile aircraft. He must therefore be highly proficient in night take-offs and landings under minimum conditions of lighting, ceiling, and visibility. He must be proficient in gunnery in order to destroy his target

It was soon decided, however, that prospective night fighter pilots must be taken from the Flying Training Command schools and that they must have more than advanced twin-engine training. Consequently, a quota of pilots for transition training on P-322 airplanes was assigned to the school at Williams Field, Ariz. 163

From Williams Field these men were transferred to Orlando where they received tactical training on P-70's. The first night fighter squadrons were shipped to England where the RAF conducted the transition to final type aircraft, British Beaufighters. Training consisted first of dual time on Blenheim and Bisley aircraft because of the pilots' long absence from flying and the necessity for transition from the P-70's tricycle landing gear to conventional landing gear. They were then trained to Beaufighters. The difficulty encountered in transition from tricycle to conventional landing gear led to the recommendation that in the United States pilots be transition trained on aircraft with the same kind of landing gear as that on the final type aircraft. 164

In June 1943 the practice of sending pilots to England to complete their training was discontinued. A three-month period of training on

163. AFRIT to CG, AFFTC, 22 Oct. 1942, in AAG 353.9 G, Training, General.

164. CG, VIII Fighter Comd. to CG, 8th AF, 26 Aug. 1943, in AAG 353.01 A, Training Reports.

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C-78's, AT-11's, A-20's, and P-70's was conducted at the School of Applied Tactics. P-322 transition for night fighter pilots in the Training Command was also discontinued. They were now selected at the end of basic, given the standard advanced twin-engine course, and then processed through the Training Command B-25 transition school.¹⁶⁵ The recommendation regarding landing gear was also heeded. B-34's, non-operational medium bombers, were transferred to the School of Applied Tactics for the purpose of giving transition to conventional type landing gear.¹⁶⁶

The School of Applied Tactics, however, was not adequately organized to handle night fighter training, so during the summer of 1943 plans were made to transfer night fighter squadron and replacement training to the Fourth Air Force.¹⁶⁷ This transfer occurred in January 1944, and during the movement of facilities transition for night fighter pilots in the Training Command B-25 schools was discontinued.¹⁶⁸ Upon establishment in the Fourth Air Force, a serious shortage of night fighter aircraft existed, as was the case throughout the program, and A-20's were assigned as substitute aircraft.¹⁶⁹ But as most of the transition for the night fighter program took place in the Training Command, this did not materially affect the

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- 165. R&R, AC/AS, Training to AC/AS, OC&R, 7 June 1943, in AFTHI files.
 - 166. R&R, AC/AS, Training to AC/AS, OC&R, 16 Oct. 1943, in AFTHI files.
 - 167. AC/AS, Training to CG, 4th AF, 22 July 1943, in AFTHI files.
 - 168. Daily Diary, AC/AS, Training, Aircrew Div., 6 Nov. 1943.
 - 169. Daily Diary, AC/AS, Training, Unit Training Div., 17 Apr. 1944; ibid., 18 Apr. 1944.
- [REDACTED]

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transition process.

8. Troop Carrier

As in all other types of aviation, with the coming of war the structure and training of cargo units underwent reorganization. Concepts of employment of transport aviation had always entailed the movement of troops and supplies behind the battle lines, but out of World War II came the use of airborne and glider troops. A new doctrine of transport, or troop carrier aviation, evolved, namely, "combat units equipped and trained for tactical employment as combat carriers in active operations in combat zones of theaters." In order to provide an agency to conduct the training of these combat carriers, the I Troop Carrier Command was activated in June 1942. Prior to June cargo activities had been concentrated in the 50th Transport Wing of the Air Force Combat Command, but apparently its equipment was so limited that training was almost negligible.

In training organization, unlike the continental air forces, the I Troop Carrier Command did not employ parent OTU's but formed new units by withdrawing cadres from units which had almost completed their operational training. Necessarily, this procedure required a separate activity for transition, one group being specifically

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170. CG, I Troop Carrier Comd. to AC/S, Operations Div., 17 Jan. 1943, in AAG 322, Airborne Comd. and Troop Carrier Comd.
171. AAF Reg. 20-1, 16 June 1941.
172. Unit History of 89th TC Group, 1 Feb. 1942-Jan. 1944.
173. R&R, No. 2, AC/AS, Training to AC/AS, OC&R, 17 July 1943, in AFTHI files.
- [REDACTED]
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designated as a transition training organization. For one class prior to the activation of the I Troop Carrier Command, the 63d Transport Group had conducted transition training, but on 17 June 1942 this function was transferred to the 89th Troop Carrier Group. Because of its unique status, on 24 December 1942 the group was removed from the 50th Wing and assigned directly to Headquarters, I Troop Carrier Command. The 89th Group was then able to concentrate on one mission, both¹⁷⁴ instructionally and administratively. Early in 1944, however, Troop Carrier Command training was reorganized. With the completion of the training of all authorized troop carrier groups, all training activity was devoted to the production of replacement crews. The 89th Troop Carrier Group, along with two others, the 10th and 63d, were redesignated combat crew training schools. Replacement training was conducted¹⁷⁵ in five phases, the first being transition. Thus transition to troop carrier aircraft became administratively similar to transition to bombardment aircraft when it was conducted in the tactical units.

Training Program. Transition training to troop carrier aircraft (transports of the DC-3 type, C-47's and C-53's) was conducted under three principal programs of instruction. The first was that prescribed by the 50th Transport Wing, the second was issued when the 89th Group

174. Unit History of the 89th TC Group, 1 Feb. 1942-Jan. 1944.

175. AG, I TCC to CG, AAF, 19 Jan. 1944, in files of AG/AS, Training; I TCC Training Directive, Replacement Training Units, 5 Feb. 1944.

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was placed directly under the I Troop Carrier Command, and the third was prescribed by the command when transition became the first phase of replacement training at the combat crew schools. Of one month's duration, their object was to produce a limited pilot, familiar with the troop carrier airplane, its equipment and accessories. In both ground and air instruction, in addition to changes in hour allotments and subject matter, constant changes in instructional procedure occurred. Many of these were improvements dictated by combat experience and
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developing concepts of troop carrier aviation.

In flight training the first program of instruction consisted of 33 hours of training, including cockpit familiarization, hood or instrument training, contact flying, day and night take-offs and landings,
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instruments and radio, and day and night cross-country flying. In February 1943 instruction was expanded in subject matter but reduced in number of hours to a minimum of 20 and a desired total of 26. The practice of a check on cockpit procedure and co-pilot duties, an intermediate progress and blindfold cockpit check, and a final check were
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instituted. In March 1944, although subject matter did not change,
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the number of hours was increased to 30. Concurrent with air instruction, extensive ground training, varying from 90 to 100 hours, was given. In addition to the usual preflight indoctrination, other

176. Unit History, 89th TC Group, 1 Feb. 1942-Jan. 1944.

177. Unit History, 26th TC Squadron, 89th TC Group, 1 Feb. 1942-1 Sep. 1943.

178. Memorandum No. 51-6, Hq., 89th TC Gp., 1 Feb. 1943.

179. Hq., I TCC Training Directive, Replacement Training Units, 5 Feb. 1944.

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courses, such as navigation, preflight planning, meteorology, physical
180 aspects of flying, and engineering, were given. In March 1944
ground instruction was added in the various types of radio and radar
181 equipment used in troop carrier aviation.

Thus from June 1942 to March 1944 the 89th Troop Carrier Group
was the sole agency for transition training to troop carrier aircraft.
Its production record between 14 August 1942, when the first class
entered, through January 1944 was quite impressive. Graduates
182 numbered 5,571; less than one-half of 1 per cent had been eliminated.
This transitioning of both single-engine and twin-engine standard
graduates included all pilot personnel for troop carrier organizations,
both first pilots and co-pilots for RTU-OTU groups and station
183 complement personnel. With the transfer of transition to the combat
crew training schools on 1 March 1944, only replacement pilots received
transition training. This transfer also affected one other transition
procedure. Formerly co-pilots had not been tagged as such until some
time in the tactical training period, but now, although they received
identical transition, they were selected at the end of the transition
period, and their training in the other phases differed from that
184 accorded first pilots.

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180. Memorandum A-3, No. 7, Hq., 50th TC Wing, 3 Aug. 1942; Unit History, 26th TC Squadron, 89th TC Group, 1 Feb. 1942-1 Sep. 1943.
181. Hq., I TCC Training Directive, Replacement Training Units, 5 Feb. 1944. See Appendix 4 for comparative chart of subject matter.
182. Unit History of 89th TC Group, 1 Feb. 1942-Jan. 1944.
183. R&R, AC/AS, Training to AC/AS, OC&R, 27 Dec. 1943, in AAG 353 #3, Training Standards.
184. Hq., I TCC Training Directive, Replacement Training Units, 5 Feb. 1944.
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Problems. At first Troop Carrier transition was hindered by the usual problems of inadequate material, lack of trained instructors, and indefinite transition regulations and procedures. Upon activation the group possessed only a few B-18's, but slowly C-47's and C-53's were made available. When the program began, many group personnel were former airline pilots who were familiar with the equipment and able to afford adequate instruction. But as they left the group, regular graduates of the transition course were employed as instructors. It soon became evident that they did not possess sufficient ability to produce fully proficient graduates, and a system of junior instructor training was developed. Transition graduates were given an additional 30 hours of training before they were qualified as junior instructors. Similarly, in the beginning there were only 3 ground school instructors and very little equipment, but by the end of 1943 the staff had been increased to 14 officer and 3 enlisted instructors. At first training was also hampered by a lack of definite instructions and regulations pertaining to the transition process. With experience, however, schedules and regulations were formulated, student check and progress forms procured, and the practice of one-hour checks at the end of each transition phase introduced.

185. Unit History, 89th TC Group, 1 Feb. 1942-Jan. 1944.

186. Unit History, 24th TC Squadron, 89th TC Group.

187. Unit History, 26th TC Squadron, 89th TC Group, 1 Feb. 1942-1 Sep. 1943.

188. Unit History, 24th TC Squadron, 89th TC Group.

Chapter VI

HEAVY BOMBARDMENT TRANSITION IN THE TRAINING COMMAND

Heavy bombardment was always the pace-setter in the development of new transition methods, and it was in heavy bombardment that the first transfer of the transition function to the individual training agency occurred. The training program, which attempted to meet the needs of the tactical training system of the Second Air Force, fell into two distinct periods. During the first, from December 1941 through August 1942, specialized heavy bombardment schools in the Flying Training Command trained combat crews for overseas replacement. After August 1942, when the Second Air Force replacement training system was functioning, Flying Training Command effort was devoted to the production of fully transition-trained first pilots--and after January 1944, co-pilots-- for the heavy bombardment operational and replacement training units. Both in production quotas and type of instruction, the whole program was designed to meet the training requirements of the Second Air Force.

1. Combat Crew Training

The Establishment of Schools. During the first months of the war all tactical unit effort was devoted to establishing an operational unit training system, but replacement crews for groups already in the theaters of operation had to be supplied. There already existed the Ferry Command School at Albuquerque, conducted by Transcontinental and

Western Airlines.¹ In an attempt to utilize all available facilities, on 22 December 1941 the TWA school was taken over by the Chief of the Air Corps and placed under the jurisdiction of the West Coast Training Center.² Production of Ferrying Command crews was to continue, but excess capacity was to be used for training crews provided by the Air Force Combat Command.³ Some three weeks later, on 10 January 1942, the Chief of the Air Corps was directed to establish specialized heavy bomber crew schools utilizing all available facilities in order that crew production could parallel as closely as possible the production of heavy bombers.⁴ First pilots with at least one year's active duty as a rated pilot were to be procured from activities under the Chief of Air Corps. Co-pilots were to be provided from advanced school graduates, as well as gunners, bombardiers, and navigators as they became available.⁵ Within a few days, by 26 January 1942, the plans had been formulated. The basic school at Hendricks Field, Sebring, Fla., was to be converted to a B-17 school with crew production beginning in April. In the meantime, through increased allocation of aircraft, production at the Albuquerque school was to be stepped up in order to meet requirements.⁶

Operations at the TWA School, December 1941-July 1942. Until the

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1. See Chap. III.
 2. R&R, Asst. C/AC to Chief, Training Div., 22 Dec. 1941, in AAG 353.9 F, Training, Misc.
 3. C/AC to CG, West Coast Training Center, 31 Dec. 1941, in AFTRC files.
 4. Asst. AAG to C/AC, 10 Jan. 1942, in AAG 353.9 C2, Training, General.
 5. Project Book, CG, AFTRC.
 6. 1st ind. (Asst. AG to C/AC, 10 Jan. 1942), OGAC to Chief, AAF, 26 Jan. 1942, in AFTRC files.

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new combat crew schools could be placed in operation, the TWA contract school was the only establishment outside of the air forces producing four-engine transition-trained pilots. This predecessor of specialized transition schools was a strange mixture of military and airline personnel and training methods. Because of its Lend-Lease contract origin, training was conducted on LB-30's (B-24's), and the crews trained were not combat crews but operating crews consisting of pilot, co-pilot, navigator, flight engineer, and radio operator. Instructors were furnished by TWA, while pilot personnel were secured from various sources. The Ferrying Command continued to send pilots, including some civilians, while the Air Force Combat Command and later the air forces and the Flying Training Command also furnished personnel.⁷ Although first pilot eligibility requirements existed for personnel from the Flying Training Command, pilot trainees from other sources did not always meet minimum standards, a fact which made training more difficult.⁸

The school's function was crew training, but due to continued shortages of other crew members,⁹ apparently most of the training was devoted to pilot and co-pilot transition. Other factors hindered training. In addition to experiencing serious maintenance difficulties, the school had very few airplanes and, being a contract school, could not afford accidents. Consequently, in comparison with later transition school operation, instructors were overcautious, shying away from

7. CO, AAB, Albuquerque to CG, AAF, 12 Mar. 1942, in AFTRC files; memo for the Davidson Board by Exec., Training Div., 21 Jan. 1942, in AAG 353.9 C2, Training, General; R&R, ACTC to Training Div., CGAC, 14 Feb. 1942, and R&R, AFRIT to AFDOF, 24 Mar. 1942, in AFTRC files.

8. AFFTC to AFRIT 25 Mar. 1942, in AFTRC files.

9. Memo for AFRIT by AFFTC, 24 Mar. 1942, in AFTRC files.

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two-and three-engine operation. Standard airline instruction, such as instrument training, was excellent, but flying was not in the military manner.¹⁰

A glance at the program of instruction shows that it only attempted transition, without further qualification for tactical flying. The 24-hour course of air instruction for all crew members consisted of:¹¹

	<u>Hours</u>
1. Pilot and Co-pilot general familiarization	1
2. First Pilot familiarization as Co-pilot	1
3. First Pilot air work	1
4. First Pilot qualification as Co-pilot	1
5. First Pilot take offs and landings	2
6. Co-pilot qualification as Co-pilot	2
7. First Pilot instrument flying and radio practice	2
8. Night air work--Navigation practice	2
9. Cross country crew practice	4
10. Cross country and high altitude practice for entire crew	8

Thirty additional hours were devoted to ground instruction for pilots and co-pilots. This included description and inspection of the airplane, cockpit procedure, loading and center of gravity distribution, high-altitude procedure and oxygen equipment, emergency operating procedure, radio and interphone, operation of the power plant and propellers, and the various mechanical systems of the airplane, with considerable time for review and examination.¹²

Pilots also received five hours of link trainer time.¹³ The prescribed hours and subjects were not rigid; much was left to the discretion of the instructor in an attempt to fit

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10. Interview, Capt. A. V. House, Jr., Historical Sec., AFTRC, with Lt. Col. W. H. Blanchard, A-3, AFTRC, 13 Aug. 1943 [Blanchard Interview], in AFIHI files.
 11. Outline of Instruction, Albuquerque. Flight Course, 30 Jan. 1942, in AFTRC files.
 12. Ibid., Instructor's Outline of Ground Instruction for Pilots and Co-pilots.
 13. Ibid., Instructor's Outline of Link Trainer Course for Pilots.

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instruction to individual capability. The objective was to produce a safe and steady ferry pilot, the type of pilot which TWA's contract specified.

From the time responsibility for four-engine crew training had first been delegated to the Flying Training Command, it had been planned eventually to militarize the Albuquerque school completely and transfer B-24 training to the jurisdiction of the Southeast Training Center. Original plans contemplated the use of Wilmington, Del., but the site was changed to Smyrna, Tenn.¹⁵ On 31 July 1942, upon the expiration of TWA's contract and completion of facilities at Smyrna, the B-24 school was transferred and completely militarized. During the next few months training at Smyrna was devoted to producing five-man ferry crews with a gradual shift to first-pilot transition after 26 August.¹⁶

Operations at the Flying Training Command Schools. While the TWA school was producing five-man B-24 crews, the Southeast Training Center was engaged in establishing the B-17 combat crew school at Hendricks Field. Initial instructor training was accomplished in collaboration with the Third Air Force,¹⁷ and by the last of March 1942, eight-man combat crew training had begun. Trainees were furnished by the Flying Training Command, first pilots having at least one year's experience while other crew members were secured from recent school graduates. As in the TWA school, operations suffered

14. Ibid., Flight Course.

15. CG, AFFTC to CG, AAF, 3 Apr. 1942, in AFTRC files.

16. Project Book, CG, AFTRC.

17. TTX, Training Div., OCAC, to CG, SEAFTC, 31 Jan. 1942, in AFTRC files.

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from a lack of complete combat crews.

The difficulty experienced by both the B-24 and B-17 schools in obtaining complete crews at scheduled times pointed to the necessity of limiting four-engine training under the Flying Training Command to pilot transition alone. Such a decision was taken at General Arnold's conference with training center commanders on 6 April 1942,¹⁹ and it was issued as a directive 10 days later. Training was to be confined to the transition of pilot-co-pilot teams, with the exception of Ferrying Command crews at the TWA school. Apparently Sebring commenced operating under this directive, but on 23 May it was rescinded. The Flying Training Command was to train complete combat crews for immediate overseas replacement duty, until such time as the Second Air Force could assume this function.²⁰ The AAF was still in the period of transformation; expediency continued to delay the ideal establishment.

Program of Instruction, Combat Crew Schools. When combat crew training was instituted at Sebring, the program of instruction was established at 4 weeks, 34 hours. Apparently, however, it soon underwent modification through developing concepts of military crew training. From March to August it varied from 6 to 8 weeks in duration.²¹

18. Project Book, CG, AFTRC.

19. AG, AFFTC to AFRIT, 14 Apr. 1942, in AAG 353.9 I, Training in aviation, Pilot Training.

20. 1st ind. (AG, AFFTC to AFRIT, 14 Apr. 1942), AFDLR to CG, AFFTC, 17 Apr. 1942, in *ibid.*; Project Book, CG, AFTRC; Gen. Arnold to CG, AFFTC, 23 May 1942, and Hq., AAF to CG, AFFTC, 10 June 1942, in AFTRC files.

21. Blanchard Interview; 1st ind. (AFFTC to CG, SEAFTC, 29 June 1942), AG, SEAFTC to CG, AFFTC, 11 July 1942, in AFTRC files.

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In June 1942 the qualification requirements for heavy bombardment crew members drawn up by the Director of Bombardment were transmitted to the Flying Training Command to be used as a guide in conducting this course. Those referring to pilots included:²²

1. Minimum requirements:

- a. Personnel so arranged that the members of each combat crew mutually trust and cooperate with each other.
- b. Qualified as a team in the following requirements:
 - (1) Able to take-off and land in approximately the minimum distances listed for type airplane assigned.
 - (2) Completed calibration of airplane.
 - (3) Qualified to fly extended night missions.
 - (4) Qualified at maximum (25000' and above) altitude flying.
 - (5) Qualified day and night, to fly under actual instrument conditions, with and without radio aids, including take-offs and landings under minimum conditions of visibility and ceiling.
 - (6) Able to navigate by day and moonlight night by pilotage and dead-reckoning means to full range of aircraft. . . .
 - (9) Checked as satisfactory in making bombing approaches by a competent pilot-bombardier instructor. . . .
 - (15) Able to fly the following formations:
 - (a) Two and three, three plane elements in Javelin.
 - (b) Three two plane elements in stagger.
 - (c) Dispersed wedge and stagger.
 - (d) Individual bombing approaches from formations, airplanes upon reaching the bomb release line being at different altitudes.

2. If time permits the following additional requirements are desired.

- a. Proficiency in taking-off under zero-zero conditions.
- b. Proficiency in taking-off and landing using a flare path under black-out conditions.
- c. Proficiency in taking proper evasive action. . . .

22. AFRIT to CG, AFFTC, 23 June 1942, in AAG 353.9 B, Gunners, Bombardiers.

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The training program was designed to fulfill these requirements, and the Southeast Training Center reported that most of them were being attained. The lack of proper facilities, however, did not allow the practice of landings under conditions of minimum visibility and ceiling, and flying under instrument conditions was avoided except when necessary in navigation flying. But hooded take-offs were given. Also, trainees were too inexperienced and there was insufficient time to qualify students in navigation by pilotage and dead reckoning by day and moonlight night to the full range of aircraft assigned. As much of this training as possible, however, was given.²³ The course was 6 weeks in duration, but beginning with the August class time was reduced to 4-1/2 weeks, 50 hours,²⁴ until a reorganization of the type of training brought about complete revision.

2. Administration of Four-Engine First-Pilot Transition

Establishment of First-Pilot Transition. Finally, on 26 August 1942 the long-planned shift to four-engine first-pilot training occurred;²⁵ the function of the specialized schools was at last solely transition. With it came an increase in the time devoted to training, because concurrently with the transfer a decision was taken to alter the source of four-engine trainees. Prior to this time trainees had been recruited mainly from the ranks of pilot instructors, but the continuing expansion of all programs within the Flying Training Command

23. 1st ind. (AFFTC to CG, SEAFTC, 29 June 1942), AG, SEAFTC to CG, AFFTC, 11 July 1942, in AFTRC files.

24. Daily Diary, AFTRC, 25 July 1942.

25. AFTRC to CG, AFFTC, 26 Aug. 1942, in AAG 353.9 F, Training, General.

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would not permit their steady depletion. Four-engine transition trainees were not to be provided from new graduates of the twin-engine advanced pilot schools, and their relative inexperience required a doubling of the course to 9 weeks, 100 hours.²⁶

This increase in time made the transformation to first-pilot training relatively simple. Upper and lower classes were established in the four-engine schools, the lower class taking the existing 4-1/2 week course and then remaining in the school for the new upper class course of 4-1/2 weeks. The new procedure was immediately placed in operation at Sebring with the 11 September class, while at Smyrna it was employed concurrently with crew training for the Air Transport Command until the last ATC class graduated on 15 November 1942.²⁷

Production Requirements and Establishment of More Schools. Production quotas during the period of crew training had been geared to the number of aircraft available, but in August four-engine transition received its first definite quota. Between 1 July 1942 and 1 March 1943 total requirements amounted to 8,085 four-engine pilots. However, due to the scarcity of aircraft, the Flying Training Command was directed to adjust production to the amount of equipment available.²⁸ Although the allocation of heavy bombers to the Flying Training Command was less than half that necessary to meet the requirements,²⁹ the hope of increased allotments prompted the command to establish enough schools to

26. Blanchard Interview.

27. AFRIT to CG, AFFTC, 26 Aug. 1942, in AAG 353.9 F, Training, General; R&R, AFRIT to AFRDB, 4 Sep. 1942, in *ibid.*; R&R, No. 2, AFRIT to A-3, 29 Nov. 1942, in AAG 353, Transition Training.

28. AFRIT to CG, AFFTC, 26 Aug. 1942, in AAG 353.9 F, Training, General.

29. Daily Diary, AFRIT, 28 Aug. 1942.

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meet the production goal. Allocations indicated the assignment of B-17's and B-24's in the ratio of 2.8 to 1. Some B-17's were placed in the Smyrna school, while two other new schools were opened. Tarrant Field, Fort Worth, Tex., under the Gulf Coast Training Center, began B-24 training on 12 October 1942, and Hobbs, N. M., under the West Coast Training Center, entered its first B-17 students on 18 December. Initial instructor training for these new schools was accomplished at Sebring and Smyrna. In January 1943 a B-17 instructor school was opened at Lockbourne, Ohio, to be used in this capacity until needed for student training. Thus the Flying Training Command had established the five schools necessary to meet the annual flow of 8,950 required by March 1943, although the supply of planes on hand was only sufficient to equip two schools completely.³⁰

Throughout 1942 and the first three months of 1943, production in the four-engine schools necessarily paralleled the number of aircraft available. The desired graduation rate was 150 students per class per school, and although Sebring and Smyrna operated at capacity during this period, the other schools did not. Since July 1942 the ratio of six trainees to one airplane, which had been personally directed by General Arnold, had been maintained, thus insuring maximum use of available equipment. Knowing that the purpose of the four-engine schools, however, was to produce sufficient transition-trained pilots to supply the needs of all operational agencies and thereby relieve

30. Project Book, CG, AFTRC.

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them of the transition function, headquarters continually attempted to increase the allocation of four-engine planes to the individual training agency.³¹

On 27 March 1943, with the promise of the assignment and maintenance of a monthly total of 352 aircraft in the near future, new production objectives were transmitted to the Flying Training Command. The command was to increase four-engine first-pilot production as rapidly as possible in order to meet the requirements of the Second Air Force, the Air Transport Command, the Antisubmarine Command, and the Materiel Command. This was to be accomplished by building up pilot production to 1,600 a month.³² In view of the increased allocation, the command believed that by maximum use of planes and the operation of eight 4-engine schools, it could reach the directed flow by 8 November 1943.

The implementation of this new program required the activation of three more 4-engine schools. On 25 May the new B-17 school at Roswell, N. M., under the West Coast Training Center, entered its first class.³³ As B-24 deliveries were somewhat behind schedule, the new B-24 schools did not open until some time later. Liberal, Kans., under the Gulf Coast Training Center, began operations in July, while Maxwell Field, Ala., under the Southeast Training Center, entered its

31. Ibid.

32. AC/AS, Training to CG, AFFTC, 27 Mar. 1943, in AAG 353 A, Pilot Training.

33. 1st ind. (AC/AS, Training to CG, AFFTC, 27 Mar. 1943), AG, AFFTC to CG, AAF, 19 Apr. 1943, in ibid.; Project Book, CG, AFTRC.

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first trainees one month later.³⁴

Consistent with the policy of accelerating production in spite of the shortage of aircraft, in May a headquarters directive increased the standard B-17 student-plane ratio to 7 to 1.³⁵ One month later, as a result of a headquarters conference, the B-17 ratio at Sebring was increased to 8 to 1 while at Smyrna B-24 trainees were entered at a 7 to 1 ratio. As the other schools reached maximum operating efficiency, their ratios were increased proportionately. Throughout the summer the student load was gradually built up until by 5 September all eight schools were operating at capacity with approximately 1,800 students a class in training.³⁶ To accomplish this, schools were employing a peak load of 70 aircraft, although it was felt that 50 was the ideal number for most efficient operation.³⁷ Consequently, in August two more four-engine schools were opened, a B-24 school at Albuquerque, in the West Coast Training Center, and in the Southeast Training Center a B-17 school at Chanute Field, Ill. Hardly had these new schools opened, before the B-17 school at Lockbourne and the B-24 school at Smyrna were redesignated four-engine central instructors schools, commencing training in October.³⁸

During the summer of 1943, while the four-engine schools were

34. AC/AS, Training to CG, 2d AF, 26 Apr. 1943, in AAG 211 B, Pilots; Consolidated Flying Training Report, AFTRC, July 1943; Report of Flying Training Students, AFTRC, Aug. 1943.

35. T.M., AFFTC to CG, SEAFTC, 11 May 1943, in AFTRC files.

36. Project Book, CG, AFTRC.

37. AG, AFFTC to CG, AAF, 24 Apr. 1943, in AAG 353 A, Pilot Training.

38. Project Book, CG, AFTRC.

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gradually building up equipment and student capacity sufficient to produce the required flow of trainees, an emergency training program was projected into the four-engine transition system. The Second Air Force had to produce 1,083 combat crews during September 1943, and to assist in this task the Training Command was directed to effect transition of 900 B-25 and B-26 pilots to four-engine bombers from 15 July to 5 August. The Third Air Force furnished 650 pilots with a minimum of 50 hours first-pilot time, and the Training Command provided 300 graduates (allowance for attrition) of the B-25 and B-26 transition schools.³⁹ Such an influx of trainees necessarily upset scheduled instruction. Four-engine schools graduated their upper class 3 weeks early, and by an intensive 3-week transition course on a proficiency basis the Training Command met Second Air Force requirements of 578 B-17 pilots and 322 B-24 pilots.⁴⁰

From the first days of four-engine transition, the relative surplus of B-17's over B-24's had necessarily weighted pilot production on the side of the B-17. Utilizing all available aircraft the Training Command had met production goals through the graduation of 932 B-17 pilots as opposed to 657 B-24 pilots.⁴¹ The requirements of tactical units, on the other hand, called for an approximately equal number of B-24 and B-17 transition graduates, and complaints had occurred because of the necessity for retransition of B-17 pilots

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39. AC/AS, Training to AC/AS, Personnel, 3 July 1943, in AFTRC files.
40. T&E, CG, AAF to CG's, TC's, 3 July 1943, in AFTRC files; Daily Diary, AC/AS, Training, 3-4 July 1943.
41. AC/AS, Training to CG, AFTRC, 1 Sep. 1943, in AAG 353 B, Pilot Training.
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[REDACTED]

once they reached units equipped with Liberators.⁴² Therefore, on 1 September 1943 headquarters made plans to allocate 280 of each type of heavy bomber to the Training Command. Pilot production would thereby be equalized, and through increased numbers of aircraft the student-plane ratio could be re-established at the most efficient standard, 6 to 1.⁴³ During the balance of 1943, while equalization was being effected, 1,500 four-engine pilots were to be made available to the tactical units in the proportion of 700 B-24 and 800 B-17 graduates. Production for 1944 was established at the rate of 1,600 graduates, 50 per cent B-17 and 50 per cent B-24, with a possible shift to 60 per cent B-24 and 40 per cent B-17 in the spring depending upon the availability of B-24 aircraft. Training Command production for its own use was to be in excess of the required flow.⁴⁴

Training under this directive was immediately effected, but because of the continued shortage of B-24's, it was necessary to graduate the November class on a proficiency basis.⁴⁵ By December 1943 sufficient B-24 aircraft had been delivered to enable the production of 800 B-24 pilots,⁴⁶ but on the 23d of that month the B-24 objective was increased to 850, for a total of 1,650 four-engine first pilots. By using returned combat personnel processed through the four-engine instructors schools, this increase, effective with the March graduating class, was

42. TTX, 2d AF to AFDFU, 11 Apr. 1943, in AAG 211 B, Pilots.

43. AC/AS, Training to CG, AFTRC, 1 Sep. 1943, in AAG 353 B, Pilot Training.

44. 2d ind. (AC/AS, Training to CG, AFTRC, 1 Sep. 1943), AC/AS, Training to CG, AFTRC, 8 Oct. 1943, in ibid.

45. Daily Diary, AC/AS Training, Aircrew Div., 9 Nov. 1943, in AFIHI files.

46. Project Book, CG, AFTRC.

[REDACTED]

[REDACTED]

met with existing facilities.⁴⁷ In March 1944, however, the change over to the 10-10-10-week program (10 weeks in each of the three stages of pilot training) throughout the Training Command and the consequent reduction of one class a year, necessitated an increase in class quotas to 900 B-17 and 924 B-24 pilots.⁴⁸

But once again, in April 1944, in order to meet new heavy and very heavy bombardment requirements of the air forces, it was necessary to shorten the training period and increase the number of trainees in the four-engine schools between 1 April and 2 August 1944. To furnish during this period 783 B-24 and 724 B-17 pilots over the normal rate,⁴⁹ the command found it necessary to plan to graduate students three weeks early, require the schools to carry a 25 per cent overload, use the instructor schools for regular transition students, and convert Chanute Field from a B-17 to a B-24 school.⁵⁰ Thus, once again through expedient methods the command met the requirements of the Second Air Force.

3. Four-Engine Program of Instruction

The development of the program of instruction in the four-engine first pilot schools of the Training Command probably followed a more clear-cut pattern of improvement than any other similar instructional program. Perhaps the reason lay in the fact that stronger emphasis

47. AG/AS, Training to CG, AFTRC, 23 Dec. 1943, in AAG 353 B, Pilot Training.

48. Daily Diary, AFTRC, 8 Mar. 1944; Project Book, CG, AFTRC.

49. Project Book, CG, AFTRC.

50. Ibid.; Daily Diary, AFTRC, 3 Apr. 1944.

[REDACTED]

[REDACTED]

was placed on heavy bombardment than any other training category. After the program had received an excellent start in late 1942, there was an increasing tendency toward collaboration between the Second Air Force and the Training Command on policies, methods, and procedures. Through conferences of interested personnel, decisions were made on all important four-engine matters, and these in turn were reflected in instructional methods and curricula. In consideration of the training curricula, it must be remembered that prescribed Training Command programs and standards were minimum; instruction was always subject to alteration by individual stations. Although occasionally only minimum standards were achieved, and at times substandard quality, generally the instruction level tended to surpass the specified minimum.

Course of Instruction, September 1942-April 1943. With the shift to the training of first-pilots and the use of less experienced trainees, newly graduated from twin-engine schools, it was necessary to lengthen the course of instruction and change its purpose. Headquarters had directed that the course be established at nine weeks, 100 hours,⁵¹ be full enough to allow for the inexperience of the trainees, and sufficiently extensive to accomplish qualification for heavy bombardment airplane commander duty, specifications for which had recently been issued by the Directorate of Bombardment.⁵² During October two conferences in the Flying Training Command drew up a program based on

51. AFRIT to CG, AFFTC, 26 Aug. 1942, in AAG 353.9 F, Training, General.
52. AG, AFFTC to CG, AAF, 17 Oct. 1942, in AAG 353.11 J, Course of Instruction.

[REDACTED]

[REDACTED]

what could be thoroughly accomplished in the period and still meet the high requirements of headquarters.⁵³

While this program was being formulated, a directive was received from headquarters specifying that at least 50 per cent of the instruction should be solo.⁵⁴ Officials of the Flying Training Command, however, did not believe that training objectives could be accomplished under this directive. Their thinking was based on the fact that former trainees with 1 to 10 years' service required at least 25 hours' dual flying before they were competent to solo and, obviously, recent graduates would require more. In addition, with only 25 hours' dual, the trainee would receive only simple transition; instrument and navigation training would be neglected. First-pilot graduates under the old program of instruction had made only one solo flight, and they had been rated thoroughly competent by other agencies. Consequently, Flying Training Command personnel believed⁵⁵

that fifteen solo hours, one-half of which is utilized as pilot and one-half as copilot, was the optimum amount of solo time that would be consistent with efficient training. This amount of time is sufficient to instill confidence in the trainee prior to his graduation and also indicates conclusively that the Flying Training Command considers the trainee a finished four-engine aircraft commander.

Upon these recommendations the 50 per cent solo directive was rescinded, and the recommended program approved.⁵⁶ The general plan of flying

53. Ibid.; Daily Diary, A-3 Div., AFFTC, 9 Oct. 1942, in AFTRC files.

54. Daily Diary, A-3 Div., AFFTC, 6 Oct. 1942.

55. AG, AFFTC to CG, AAF, 17 Oct. 1942, in AAG 352.11 J, Course of Instruction.

56. AFRTT to CG, AFFTC, 21 Oct. 1942, in ibid.

[REDACTED]

and ground instruction was: ⁵⁷

1. <u>Flying Training:</u>		<u>Hours</u>
a. Transition		30
Day	20	
Night	10	
b. Instrument		20 on instrument 20 as safety pilot
c. Formation		5
d. Altitude Missions		5
e. Navigation		25
Day	15	
Night	10	
Total		<u>105</u> hours
f. Link Trainer	15	
2. <u>Academic and Ground Instruction:</u>		<u>Hours</u>
a. Ground technical instruction		
(1) Theoretical		30
(2) Practical engineering maintenance		44
b. Navigation		20
c. Radio		15
d. Practical Meteorology and weather flying		6
e. Aircraft Recognition and Range Estimation		10
f. Naval Forces and Ship Recog- nition		10
g. First Aid		3
h. Oxygen (altitude flying and use of equipment)		6

57. Hq, AFFTC, Program of Instruction, Pilot Transition--Four-Engine,
First Pilot Trainees, 10 Oct. 1942, in AFTHI files.

i. Code Review and signal lamps	6
j. Chemical Warfare Defense	<u>4</u>
	154
k. Athletics	<u>54</u>
Total	208

The total of 105 hours' flying instruction was divided between pilot and co-pilot time in all phases, with at least 15 hours of solo. A survey of the course in detail demonstrates how it was pointed toward the attainment of the qualifications prescribed by Headquarters, AAF. The 30 hours of transition were intended to accomplish:⁵⁸

- a. Thorough familiarization with normal and emergency procedure of operation and demonstration of limitations of airplane to include:
 - (1) Overshooting landing area and practice "going around"
 - (2) Run-away propeller during take-off
 - (3) Failure of engine during flight
 - (4) Engine fire, ground and air
 - (5) Abandoning aircraft during flight and after crash landing, on land or water, including dinghy drill
 - (6) Landing gear failure
- b. Emphasis . . . on use of check lists.
- c. Ability to take off with and without flaps, with light and maximum gross load in the shortest practicable distance.
- d. Ability to land from high and low approaches with and without power in the shortest practicable distance after maneuvering for approach within a radius not to exceed two miles.
- e. Proficiency in cross-wind take-offs and landings.
- f. Ability to take off and land under minimum conditions of visibility and ceilings.
- g. Ability to make strange field landings.
- h. Proficiency in all air maneuvers, such as steep banks, chandelles, lazy-eights, eight on pylons, stalls, and any other maneuvers within the limitations of the type aircraft and which are not restricted.

58. Ibid. Slight changes have been made in the quotation to make coordinate construction.

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- i. Thorough knowledge of proper methods of operating type aircraft engines, both on the ground and in the air.
 - j. Proficiency in operating type aircraft with any one engine inoperative, including landing and take-off.
 - k. Proficiency in operating type aircraft in the air with any two engines inoperative.
 - l. Proficiency in night operations to include take-off and landing by flare path.

Instrument training was designed "to qualify the student for operation under actual instrument conditions," proficiency being qualification under AAF Regulation 50-3. Formation flying was limited to basic fundamentals of formation with four-engine aircraft. Altitude missions designed to familiarize the trainee with the conditions peculiar to high-altitude operation of four-engine equipment were to be performed with full load and required demonstration of proficiency above 30,000 feet. In the 25 hours of navigation, proficiency was to be acquired in radius of action problems, use of various types of navigation, and calibration of navigation instruments. Link trainer instruction was to be coordinated with the instrument training program.⁵⁹

The 154 hours of ground instruction entailed, in technical instruction, proficiency in description and operation of the four-engine airplane, power plant, and accessory equipment; practical maintenance; thorough knowledge of all technical features, aircraft instruments, and airplane systems; and cruising control and landing. Navigation included practical dead reckoning dry plot exercises coordinated with flight training, while radio training encompassed the operation and maintenance of the various radio sets. Practical meteorology was

59. Ibid.



[REDACTED]
[REDACTED]

devoted to flight planning. In aircraft recognition and range estimation and in naval forces and ship recognition, there was a review of previous training. First aid and oxygen instruction were concerned with proper use of equipment, while chemical warfare defense included two hours of classroom instruction and two hours of practical demonstration. Code review was designed toward attainment of visual proficiency of six words a minute and aural proficiency of eight words a minute.⁶⁰

During the fall of 1942, although four-engine training was being expanded generally and new stations activated, the real development of four-engine transition procedure occurred at Sebring and Smyrna. At Sebring a B-17 school of the highest quality was built up, a school that set the standard for all heavy bombardment transition in the Training Command. Flying was accomplished in a purely military manner, emphasis was placed on emergency procedures, and full loads were employed. At Smyrna, on the other hand, training did not make such an auspicious beginning. Many of the first instructors were TWA pilots commissioned upon the close of the Albuquerque school, and they continued instruction in the airline manner, emphasizing safety at the expense of all-round training. There also seems to have been a feeling that the Liberator could not match the Fortress in many operations. When some B-17's were placed at Smyrna, instructors from Sebring accompanied them and incidentally were checked off on B-24's. Through experimentation, they demonstrated to Smyrna personnel that

60. Ibid.

[REDACTED]
[REDACTED]

[REDACTED]

the same things could be done with the B-24 as with the B-17, and as a result the quality of B-24 instruction improved.

Fortunately the excellence of the B-17 Sebring school was transmitted to the other Fortress schools through instructor training at Sebring. The instructors at the B-24 school at Tarrant Field, on the other hand, were trained in the early days of Smyrna, and as late as 1943 the quality of instruction at that school was found to be extremely poor. Personnel were overly safety conscious, and instruction in emergency procedures was at a minimum. But through demonstration and instruction by Consolidated representatives, Tarrant personnel learned what could be done with the Liberator, and instruction soon met the standard of the other four-engine schools.⁶¹ Thus, first-pilot heavy bombardment transition training made an auspicious beginning.

Second Air Force-Flying Training Command Conference, February 1943.

Four-engine training in the Flying Training Command was pointed toward producing pilot trainees with a firm grounding in individual flying training so that when pilots were transferred to the Second Air Force they could progress rapidly and efficiently through crew training. Throughout the war period there was an increasing tendency toward collaboration with the Second Air Force in an attempt to meet the quality of training desired in command graduates. Requirements and methods were arrived at through a series of conferences. The first of these took place on 1-2 February 1943 at Fort George Wright, Wash. This conference touched on all four-engine training problems, princi-

61. Blanchard Interview.

[REDACTED]

[REDACTED]

pally the development of the airplane commander, factors affecting pilot morale, factors affecting training, curriculum of the four-engine schools, and elimination of the unfit. Its recommendations and resultant action had a profound influence on the course of four-engine instruction.⁶²

One of the most important functions of the transition program was the production of individuals capable of assuming airplane commander duties. The Second Air Force believed that if the Flying Training Command would select personnel with command ability and make definite efforts to train them for command responsibility, operational training would be noticeably benefited and would progress more rapidly. Consequently, the conference made several recommendations designed to aid in the development of airplane commanders. It was suggested that assignment to four-engine training be based on leadership capacities rather than just on physical qualifications as in the past. Another problem sprang from the fact that many flight officers were being assigned to bomber transition, although they had been designated flight officers because of lack of qualities of leadership. In view of the command status of four-engine pilots, and the necessity that they rank other crew members, the Second Air Force had either to commission these men or not use them at all. Consequently, it was recommended that only commissioned personnel be assigned to four-engine training.⁶³

62. CG, 2d AF to CG, AAF, 3 Feb. 1943, in AAG 337 B, Conferences.

63. Ibid.

[REDACTED]

[REDACTED]

It was also suggested that the addition of war rooms at the schools would decidedly influence the "battle morale" of potential airplane commanders, and their establishment was recommended. The question of model crews at each school was also discussed, as it was believed that "the use of model crews would enable the four-engine schools to acquaint the airplane commander with his proper relations with his crew components." In the program of instruction itself, the conference recommended that the 20 hours allotted to aircraft and surface vessel identification could be more advantageously devoted to orientation courses covering the organization and operation of the Second Air Force and command responsibilities of the airplane commander.⁶⁴

The conference also made other recommendations. Several of these concerned morale and disciplinary problems.⁶⁵ The conference concluded that a "crying need" existed for proper liaison between the the Second Air Force and the Flying Training Command. It was recommended that the two agencies exchange officers in their A-3 sections and that all contacts be conducted through them. The Second Air Force also agreed to maintain records on the progress of four-engine graduates and submit them along with training suggestions to the Flying Training Command.⁶⁶

Discussion was held on the flying ability of four-engine graduates. It was felt that their greatest deficiency was inability to fly under actual instrument conditions, and certain recommendations were made, such as conducting instrument checks under overcast con-

64. Ibid.

65. See below, Sec. 4.

66. CG, 2d AF to CG, AAF, 3 Feb. 1943, in AAF 337 B, Conferences.

[REDACTED]

[REDACTED]

ditions. The Flying Training Command reported that the restrictive provisions of AAF Regulation 60-16 made instrument training difficult, and it was recommended that the director of training at each school be authorized to prescribe his own weather limitations. The question of 50 per cent solo time was reopened by the Commanding General of the Second Air Force, but in accordance with the desires of the Flying Training Command, it was decided that no change in the existing program would be made until its adequacy had been proved or disproved. At least 10 hours of solo time was considered the minimum allowable.⁶⁷

Within a surprisingly short time action was taken on most of the recommendations of the conference, both administrative and instructional.⁶⁸ From this time on, the question of airplane commander qualification received increased attention. A directive was issued that excluded flight officers from transition training, but within a month it was rescinded since it conflicted with AAF policy regarding discrimination against flight officers because of grade.⁶⁹ Apparently model crews were not assigned to each of the four-engine schools, but Second Air Force crews did from time to time make periodic visits to demonstrate crew procedure.⁷⁰ The recommendation to establish war rooms at the four-engine schools was partially carried out with the establishment of one at Tarrant Field on an experimental basis.⁷¹

67. Ibid.

68. For discussion of instructional changes, see below.

69. Project Book, CG, AFTRC; A-1, AFFTC to CG's, TC's, 25 Mar. 1943, in AFTRC files; AFRIT to CG, AFFTC, 6 Mar. 1943, in AFTRC files.

70. Daily Diary, A-3 Div., AFFTC, 22 Apr. 1943, in AFTRC files.

71. R&R, AFRIT to Dir. of Intelligence, 22 Feb. 1943, in AAG 210.31 #1, Commands, Misc.

[REDACTED]

[REDACTED]

It seems that they were later opened at other schools.

The need for cooperation between the Second Air Force and the Flying Training Command, so apparent at the Fort George Wright conference, received increasing consideration. From time to time, the Second Air Force submitted recommendations to the command for the improvement of four-engine training, and these were in turn transmitted to the lower echelons.⁷² Generally, they concerned training details, larger changes being effected by subsequent conferences. The conference recommendation for the exchange of liaison officers between the Flying Training Command and the Second Air Force evidently was not immediately carried out, for in August a board of officers investigating the accident rate in the Second Air Force again recommended the appointment of a staff of liaison officers between the two agencies. Finally, in October the long-contemplated exchange of liaison officers for the coordination of four-engine training occurred.⁷³

Conference on B-24 Program of Instruction, March 1943. Before discussing the changes in the program of instruction resulting from the Flying Training Command-Second Air Force conference, it is necessary to consider a second conference which convened 5 March 1943 in the Directorate of Individual Training, to examine the B-24 program

72. CG, AFFTC to CG, 2d AF, 12 Apr. 1943, in AFTRC files.

73. Daily Diary, AC/AS, Training, Aircrew Div., 27 Aug. 1943; AC/AS, Training to CG, AFTRC, 25 Aug. 1943, in AFTRC files; Project Book, CG, AFTRC.

[REDACTED]

[REDACTED]

of instruction and to recommend changes designed to produce more competent airplane commanders. Prescribed B-17 and B-24 programs had always been identical, but the schools had been experiencing difficulty in producing Liberator trainees as well qualified as Fortress graduates under similar instructional programs. The conference agreed that "the actual flying of a B-24 airplane, by a young pilot, was thirty per cent more difficult than the flying of a B-17 airplane, as the B-17 was more conventional in design and operation and more what the young pilot had been accustomed to. Instrument training, in particular, was much easier to accomplish in a B-17 than in a B-24 airplane."⁷⁴

The conference therefore decided that additional flying instruction must be accorded B-24 trainees in order to bring them to the same state of proficiency as B-17 students in the nine-week course.⁷⁵ A new program of instruction was submitted, which increased all flying instruction to 125 hours and instrument training to 50.⁷⁶ The conference also recommended that greater emphasis be placed on preparation for airplane commander training, that the technical manuals and B-24 flight operation films prepared by Consolidated Aircraft Corporation be furnished to B-24 organizations, and that the close liaison between B-24 schools, B-24 crew training organizations, and Consolidated, which had resulted from the conference, be continued.⁷⁷

74. Col. Troup Miller, Jr., to AFRIT, 5 Mar. 1943, in AAG 353.11 #1, Misc. Course of Instruction.

75. Ibid.

76. Memo for AFRDB by Chief, Training Div., 11 Mar. 1943, in ibid.

77. Col. Troup Miller, Jr., to AFRIT, 5 Mar. 1943, in ibid.

[REDACTED]

Program of Instruction, April 1943-February 1944. These two conferences resulted in new programs of instruction for B-17 and B-24 airplane commander training. Almost all of their recommendations received recognition. The general plan for B-17 flying training remained the same as under the previous program, but B-24 air instruction was increased from 105 to 125 hours. The additional hours were allotted to transition and instrument training; formation, altitude missions, and navigation remained as before. Transition was increased by 10 hours to 40 hours, 25 by day and 15 by night. Instrument training was also increased by 10, making 25 on instruments and 25 as safety pilot. The additional B-24 flying hours were to allow for the relative difficulty of learning to fly the plane. Actually, instructional changes were similar in both programs. During the transition period students were now to receive thorough instruction in the use of automatic pilot equipment. In accordance with the increased emphasis on instrument training and in order to insure the highest possible proficiency, separate instrument flying departments were established at each school. At least one flight was to be performed successfully in an overcast, and as much instrument training as possible was to be accomplished under actual instrument conditions. School commanders were authorized to determine when practice flights during weather lower than prescribed by AAF Regulation 60-16 could be performed. Also, each student was to receive at least 10 hours of solo time.⁷⁸

The general plans for academic and ground instruction for the

78. FTC Memorandums Nos. 50-2-1, and 50-2-2, 14 Apr. 1943.

[REDACTED]

B-17 and the B-24 were identical; the total number of hours for each was reduced by 2 to 152. Several changes occurred in the curriculum, for due to increased emphasis, navigation was augmented by 10 hours for a total of 30, while a 6-hour course in airplane commander duties was added. It included "the basic duties of each member of the combat crew; indoctrination in the basic principles of establishing and maintaining discipline, esprit de corps, and teamwork within the combat crew; and orientation in the organization and purpose of the Second Air Force." In addition, intelligence documents pertinent to heavy bombardment flying and copies of the Second Air Force publication, "Duties and Responsibilities of the Airplane Commander," were made available to students. Other changes occurred, such as added hours in oxygen and meteorology instruction; while chemical warfare defense, aircraft recognition and range estimation, and naval forces and ship recognition were eliminated.⁷⁹

With training under the new program of instruction in operation, representatives of four-engine activities met 21-22 June 1943 at Lockbourne, Ohio, to discuss local engineering problems and details of training methods. One of the problems considered was the necessity for converting B-17-trained students to B-24's once they reached the tactical units.⁸⁰ This condition had occasioned several complaints by the Second Air Force,⁸¹ but apparently the equipment situation obviated remedy at this time. Minor changes in the program of instruc-

79. Ibid.; Daily Diary, A-3 Div., AFFTC, 20 Apr. 1943, in AFTRC files.

80. Daily Diary, A-3 Div., AFFTC, 25 June 1943, in AFTRC files.

81. THX, 2d AF to AFDP, 11 Apr. 1943, in AAG 211 B, Pilots.

[REDACTED]

[REDACTED]

tion were brought about, such as the re-institution of 12 hours of
aircraft and naval recognition.⁸²

Increased Collaboration with the Second Air Force. Once the policy of collaboration between the Second Air Force and the Training Command had been established, increased efforts were made to maintain and strengthen it. In August 1943 a board of officers investigated the accident rate in the Second Air Force.⁸³ Its recommendations were transmitted to the Training Command as a directive on 27 August 1943. The first recommendation urged "the appointment of a Board of Officers consisting of representatives of the Second Air Force and the Training Command for the purpose of standardizing both B-17 and B-24 check lists, and pilot and co-pilot procedures, both normal and emergency."⁸⁴ On 6 September the conference convened at Fort Worth, Tex.⁸⁵

It was essential that the procedures taught to students in transition schools carry through into OTU-RTU training, but the air forces and the Training Command were employing check lists that varied slightly. In addition, it was felt that the lack of standard and emergency pilot-co-pilot procedure was a contributory factor to accidents. Tied in with the need for check lists was the fact that the expansion of the four-engine program had required the employment of instructors with very limited experience. Through the use of amplified check lists these instructors could be most easily taught how to produce students

82. TTX, AFTRC to CG's, TC'S, 13 July 1943, in AFTRC files.

83. Daily Diary, AC/AS, Training, Aircrew Div., 27 Aug. 1943.

84. AC/AS, Training to CG, AFTRC, 25 Aug. 1943, in AFTRC files.

85. Agenda, Four-engine Conference convened at Hq., AFTRC, 6 Sep. 1943, in AAG 337 #5, Conferences, Military, Naval, and Others.

[REDACTED]

[REDACTED]

⁸⁶ of the desired quality. The conference therefore drew up official check lists, amplified check lists, and emergency procedure operation lists, for both B-17 and B-24 aircraft,⁸⁷ which were adopted as standard in the Second Air Force and the Training Command.⁸⁸ The conference also formulated a standard pilot transition training record which provided space for rating the pilot on each maneuver performed in transition training. In this way the operational training agency could gain complete knowledge of the individual pilot's proficiency.⁸⁹

The board of officers investigating the accident rate in the Second Air Force also made other recommendations that affected four-engine transition. One was the reaffirmation of the desirability of liaison officers between the Training Command and the Second Air Force. Another was the establishment of central instructors schools (four-engine pilot). The board also suggested that "more thorough distribution of accident data be furnished by the Flight Control Command to insure every pilot's familiarity with previous accidents and their causes." The necessary action was taken by the Training Command.⁹⁰

Training Conference, Colorado Springs, September 1943--Recommendations and Action. In order to create better coordination and understanding of all AAF training problems, on 20-22 September 1943 a training conference of representatives from Headquarters, AAF, the first

86. Ibid.

87. A-3, AFTRC to CG, AFTRC, 8 Sep. 1943, in ibid.

88. AG, AFTRC to CG's, TC's, and CO's each AAF Pilot School (Specialized Four-Engine), Chairman of Conference, 8 Sep. 1943, in ibid.

89. Agenda, Four-engine Conference convened at Hq, AFTRC, 6 Sep. 1943, in ibid.

90. AG/AS, Training to CG, AFTRC, 25 Aug. 1943, in AFTRC files; and 1st ind., AG, AFTRC to CG, AAF, 17 Sep. 1943, in AAG 353 B, Pilot Training.

[REDACTED]

[REDACTED]

four air forces, and the continental commands was held at Colorado Springs, Colo. Of the 19 recommendations of the four-engine committee, many pertained to materiel matters, administration of four-engine training, and operating problems of four-engine program. One resulted in a subsequent conference and more detailed recommendations, while another occasioned a survey of B-24 instruction. Others pertained to co-pilot training and the central instructors schools.⁹¹ It was also suggested that the directive requiring 12 hours' recognition training in the four-engine Training Command schools and 18 hours in the Second Air Force be rescinded and rewritten, as it was felt that this instruction should be held to a minimum for four-engine first pilots.⁹² Such revision was later incorporated in a new program of instruction.

One recommendation was that the "B-24 schools of the Training Command run a service test in order to determine the feasibility of reducing the present B-24 Program of Instruction of 125 hours to 105 hours," as in the B-17 schools.⁹³ With approval by AG/AS, Training on 2 October, the service test was conducted with Class 43-4-I in both the Eastern and Central Flying Training Commands.⁹⁴ This test proving successful, in December the command recommended that minimum B-24 hours be reduced to conform with the B-17 program of instruction. This was approved by headquarters, and B-24 flying instruction returned to its former basis.⁹⁵

91. See Secs. 3 and 4 below.

92. Report, Training Conference, Hq., 2d AF, Colorado Springs, 20-22 Sep. 1943, in AFIHI files.

93. Ibid.

94. AG/AS, Training to CG, AFTRC, 2 Oct. 1943, in AAG 452.1 H, Bombers; and 1st ind., AG, AFTRC to CG, AAF, 12 Oct. 1943, in ibid.

95. Project Book, CG, AFTRC.

[REDACTED]

[REDACTED]

The four-engine committee also recommended that a conference be convened to prepare "a completely coordinated revision of each activity of the ground school course for all Air Crew Members."⁹⁶ This recommendation was approved by AG/AS, Training; and representatives of Headquarters, AAF, the four continental air forces, the Training Command, and the four-engine pilot schools met at Fort Worth on 3 November 1943.⁹⁷ The primary mission of the conference was to study the ground school portion of heavy bombardment aircrew training and to revise current programs with a view to eliminating the unnecessary, emphasizing the important, and properly coordinating preliminary and advanced training.⁹⁸ The conference agreed that certain minimum proficiency standards should be established for Training Command graduates. Accordingly, training standards were recommended for each ground school subject. After approval by Headquarters, AAF, these were incorporated into a revised program of instruction for four-engine transition schools. The conference also made other recommendations concerning ground school instructors, code proficiency, and co-pilot training.⁹⁹

Program of Instruction, February 1944. On 14 February 1944 the recommendations made by the various conferences by headquarters, and

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96. Report, Training Conference, Hq., 2d AF, Colorado Springs, 20-22 Sep. 1943.
97. Members of the Board to CG, AFTRC, 9 Nov. 1943, in AAG 353, Ground Duty Training.
98. Agenda, Conference for Revision of Ground School Course for Aircrew Members Convened at Hq, AFTRC, 3 Nov. 1943, in ibid.
99. Members of the Board to CG, AFTRC, 9 Nov. 1943, in ibid.; 1st ind., AG, AFTRC to CG, AAF, 19 Nov. 1943), AC/AS, Training to CG, AFTRC, 19 Dec. 1943, in ibid.; see Secs. 3 and 4 below.
- [REDACTED]

by the Second Air Force for the improvement of four-engine instruction were incorporated in a revised program for airplane commander transition training. B-17 and B-24 instructional hours were now identical, 105 hours of flying, 145 of ground school. The general plan for flight training was similar to the previous B-17 program, the only change being that navigation was reduced by five hours, these hours being devoted to bomb approach instruction.¹⁰⁰ Actually this change had been in effect since September, 1943.¹⁰¹ Repeated complaints by operational units on the lack of bomb approach training on the part of command graduates and the consequent difficulties in bombardier proficiency had brought headquarters action.¹⁰² Also, pilots were now required to undergo four hours' bomb trainer time. In the other stages of flying instruction only minor changes occurred, such as the amendment of the landing requirement to include only no-flap landings, and increased emphasis on certain aspects of formation. To recapitulate, flying training consisted of:¹⁰³

		<u>Hours</u>
Transition		30
Day	20	
Night	10	
Instrument		40
Instrument	20	
As Safety Pilot	20	
Formation		5
Altitude Missions		5
Navigation		20
Day	10	
Night	10	

100. TC Memorandum No. 50-2-1, 14 Feb. 1944.

101. Project Book, CG, AFTRC.

102. Memo for Gen. Harper by Maj. Herzog, 14 June 1943, in AC/AS Training, Aircrew Div. files.

103. TC Memorandum No. 50-2-1, 14 Feb. 1944.

		<u>Hours</u>
Bomb Approach		5
FDI Practice and		
Rate Turns	1	
Manual Dry Runs	2	
Auto-Pilot Dry Runs	2	
	TOTAL	<u>105</u>
Link Trainer		15
Bomb Trainer		4

The ground school course of instruction underwent more complete revision, now conforming to the recommendations of the November 1943 conference on heavy bombardment ground instruction. Each of the recommended training standards became the basis for a course of instruction, the object of the course being the attainment of these standards. Ground instruction consisted of:¹⁰⁴

	<u>Hours</u>
Auto Engineering	36
Weight and Balance	3
Aero Maintenance Engineering	18
Altitude	3
Radio Equipment	15
Navigation	30
Bomb Approach and Auto-Pilot	8
Aural and Visual Code	12
Weather Flying	12
Recognition--Aircraft and Ship	6
Duties of Airplane Commander	2
	TOTAL
	<u>145</u>
Physical Fitness	54

Auto engineering, weight and balance, and maintenance engineering corresponded to the former ground technical instruction. Navigation and radio remained the same. Code review, although similar in scope, was increased by six hours, while aircraft and naval recognition was

104. Ibid.

[REDACTED]

reduced by six hours in accordance with the recommendations of the September training conference. The courses in duties of the airplane commander and altitude instruction (formerly oxygen instruction) were reduced in hours although their scope did not change. Weather flying was increased by two hours to 12, and its scope conformed to the standards established by the Ground School Conference and the recommendations of a weather conference held at Headquarters, AAF in November.¹⁰⁵ It required familiarity with weather terminology and weather maps so as to be able to recognize weather factors in action and determine the tendency of change in these factors. The new eight-hour course in bomb approach and automatic pilot met the prescribed standard, "familiarization with the bombing problem, operating of the bomb sight, automatic-pilot, and a knowledge of the errors caused by lack of pilot-bombardier cooperation."¹⁰⁶

It is general opinion that after the heavy bombardment transition program swung into efficient operation, based on the excellent instructional procedure first developed at Sebring, this training produced students well-prepared to progress rapidly and efficiently through operational and replacement training. Quality was continually improved through Air Force-Training Command coordination. The instructional programs were minimum standards, and in most cases graduates are said to have surpassed them. In certain instances, trainees were graduated on a proficiency basis with less than the prescribed number

105. Ibid.; Members of the Board to CG, AFTRC, 9 Nov. 1943, in AAG 353, Ground Duty Training; Report, Weather Training Conference, Hq., AAF, 17-19 Nov. 1943, in AFTHI files.

106. TC Memorandum No. 50-2-1, 14 Feb. 1944.

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of hours, but this was usually due to factors beyond Training Command control. This occurred when increased production objectives forced early graduation of classes, or aircraft transfers to other agencies produced critical airplane-student ratios. On the whole, four-engine transition was apparently one of the best conceived, coordinated, and developed of training programs.

4. Problems, Four-Engine Transition

The problems encountered in four-engine transition training were, for the most part, those inherent in any expanding training program--insufficient aircraft, a scarcity of trained instructor personnel, maintenance difficulties, and continued interruptions in the training schedule occasioned either by the need of giving additional training to personnel from other agencies or by inclement weather. In addition, heavy bombardment training was hindered, for a time, by a potentially serious morale problem.

Aircraft. As has been demonstrated in the discussion of requirements and production, the insufficient supply of heavy bombers, particularly B-24's, created the most serious problem. Fortunately, during the period of the most acute shortage, production quotas were not arbitrarily set but were geared to the availability of aircraft. Program planning had to be projected, and required flow of pilots was based on promised deliveries of aircraft that often did not materialize for some months after they were due. By the time definite quotas were set, however, the Training Command through maximum airplane utilization was able to accomplish the required training. After

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November 1943 sufficient aircraft were available, although sometimes temporary transfers of planes to the air forces where they were needed for operational training caused excessive student-airplane ratios and in some cases the graduation of pilots with less than the prescribed number of hours.¹⁰⁷

The lack of adequate aircraft was further aggravated by maintenance difficulties. Such was the case with the B-24 from the time of its first employment at the TWA school. B-24 maintenance at Smyrna was especially critical during the period of combat crew training because of an acute shortage of qualified maintenance personnel.¹⁰⁸ Apparently with the increase in trained technicians, the problem of heavy bomber maintenance as a main influencing factor gradually disappeared. As late as 1944, however, it still maintained some influence.¹⁰⁹

Interruptions to the Training Schedule. Another factor that noticeably hindered pilot production was the continual transitioning of personnel other than those progressing through the regular school system. Personnel from the air forces, the Air Transport Command, and the School of Applied Tactics were often ordered in for transition. In addition, a certain amount of "off the record" transition occurred of pilots not specifically assigned.¹¹⁰ This unauthorized

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107. Project Book, CG, AFTRC; Daily Diary, AC/AS, Training, Aircrew Div., 9 Sep. 1943.
108. AG, SEAFTC to CG, AFFTC, 9 Nov. 1942, in AAG 353, Transition Training.
109. Project Book, CG, AFTRC.
110. Ibid.; AC/AS, OC&R to CO, School of Applied Tactics, in AAG 353 #2, Pilot Training.
- [REDACTED]

[REDACTED]

utilization of equipment was later prohibited by a directive from Headquarters, Flying Training Command.¹¹¹ As regular schedules had to be maintained, additional trainees were usually carried as an overload and consequently occasioned a serious drain on available aircraft and instructor personnel. Further complicating training schedules, these trainees usually did not take the standard nine-week course but were sometimes given only 4-1/2 weeks of training or were graduated on a proficiency basis. Production was also curtailed in the early period by the necessity for training instructors, sometimes constituting whole classes and thereby reducing the flow to the tactical units. Inclement weather also influenced production, particularly at the schools in the northern states. For example, in the February 1944 class at Liberal, Kans., only 63 out of a class of 230 were graduated on schedule. In fact the school fell so far behind that in order to stabilize production, it was necessary to omit one entire class.¹¹²

Morale. Traditionally, four-engine bomber crews enjoyed extremely high morale. Only two significant morale problems seem to have been encountered in four-engine training in the Training Command. The most serious was the assignment of personnel who did not wish this training. This practice was undesirable as such personnel did not possess the proper mental attitude for intensive instruction and their presence tended to destroy the morale of other trainees. It also increased

111. R&R, A-3, AFFTC to A-1, AFFTC, 25 Feb. 1943, in AFTRC files.

112. AG, AFFTC to CG, WCAPTC, 11 Apr. 1943, in AFTRC files; Project Book, CG, AFTRC.

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the elimination rate and prevented the most effective utilization of aircraft.¹¹³ Consequently, in October, 1942, the Flying Training

Command directed that only volunteers be assigned to four-engine training.¹¹⁴ During the same month a coordinated system of assign-

ment for all graduates except Regular Army officers, which helped to solve the problem of insuring the procurement of volunteers, was set up within the command.¹¹⁵ The policy of volunteer selection remained in effect until August 1943, when it was modified to the extent that students were to be selected "as far as practicable" from those who signified a desire for four-engine training.¹¹⁶

The second morale problem sprang from the difficulty of exercising control over students who had already received commissions and flight ratings. This affected discipline at the four-engine schools. The problem was aggravated by the fact that pilots were frequently denied promised leaves and as a consequence resented their lack of opportunity to visit the home town and show off newly-earned wings and bars. As a result graduates on orders to Second Air Force stations frequently deviated for personal reasons¹¹⁷ from their prescribed routes. A solution was reached when, effective with the advanced pilot class graduating 30 August 1943, trainees were given 10 days leave prior to reporting to transition schools.¹¹⁸

113. AFFTC to CG's, TC's, 8 and 21 Oct. 1942, in AFTRC files.

114. AFFTC to CG's, TC's, 8 Oct. 1942, in AFTRC files.

115. AG, AFFTC to CG, GCAFTC, (?) Oct. 1942, in AFTRC files.

116. AFTRC to CG's, TC's, 26 Aug. 1943, in AFTRC files.

117. CG, 2d AF to CG, AAF, 3 Feb. 1943, in AAG 337 B, Conferences.

118. T.X., AFTRC to CG's, TC's, 15 Aug. 1943, in AFTRC files.

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Instructors. The rapid expansion of the Flying Training Command imposed an acute drain on qualified instructor personnel in all types of training. The four-engine program suffered from this situation, but apparently not as seriously as some of the other programs. Evidently, as was the case at the beginning of the program, instructor personnel were selected from the best qualified pilots in the command, and a concerted effort was made to maintain established student-instructor ratios. In 1942 this ratio was set at 1 instructor to every 4 trainees, but in September 1943, it was altered to 1 to 3.6.¹¹⁹ Initial instructor training was conducted in the Third Air Force, and until the fall of 1943 additional instructors required for the expanding program were trained at the operating schools.¹²⁰ But the tremendous expansion of the four-engine program forced the utilization of relatively inexperienced personnel; various means were employed to improve instructor quality, such as amplified instructor check lists and familiarization visits to Second Air Force stations so that instructors could acquire a clear conception of what was desired of command graduates.¹²¹ In August 1943 a recommendation of a board of officers investigating the accident rate in the Second Air Force gave further impetus to this policy, and it was directed that 16 instructor pilots a month be exchanged between the two agencies.¹²² This was accomplished

119. Project Book, CG, AFTRC; TWX, AC/AS, Training to CG, AFTRC, 21 Sep. 1943, in AFTRC files.

120. TWX, Training Div., OCAC, to CG, SECTC, 31 Jan. 1942, in AFTRC files; Project Book, CG, AFTRC.

121. Daily Diary, A-3 Div., AFFTC, 3 May 1943, in AFTRC files.

122. Daily Diary, AC/AS, Training, 27 Aug. 1943; AC/AS, Training to CG, AFTRC, 25 Aug. 1943, in AFTRC files.

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by one-week tours at first-phase Second Air Force stations and one-week visits to four-engine schools.¹²³

In keeping with the policy of standardization of transition procedure among the responsible agencies, this same board recommended the establishment of a central instructors school (four-engine pilot).¹²⁴

The Training Command was directed to carry out this recommendation,¹²⁴ and in September 1943 two four-engine central instructors schools were activated--one for the B-17 at Lockbourne, Ohio, and the other for the B-24 at Smyrna, Tennessee. These schools, chosen because of their previous experience in instructor training, began operations on 14

October.¹²⁵ Their mission was:¹²⁶

- a. To train four-engine flying instructors for the Army Air Forces.
- b. To qualify selected pilot personnel for four-engine duty prior to assignment to the various Commands of the Army Air Forces utilizing four-engine equipment.
- c. To standardize all four-engine pilot-co-pilot procedures both normal and emergency.
- d. To function as a laboratory for testing and developing four-engine training methods.
- e. To edit and make necessary revisions in the four-engine instructor's manual.
- f. To test, evaluate, and publish, for the approval of Headquarters, Army Air Forces Training Command, methods and procedures of four-engine instruction.

Thus in addition to instructor training, the schools performed other important and long-needed functions. These two schools also carried a small number of regular first-pilot trainees.¹²⁷

123. AG, AFTRC to CG's, TC's, 11 Nov. 1943, in AFTRC files.

124. Ibid.

125. Project Book, CG, AFTRC.

126. AG, AFTRC to CG, AFTRC, 6 Sep. 1943, in AAG 353 B, Pilot Training.

127. Ibid.

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Prior to the establishment of the instructors schools the Training Command had been directed to process all returned combat pilots assigned to the Second Air Force through Sebring or Tarrant on a proficiency basis, but they were soon diverted to the instructors schools.¹²⁸ In accordance with the recommendations of the September training conference at Colorado Springs, a number of returned combat personnel were retained at the instructors schools so that four-engine instruction development could benefit from their experience.¹²⁹ In November a system was worked out whereby all returned four-engine personnel below field grade were sent for processing through Lockbourne and Smyrna. Those who graduated were assigned in the following percentages:¹³⁰

First Air Force	10 per cent
Second Air Force	37 per cent
Third Air Force	10 per cent
Fourth Air Force	10 per cent
Training Command	33 per cent

In this way, training both in the command and the air forces could benefit from actual combat experience.

In addition to returned combat personnel, Training Command instructors and overflow trainees from the other four-engine schools, the air forces also sent previously assigned instructor personnel for processing.¹³¹ In fact, so great was the demand on the capacity of the instructors schools that in February 1944 a training priority was

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128. AC/AS, Training to CG, AFTRC, 16 Aug. 1943, in AAG 353, Transition Training; Daily Diary, AC/AS, Training, Aircrew Div. 24 Oct. 1943.
129. Report, Training Conference, Hq., 2d AF, Colorado Springs, 20-22 Sep. 1943.
130. AC/AS, Training to CG, AFTRC, 8 Nov. 1943, in AAG 211 #2, Pilots.
131. Daily Diary, AC/AS, Training, Aircrew Div., 15 Dec. 1943.
- [REDACTED]

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established, allotting first priority to instructors from the air forces, and Training Command, second to regular transition students, and third to returned combat personnel.¹³² In March it was further necessary to stop the flow of returned combat personnel until after 30 June in order to take care of the accelerated pilot production program.¹³³

5. Co-pilot Training and Problems

The Co-pilot Problem. Throughout the heavy bombardment program, primary attention was focused on the production of the first pilot. For many months the co-pilot was almost a forgotten man. The method by which co-pilots were supplied to the Second Air Force has been discussed,¹³⁴ but this expedient was an unsatisfactory solution to a problem that had to be submerged until first-pilot production met all requirements. But as the four-engine transition program moved into high gear, there was an increasing realization of the necessity for supplying fully qualified co-pilots. Tied in with this was an important morale factor, for the designation of career co-pilot had acquired an undesirable stigma. And yet the co-pilot was a very important member of the crew; he supplied the balance^{and} the engineering data, and functioned as first pilot in case of an emergency. For many months the question of co-pilot production and morale problems provided a fertile field for discussion, proposed solutions ranging all the way from eliminating the co-pilot entirely¹³⁵ to establishing separate co-pilot

132. Daily Diary, AFTRC, 17 Feb. 1944.

133. Daily Diary, AC/AS, Training, Individual Training Div., 27 Mar. 1944.

134. See Chap. V, Sec. 1.

135. R&R, AFRDB to AFDNR, 28 July 1942, in AAG 211 D, Grades, Titles.

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courses.¹³⁶

But until mid-1943 the solution of the four-engine co-pilot problem remained in the realm of theory. On 13 July 1943 a directive from AG/AS, Personnel specified that all four-engine eliminees would be assigned to the Second Air Force, which implied their use as co-pilots. This immediately caused a storm of protest on the part of the training agencies, as it was considered not only a damaging morale factor but an incipient accident producer. The Training Command was also interested in preserving the good reputation of its four-engine graduates.¹³⁷ Within a few days the directive was rescinded.¹³⁸

Once the question of having the Training Command provide co-pilots had been opened, it gathered momentum. In August the board of officers investigating the accident rate in the Second Air Force proposed a new plan. It entailed the selection of a number of trainees during the advanced single-engine stage and their transfer to four-engine schools for co-pilot training two to three weeks before graduation. There they would be given an extensive ground school course, emphasizing airplane design and engineering, and limited airwork of about 10 hours. Then upon first-pilot graduation, pilots and co-pilots would proceed to the Second Air Force as a team. They would be familiar with each other, the co-pilot would know that he was trained for specific duties, and the team could immediately engage in first-phase

136. Daily Diary, AFTRC, 14 Jan. 1944.

137. R&R, No. 1, AG/AS, Training to AG/AS, Personnel, 23 July 1943, in AAG 353.01 #3, Schedules, Programs, Directives.

138. R&R, No. 2, AG/AS, Personnel to AG/AS, Training, 28 July 1943, in ibid.

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139
combat training instead of pilot and/or co-pilot transition.

The Training Command was in accord with the principle of producing qualified co-pilots but felt that the labelling of single-engine pilots, who believed that they were destined for pursuit, as career co-pilots in advanced training would result in an even more serious morale problem than that encountered in the Second Air Force. It would also result in inefficient utilization of single-engine facilities and would overtax those at the four-engine schools. Furthermore, it would have one of three unsatisfactory results: a reduction in the amount of flying time received by first-pilot trainees, a necessity for additional airplanes, or a decrease in the number of first-pilot graduates. The Training Command, therefore, countered with another proposal, suggesting that if it were necessary to have career co-pilots, they should be procured from some other source, such as unrated pilots with over 100 hours' flying time or graduates of the Brooks Field Classification School. These men could be given a course of instruction as aerial engineers and then be assigned to the transition schools for a nine-week ground school course, instruction in pilot-co-pilot procedures, and approximately 10 hours' airwork.¹⁴⁰

This proposal had hardly been made before the Colorado Springs training conference recommended that no pilots be trained as career co-pilots and that the Training Command furnish the air forces with

139. AC/AS, Training to CG, AFTRC, 27 Aug. 1943, in AAG 353 B, Pilot Training.

140. 1st ind. (AC/AS, Training to CG, AFTRC, 27 Aug. 1943), AG, AFTRC to CG, AAF, 27 Aug. 1943, in ibid.

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trained four-engine co-pilots.¹⁴¹ Apparently, a headquarters decision was not immediately forthcoming, but the Training Command considered the proposal, even recommending prescribed co-pilot ground school standards at the November ground school conference.¹⁴² In December a detailed plan was submitted whereby at the end of the first 4-1/2 weeks of the transition course, one-half of the class would be graduated as co-pilots; the balance, the students who had demonstrated the most aptitude, would remain for the full nine weeks and graduate as airplane commanders. This would require a revision of curricula, placing intensive ground school instruction, instrument, and transition training in the first 4-1/2 weeks.¹⁴³ It had the advantage of permitting all trainees to compete for first-pilot assignment, but also had the disadvantage of producing 1,200 first pilots and 1,200 co-pilots, which was 400 below the monthly requirement of 1,600 first pilots.¹⁴⁴ It seems that the plan was considered feasible by headquarters, but was deferred due to the necessity for recomputation of crew requirements.¹⁴⁵

The Establishment of Co-pilot Transition. Early in 1944 the increased load on the four-engine schools precluded the institution of this plan, but the problems arising from the assignment of under-trained personnel as co-pilots still demanded solution. Therefore,

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141. Report, Training Conference, Hq., 2d AF, Colorado Springs, 20-22 Sep. 1943.
142. Members of the Board to CG, AFTRC, 9 Nov. 1943, in AAG 353, Ground Duty Training.
143. Daily Diary, A-3 Div., AFTRC, 9 Dec. 1943, in AFTRC files.
144. Project Book, CG, AFTRC.
145. 1st ind. (AG, AFTRC to CG, AAF, 19 Nov. 1943) AC/AS, Training to CG, AFTRC, 19 Dec. 1943, in AAG 353, Ground Duty Training.
- [REDACTED]

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on 20 January 1944 an entirely new plan was placed in operation. Six hundred second lieutenants were ordered to the flexible gunnery schools for a period of 4-1/2 weeks, two for each aircraft assigned. There they received 25 hours' co-pilot time on gunnery missions and a comprehensive ground course qualifying them in the engineering aspects of four-engine aircraft. In this manner 466 B-17 and 134 B-24 co-pilots were produced. It was planned, as more experience was gained in this project, that the student-plane ratio would be increased with subsequent classes so as eventually to satisfy total air force needs of 850 B-24 and 800 B-17 co-pilots.¹⁴⁶

Thus, the function of co-pilot transition had at last been transferred to the individual training agency, but not through standard program procedure. Training was still expedient; transition was incidental to the performance of another training function. This method did not offer a solution to the career co-pilot problem, but apparently supported its continuance.¹⁴⁷

146. Project Book, CG, AFTRC.

147. By April 1944 the program had not been in effect long enough to estimate the quality of its graduates, but at least the Training Command was supplying the air forces with more qualified co-pilot material than before.

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CHAPTER VIIMEDIUM BOMBARDMENT TRANSITION IN THE
TRAINING OCEAN

The transfer of the medium bombardment transition function to the individual training agency did not occur under a developmental process similar to that of heavy bombardment. It differed in two ways. First, although there had been tentative steps toward establishing medium bombardment combat crew schools,¹ when transfer of the transition function did occur it was marked by immediate initiation of first-pilot training. Secondly, the B-25 and B-26 schools were not established at the same time or in the same manner. Furthermore, in type of training and method of operation, except for a period when both schools were conducted on a specialized postgraduate basis, the two types of transition were quite dissimilar. The initiation of B-26 transition antedated B-25 and followed quite closely the training pattern established for heavy bombardment. B-25 transition, on the other hand, after a period in which it corresponded to B-26 transition, underwent radical change. A new method of tactical transition was developed--the employment of a modified B-25 as an advanced trainer. Thus B-25 transition followed a more pronounced course of development and change than any other type of transition, while that for B-26 adhered to the established principles of specialized school transition training.

1. Daily Diary, AFPTC, 30,31 May 1942.

1. Administration

The Establishment of B-26 Transition. Since the first weeks of the war, IAF personnel had contemplated that medium bombardment transition would become a function of the Flying Training Command. Finally, on 6 October 1942 the first action on this plan occurred when headquarters directed the establishment of a specialized B-26 transition school in the Flying Training Command.² To the Gulf Coast Training Center was delegated the responsibility for the immediate development of this new program.³ After preliminary instructor training by the Third Air Force, the school opened 15 November at Tarrant Field in conjunction with the B-24 school. The entrance of the first class of 24 students⁴ marked the beginning of a period of difficulty, disappointment, and hard work seldom equaled in the Flying Training Command.

Original student-instructor production was to be based on the 37 B-26 aircraft allocated to the training agency.⁵ Accordingly, the Flying Training Command established its own quotas, but on 11 December the Directorate of Individual Training, on the insistence of the Directorate of Bombardment,⁶ increased production quotas to 150 a month, an irreconcilable ratio of students to planes. The original 37 B-26's proved practically unflyable and remained in overhaul for the first three months. Further delivery was slow.⁷ But since the directed flow

2. AFMIF to CG, AFTTC, 6 Oct. 1942, in MAG 353.9 F, Training, General.

3. MG, AFTTC to CG, GCMFIC, 19 Oct. 1942, in files of AG/AS, Training.

4. Project Book, CG, AFMIF.

5. AFMIF to CG, AFTTC, 6 Oct. 1942, in MAG 353.9 F, Training, General.

6. R&A, AFMIF to AFMIF, 11 Dec. 1942, in MAG 452.1 D. Bombers; Project Book, CG, AFMIF.

7. T&A, AFTTC to CG, IAF, 6 Jan. 1943, in MAG 452.1 Bombers (Heavy), B-26.

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of students was maintained, the B-26 school was forced to suspend entire classes, graduate students upon completion of a single solo flight, and concentrate on instructor and regular officer trainees while others were turned back to duty in the Flying Training Command or ordered on to the air forces.⁸ In addition, B-26 training at Tarrant was accorded secondary consideration in deference to the well-established B-24 school, but this was remedied when the school was permanently transferred to Del Rio, Tex., on 1 February 1943.⁹ Thus, the facilities for B-26 transition were entirely inadequate, and the establishment of a coordinated program was virtually impossible. In February a conference at Headquarters, Flying Training Command proposed a solution,¹⁰ but in the meantime Headquarters, AAF had revised the entire medium bombardment transition program and had placed B-25 and B-26 transition training on a comparable and more workable basis.

The Establishment of B-25 Advanced Training. Pilot transition to B-25 type airplanes in the Flying Training Command was unique among bombardment programs in that it did not commence with the establishment of a specialized school. Although for some time tentative plans had anticipated B-25 transition in the command, headquarters agencies were apparently divided on the necessity for the establishment of a specialized B-25 school. As late as November, 1942, plans were indefinite as to whether B-25's, as they became available, would be employed in a post-

8. O/S, AFTTC to AFMIF, 25 Feb. 1943, in files of AC/AS, Training.

9. Memo for CG, AFTTC by A-3, AFTTC, 12 Dec. 1942, in files of AC/AS, Training; Project Book, CG, AFTTC.

10. O/S, AFTTC to AFMIF, 25 Feb. 1943, in files of AC/AS, Training.

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[REDACTED] [REDACTED]
graduate transition school or would be assigned to advanced twin-engine schools for use in the latter weeks of twin-engine training.¹¹ Nevertheless, based on the initiation of P-26 post-graduate training and the fact that a small number of B-25's had been allocated during the last of 1942, the Flying Training Command formulated plans for the eventual establishment of a specialized B-25 transition school.¹² The allocation of additional airplanes gave further impetus to these tentative plans, and on 11 December 1942 the command requested authority to open a B-25 school with a 50-hour, 4-1/2 week program of instruction.¹³

Finally, on 22 December 1942, B-25 transition became a function of the individual training agency, but because of the relative facility of transition to B-25 type airplanes, no postgraduate transition school was to be established. Sufficient B-25's were to be assigned to advanced twin-engine pilot schools to produce B-25 first pilots to meet air force requirements of 80 each month beginning in January 1943. With rapidity, B-25 training was implemented. By 30 December 30 B-25's had been assigned to the advanced twin-engine school at Roswell, N.M., and the Commanding General of the West Coast Training Center had been directed to graduate 87 pilots with 25 hours' first-pilot time for each class in 1943 commencing 6 February.¹⁴ For three months directed training was conducted, quotas were met, and for the first time graduates with B-25 transition were assigned to the air forces. These graduates, however,

11. RAR, No. 2, AFRTT to AFTR, 13 Nov. 1942, in MAG 353, Transition Training.

12. CG, AFFTC to AFRTT, 24 Nov. 1942, in files of AG/AS, Training.

13. AG, AFFTC to AFRTT, 11 Dec. 1942, in files of AG/AS, Training.

14. AG, AFFTC to CG, AFRTT, 30 Dec. 1942, in files of AG/AS, Training.

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were but limited pilots; their individual training on B-25's had not been fully completed.

Reorganization and the Establishment of Comparable B-25 and B-26 Specialized Schools. Meanwhile, it seems that headquarters agencies were not fully in accord as to the proper method of transition to medium bombardment aircraft. Early in January 1943 the Assistant Chief of Air Staff, A-3 specified that transition for B-25's and B-26's should be identical. The office of the Director of Bombardment concurred, but evidently the Directorate of Individual Training was not in complete agreement.¹⁵ For almost two months headquarters considered the advisability of opening a B-25 postgraduate transition school. Disagreement seems to have centered around the fact that the B-25 airplane was not as difficult to fly as the B-26, especially under emergency conditions. There also was a feeling that incipient medium bombardment morale problems should be kept to a minimum and that the employment of a short B-25 transition course in the advanced flying schools would "falsely emphasize ease of transition to this type and the corresponding difficulty of transition to B-26 type."¹⁶

On 22 February the Directorate of Bombardment submitted its final and considered opinion, an opinion which became the basis for the medium bombardment training objective:¹⁷

15. RAB, No. 2, AFMDS to AFMT, 19 Jan. 1943, in AAG 452.1 D, Bombardment; RAB, No. 3, AFMT to AFMDS, 22 Jan. 1943, in *ibid.*

16. RAB, No. 2, AFMDS to AFMT, 19 Jan. 1943, in *ibid.*

17. RAB, No. 3, AFMDS to AFMT, 22 Feb. 1943, in files of AC/AS, Training.

[REDACTED]

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The primary concern of this directorate is that all pilots graduating from transition schools are able to meet the standards prescribed. It is most desirable that products of transition schools be capable and dependable pilots on their assigned airplane. They should be proficient not only in handling their airplane in flight, and while on the ground under normal conditions, but should know all the technical features thereof. The training Air Forces should not have to devote part of the limited time for operational training to further transition training It is entirely possible that training standards of proficiency currently established can be attained by B-25 pilots in less time than is necessary to meet same standards for B-26 pilots. It is believed that this can best be determined by the Flying Training Command. A separate school for B-25 transition training, is however, considered necessary.

Thus the objective of B-25 transition training became identical with that of B-26, an objective to be accomplished by postgraduate schools operating under similar programs of instruction. Concurrently, there was a growing opinion both in headquarters and in the Flying Training Command that final determination of the 1943 medium bombardment transition program was necessary. The establishment of transition facilities in the command was dependent upon the air forces' requirements for pilots and the allocation of operational type aircraft to the training agency. The MAT program for 1943 had established a requirement of 41,381 twin-engine pilots, but the percentage of these to receive transition on B-25 and B-26 aircraft had not been specified. The latest medium bombardment allocations to the Flying Training Command had allotted a total of 466 B-25's and 819 B-26's through January 1944. In order that proper long-range plans could be made, and in order that production requirements could be coordinated with aircraft allocations, in February

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1943 the Director of Individual Training requested the various type directors to submit their respective requirements for medium bombardment pilots.¹⁸

Within a few days the medium bombardment transition program underwent reorganization. On 4 March the 1943 pilot requirements for medium bombardment groups were transmitted to the Flying Training Command:

	<u>B-25 Requirements</u> ¹⁹	<u>B-26 Requirements</u> ²⁰
April	150	168
May	149	190
June	144	197
July	144	161
August	143	186
September	146	146
October	155	155
November	165	165
December	174	175
	<u>1,370</u>	<u>1,543</u>

In addition to B-25 group needs, a total of 764 transition-trained graduates were required for air support units, 372 for night fighter units, and 90 for antisubmarine units, making a grand total of 2,596.²¹

It was realized that until additional aircraft could be allocated to the Flying Training Command these quotas could not be fulfilled. The requirements were not cumulative, and where the command would not be able to meet quotas immediately, the Third Air Force was prepared to give transition.²² In the case of B-25 graduates, air force units were to receive priority over all other organizations.²³ Previously pilots

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18. RAR, AFMIT to AFEDB, 23 Feb. 1943, in AAG 452.1 D, Bombers;
RAR, AFEDB to AFMIT, 19 Feb. 1943, in AAG 211 A, Pilots.
19. AFMIT to CG, AFPTC, 4 Mar. 1943, in AAG 353 A, Pilot Training.
20. AFMIT to CG, AFPTC, 4 Mar. 1943, in AAG 400.314 C, Data on
Estimates as to Needs of Organizations.
21. AFMIT to CG, AFPTC, 4 Mar. 1943, in AAG 353 A, Pilot Training.
22. RAR, No. 2, AFEDB to AFMIT, 25 Feb. 1943, in AAG 452.1 D, Bombers.
23. RAR, No. 3, AFPTC to J3/AS, A-1, 27 Mar. 1943, in AAG 211 A, Pilots.

[REDACTED]

intended for assignment to night fighter units had been given transition on P-322 aircraft, but at this time it was decided to train them on B-25's.²⁴ Until B-25 school capacity could meet night fighter quotas, however, prospective night fighter pilots were to continue to be supplied from P-322 transition graduates.²⁵

The March reorganization of the medium bombardment transition program did not affect the established organization of the B-26 school; it required a re-gearing of existing and planned facilities for as rapid expansion as possible to meet the new quotas. The next three months were filled with problems of aircraft availability, instructor training, and class acceleration. Late in April, however, a second school opened at Dodge City, Mo., and by early June 1943, B-26 transition was at last operating according to directed flow.²⁶ Sufficient planes had been allocated, facilities were adequate, instructors were trained, and the maintenance problem was solved. After eight months of extreme difficulty the B-26 program had at last achieved efficiency and was prepared to settle down to the routine of producing fully qualified first pilots to meet operational requirements.

Here the implementation of the revised medium bombardment program for B-26's required but an expansion of existing facilities, in B-25 transition it necessitated the development of a new method of training and a new instructional program. To obtain the greatly in-

24. See Chap. VIII, Sec. 2.

25. LHM to CG, AFTRC, 4 Mar. 1943, in LAG 353 A, Pilot Training.

26. See below, Sec. 3; LAG 352 (1-14-43) OE-I-PTTC-4, 16 Apr. 1943; Project Rock, CG, AFTRC.

[REDACTED]

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creased production rate as rapidly as possible, the Flying Training Command was authorized to establish B-25 postgraduate schools. The length of the course was fixed at nine weeks, until such time as experience demonstrated that the standards of proficiency for B-25 pilots could be attained in a lesser period. During reorganization, training was to be continued in the advanced course at Roswell, N.M.²⁷

It seems that the immediate initiation of this new program would have been a tremendous task, but actually several months of anticipatory planning served the Flying Training Command well. In January, 1943, on the basis of increased B-25 allocations and a telephone call never followed up by a headquarters directive, the command had made complete plans to establish a B-25 specialized school at Lather Field, Calif., under the West Coast Training Center. Now that transition training had been accorded first priority in the utilization of B-25's, the Flying Training Command was able to place those plans in motion. Within two days the use of Lather Field had been confirmed, and the first class of 87 students matriculated 15 March.²⁸ With surprising rapidity Lather was built up to standard transition school size, and on 20 April training began at a second school at La Junta, Colo.²⁹ So swift was the achievement of directed student flow that it precipitated a serious aircraft shortage, but by the end of June there were sufficient aircraft to allow both schools to function at full capacity, with a total of 640 students in training.³⁰ Thus, the preliminary planning for the B-25

27. AFAT to CG, AFPC, 4 Mar. 1943, in LAG 353 ., Pilot Training.

28. Project Book, CG, AFPC.

29. AG, AFPC to AG/AS, OCM, 18 July 1943, in LAG 352, Pilot Schools.

30. See below, Sec. 3; Project Book, CG, AFPC.

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[REDACTED]

[REDACTED]

transition program and the experience gained in the earlier activation of E-26 transition schools enabled the establishment of this program with an ease and rapidity seldom experienced by the training agency.

Reorganization of E-25 Transition: the Institution of A-1-24 Advanced Training. But hardly had E-25 and E-26 transition been placed on a comparable basis before the AAF began to formulate plans that eventually resulted in both an administrative and instructional reorganization of E-25 transition training. In spite of the institution of E-25 postgraduate transition schools, many people in the training program believed that the E-25 could be used more advantageously in the advanced twin-engine schools, both to give transition to tactical aircraft and to provide a better twin-engine advanced trainer. Allocations indicating the delivery of a large number of E-25's to the Training Command late in 1943 pointed to the feasibility of their use for this purpose. Furthermore, an experiment which had been conducted at Kirtland Field entailing certain modifications, particularly weight reduction, indicated that the E-25 could be made even more suitable for advanced training.

On 19 July 1943 a board of officers composed of representatives from Headquarters, AAF, Headquarters, Training Command, the Materiel Command, the Air Service Command, the Central Instructors School at Randolph Field, Tex., and the E-25 schools convened at Fort Worth. Its purpose was "to study and initiate recommendations for modifications necessary to adapt[the] E-25 airplane to use in training of

31. A-1, AG/15, Training to CG, AFTRC, 12 July 1943, in MAG 452.1, Bombers (Heavy) E-25.

[REDACTED]

[REDACTED]

students in advanced schools."³² Out of the considerations of the board came the recommendation that since the lightened B-25 was more suitable for advanced training than the standard B-25, the modified model should be accorded a new designation. It became the AT-24. The board also recommended the method by which modification of new aircraft and aircraft already in the Training Command should be accomplished.³³ Those recommendations were immediately approved by the Training Command in the belief that the modified B-25 constituted an "outstanding advanced trainer" and that its employment would produce a "superior pilot."³⁴ On 6 August, AG/AS, Training authorized the Training Command to employ it for advanced training and to provide the machinery to effect modification of future B-25's delivered to the command. Delivery in small numbers was to begin in August.³⁵

Sometime before the meeting of the B-25 modification board, the Training Command had begun an experiment utilizing twin-engine advanced trainers in basic schools and then sending basic graduates direct to the B-25 transition schools.³⁶ Although this test had not yet been finished, the command was quite confident that the B-25 would prove well suited for twin-engine advanced training, and on 6 August 1943 it proposed to discontinue the B-25 transition schools with the class graduating 5 November. No reduction in qualified B-25

32. Agenda, B-25 Modification Board, 16 July 1943, in ibid.

33. Report of the Proceedings of a Board of Officers, Hq., AFTRC, 19 July 1943, in ibid.; Daily Diary, AFTRC, 9 Oct. 1943.

34. Acting C/S, AFTRC, to CG, AAF, 24 July 1943, in TAG 452.1, Bombers (Heavy) B-25.

35. AG/AS, Training to CG, AFTRC, 7 Aug. 1943, in ibid.

36. Project Book, CG, AFTRC.

[REDACTED]

[REDACTED]

pilots for the air forces would result, and night fighter pilots would continue to receive the full nine-week B-25 transition course.³⁷ AG/AS, Training did not concur,³⁸ but early in October a compromise was effected. One B-25 post-graduate school was to continue producing 210 B-25 pilots a class to meet air force requirements in addition to night fighter requirements of 45 a month. The other B-25 school was to be converted to a B-25 advanced school.³⁹

On 3 October 200 students with 35 hours on the AT-17 in basic entered the converted school at La Junta, Colo.⁴⁰ The Training Command therefore was conducting two types of B-25 training, the standard B-25 course at Wether Field and the AT-24 advanced course at La Junta. This continued for five months, but in February 1944, upon the receipt of a favorable report from the III Bomber Command "concerning the proficiency of graduates trained on the AT-24 by comparison with twin-engine graduates trained on AT-10 and AT-17 airplanes and by comparison with regular graduates of B-25 transition training," the command requested authority to convert the remaining B-25 school to AT-24 advanced training. On 26 February 1944 the necessary authority was granted. With final conversion, effective 26 May, all requirements of the Air Forces were to be provided from AT-24 graduates. A few standard B-25's were to be retained at Wether Field for training night fight-

37. AG, AFTRC to CG, MAT, 6 Aug. 1943, in AG 352, Pilot Schools.

38. 1st ind. (AG, AFTRC to CG, MAT, 6 Aug. 1943), AG/AS, Training to CG, AFTRC, 13 Aug. 1943, in ibid.

39. Daily Diary, AFTRC, 7 Oct. 1943.

40. Project Book, CG, AFTRC.

41

er pilots under the former nine-week specialized course.

B-26 Transition, June 1943 - April 1944. While the B-25 program was undergoing complete administrative reorganization, the B-26 transition schools continued functioning under the established specialized school system. Early in September 1943 the production quota was raised to 130 a class for each school, a total of 260. Although the express purpose of the B-26 transition schools was to train personnel for the B-26 OTU-RTU system of the Third Air Force, throughout this period pilot personnel, including pilots for the Second Air Force, women pilots, and French trainees, were transition-trained at the B-26 schools. On occasion, their presence necessitated a reduction in

42

directed student load. On 18 February 1944 a new B-26 production objective was transmitted to the Training Command. Intake requirements of the Third Air Force had been revised to 133 a month, and in accordance with the change-over to the 10-10-10-week program, the quota became 160 a class. In addition, the B-26 schools were to train

43

women pilots and French flyers in the following numbers, plus 25 French trainees per month for the balance of 1944:

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41. Daily Diary, AFTRC, 22 Feb. 1944; Daily Diary, AC/AS, Training, Aircrew Div., 26 Feb. 1944; Project Book, CG, AFTRC. New requirements for night fighter pilots transition-trained on B-25's were:

Class 44-2-A	25	44-2-E	105
44-2-B	65	44-2-F	80
44-2-C	105	44-2-G	90
44-2-D	105	44-2-H	90

42. Project Book, CG, AFTRC.

43. AC/AS, Training to CG, AFTRC, 18 Feb. 1944, in AAG 353 B, Pilot Training.

	<u>French Trainees</u>	<u>Women Pilots</u>	<u>Total</u>
21 Feb. 1944	25	20	45
25 March 1944	35	20	55
26 April 1944	35	20	55
29 May 1944	25	20	45
30 June 1944	25	20	45
2 Aug. 1944	25	28	53
2 Sep. 1944	25		25

During the summer of 1943, modification of the B-26, similar to that made on the B-25, was accomplished. But where the B-25 was modified to provide a better advanced twin-engine trainer, the primary purpose of B-26 modification was the attainment of a more efficient tow plane. The resultant airplane, the AT-23, constituted an excellent high-altitude tow plane, and the training conference at Colorado Springs on 20-22 September 1943 recommended that as many as possible of these aircraft be made available for tow-target work.⁴⁴ Necessarily the use of these aircraft required transition training, and during November, December, and January 240 AT-23 pilots for the Second Air Force were trained at the B-26 schools, as well as 210 for regular Third Air Force requirements and all additional AT-23 pilots required by the Training Command.⁴⁵

Since AT-24 graduates had proved a successful substitute for graduates of the standard B-25 course and as the secondary purpose of B-26 modification was for experimentation as an advanced trainer,⁴⁶ in January 1944 an experimental class of 50 aviation cadets who had received AT-17 transition in basic were given advanced training on the AT-23 at the B-26 transition school at Del Rio, Tex. Their course

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44. Report of the Training Conference, HQ, 2d AF, Colorado Springs, 20-22 Sep. 1943.
 45. Project Book, CG, AFTRC.
 46. AG/AS Training to CG's, AFTRC and 3d AF, 8 July 1943, in AAG 452.1 Bombers (Heavy) B-26.

[REDACTED]

of instruction followed closely that given on the AT-24.⁴⁷ Upon graduation in March, 40 of these graduates were transferred to the Third Air Force.⁴⁸

2. Program of Instruction

The Development of the First B-26 Program. When B-26 first-pilot transition became a function of the Flying Training Command in October 1942, there were two precedents upon which instructional methods could be based. These were the already well-established four-engine first-pilot program and the B-26 transition procedure developed by the Third Air Force. The October directive specified a nine-week course "on a comparable basis to that now given in the 4-engine schools."⁴⁹ The Flying Training Command decided that preliminary instructor training was to be conducted at Tarrant Field (B-24), and out of the experience gained a program was to be evolved which would satisfy the peculiar demands of the B-26.⁵⁰ But it seems to have been discovered at Tarrant that Flying Training Command personnel were not sufficiently familiar with the operation of modern medium bombardment aircraft to establish a school solely responsible for the individual training of future combat pilots. To solve the problem of initial instructor training as effi-

47. Daily Diary, AFTRC, 21 Dec. 1943.

48. Project Book, CG, AFTRC. Possibly if reports on the operational proficiency of AT-23-trained pilots proved favorable, the B-26 program of instruction would undergo a change comparable to the B-25.

49. AFRIT to CG, AFFTC, 6 Oct. 1942, in AAG 353.9 F, Training, General.

50. AG, AFFTC to CG, GCAFTC, 19 Oct. 1942, in files of AC/AS, Training.

[REDACTED]

ciently as possible and to insure the establishment of a transition course that would most acceptably meet the requirements of the operational training units, the collaboration of the Third Air Force was secured.⁵¹ The station selected, Barksdale Field, was well-prepared to deal with the B-26 problem, for aside from first-phase operational training, personnel there had conducted transition training for a number of Air Transport Command pilots. There a 20-day course was conducted.⁵²

Thus, out of Flying Training Command four-engine and Third Air Force twin-engine experience, the first program of instruction for B-26 specialized training was evolved. In many ways the pilot transition program was similar to that employed in the four-engine schools, but in addition there was a 31-hour indoctrination and familiarization course to be completed prior to flight. This course, developed through collaboration with the Third Air Force, was designed to satisfy the desires of the Commanding General, AAF for instruction in emergency procedures as well as to overcome student fear of the B-26. Comparable to, although fuller than, the type of preflight instruction given in the tactical units, it entailed.⁵³

Hours

Introduction and Pertinent Sections of
Pilots' Information File and Air-Traffic
Rules

3

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51. R&R, AFRTT to AFRDB, 15 Oct. 1942, in AAG 353.9 J, Training in Aviation, Pilot Training.
52. Project Book, CG, AFTRC.
53. Hq., AFFTC, Directed B-26 Ground Program of Instruction, Pilot Transition, First Pilot Trainees, 15 Jan. 1943, in AFTHI files.

	<u>Hours</u>
Flight Characteristics, B-26 Airplane	1
"Sit Time"--Cockpit Instruction on Installation and Operation of Fuel, Fuel Transfer, and Carburetion	1
Demonstration of Above Systems, Using Mock-Up Sets	1
Lecture and Questionnaire on Above Subjects	2
"Sit Time" -- Cockpit Instruction on Electrical System	1
Demonstration of Electrical System, Using Mock-Up Sets	1
Lecture on Electrical System and Questionnaire on Same Subject	1
Lecture on Engine and Accessories	1
"Sit Time" -- Cockpit Instruction on Propeller Installations and Control	1
T. F. Theory and Operation of Curtiss Electric Propeller	1
Lecture on Propellers and Questionnaire on Same Subject	2
Lecture on Radio -- B-26 Airplane	1
Lecture on Hydraulic System and Questionnaire on Same Subject	2
Loading and Loading Diagrams -- B-26 Airplane	1
Take-Off, Climb, and Cruising Control Charts	1
Demonstration of All B-26 Equipment and Hydraulic Systems Using Mock-Up Sets	2
Use of Auxiliary Equipment, Procedure for Abandoning Airplane, Emergency Landing at Sea, Technique in Landing, and Use of Emergency Equipment	2
Pilots' and Copilots' Check Lists	1

Lecture and Discussion on Booklet--"Lessons That Live"	1
"Single-Engine Operation"	1
Review and "Quiz"	$\frac{3}{31}$

The 100 hours of flying training were designed to produce a pilot proficient as a "limited day, night, instrument first pilot of B-26 type aircraft." The general plan of flying training was:⁵⁴

Transition		<u>Hours</u>
Day	42	52
Night	10	
Instrument		20
Formation		9
Altitude Missions--Fully loaded		8
Navigation		11
Day	6	
Night	5	
		<u>100</u>

Flying instruction was pointed toward the attainment of most of the training standards for medium bombardment pilots established by the Directorate of Bombardment, although apparently some of the more difficult or dangerous ones were eliminated. Prior to commencing the scheduled 100 hours, the student flew two hours as an observer. Transition instruction included 10 hours as co-pilot, while the first 32 hours were used for "landing and take-off with particular stress on flying the airplane." This entailed at least one hour of single-engine operation and 32 landings and 16 flights. The aim of the transition period was to accomplish familiarization with normal and emergency operating procedures

54. Hq., AFMTC, Directed Program of Instruction, Pilot Transition, B-26, First Pilot Trainees, 15 Jan. 1943, in AFTHI files.

[REDACTED]

and demonstration of the limitations of the airplane, proficiency in take-offs and landings both in cross-winds and under minimum conditions of visibility and ceiling, familiarity with the stalling characteristics of the airplane and proficiency in rapid recovery from stalls, landings at three strange fields, knowledge of proper engine operation, and proficiency in single-engine operation. Also during this period emphasis was placed on the use of check lists, take-offs with normal to 3/4 flaps, and landings with various flap settings, including no flaps. The 10 hours of night transition entailed at least 10 landings and five flights.

Instrument training was designed to qualify the student for operation under actual instrument conditions, proficiency being qualification for an AAF instrument card. Formation included the basic fundamentals of flying in formation, while the altitude mission, loaded to 35,000 pounds minimum, consisted of cruising, following a cruising control chart, and climb to the service ceiling of the airplane. In the six hours allotted to day navigation, ability to navigate by pilotage and dead reckoning without radio and ability to calibrate instruments were to be attained. The 5 hours of night navigation included a minimum of 2 flights and 2 strange-field landings. Link trainer instruction was coordinated with instrument training.⁵⁵

B-26 training was carried on under this program of instruction until July 1943. As in all other programs during the implementation period, training did not always meet prescribed standards. The shortage of air-

55. Ibid.

[REDACTED]

[REDACTED]

craft and other operating problems forced expedient measures. For example, B-25's were used for transition and AT-11's for instrument training. Several classes were accelerated, graduating in 4-1/2 weeks after solo flight.⁵⁶ Proficiency standards were so high, however, that it was often difficult for the school to graduate sufficient students.⁵⁷ During this period one significant change in the program of instruction occurred. In February 1943 action was taken to equip one medium bombardment group with B-26's equipped for single-pilot operation.⁵⁸ Accordingly, during the last 25 hours of the 100-hour course, "single-pilot operations [were] emphasized to the extent necessary to qualify the pilot to operate the aircraft without the assistance of the co-pilot." But because of the relative inexperience of the trainees, single-pilot procedure was not adopted as standard.⁵⁹

B-25 Advanced Instruction. When B-25 training became a function of the individual training agency in December 1942, it was not on a basis comparable to the B-26 specialized school program. It entailed only the institution of simple transition during the last weeks of advanced twin-engine training.⁶⁰ The basis for instruction was a three-week indoctrination course of B-25 instructor crews at the Photographic OTU, Peterson

56. Project Book, CG, AFTRC.

57. Blanchard Interview.

58. AFRIT to CG, AFFTC, 5 Feb. 1943, in AAG 353, Transition Training.

59. AG, AFFTC to CG, AAF, 23 Apr. 1943, in ibid.

60. AG, AFFTC to CG, WCAFTC, 30 Dec. 1942, in files of AG/AS, Training.

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
Field, Colo.,⁶¹ and it may be assumed that the instruction was similar to familiarization given in tactical units. Students received 25 hours of first-pilot time, but they did not solo. In addition to the prescribed quota, other students received such transition flights as time and equipment permitted.⁶² As a result, this training was not comparable to that given at the other bombardment schools; it lacked thoroughness and attempted little more than an introduction to the combat type.

B-25, B-26 Transition Program of Instruction. With the revision of the medium bombardment transition program and the placing of B-25 and B-26 training on a comparable basis, and in accordance with policy of standardizing all transition, a new program of instruction appeared. This instruction represented a considerable departure from that first developed for B-26 transition and an even greater change for B-25 training. Several months of both B-25 and B-26 training necessarily had their influence, but it was principally the experience attained in four-engine transition that directed the formulation of the new course of instruction.⁶³ This was not only true of allotted hours and subject matter but of the prescribed standards of training determined through collaboration with the air forces. Necessarily the individual training agency was obligated to produce qualified airplane commanders for medium bombardment units as well as for heavy bombardment; therefore, the objective was no longer the production of a limited pilot, but of a qualified airplane commander. Other changes in the four-engine program, such as the increased emphasis on instrument training, were also reflected in the new medium bombardment

61. TTX, AFRTT to CG, AFPTC, 28 Jan. 1943, in files of AC/AS, Training.
62. AG, AFPTC to CG, MCAPTC, 30 Dec. 1942, in files of AC/AS, Training.
63. Project Book, CG, AFTRC.

[REDACTED]

program of instruction. B-25 and B-26 flight instruction consisted of:⁶⁴

	<u>Hours</u>	
	<u>B-25</u>	<u>B-26</u>
Transition	25	30
Day	20	25
Night	5	5
Instrument	20	20
Formation	6	6
Altitude Formation Mission	4	4
Navigation	20	15
Day	12	9
Night	8	6
Total First Pilot	<u>75</u>	<u>75</u>
Approximate Copilot during course	<u>30</u>	<u>30</u>
Total First Pilot and Copilot	<u>105</u>	<u>105</u>
Link Trainer	20	20

In transition, although the scope of instruction was similar, allotted hours for the B-25 and B-26 differed in order to allow for the relative difficulty of mastering flying characteristics of the planes. Furthermore, this instruction only differed from the B-17 program in accordance with dissimilarities of the two types of bombers. Similarly, instrument training, formation, altitude missions, and navigation were all patterned after B-17 instruction. The ground program of instruction underwent a great increase in both hours and range of subjects over the former B-26 program. Ground technical instruction included all the subjects previously taught in indoctrination and familiarization, while additional courses, patterned after four-engine instruction, were added. Ground training now entailed:⁶⁵

Ground technical instruction including	
practical engineering maintenance	42
Navigation	24
Radio	10
Weather	10
Weight and balance	6
First aid	2
Oxygen (altitude flying and use of equipment)	4
Code review and signal lamps	12
Duties of airplane commander	<u>4</u>

64. TC Memorandum No. 50-2-3, 14 July 1943. For a survey of the heavy bombardment program of instruction see Chapter VI, Section 3.

65. Ibid.

Naval vessel recognition
Aircraft recognition
Athletics

12
12
54
192

For several months, until the advent of the AT-23 and AT-24, training continued under this program of instruction. Although B-25 and B-26 curricula were similar, interpretation by individual stations and instructors and differences in planes necessarily had their influence. The B-25 program, placed in operation so rapidly, was characterized by quantity rather than quality production. Flying Training Command personnel, while attempting to raise the standards, felt that those pilots, although not the most proficient, were adequately trained to carry out their combat mission. The B-26 school, on the other hand, concentrated on quality, although it was felt by some personnel that training was too conservative for combat requirements. Apparently, no major changes occurred during this period in the prescribed curricula with the exception of the reduction of B-25 minimum first-pilot time from 75 to 65 hours in November 1943.

New Nine-Week Program of Instruction. Early in January 1944 a new program of instruction for B-26 transition and nine-week B-25 transition appeared. In flight training, it incorporated the reduction of total first-pilot time for B-25 trainees from 75 to 67 hours. For both types, minimum solo time was reduced from 25 to 15 hours. The

66. Blanchard Interview; Project Book, CG, AFTRC; Daily Diary, AFTRC, 4 Nov. 1943.

[REDACTED]

[REDACTED]

greatest change was an increased emphasis on formation and a consequent reduction in the hours devoted to navigation. For B-25 students navigation was reduced by 10 hours, the remaining 2 being devoted to night formation, while in B-26 training navigation was reduced by 5 hours, formation being increased to a total of 15, 12 day and 3 night. In formation, students were to "be made proficient in flying all positions in the basic three ship element, both day and night." ⁶⁷ Ground ⁶⁸ instruction did not change.

Throughout 1943 heavy bombardment transition instruction benefited from training requirements and methods arrived at through conferences between the Training Command and the Second Air Force. Some of the general methods and standards so determined were reflected in the medium transition program, such as the increased emphasis on airplane commander qualification. Apparently there were no conferences specifically concerned with medium bombardment transition. In March 1944, however, a B-26 training conference between the Third Air Force and the Training Command met at Barksdale Field. There the Third Air Force requested that additional stress be placed on instruction in gaining directional control upon engine failure, operation of auxiliary and emergency equipment, and assembly in formation and take-off. These items, all covered in the current program of instruction, were brought ⁶⁹ to the attention of the B-26 schools.

67. TC Memorandum No. 50-2-3, 7 Jan. 1944.

68. TC Memorandum No. 50-2-3B, 19 Feb. 1944.

69. Daily Diary, AFTRC, 16 Mar. 1944; Project Book, CG, AFTRC.

[REDACTED]

3. Transition Problems

B-26 Transition. The problems incident to the establishment and conduct of B-25 and B-26 training were similar to those encountered in heavy bombardment--problems of aircraft availability, instructor training, additional student loads, maintenance, and morale. But in each case, they were more intensive and prolonged in B-26 transition than in B-25. In fact, for some time B-26 training was hindered by problems of a severity unequalled in any other program.

In the beginning, in addition to the usual serious aircraft shortage, B-26 training was delayed by poor maintenance and the necessity for aircraft overhaul and modification. Originally, the Flying Training Command established B-26 transition with 37 aircraft that soon not only proved to be practically unflyable but extremely dangerous. For the first three months, therefore, these planes remained in overhaul. Further delivery of aircraft was slow, and maintenance of aircraft on hand was aggravated by a lack of trained mechanics, tools, and spare parts. For example, in January there were 92 students in training on 9 airplanes, while the established student-plane ratio was 3 to 1.⁷⁰ Required student flow was maintained, but so severe were operating difficulties that directed production could not be maintained. Classes trained behind schedule and were even suspended completely.⁷¹ By March 1943, however, sufficient aircraft were on

70. C/S, AFFTC to CG, AAF, 27 Feb. 1943, in files of AC/AS, Training; Project Book, CG, AFTRC; TWX, AFFTC to CG, AAF, 6 Jan. 1943, in AAG 452.1 Bombers (Heavy) B-26.

71. C/S, AFFTC to AFRT, 27 Feb. 1943, in files of AC/AS Training.

hand, and through cooperation with the Technical Training Command and the Third Air Force (Barksdale Field) sufficient mechanics had been

⁷²
trained. But just as the B-26 school was beginning to adjust facilities to production objectives, the new quota of 4 March 1943 was announced. Again the instructor training required to meet this new program was delayed by lack of aircraft in spite of increased efforts by headquarters to allocate sufficient planes. Finally, by June 1943 the numbers of aircraft assigned to the B-26 schools were

⁷³
adequate.

Aside from shortages in available aircraft, the attainment of production objectives was hindered by the necessity for providing adequately trained B-26 instructors. Prior to October 1942, all B-26's assigned to the Flying Training Command had been employed in gunnery training, and their operating crews had been trained for the specific

⁷⁴
purpose of flying gunnery missions. In order to familiarize Flying Training Command personnel with proper B-26 instructional methods, the assistance of the Third Air Force was secured, and 15 command pilots received "exceptionally good training" at Barksdale Field. Sixteen other qualified B-26 pilots were obtained, and student training began. The established student-instructor ratio was 3 to 1, but in December

72. Project Book, CG, AFTRC.

73. R&R No. 2, AC/AS, OC&R to AC/AS, Training (date ?) in AAG 353 A, Pilot Training; Project Book, CG, AFTRC.

74. 1st ind. (AFRIT to CG, AFFTC, 6 Oct. 1942), AG, AFFTC to CG, AAF, 19 Oct. 1942, in AAG 353.9 F, Training, General; Project Book, CG, AFTRC.

[REDACTED]

1942 a definite shortage of trained instructors existed. Consequently, it was decided to stop all student training except that of Regular Army officers and to concentrate on instructor training. But the increased production objective of 4 March 1943 again required additional instructors; therefore, the Flying Training Command was authorized to retain sufficient graduates to build up to the directed student-

⁷⁵
instructor ratio. In order to set the new program in motion, an exchange of plans occurred between the command headquarters, plans that were considered so important that they received the personal
⁷⁶
attention of the Commanding General, AAF. It was decided to retain the current graduating class of 47 Regular Army officers as instructors to train two classes of 141 students each in an accelerated $4\frac{1}{2}$ -week

⁷⁷
course. But inadequate aircraft, the elimination of 7 of the officers as instructor material, and a shortage of 100-octane gasoline delayed for some 15 days the realization of this plan. By the end of April 1943, however, sufficient instructors were in training to

⁷⁸
accomplish the increased program. After this time, there seems to have been no particular instructor difficulty--either in quality or quantity. Additional instructors were provided from graduates of

⁷⁹
the transition schools. Late in 1943 the question of language

75. AFRIT to CG, AFFTC, 4 Mar. 1943, in AAG 400.314 C, Data on Estimates as to Needs of Organizations.

76. AC/AS, Training to CG, AFFTC, 23 Apr. 1943, in files of AC/AS, Training.

77. 1st ind. (AFFTC to CG, AAF, 3 Apr. 1943), AC/AS Training to CG, AFFTC, 15 Apr. 1943, in files of AC/AS, Training.

78. R&R, No. 3, AC/AS, Training to AC/AS, CG&R, 30 Apr. 1943, in AAG 353 A, Pilot Training; Project Book, CG, AFTRC.

79. Daily Diary, AFTRC, 30 Nov. 1943.

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difficulty arose with the French trainees, but this was solved by the utilization of some of the qualified French students as instructors
80
for future classes.

After mid-1943, when aircraft availability, maintenance, and instructor problems had practically disappeared, the sole hindrance to the maintenance of directed student production was the necessity for the transition of pilots other than those progressing through the regular school system. This included a three-week transition course for experienced four-engine pilots from the 58th Bombardment Wing and and a two-week course for Second Air Force pilots assigned to duty on the AT-23. The latter occasioned a reduction of 40 in the regular
81
student load.

Of all the problems incident to the establishment of the B-26 program in the Flying Training Command, however, there was one that was quickly accorded much attention--the bad reputation the B-26 had received both with the public and the military. Trainees were frankly afraid of being assigned to Marauder units; therefore, in establishing a transition program for a plane that was admittedly difficult to fly, the Flying Training Command had the added task of combating student fear and low morale. Instructional programs were definitely pointed toward building up confidence in the B-26, but in addition a number of special assignment and morale-building procedures were employed.

80. Ibid., 27 Dec. 1943.

81. TWX, AC/AS, Training to AFTRC, 22 July 1943, in files of AC/AS, Training; Daily Diary, AC/AS, Training, Aircrew Div., 30 Sep. 1943.

[REDACTED]

In December 1942, while the B-26 program was still in the organizational stage, headquarters directed that only the best pilots from each twin-engine graduating class would be assigned to B-26 training; in fact, selection of quality students took precedence over four-engine assignment. Many officers assigned, however, expressed a desire not to continue B-26 training. In February 1943, therefore, the Commanding General, AAF directed that assignment be placed on a voluntary basis.⁸² But this procedure soon proved damaging to the campaign to improve the reputation of the B-26 and offered an opportunity for command pilots to attain a change of station and then request transfer on the grounds of dislike of the B-26.⁸³ On 22 June 1943 the policy of voluntary assignment was rescinded; B-26 assignment was placed on the same basis as other types of training.⁸⁴

In addition, a continuous campaign was conducted to popularize the B-26 both with the public and the military and to raise the morale of trainees. The policy of instructional visits to the twin-engine advanced schools, instituted to alleviate this problem in the tactical units, also benefited the Flying Training Command program.⁸⁵ Similarly, in June 1943 an experienced combat pilot, specially returned from the Twelfth Air Force, visited the B-26 schools and the twin-engine advanced schools giving lectures and demonstrations of the capabilities of the plane.⁸⁶ So effective was this method that at one advanced school one-third of the graduating class immediately applied for Marauder assignment.⁸⁷ Other attempts were made, such as a request for a commercial

82. TWX, AFRIT to CG, AFFTC, 5 Dec. 1942, in files of AC/AS, Training; R&R, AFRIT to AFRDB, 19 Feb. 1943, in AAG 210.31, Commands, Misc.; AFRIT to CG, AFFTC, 19 Feb. 1943, in AAG 353, Transition Training.

83. Hq., SEAFTC to CG, AFFTC, 29 May 1943, in AAG 352.11 B, Course of Instruction.

84. 1st ind. (AG, AFFTC to CG, AAF, 18 June 1943), AC/AS, Training to CG, AAFTC, 22 June 1943, in *ibid.*

85. See above, Chap. V, Sec. 3.

86. AFRIT to CG, AFFTC, 19 Feb. 1943, in AAG 353, Transition Training.

87. Dir. of Training, George Field, Ill., to Col. T. J. DuBose, 5 June 1943, in AAG 373.3, Aerial Demonstrations.

film glamorizing B-26 training.⁸⁸ Apparently as a result of this concerted campaign, modifications in the plane, and extreme caution on the part of school personnel, by the late summer of 1943 the morale problem at the B-26 schools had practically disappeared. Both in the schools and the tactical units, the spirit of B-26 pilots was remarkably high.⁸⁹

B-25 Transition. B-25 training in the Flying Training Command was distinguished by a lack of the operating problems that characterized the B-17, B-24, and B-26 transition programs. No serious difficulties of morale or maintenance were experienced, and only minor ones in the attainment of student flow. At the beginning of the program production was not hindered by aircraft shortage. Only after the program had been placed on a specialized school basis in March 1943 and directed student flow quickly established, was there a lack of airplanes. During April and May a deficiency existed, but by the end of June, after concerted headquarters action, there were 90 B-25's at Mather and 93 at La Junta, a total sufficient to allow both schools to function at full capacity.⁹⁰ From then on, with one exception, aircraft were apparently adequate.

As in the case of the other programs, certain numbers of pilots were given transition as an overload at the B-25 schools. In November and December 1943 women and Negro pilots were given B-25 transition and a corresponding reduction in student load resulted. Negro transition as an overload continued through the 28 April 1944 graduating class; it was then planned to transfer this training to the Eastern Flying Training Command.⁹¹

At no time does there seem to have been a serious instructor defi-

88. R&R, AFRTT to AFTSP, 27 Feb. 1943, in AAG 062.2 #2, Motion Picture Photography and Motion Pictures.

89. Blanchard Interview.

90. Project Book, CG, AFTRC; 1st Ind. (AG, AFFTC to AC/AS, Training, 20 Apr. 1943), AC/AS, Training to CG, AFFTC, 28 Apr. 1943, in AAG 353 A, Pilot Training.

91. Project Book, CG, AFTRC.

[REDACTED]

ciency. With the establishment of the specialized schools, the command was authorized to retain sufficient graduates to achieve a ratio of one instructor to every four students, and additional instructors were secured by this accepted method. When AT-24 training was instituted in advanced schools, instructors were given a four weeks' course at the Central Instructors School at Randolph Field. B-25 personnel returned from combat who were slated for instructor duty also received standardization training at the Central Instructors School.⁹²

4. B-26 Co-pilot Transition

As in other programs, in B-26 training the Training Command had concentrated on production of qualified airplane commanders. Co-pilots were provided from standard single- or twin-engine graduates and received tactical transition in the Third Air Force. But as the Training Command programs settled down to smooth functioning, there was an increasing realization that the co-pilot needed some pre-tactical transition training. A plan for heavy bombardment co-pilot transition had been placed in operation in January, 1944.⁹³ One month later, 3 February 1944, the Training Command proposed a method for supplying the operational units with better qualified B-26 co-pilot material. From 15 to 20 per cent of the students at the B-26 schools were being eliminated for failure to attain first-pilot proficiency. The command therefore requested permission to retain those eliminees who were qualified as co-pilots, con-

92. AFRTT to CG, AFFTC, 4 Mar. 1943, in AAG 353 A, Pilot Training; Daily Diary, AFTRC, 5 Nov. 1943, 7 and 22 Dec. 1943.

93. See above, Chap. VI, Sec. 5.

[REDACTED]

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tinue their training, and graduate them as co-pilots. This plan would have three advantages: it would salvage 50 per cent of the eliminees and thereby make use of their B-26 experience; it would provide the using agency with qualified co-pilots; and it would "stimulate incentive among students in B-26 transition schools . . . to graduate as first pilots rather than co-pilots, consequently avoiding the possibility of a student endeavoring to get a 'better assignment' through the process of being eliminated."⁹⁴ On 18 February authority to initiate this project was granted. B-26 eliminees were to be screened, and those considered satisfactory co-pilot material and also potential first pilots were to be retained for further co-pilot training provided their instruction would not interfere with scheduled first-pilot training.⁹⁵ The using agency was at last to receive qualified co-pilots as well as first pilots, thereby facilitating the accomplishment of B-26 tactical training.

AT-24 Advanced Program of Instruction. The reorganization of the B-25 transition program and the institution of AT-24 training in advanced pilot-training schools exercised a far-reaching effect on established Training Command instruction. Based on experience gained through experimental training conducted in the summer of 1943, special basic and advanced programs of instruction were devised.⁹⁶ Two basic schools, at Garden City, Kans., and Waco, Tex., were equipped with twin-

94. AG, AFTRC to CG, AAF 3 Feb. 1944, in AAG 353 #5, Pilot Training.

95. AG/AS, Training to CG, AFTRC, 18 Feb. 1944, in AAG 353 B, Pilot Training.

96. Project Book, CG, AFTRC.

[REDACTED]

engine trainers, and there above-average students, all volunteers, were selected to receive 35 hours, of a total of 70, in twin-engine trainers.⁹⁷

In January 1944 a decision was made to conduct the entire basic course for future AT-24 trainees on twin-engine trainers as soon as these aircraft could be made available.⁹⁸

The new AT-24 advanced program had to be designed for the dual purpose of giving the trainee all instruction formerly given in advanced training, with the exception of twin-engine trainer transition, and yet prepare him for operational duty on tactical aircraft. Its object was "proficiency as pilot of two-engine training aircraft (AT-24) preparatory to rating as pilot and assignment to multi-engine units." The program of instruction resembled quite closely the instruction given in standard twin-engine advanced schools, except that more time was necessarily devoted to transition and fundamentals to compensate for the more advanced type aircraft. Flight instruction consisted of:⁹⁹

		<u>Hours</u>
Transition and Fundamentals		31
Day	23	
Night	8	
Formation		14
Day	10	
Night	4	
Instrument and Radio		10
Navigation		15
Day	10	
Night	5	
Link Trainer		(10)
Total Flying Time		70 hours
Total Link Trainer Time		10 hours

97. Interview with Major G. R. Holsclaw, Pilot Training Section, A-3, Central Flying Training Comd., conducted by Capt. James Taylor, Historical Sec., A-2, Central Flying Training Comd., 17 Dec. 1943, in AFTRC files; interview with Lt. R. H. Atkinson, School Sec., AAF Basic Flying School, Garden City, Kans., 8 Dec. 1943, in AFTRC files; TC Memorandum No. 50-9-2, 1 Oct. 1943.

98. Daily Diary, AFTRC, 26 Jan. 1944.

99. TC Memorandum No. 50-10-9, 6 Nov. 1943.

[REDACTED]

Training in the 31-hour transition and fundamentals period resembled quite closely that given in the postgraduate schools. Prior to flying, students were given the usual thorough ground preparation including instruction in emergency procedures and blindfold cockpit tests. Before practicing take-offs and landings, sufficient dual airwork was given to emphasize maximum performance and insure knowledge of airplane flying characteristics and auxiliary controls. Landings were taught with various degrees of flap settings. Cross-wind landings, go-around procedures, power-on and power-off approaches, and simulated single-engine approaches to landings were included. The technique of handling the airplane with one throttle retarded soon after take-off was to be simulated at altitude. The proper use of check lists, accuracy in landings, and proper pilot-co-pilot procedures were stressed. The principal objective of the formation phase was proficiency in "the basic fundamentals of formation flying in multi-engine aircraft." Instrument training was pointed toward the attainment of an air force instrument pilot certificate. Navigation training was based primarily on dead reckoning and pilotage and included at least one high-altitude and one low-altitude mission. Link trainer¹⁰⁰ instruction was coordinated with flying training.

100. Ibid.

Chapter VIII

FIGHTER TRANSITION IN THE TRAINING COMMAND

Transition to fighter aircraft in the Training Command was quite different from that in the heavy and medium bombardment programs. Although both single and twin-engine fighter transition started through plans to provide replacement pilots, the needs of the training air forces soon dictated a different program. From its beginning, single-engine transition was limited to a short familiarization course on the P-40 in the last stage of advanced training. P-38 transition, on the other hand, differed in scope according to the requirements of the using agencies, but it too took place in advanced training. Early in 1944, because of a peculiar situation in the Fourth Air Force, it was necessary to transfer most P-38 transition to a new P-39 course similar to that given on the P-40. All transition to fighter aircraft, therefore, was specifically designed to meet the requirements of the air forces, both in the type of training given and in the type of aircraft used.

1. P-40 Transition

Early Plans for Single-Engine Fighter Transition. In June 1942, while the RTU system of the training air forces was still in the implementation stage, Headquarters, AAF decided that the Flying Training Command would conduct fighter/^{pilot} replacement training. The plan entailed the transfer of 135 airplanes of B-35, P-36, P-39, and P-40 types to

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the advanced single-engine school at Selma, Ala. For each tactical aircraft assigned, the Flying Training Command was to graduate two pilots with a minimum of 35 hours' training.¹ On 14 June headquarters directed that 20 of these planes would be transferred to Selma at once for the institution of instructor training. Headquarters planned that after fighter pilot replacement training started, the Flying Training Command would give 10 hours' transition to as many other pilots as time and equipment would allow. Training was to be modeled on that conducted in the First Air Force.² The command made tentative implementation plans, but apparently fighter pilot replacement training never began as a result of the fact that sufficient equipment was not delivered. Throughout the last half of 1942 the few tactical fighter aircraft in the command were employed at the advanced single-engine schools for a small amount of elementary transition, and in January 1943 fighter transition was given to Air Transport Command pilots.³

Establishment and Administration of P-40 Transition Program.

Finally on 5 February 1943, single-engine fighter transition became a definite function of the Flying Training Command. By 1 April, 130 P-40 type airplanes were to be allocated to the command, and pilot

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1. R&R, AFRAD to AFRM, 13 June 1942, in AAG 353.9 E, Training, General.
 2. AFRIT to CG, AFFTC, 14 June 1942, in AAG 211 C, Titles, Grades--Officers.
 3. 1st ind. (AFRIT to CG, AFFTC, 14 June 1942), AG, AFFTC to CG, AAF, 29 June 1942, in ibid.; AFRIT to CG, AFFTC, 21 Jan. 1943, in AAG 353, Transition Training; 1st ind., (AFRIT to CG, AFFTC, 14 June 1942), AG, AFFTC to CG, AAF, 24 June 1942, in ibid.
- [REDACTED]

production, geared to the number of planes, was to be 698 a class.
Five advanced single-engine schools were chosen to give this training,⁴
which was to consist of 10 hours' transition during the last 4½ weeks
of the regular advanced course. Upon graduation these selected pilots
were to be assigned to Air Defense, Air Support, and Air Transport Com-
mand activities.⁵

The training was to start as soon as aircraft were made available,
and by the second week in March a small number of students were under-
going transition. Gradually as the five designated schools received
P-40 aircraft, transition was instituted. In July, however, the limi-
tation of only five schools was rescinded, and with P-40 deliveries
continuing throughout the summer, by November there was a minimum of
28 planes at each advanced single-engine fighter school.⁶ This number
was sufficient to meet the new headquarters requirement of 11 October
1943, 1,200 P-40 transitioned graduates per class.⁷

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4. The schools chosen by the Flying Training Command were: in the Southeast Training Center, Craig Field, Selma, Ala., and Spence Field, Moultrie, Ga.; in the Gulf Coast Training Center, Moore Field, Mission Tex., and Foster Field, Victoria, Tex.; and in the West Coast Training Center, Luke Field, Phoenix, Ariz. 1st ind. (AFRIT to CG, AFFTC, 5 Feb. 1943), AG, AFFTC to CG, AAF, 4 Mar. 1943, in AAG 353 A, Pilot Training.
 5. AFRIT to CG, AFFTC, 5 Feb. 1943, in ibid.
 6. Project Book, CG, AFTRC.
 7. AC/AS, Training to CG, AFTRC, 11 Oct. 1943, in AAG 353, Transition Training.

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On 25 November a fixed gunnery training conference met at Eglin Field, Fla., for the purpose of standardizing fixed gunnery training. General opinion of the conference was that because of the increasing pressure of time on the advanced pilot program, insufficient time was allotted to fixed gunnery training.⁸ Out of the thinking of this conference came a Training Command recommendation that affected the administration, although not the instruction, of P-40 transition. The command proposed to conduct advanced single-engine training under a 70-hour, nine-week program of instruction. Then upon graduation, 1,200 single-engine pilots would be held over for 4-1/2 weeks (later changed to 5) for 10 hours of P-40 transition and 30 hours of gunnery. The command, having sufficient facilities and equipment to carry out this program, submitted it to headquarters for approval. Official approval occurred 23 December 1943, and the new program was instituted in January in the Eastern Flying Training Command, in March in the Central Flying Training Command, and in April in the Western Flying Training Command.⁹

In the latter part of 1943 there was a serious aircraft shortage, but through reduction of transition time the command met its prescribed quota of 1,200 graduates a class.¹⁰ In March 1944 the change to the

8. A-3, AFTRC to CG, AFTRC, 17 Dec. 1943, in AAG 337 #7, Conferences, Military, Naval, and Others.

9. Project Book, CG, AFTRC; Daily Diary, AFTRC, 29 Jan. 1944, 13 Mar. 1944.

10. Project Book, CG, AFTRC.

[REDACTED]

10-10-10-week training schedule throughout the Training Command and the fact that no graduates would be available in May necessitated an increase in the size of each class, particularly 44-D.¹¹ New objectives transmitted on 29 March 1944 were: 44-D, 2531; 44-E, 1140; 44-F, 1365; thereafter 1540.¹²

In meeting requirements the individual training agency supplied all fighter units with pilots who had completed transition to tactical aircraft. Although this training improved graduate quality and facilitated OTU-RTU training, its prime value lay in the screening it entailed. Instructors selected only the most proficient single-engine trainees for transition, others being relegated to bombardment co-pilot, transport, or utility pilot status. Thus the fighter units were assured not only of receiving pilots familiar with tactical aircraft but of the best potential combat material.¹³

Program of Instruction. During the last half of 1942 before transition to P-40 type aircraft became a specific function of the individual training agency, sporadic transition to fighter aircraft occurred. Taking place on whatever types were available (P-35's, P-36's, P-40's), it probably corresponded to that given in the tactical

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11. Memo for Maj. Gen. Harper by Maj. A. P. Fonda, 12 Apr. 1944, in files of AC/AS, Training.
 12. AC/AS, Training to CG, AFTRC, 29 Mar. 1944, in AAG 353, Transition Training.
 13. Report on assignment procedures at Foster Field, Victoria, Tex., 11 Dec. 1943, in AFTRC files.

¹⁴
units. But with the directive of 5 February 1943, P-40 transition in the Flying Training Command attained production-line program status. It was to be included in the standard nine-week advanced single-engine course. Necessarily, the superimposition of this new 10-hour course required a corresponding reduction in the standard program, which was accomplished by deleting hours in day and night transition, day and night navigation, formation, acrobatics, and combat training. The new 10-hour course was to be devoted strictly to transition training; the first two hours to familiarization, the remaining eight to landings and take-offs.¹⁵

On 15-16 Feb. 1943, the first of a series of fighter conferences designed to effect closer liaison between the advanced flying schools and the fighter OTU's and RTU's met at Fort Worth. This conference was particularly concerned with fighter training in the Flying Training Command, and out of its recommendations came the standard program of instruction for P-40 transition. Like all transition programs, when transferred to the Flying Training Command, it was based on previous OTU-RTU experience.¹⁶

The 10 hours of day transition were divided into nine flights, each of approximately 1 hour's duration. The first two were for the

14. See Chap. V, Sec. 5.

15. AFRIT to CG, AAFTC, 5 Feb. 1943, in AAG 353 A, Pilot Training.

16. C/S, AAFTC to CG, AAF, 2 Mar. 1943, in AAG 337 #3, Conferences, Military, Naval, and Others.

[REDACTED]

purpose of familiarization with aircraft flying characteristics, the third entailed practice landings, the fourth was for securing engine performance data, the fifth was similar to the first two although more advanced, the sixth and seventh were concerned with altitude performance, the eighth entailed another practice landing stage, and cross-country data were secured in the ninth. For each flight a detailed method of execution was prescribed; the trainee was told exactly what to do and what not to do; what maneuvers should be accomplished, and how, when, where, and under what conditions. After the flight he was required to answer questions on the data he had gathered.¹⁷ In this manner, thorough familiarization with flying and performance characteristics was attained, and the operational units received trainees qualified to progress to individual and unit combat training.

Although the 10-hour transition course was the standard program employed for aviation cadets, there was a special course for Regular Army and experienced Reserve officers; for example, the one given the West Point class training in June 1943.¹⁸ Two weeks in duration, it entailed more than simple transition. Its objective was production of a pilot proficient on single-engine fighter aircraft, and it included "flight and ground training to insure pilot proficiency and a thorough understanding of the mechanical functioning of the P-40 airplane."¹⁹ Flight instruction consisted of:

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17. FTC Memorandum No. 50-1-2, 23 Feb. 1943. For a more detailed description of these transition flights see Appendix 5.
 18. Project Book, CG, AFTRC.
 19. FTC Memorandum No. 50-2-5, 12 June 1943.
- [REDACTED]

	Hours	
	AT-6	P-40
Transition	4	8
Day	2	6
Night	2	2
Navigation		2
Formation	2	3
Acrobatics	2	3
Combat	<u>2</u>	<u>2</u>
	10	18
Total Pilot Time		
Link Trainer		28
		5

In scope, this instruction resembled more closely that given in the bombardment schools than the regular P-40 course. Transition included over-shooting and practice going-around, cross-wind landings and take-offs, stalls with and without power and at high speed, knowledge of the aircraft engine, proficiency in night operations, and spins in the AT-6 and P-40. Navigation entailed one flight; formation, acrobatics, and combat training included basic fundamentals. After the transition course, trainees received a gunnery course of 36 hours' flying and 34²⁰ hours' ground school at the Central Instructors Fixed Gunnery School. In February 1944 the gunnery training was included at the advanced fighter²¹ school in the change to the transition-fixed gunnery program. Ground instruction was informal, and hours and lectures were not prescribed. Instruction, consisting of engineering maintenance, navigation, radio, code, practical meteorology, aircraft recognition, first aid, and use of oxygen, was made an individual problem. Daily tests, however, were²² conducted, and a library was made available to the students.

20. Ibid.

21. TC Memorandum No. 50-2-5A, 22 Feb. 1944.

22. FTC Memorandum No. 50-2-5, 12 June 1943.

Problems. The single important problem encountered in P-40 transition was the difficulty in meeting prescribed production quotas. This was caused by the interplay of two factors--inadequate numbers of aircraft and, on occasion, the necessity of training extra students. When the program began, production was based on the ratio of six graduates to each tactical aircraft assigned. Training was conducted under this ratio, but often difficulties were encountered because of the grounding of P-40's for modification or overhaul. Until late in 1943 the aircraft assigned were seldom new production models. In November 1943 Packard engines for the P-40F and P-40L types were no longer available, and this affected approximately one third of the command's aircraft. Modification was necessary, and as late as February 1944, the command was short 73 aircraft. This problem was met in three ways: by holding over classes in order to complete their transition, by authorized reduction in production, or by graduating classes with P-40 transition time less than the prescribed 10 hours.

Similarly, students were graduated with less than 10 hours' transition when in June 1943 headquarters requested graduates in excess of the established objective..²³ The greatly increased production quotas caused by the change-over to the 10-10-10-week program posed a like problem. Headquarters, AAF authorized the substitution of standard single-engine graduates for class 44-D,²⁴ but the command, in a desire to maintain

23. Project Book, CG, AFTRC.

24. AC/AS, Training to CG, AFTRC, 29 Mar. 1944, in AAG 353, Transition Training.

[REDACTED]

the quality of its graduates, managed to graduate the full quota with five to seven hours' transition. Equipment was flown to the maximum, and an instructor-student ratio as high as 8 to 1 was employed.²⁵

Thus, in P-40 transition, problems of aircraft availability and changing production quotas did not always allow the attainment of standard training, or such standards had to be achieved through expedient methods.

2. P-38 Transition

Early Twin-Engine Fighter Transition. The transfer of P-38 transition to the individual training agency occurred through a series of diverse and somewhat complicated measures, and at no time was a final type program reached. The first step was caused by a dual problem--the difficulties encountered in the Fourth Air Force in transitioning single-engine graduates to a "hot" twin-engine fighter plane and the necessity of the Flying Training Command's retaining all advanced twin-engine training planes under its jurisdiction. In June 1942 the Fourth Air Force asked permission to exchange some of its P-38's for Flying Training Command AT-9's²⁶ in order that it could give the necessary²⁷ transition to twin-engine trainers prior to P-38 training. The Flying Training Command, already having transferred some AT-9's, objected strongly, as it considered the AT-9 its only plane that could provide a satisfactory step to twin-engine combat aircraft. The command countered

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25. Memo for Maj. Gen. Harper by Maj. A. P. Fonda, 12 Apr. 1944, in files of AC/AS, Training.
26. The Curtiss AT-9 was a two-seater, twin-engine, advanced training monoplane specially developed for training twin-engine pilots. Jane's All the World's Aircraft, 1941, 158.
27. R&R, AFRAD to AFFTC, 11 June 1942, in AAG 353.9 E, Training, General.
- [REDACTED]

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with a plan whereby it would produce single-engine graduates with five to 10 hours' transition on twin-engine trainers for assignment to P-38 units. Rather than employ standard twin-engine graduates, single-engine students would be given transition because they had received previous training in pursuit tactics.²⁸ After considerable headquarters discussion, it was decided that the responsibility for twin-engine trainer transition lay with the Flying Training Command.²⁹ Consequently, on 20 July 1942 the proposed program was officially directed.

This program entailed a complicated system of liaison and transfer. Five weeks prior to the graduation of each advanced single-engine class, requirements for students to be given transition to AT-9's or comparable type aircraft were to be obtained from the Directorate of Air Defense. These specially selected trainees were to be given sufficient training to insure ability to solo.³⁰ Early in August this training was placed in operation in the three training centers, and on 22 October a quota of approximately 150 trainees a month was established.³¹ Its duration, however, was short-lived, due to the institution of a new type of twin-engine fighter transition.

In October 1942, in accordance with the requirements of the newly approved 273 Group Program, the Flying Training Command was directed to take measures to overcome certain pilot shortages. One of these

28. R&R, No. 2, AFFTC to A-3, AFROM, AFRAD, 24 June 1942, in ibid.

29. R&R, No. 8, AFDMR to AFRIT, 10 July 1942, in ibid.

30. AFRIT to CG, AFFTC, 20 July 1942, in AAG 353.9 G, Training, General.

31. 1st ind., (AFRIT to CG, AFFTC, 20 July 1942), AG, AFFTC to CG, AAF, 3 Aug. 1942, in ibid.; AFRIT to CG, AFFTC, 22 Oct. 1942, in ibid.

[REDACTED]

[REDACTED]

was the establishment of a school to train P-38 replacement pilots for overseas units. Approximately 70 graduates of the above twin-engine trainer course were to receive an additional 60 hours on P-322's (P-38's), 10 hours of which would be transition and 50 hours, tactical training.³² Another 15 of the twin-engine graduates were to be specially selected for their physical qualifications and given P-322 transition prior to assignment to night fighter units.³³ The responsibility for this new program was delegated to the West Coast Training Center, and Williams Field, Ariz., was selected as the training station. Preparations were made to start training, but on 11 January 1943 headquarters cancelled the replacement training project, and the P-322's were employed in a specially designed twin-engine advanced fighter course.³⁴

Administration of P-322 Transition. The new twin-engine fighter course entailed 23 hours of transition to P-322's in the regular nine-week advanced twin-engine course. For several months the program progressed smoothly. P-38 units in the Fourth Air Force and night fighter units at the School of Applied Tactics (until pilot transition for the latter activity was transferred to the B-25 schools in July) received pilots already trained to tactical aircraft. Sufficient aircraft were available to meet the new production objective of 5 February 1943:³⁵

32. AFRIT to CG, AFFTC, 20 Oct. 1942, in ibid.

33. AFRIT to CG, AFFTC, 22 Oct. 1942, in ibid. For an outline of the night fighter program see Chapter V, Section 7.

34. Project Book, CG, AFTRC; 1st ind. (AG, AFFTC to AFRIT, 22 Dec. 1942), AFRIT to CG, AFFTC, 11 Jan. 1943, in AAG 353, Pilot Training.

35. Project Book, CG, AFTRC; AFRIT to CG, AFFTC, 5 Feb. 1943, in AAG 353 A, Pilot Training.

[REDACTED]

	<u>Twin-Engine Fighters</u>	<u>Twin-Engine Night Fighters</u>
January	38	15
February	86	15
March	178	15
April	214	30
May	203	30
June	248	30
July	174	40
August	177	
September	175	
October	202	
November	246	
December	283	

Training under the February quotas continued throughout 1943.

The instructional program was completely revised in the fall, P-322 transition time being reduced to 10 hours, but this did not affect production or administration of the program. In December, a plan similar to that adopted in P-40 transition, 4-1/2-week postgraduate gunnery-transition course, was proposed. Apparently, however, because of complete revision of P-322 transition early in 1944, this plan never got beyond the paper stage.³⁶

The year 1944 ushered in a series of administrative and instructional changes in P-322 transition. In January, as a result of a conference of personnel of AC/AS, Training, the IV Fighter Command, and the Training Command, a new plan for advanced twin-engine fighter training was evolved.³⁷ Previously, in October 1943, a new 1944 class quota of 360 P-322 graduates had been set up,³⁸ but this was now to be reduced to 130. Furthermore, the new plan contemplated that 50 of these graduates with a minimum of 23 hours' P-322 training were to be assigned

36. Project Book, CG, AFTRC.

37. Ibid.

38. AC/AS, Training to CG, AFTRC, 18 Oct. 1943, in files of AC/AS, Training.

to photo-reconnaissance units employing P-38 type aircraft while the remaining 80 were to be given the established 10-hour program.³⁹ This new training, however, initiated with Class 44-B (graduating 8 February), did not adhere to the prescribed objective; quotas were determined monthly by headquarters in accordance with unit requirements. Class 44-B was composed of 50 23-hour graduates and 130 10-hour graduates, while class 44-C included 61 23-hour and 110 10-hour graduates.⁴⁰

Almost as soon as this dual training began the P-322 program was again altered. A shortage of P-38's in the IV Fighter Command necessitated the employment of P-39 type aircraft for the first phases of P-38 OTU-RTU. As a result, the IV Fighter Command no longer desired graduates of P-322 transition.⁴¹ Late in February the command was directed to stop 10-hour P-322 transition with class 44-C (graduating 12 March)--all P-322's were to be utilized solely for the transition of pilots for photo-reconnaissance units.⁴² New production quotas were established: Class 44-D, none; Class 44-E, 50; Class 44-F, 75; Class 44-G, 90.⁴³

There was one serious obstacle, however, to the accomplishment of this new program. P-322 aircraft in the Training Command were fast

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39. Previously, the Fourth Air Force had accomplished P-38 transition for photo-reconnaissance units of the Third Air Force. But this necessitated the establishment of a P-38 pilot pool in the Fourth Air Force, so at the January 1944 training conference at Fort Worth, it was decided that P-38 transition for photo-reconnaissance pilots would be conducted by the Training Command. Project Book, CG, AFTRC; Daily Diary, AFTRC, 22 Jan. 1944.
40. Project Book, CG, AFTRC.
41. See below, Sec. 3.
42. Project Book, CG, AFTRC.
43. AC/AS, Training, to CG, AFTRC, 29 Mar. 1944, in AAG 353, Transition Training.

becoming overage and were placed in Class 26 because of lack of replacement parts.⁴⁴ AC/AS, Training, therefore, authorized the command to produce pilots under established quotas with less than 25 hours.⁴⁵ But so rapid was the attrition of P-322's that in March the Western Flying Training Command reported that Class 44-F, graduating 27 June, would probably be the last to receive P-322 transition.⁴⁶ Thus, the function of twin-engine fighter transition was rapidly fading from the jurisdiction of the individual training agency.

P-38 Program of Instruction. The P-322 (P-38) program of instruction originated in the same manner as the P-40--out of the conference of members of all pursuit training agencies held 15-16 February 1943 at Fort Worth.⁴⁷ The existing advanced twin-engine program of instruction was revised to include provision for P-322 training, thereby influencing the entire advanced stage of pilot training. Flight instruction for the nine-week course consisted of:⁴⁸

	Type of Aircraft			Total Hours
	BT-13	AT-9	P-322	
1. Transition and Fundamentals				
Day		15	8	30
Night		5	2	
2. Instrument (under hood)		9		9
(Link Trainer)		(10)		
3. Navigation				
Day		4	3	10
Night		3		

44. Project Book, CG, AFTRC.

45. AC/AS, Training, to CG, AFTRC, 29 Mar. 1944, in AAG 353, Transition Training.

46. Daily Diary, AFTRC, 24 Mar. 1944.

47. C/S, AFFTC to CG, AAF, 2 Mar. 1943, in AAG 337 #3, Conferences, Military, Naval and Others.

48. ^{FTC} Memorandum No. 50-1-3, 23 Feb. 1943.

	Type of Aircraft			Total Hours
	BT-13	AT-9	P-322	
4. Formation		4	2	6
5. Gunnery				
Ground		5	2	22
Aerial		11	4	
6. Combat				
Aerobatics			1	3
Combat			1	
Spins				
Total Flying Time	$\frac{1}{1}$	56	23	80
Total Link Trainer				10

AT-9 and P-322 training were closely merged, instruction on P-322's naturally following that on the AT-9. Prior to flight, thorough ground preparation was given, "emphasizing adequate cockpit checks and familiarity with all emergency procedures." A blindfold cockpit test was required. During the dual transition period adequate AT-9 airwork was given to "insure proficiency in climbs, glides, and turns of varying degree, take-off and landing, forced landing, smooth use of all auxiliary controls, and the maximum performance characteristics of the aircraft, including high speed stalls and power-on and power-off stalls." These maneuvers were then practiced solo in the P-322. At least once in every flight single-engine operation was performed. Accuracy landings and go-around procedure were emphasized. In the P-322, all approaches were made with power on. Landings were executed with the various degrees of flap settings, and cross-wind landings were stressed. In night transition, a minimum average of three landings an hour was required. Navigation, formation, and gunnery training in the P-322 were integrated with similar training on the AT-9 and were similar to standard advanced instruction. The two hours' combat time in the P-322 was divided between combat and acrobatic

training. It was limited to individual combat involving not more than two airplanes. Emphasis was placed upon "executing tight turns involving maximum performance of the airplane at various altitudes." Concurrently with flight instruction, students received standard advanced-pilot ground instruction as well as flying line critiques.⁴⁹

With training under the above program of instruction in operation, recommendations for changes began to flow from both the tactical units and the Flying Training Command. These recommendations finally resulted in placing P-322 transition on a basis comparable to P-40 familiarization. At the April 1943 fighter conference the IV Fighter Command, the using agency for P-322 graduates, recommended that advanced twin-engine fighter training be conducted on single-engine AT-6's, followed by transition to the P-322. Headquarters, AAF did not concur, believing that this would result in most of the program being devoted to transition and would not produce a well-rounded pilot.⁵⁰ At the May conference at the School of Applied Tactics, the IV Fighter Command representative stated that pilots with but 10 hours' simple transition on the P-322 would be more acceptable than 23-hour P-322 pilots, but headquarters again did not agree and directed the Training Command to continue under the established instructional program.⁵¹

On 7 August 1943 the Training Command recommended another change

49. Ibid.

50. AC/AS, Training to CG, AFFTC, CG's, 1st, 2d, 3d. AF'S, 21 July 1943, in AAG 337 #5, Conferences, Military, Naval, and Others.

51. T.X, AC/AS, Training to CG, AFFTC, 10 June 1943, in files of AC/AS, Training.

in the program of instruction. It believed that the existing advanced twin-engine fighter course involved an unusual amount of transition and fixed gunnery, especially in the last 4-1/2 weeks, at the expense of a well-rounded fighter pilot. The command requested authority to retain students for two weeks after graduation for fixed gunnery and P-322 training.⁵² This recommendation occasioned a review of Fourth Air Force training by headquarters. The IV Fighter Command recommended that Training Command graduates be⁵³

thoroughly indoctrinated in sound basic flying principles, that during the last phase of their training, fixed gunnery in AT-6 type airplanes be emphasized, and some training in P-322's be given. Time in P-322's need not exceed ten (10) hours.

If practicable, transition flights in P-38's should be given but should not exceed five (5) hours and should not go beyond the point where the trainee becomes familiar with the controls, instruments, flying characteristics and performance of airplane.

The IV Fighter Command also recommended that the period of individual training not be extended, as such action would disrupt its first phase OTU-RTU training.⁵⁴ On 27 September 1943 AC/AS, Training approved these recommendations, and in October rescinded the 23-hour course, instituting 10 hours' P-322 transition.⁵⁵

The new program of instruction was started in November 1943. The entire advanced twin-engine fighter course was revised, training on AT-6's now composing the bulk of the program, with only a few hours'

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- 52. AG, AFTRC to CG, AAF, 7 Aug. 1943, in files of AC/AS, Training.
 - 53. 3d ind. (AG, AFTRC to CG, AAF, 7 Aug. 1943), CG, IV Fighter Comd. to CG, AF, 8 Sep. 1943, in files of AC/AS, Training.
 - 54. Ibid.
 - 55. 5th ind. (AG, AFTRC to CG, AAF, 7 Aug. 1943), AC/AS, Training to CG, AFTRC, 27 Sep. 1943, in files of AC/AS, Training; Project Book, CG, AFTRC.

transition on AT-9's and training on P-322's relegated to simple transition.⁵⁶ The nine weeks of fighter training consisted of:

	Type of Aircraft			Total Hours
	AT-6	AT-9	RP-322	
1. Transition and Fundamentals				
Day	9	4	7	
Night	4			24
2. Instrument (under hood) (Link Trainer)	9 (10)			9 (10)
3. Navigation				
Day	6		1	
Night	4			11
4. Formation	8		2	10
5. Gunnery				
Ground	7			
Aerial	15			22
6. Aerobatics	<u>4</u>	<u>4</u>	<u>10</u>	<u>4</u> 80
	66			

P-322 transition instruction was now comparable to that given on the P-40; it was designed to emphasize "maximum performance to insure thorough knowledge of the flying characteristics of the airplane, and familiarity with auxiliary controls." It was divided into five general types of flights, each composed of several flights of one hour's duration.

⁵⁷
They were:

1. Three (3) fighter aircraft flying characteristics flights to include the following:
 - a. Climbing turns to twelve thousand (12,000) feet.
 - b. Gentle and steep turns at altitude at cruising power settings.
 - c. Gliding turns (wheels and flaps up and extended) to eight thousand (8,000) feet. . . .
 - d. Partial stalls at cruising and gliding power settings.
 - e. Manual extension and retraction of landing gear and flaps at altitude.
 - f. Precision chandelles and lazy eights.

56. TC Memorandum No. 50-10-5, 11 Nov. 1943.

57. Ibid.

2. Three (3), engine performance data, flights to include the following:
- a. Repetition of maneuvers suggested in [1 above, with the exception of e] and with particular attention directed to engine performance.
 - b. Completion of "Engine Performance Data Sheet."
3. One (1) local cross-country performance data flight to include the following:
- a. Completion of triangular cross-country flight with landing at home base or auxiliary field.
 - b. Completion of "Engine Performance Data Sheet."
4. One (1) altitude performance data flight to include the following:
- a. Climb to altitude of 20,000 feet.
 - b. Repetition of maneuvers suggested in [1 above with the exception of e]. . . .
 - c. Completion of "Engine Performance Data Sheet."
5. Two (2) local formation flights to include practice of three-ship close interval formation.

Concurrently with flying, the trainee received thorough ground preparation, "emphasizing adequate cockpit checks and familiarity with all emergency procedures." Prior to flight, successful completion of a blindfold cockpit test was required.⁵⁸

In January 1944, with the institution of P-322 transition for photo-reconnaissance RTU pilots and the later discontinuance of the 10-hour course, necessarily the instructional program had to be geared to the peculiar training requirements of these pilots. A 25-hour program of instruction was directed, consisting of:

	Hours
Day Transition	7
Day Navigation	10
Formation	3
Night Transition	3
Night Navigation	2

58. Ibid.

In general scope, this program was similar to the 23-hour course of instruction of February 1943, except that it was pointed toward the mission of photo-reconnaissance pilots rather than standard fighter pilots. Naturally fixed gunnery and combat were deleted, while special emphasis was placed on navigation by pilotage.⁵⁹ The Western Flying Training Command was instructed to effect this training, but until such time as the P-322's could be fitted with flame dampeners, night operations were omitted, 15 hours being devoted to day navigation.⁶⁰ Photo-reconnaissance units also desired that the training program include altitude flights and cross-country, but so poor was the condition of the P-322's that training completely in line with their desires could not be given.

As in P-40 training, there was a special two-week transition course for Regular Army officers and experienced Reserve officers. Having as its objective "proficiency as pilot on twin-engine fighter aircraft," its scope included "flight and ground training to insure pilot proficiency and a thorough understanding of the mechanical functioning of the RP-322 airplane." Flying instruction consisted of:⁶¹

	AT-9	AT-6	RP-322
Transition	2*	2	10
Day			6
Night			4
Navigation			2
Formation		2	3
Acrobatics		2	3
Combat		2	2
	<u>2</u>	<u>8</u>	<u>20</u>
Total Pilot Time			30
Link Trainer			5

* Not to be given to pilots already qualified to fly twin-engine aircraft.

59. TTX, AC/AS, Training to CG, AFTRC, 11 Feb. 1944, in files of AC/AS, Training.

60. Daily Diary, AFTRC, 18 Feb. 1944.

61. FTC Memorandum No. 50-2-6, 12 June 1943.

Prior to flight, pilots were required to pass a blindfold cockpit test and to be thoroughly familiar with all emergency procedures. Transition consisted of one hour's single-engine operation, over-shooting and practice "going around," cross-wind landings and take-offs, stalls with and without power and at high speed, and the attainment of thorough knowledge of operating type aircraft engines and proficiency in night operations. The two-hour transition in the AT-6 was devoted to practicing recovery from spins; no spins were given in the RP-322. Navigation consisted of one round-trip flight, with one leg at 15,000 feet, the other at 500. In formation, pilots were given two hours in the AT-6 prior to formation in the RP-322, and there was one flight to the service ceiling of the RP-322. Trainees were checked off on all authorized acrobatics in the AT-6 prior to performing the same in the RP-322. The same was true of combat practice. After completion of this training, pilots received 36 hours' flying and 34 hours' ground instruction in gunnery at the Central Instructors Fixed Gunnery School.⁶² When the 4-1/2 week transition-fixed-gunnery course was instituted, this instruction was given at the advanced fighter school.⁶³ Ground instruction, as in P-40 training, was informal; instruction was given in engineering maintenance, navigation, radio, code, practical meteorology, aircraft recognition, first aid, and use of oxygen.⁶⁴

Problems. P-322 training seems to have been relatively free of the problems that often hindered other transition programs. The number of trainees was small, and there was not the usual requirement for

62. Ibid.

63. TC Memorandum No. 50-2-6A, 22 Feb. 1944.

64. FTC Memorandum No. 50-2-6, 12 June 1943.

[REDACTED]

transition of personnel in addition to regular flow. In the development of the program of instruction, because of the changing requirements of the using agencies, instruction was continually altered both in subject matter and hours. The chief difficulty was the supply and maintenance of P-322 aircraft. By the spring of 1944 the lack of replacement parts for airplanes which wore out quickly necessitated a reduction in student load and the substitution of other types of aircraft such as the AT-24.⁶⁵ In addition, because of the differences between the flying characteristics of the P-322 and operational type P-38's, apparently it was difficult to train pilots adequately for the using activities.

3. P-39 Transition

Late in 1943 a situation arose in the tactical units that caused the transfer to the Training Command of transition to another type of plane, the P-39. For many months P-38 units in the Fourth Air Force had been receiving graduates of Williams Field who had been given transition on the P-322. But a shortage of P-38's in the Fourth Air Force necessitated the use of P-39's for the first phases of P-38 OTU and RTU. Under this situation, previous transition to P-322's was not only a waste of time but was actually dangerous for trainees who were to receive their first fighter training in the P-39. The IV Fighter Command, therefore, desired graduates who had received transition to the P-39 rather than the P-322.⁶⁶

65. Project Book, CG, AFTRC.

66. CG, IV Fighter Comd. to CG, 4th AF, 20 Dec. 1943, in AAG 337 #7, Conferences.

[REDACTED]

[REDACTED]

In accordance with recommendations of the Fourth Air Force, on 26 February 1944 Headquarters, AAF directed the Training Command to institute P-39 transition similar to that given on the P-40.⁶⁷ Immediate transfer of 75 P-39's to the Training Command was promised, and the new program was delegated to the Western Flying Training Command. Beginning with class 44-C, graduates of the advanced twin-engine fighter school at Williams Field were transferred to Victorville, Calif., for a five-week fixed-gunnery, fighter-transition course on the P-39.⁶⁸

P-39 transition began on 21 March, and although aircraft were inadequate, production was aimed at 300 graduates per class.⁶⁹ But a week later quotas were raised to: Class 44-D, 472; Class 44-E, 860; Class 44-F, 562; thereafter, 562. Headquarters realized that the shortage of available aircraft would not allow the immediate fulfillment of these new objectives, so the Training Command was authorized to assign standard single-engine pilots in excess of the former 300 quota.⁷⁰ Actually the command planned to meet this excess with graduates of P-40 transition.⁷¹ Therefore, P-39 transition did not become a function of the individual training agency through the usual planned transfer but through the scarcity of P-38 aircraft in the operational and replacement training system of the Fourth Air Force.

67. AC/AS, Training to CG, AFTRC, 26 Feb. 1944, in AAG 210.31, Assignment of Pilots.

68. Project Book, CG, AFTRC.

69. Ibid.; Daily Diary, AFTRC. 26 Mar. 1944.

70. AC/AS, Training to CG, AFTRC, 29 Mar. 1944, in AAG 353, Transition Training.

71. Project Book, CG, AFTRC.

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Chapter IX

SUMMARY

From the first employment of the De Haviland observation plane to the use of the B-29 bomber, the transition period served to introduce the pilot to a new type of combat aircraft, to give him a knowledge of the plane's operating and performance characteristics. Although the transition process did not change in function, with the development of each plane with higher performance capacities, it did grow in complexity. In addition, as the airplane developed, there was a widening difference between the various types of aviation which required the formulation of transition procedure fitted to the separate types of aviation, and to some degree, for the individual planes within the types. Furthermore, transition was always subject to other influences--the general tenor of peace or wartime operations, the employment of mass or individual training, the experience of the trainees, and the type of regulation of the governing agency.

From 1918 to the coming of the heavy bomber in 1937, transition followed a similar pattern. Pilots received their first transition to tactical aircraft at the Air Corps Training Center. Here the transition process was subject to the uniformity of a production-line type of program. Time was cheap and trainees were carefully trained to combat types that did not differ too much from the planes they had been flying. In the tactical units more experienced pilots also learned to fly new types of planes. Transition was individual and in-

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formal, conforming only to local station regulation. In 1937 the first of the modern bomber series made their appearance in the tactical units. Around this expensive equipment grew up a host of regulations which affected transition to all types of multi-engine aircraft. Minimum eligibility qualifications were prescribed, which in a way compensated for the relative difficulty of transition to the new types of planes.

In 1939 the expansion program, with its increase in personnel and units and the introduction of new types of planes, had a great influence on the transition process. Transition to all types of combat aircraft was forced out into the tactical units: the units had to change from their former individual type of transition to a set program for inexperienced trainees. In addition, a sustained transition program was conducted for experienced personnel as new types of planes appeared, for toward the end of this period most of the aircraft which were to be employed in World War II came into service. At the beginning, regulation assumed a new importance, but later there was a tendency toward more dependence on the judgment of unit commanders. Much of the transition procedure used in World War II was evolved, but the concern over the widening gap in aircraft performance characteristics caused transitioning through a series of tactical aircraft.

With the coming of war an entirely new set of problems was posed. Inexperienced trainees had to be prepared quickly for battle duty; the entire training establishment had to be reorganized. During the months preceding the war there had been a move to reinstate transition in the individual training agency, and the need for this transfer became increasingly evident. But the shortage of combat aircraft pre-

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cluded immediate transfer, and for many months transition remained in the tactical units. For the most part it resembled the type of training given during the expansion program, except that minimum eligibility qualifications for bombardment aircraft no longer existed, and fighter trainees were immediately introduced to modern pursuit ships. Early in 1942 the need for supplying replacements in the combat theaters required expedient action; plans to establish replacement training organizations in the individual training agency were formulated. Actual establishment of such organizations, however, occurred only in the case of heavy bombardment. Gradually, as replacement training got under way in the operational training agency, this need no longer existed. After repeated complaints by the tactical units because of the necessity for conducting transition, and with an increase in available aircraft, it was decided to transfer all transition to combat aircraft to the individual training agency.

Complete transfer never occurred, but by the late summer of 1943 heavy bombardment first-pilot transition had been instituted there with medium bombardment following a few months later. Early in 1944 heavy and medium bombardment co-pilot transition was also established in the Training Command. Transition was given at special postgraduate schools, and the production-line type of training entailed more than simple familiarization. Early in 1943 transition to certain types of pursuit aircraft was also transferred to the individual training agency in the last stage of advanced pilot training. P-40 transition, given to all trainees destined for any type of single-engine fighter, entailed familiarization with the combat type. P-38 transition, on

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the other hand, resembled both the bombardment and the P-40 programs, depending on the requirements of the tactical units. Meanwhile, transition to other types continued in the tactical units. This first phase of OTU-RTU training, was subject to individual unit determination with general regulation by higher echelons. It still retained some of the informal characteristics of the prewar period, but the greater number and lower experience of the trainees required more definite procedures.

[REDACTED]

GLOSSARY OF ABBREVIATIONS

AAB	Army Air Base
AAF	Army Air Forces
AAG	Air Adjutant General
AC	Air Corps
AC/AS	Assistant Chief of Air Staff
AOTC	Air Corps Training Center
AFAMC	Material Command
AFATC	Air Transport Command
AFCC	Air Force Combat Command
AFDAS	Deputy Chief of Air Staff
AFDIR	Director of Military Requirements
AFDOP	Director of Personnel
AFDFU	Assistant Chief of Air Staff, Program Planning
AFDES	Director of Technical Services
AFETC	Eastern Flying Training Command
AFETC	Flying Training Command
AFIHI	AC/AS, Intelligence, Historical Division
AFPIP	Director of Military Personnel
AFRAD	Director of Air Defense
AFRAS	Director of Air Support
AFRDB	Director of Bombardment
AFRIT	Director of Individual Training
AFROM	Director of War Organization and Movement
AFTRC	Training Command
AFTSI	Director of Technical Inspection
AFTEP	Director of Photography
AFTEC	Technical Training Command
AG	Adjutant General
AS	Air Service
C/AC	Chief of the Air Corps
C/AS	Chief of Air Staff
CG	Commanding General
CO	Commanding Officer
Comd.	Command
C/S	Chief of Staff
D/CS	Deputy Chief of Staff
FTC	Flying Training Command
GOAFTC	Gulf Coast Air Forces Training Center
GHQ AF	General Headquarters Air Force
Gp.	Group

Hq. Headquarters

Ind. Indorsement

MM&D Materiel, Maintenance, and Distribution

n.d. no date

OCAC Office, Chief of the Air Corps

OC&R Operations, Commitments, and Requirements

OTU Operational Training Unit

R&R Routing and Record Sheet

RTU Replacement Training Unit

SEACTC Southeast Air Corps Training Center

SEAFTC Southeast Air Forces Training Center

TC (Training Center
(Training Command
(Troop Carrier

TCC Troop Carrier Command

T&O Training and Operations

TWA Transcontinental and Western Airlines

TWX Teletypewriter exchange

WCAFTC West Coast Air Forces Training Center

WD War Department

B I B L I O G R A P H Y

Official Publications

War Department

Adjutant General Letters

Used as authority for activation, designation, and redesignation of training establishments, and announcement of War Department policies.

Circulars

War Department policies and standards.

Press Releases

In lieu of original documents, Press Releases have occasionally been used as secondary materials.

Headquarters, Army Air Forces

AAF Memoranda

AAF Regulations

AAF Training Standards

AC Circulars

OCAC Circulars

OCAC Circular Letters

Policies, practices, and standards established for AAF functions.

AS U-Stencils

AC U-Stencils

Programs of instruction, speeches, and general surveys of AAF activities.

Annual Reports of the Director of Air Service

Annual Reports of the Chief of Air Service

Annual Reports of the Chief of Air Corps

Report of the Commanding General of the Army Air Forces to the Secretary of War (4 January 1944)

Periodic reports on activities of the air arm. Valuable for general information on training.

The Air Corps News Letter

In lieu of original documents, this has occasionally been used as secondary material.

Headquarters, General Headquarters Air Force

Training Directives
Memoranda

Valuable for policies, standards, practices, and programs of instruction.

Headquarters, Training Command

FTC Memoranda
TC Memoranda

Valuable for statements of objectives, qualification standards, and programs of instruction.

Headquarters, I Troop Carrier Command

Training Directives

Headquarters, Materiel Command

WS-1, Daily Aircraft Acceptance and Delivery Report, AFAMC

Headquarters, First, Second, Third, and Fourth Air Forces
General Orders

Used for information on activation and redesignation of subordinate commands.

Model Mission Flight Training, Second Air Force
Training Directives
Memoranda

Valuable for policies, standards, practices, and programs of instruction.

Headquarters, Commands of the Continental Air Forces

Circulars
Memoranda

Valuable for policies, standards, practices, and programs of instruction.

Headquarters, Training Wings

Memoranda

Valuable for standards, practices, and programs of instruction.

Headquarters, Groups

Memoranda
Training Memoranda

Operations Memoranda

Operations Circulars

Valuable for standards, practices, and detailed programs of instruction.

Headquarters, Air Bases

Operations Memoranda

Valuable for practices and detailed programs of instruction.

AAF Central Files [cited AAG]

062.2 #2	Motion Picture Photography and Motion Pictures
210.11 B	Eligibility and Qualification
210.31	Assignment of Pilots
210.31 #1	Commands, Miscellaneous
211 A	Pilots
211 B	Pilots
211 C	Pilots
211 D	Pilots
211 #2	Pilots
211 A	Titles, Grades--Officers
211 C	Titles, Grades--Officers
211 D	Titles, Grades--Officers
300.5 P	Air Corps Circulars
300.5 T	Air Corps Circulars
300.5 V	Air Corps Circulars
300.5 Y	Air Corps Circulars
300.5 E	War Department Circulars
319.1 E	Annual Report of the G/AC
321.9 A	Groups
321.9-3A	Groups
321.9-3B	Groups
321.9-3D	Groups
322	Airborne Command and Troop Carrier Command
322 B	Crews
322.3	Operational Training Units
322.3 B	Operational Training Units
337	Bulk
337 B	Conferences
337 #3	Conferences, Military, Naval, and Others
337 #5	Conferences, Military, Naval, and Others
337 #7	Conferences, Military, Naval, and Others
352	Pilot Schools
352.11	Course of Instruction
352.11 B	Course of Instruction

352.11 C Course of Instruction
 352.11 J Course of Instruction
 352.11 #1 Miscellaneous Course of Instruction
 353 Ground Duty Training
 353 A Pilot Training
 353 B Pilot Training
 353 #2 Pilot Training
 353 #5 Pilot Training
 353 #3 Training Standards
 353 Transition Training
 353.01 #3 Schedules, Programs, Directives
 353.01 B Training Program
 353.01 A Training Reports
 353.02 #1 Instruction Visits
 353.9 Crew Training
 353.9 B Gunners, Bombardiers
 353.9 B Observer Training
 353.9 F Training in Aviation, Pilot Training
 353.9 H Training in Aviation, Pilot Training
 353.9 I Training in Aviation, Pilot Training
 353.9 J Training in Aviation, Pilot Training
 353.9 A Training, General
 353.9 B2 Training, General
 353.9 C1 Training, General
 353.9 C2 Training, General
 353.9 D Training, General
 353.9 E Training, General
 353.9 F Training, General
 353.9 G Training, General
 353.9 H Training, Miscellaneous
 353.9 F Training, Miscellaneous
 353.9 G1 Training, Miscellaneous
 353.9 Transition Instructions Issued by GHQ Air Force Units
 373.3 Aerial Demonstrations at Fairs, Cities, etc.
 380 E Program--Project
 400.314 C Data on Estimates as to Needs of Organizations
 452.1 A2 Bombers
 452.1 B Bombers
 452.1 D Bombers
 452.1 E Bombers
 452.1 G Bombers
 452.1 H Bombers
 452.1 A B-29 Bombers
 452.1 Bombers (Heavy) B-25
 452.1 Bombers (Heavy) B-26
 452.1 Bombers (Light) A-20
 452.1 A Pursuit Planes
 452.1 C Pursuit Planes
 452.1 D Pursuit Planes

452.1 G Pursuit Planes
452.1 K Training Planes

These files contain official correspondence consisting of letters, memoranda, routing and record sheets, telegrams, reports, and charts. They have been used as the chief source of headquarters and lower echelon action.

Headquarters Staff and Training Command Files

AC/AS, Training

Individual Training Division and Unit Training Division:

Miscellaneous Correspondence

This material has been utilized because it is not available elsewhere or readily accessible in AAG Files. It is especially valuable for communications between headquarters and training agencies in the field.

AC/AS, Intelligence, Historical Division
Administrative History Branch:

Daily Diaries

AC/AS, Training; AC/AS, Training, Aircrew Division; AC/AS, Training, Individual Training Division; AC/AS, Training, Unit Training Division; AC/AS, Operations, Commitments, and Requirements, Director of Individual Training; Army Air Forces Training Command (Flying Training Command)

Valuable for indicating developments under way and action on larger directives and programs.

Interviews

Interview, Capt. A. V. House, Jr., Historical Section, AFTRC, with Lt. Col. W. H. Blanchard, A-3, AFTRC, 13 Aug. 1943

Valuable for detailed data on heavy and medium bombardment transition programs in the Training Command.

Miscellaneous Correspondence and Reports

Principally copies of correspondence and reports furnished by operational training agencies in the field upon request. Valuable for action and type of training in the lower echelons. Also consists of correspondence of AC/AS, Training, Unit Training Division.

Programs of Instruction

Project Book of Commanding General, Air Forces Training Command

Exceedingly valuable. Consists of biweekly status reports on every type of flying training in the command. Used principally for details of action taken by the Training Command.

Reports

Report of Flying Training Students (Consolidated Flying Training Command Reports)

These are monthly statistical reports on flying training used principally for data on class entrance dates.

Report, Training Conference, Hq., Second Air Force, Colorado Springs, Colo., 20-22 Sep. 1943

Information on training developments and recommendations for changes.

Report, Weather Training Conference, Hq., AAF, 17-19 Nov. 1943

Information on weather training for pilots.

Archives Branch:

Unit Histories

History of Headquarters, Second Air Force, Activation to 6 Dec. 1941

History of III Bomber Command, Phase I, 1932-1941

History of XX Bomber Command, 27 Nov. 1943-31 Jan. 1944

History of III Reconnaissance Command, 7 Dec. 1941-30 Sep. 1943

History of III Reconnaissance Command, Dec. 1943

History of the 15th Bombardment Operational Training Wing Headquarters, 1 Jan. 1943-1 Sep. 1943

History of the 18th Replacement Wing, 15 June 1942-31 Dec. 1942

History of the 56th Bombardment Training Wing (L), Activation to January 1944

History of 39th Bombardment Group (H), 7 Dec. 1941-31 Dec. 1942

History of 407th Fighter-Bomber Group, Activation-30 Sep. 1943

History of 89th Troop Carrier Group, 1 Feb. 1942-Jan. 1944

History of 24th Troop Carrier Squadron, 89th Troop Carrier Group, 1 Feb. 1942-1 Sep. 1943

History of 26th Troop Carrier Squadron, 89th Troop Carrier Group, 1 Feb. 1942-1 Sep. 1943

These consist of narratives and supporting documents.

Valuable for information on training, method of carrying out directives of higher echelons, and particular problems and procedures of lower echelons. Supporting documents also are cited.

Army Air Forces Training Command

Daily Diary, A-3 Division, AFTRC

Valuable for action within Headquarters, Training Command.

Interviews

Interview with Maj. G. R. Holsclaw, A-3, Central Flying Training Command, conducted by Capt. James Taylor, Historical Section, A-2, Central Flying Training Command, 17 Dec. 1943

Interview with 1st Lt. R. E. Atkinson, School Secretary, AAF Basic Flying School, Garden City, Kansas, 8 Dec. 1943

Used for information on AT-24 program.

Report on Assignment Procedures at Foster Field, Victoria, Tex., 11 Dec. 1943

Used for information on P-40 program.

Miscellaneous Correspondence

Consists of correspondence collected by Historical Section, A-2, Training Command from files of Headquarters, AFTRC.

Principally concerned with heavy bombardment training.

Miscellaneous

Jane's All the World's Aircraft

The Aircraft Yearbook

"Outline of Heavier-than-Air Training," prepared at the Air Corps Training Center, 23 June 1937, by Maj. Charles H. Dowman

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Appendix 1

B-17 Transition Program of Instruction, 2d Bombardment Group,
GHQ Air Force, January 1939¹

In the following curriculum, the hours of instruction listed are experience hours and not pilot hours. The airplane should be considered a class room and each student given as much actual handling of the ship as possible. Before the end of the course, each student should have made a minimum of 10 landings.

1st Week

Monday:

5 hours - Orientation lecture. Familiarization with technical data.

Tuesday:

3 hours - Conference on airplane, familiarization with controls.

2 hours - Questionnaire on B-17.

Wednesday:

1 hour - Conference on questionnaire.

1 hour - Familiarization flight, student observing.

1 hour - Conference on flight.

Thursday:

3 hours - Local flight for instruction on controls, instruments, cruising speeds.

Friday:

Conference on maintenance by Squadron Engineering Officer.

Saturday:

Conference on maintenance, performance of cancelled missions.

2nd Week

Monday:

3 hours - Local flight for instruction on radiocompass, drift sight, bomb sight, combinations of engines.

Tuesday:

3 hours - Navigation flight of at least 300 miles.

Wednesday:

2 hours - Instruction in landings, use of flaps, handling ship at low speeds.

Thursday:

3 hours - Bombing at medium and low altitudes.

Friday:

Conference on maintenance, performance of cancelled missions.

Saturday:

Conference on maintenance, performance of cancelled missions.

1. Training Memorandum No. 8, Hq., 2d Bombardment Group, GHQ Air Force, 24 Jan. 1939.

3rd Week

Monday:

3 hours - Performance flight to 25,000 feet.

Tuesday:

2 hours - Day formation

Wednesday:

3 hours - Bombing, 20,000 feet.

Thursday:

2 hours - Gunnery on slicks and shadows.

Friday:

Conference on maintenance, performance of cancelled missions.

Saturday:

Conference on maintenance, performance of cancelled missions.

4th Week

Monday:

3 hours - Navigation flight of at least 300 miles.

Tuesday:

2 hours - Night landings.

Wednesday:

10 hours - 1000 mile cross-country, half at night.

Thursday:

Return from cross-country.

Friday:

2 hours - Final check by Flight Commander.

Saturday:

Maintenance of airplane and equipment.

TOTAL FLYING TIME FOR CLASS "I" PILOTS - 42 hours

5th Week

Monday:

Maintenance.

Tuesday:

Maintenance.

Wednesday:

3 hours - Bombing from medium altitude.

Thursday:

3 hours - Performance flight 25,000 feet.

Friday:

2 hours - Formation.

Saturday:

1½ hours - Flights on various combinations of engines.

1½ hours - Instrument flying.

6th Week

Monday:

Maintenance, performance of cancelled missions.

Tuesday:

Maintenance, performance of cancelled missions.

Wednesday:

3 hours - Gunnery, tow target.

Thursday:

3 hours - Bombing, 20,000 feet.

Friday:

1000-mile cross-country, half at night.

Saturday:

10 hours - Return from cross-country.

2 hours - Final check by flight commander.

TOTAL FLYING TIME FOR CLASS "II" PILOTS: 69 hours.

7th Week

Monday:

Maintenance, performance of cancelled missions.

Tuesday:

Maintenance, performance of cancelled missions.

Wednesday:

3 hours - Bombing at medium altitude.

Thursday:

3 hours - Performance flight at 25,000 feet.

Friday:

2 hours - Formation.

Saturday:

1½ hours - Flights on various combinations of engines.

1½ hours - Instrument flying.

8th Week

Monday:

Maintenance, performance of cancelled missions.

Tuesday:

Maintenance, performance of cancelled missions.

Wednesday:

3 hours - Gunnery, tow target.

Thursday:

3 hours - Bombing, 20,000 feet.

Friday:

10 hours - 1000-mile cross-country.

Saturday:

Return from cross-country.

2 hours - final check by flight commander.

TOTAL FLYING TIME FOR CLASS "III" AND "IV" PILOTS - 96 hours.

Appendix 2

Transition Instruction for A-20¹

	Hours
First Week	
Co-pilot B-25	6:00
Six take-offs.	
Six landings.	
One hour instrument flying. During this period the regular procedure for flight maneuvers required by AAF Regulation 50-3 for instrument flight check will be flown.	
One hour single-engine operation to include ascents, descents, instruments, simulated landings at 5000 feet above the terrain, and actual landings with one engine operative but throttled back, propeller not feathered. No one period of this phase will exceed five minutes operation on any one engine.	
A-20 Transition	4:00
The first hour will be with the trainee pilot riding "piggy-back" with a supervisory pilot at the controls.	
The remaining three hours will be air work with each flight consisting of approximately one hour's duration.	
Second Week	
A-20 Transition	12:00
The first five to seven hours will be take-offs and landings, until a minimum of ten landings have been completed. . . .	
The remaining hours will be pilotage navigation flights following varied polygonic courses from the home airdrome. On these flights the trainee pilot should develop proficiency in pilotage navigation and should orient himself with the terrain within a fifty-mile radius of the home airdrome.	
Third Week	
A-20 Transition	4:00
The first hour will be practice in single-engine operation to include ascents, descents, and simulated landings at 5000 feet above the terrain. No period of this phase will exceed five minutes operation on any one engine. Actual landings or instruments will not be practiced on single-engine at this time.	
The second and third hour will be devoted to pilotage navigation.	
The last hour will be a check flight with the squadron check pilot of trainee pilot's flight leader riding "piggy-back."	
Instrument	8:00
Total day transition	26:00

1. Memorandum No. 50-1A, Hq., 56th Bombardment Training Wing (L), 27 Sep. 1943; Memorandum No. 50-14B, Hq., 56th Bombardment Training Wing (L), 9 Sep. 1943.

Appendix 3

Transition Instruction, F-47 Aircraft¹

FIRST TRANSITION FLIGHT F-47

1. Make a normal take-off. Do not force tail up with forward stick. Do not stall the airplane off the ground.
2. Retract the landing gear after the airplane has attained sufficient speed and altitude.
3. Reduce the manifold pressure and RPM for climbing.
4. Climb at an IAS of 170 MPH.
5. Climb to 12,000, level off, reduce manifold pressure and RPM to 2,150 and 28 inches (cruising), and trim for level flight. Look around the field and surrounding area. Carefully observing outstanding landmarks such as lakes, rivers, roads, railroads, towns, farming territory, wooded areas, etc.
6. Staying within 10 mile radius of, and in sight of, the field, practice easy turn, coordination exercises, and feel the airplane out. Make partial stalls with immediate recovery straight ahead and in gentle turns with wheels and flaps up; wheels down, flaps up; wheels and flaps down. Practice shallow and medium gliding turns never reducing power to less than 15 inches. Continue glides down to 6,000 feet.
7. Lose remaining altitude outside traffic pattern and change to reserve tank.
8. Lower landing gear, contact the control tower, join traffic and land. Be sure you have made a thorough check of cockpit and airplane before landing.
9. After landing, roll to end of runway. Unlock tail wheel (in event tail wheel doesn't unlock, cut your engine, call control tower and stand by your airplane) before turning and raising flaps. Taxi back to line carefully.

NOTE: Practice everything you do with the most detailed and fanatic precision.

1. Operations Memorandum No. 3-34, Hq., 338th Fighter Gp., 1 Dec. 1942.

SECOND TRANSITION FLIGHT

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1. Take off and climb to 12,000 feet. After each maneuver that entails a loss in altitude, climb back up to 12,000 feet. Check engine instruments at frequent intervals during various altitudes of flight, noting particular attention to changes.
2. Practice immediate recovery stalls, power on and off, wheels and flaps up and down. Practice gentle and medium turns while in level flight, climbing and diving always striving for precision and coordination. Do some shallow chandelles and lazy eights.

THIRD TRANSITION FLIGHT

1. Take off and climb to 12,000 feet. Climb at 2,500 R.P.M. and 38 inches Hg. Use turbo as needed to maintain the 38 inches Hg. Note instruments carefully at all times.
2. Level off and trim airplane. Maintain 38 inches and 2500 R.P.M. for four minutes of level flight. Note IAS and all engine instrument readings.
3. At 12,000 feet with cruising power practice immediate recovery stalls. Note any difference between this ship and others you may have flown. Stall the airplane from steep turns by gradually reducing power and tightening the turn. Recover immediately by relaxing on the stick.
4. Practice precision turns, chandelles and lazy eights rolling out on a point.
5. When losing altitude to return to the field push the nose down gently and allow the AS to reach 280 MPH, make gentle turns left and right. Reduce speed at 4,000 feet. Approach field in normal manner and come in and land.
6. Report to the Flight Commander.

FOURTH TRANSITION FLIGHT

1. Take off and climb to 5,000 feet.
2. Local XC as prescribed by Flight Commander. The purpose of this Cross Country is for you to establish all nearby land marks in your own mind.
3. Accomplish Performance Data Card while on this Cross Country.
4. Return to field and practice landings for remainder of period. On each take-off leave traffic and climb to 4,000 feet. Continue filling out Performance Card. Re-enter Traffic and land.
5. Report to Flight Commanding Officer.


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FIFTH TRANSITION FLIGHT

1. Take off and climb to 12,000 feet.
2. At 12,000 feet do precision 360° turns at varying degrees of bank up to and including vertical turns holding the exact same altitude by checking altimeter and climb indicator. If unable to hold altitude during vertical turns increase speed until altitude is maintained.
3. Level off at 12,000 feet and fly for three (3) minutes. Place prop in manual position and fly straight for two (2) minutes. Start descent of 800 feet per minute until RPM reaches 2,400 RPM. Maintaining descent return prop to cruising RPM manually. Level off and hold for two minutes, climb back to 12,000 at 500 feet per minute. Maintain cruising RPM manually. Repeat procedure using throttle to maintain constant RPM. On regaining altitude do not use excessively manifold pressures with low RPM.
4. Practice steep turns, rolling in and out of turns rapidly. Concentrate on maintaining altitude and keeping ball centered.
5. Practice lazy eights and concentrate on keeping the ball centered for remainder of period.
6. Land and report to Flight Commander.

SIXTH TRANSITION FLIGHT

1. Put on demand type oxygen mask and start using oxygen before starting engine. Have Flight O. O. check oxygen equipment before take-off. Take off and climb to 20,000 feet, using 2,400 RPM and 34" Hg. during climb. Fill out Performance Data Card on this flight. Climb at 165 MPH to 15,000 - 175 MPH to 20,000. Level off - reduce power to normal cruising.
2. Practice medium and steep turns, stalls and chandelles and lazy eights.
3. Lose altitude watching turbo speed and position of control. Return to the field and land.

SEVENTH TRANSITION FLIGHT

1. Altitude flight to 30,000 feet repeating same procedure as in the Sixth Transition Period.

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EIGHTH TRANSITION FLIGHT

1. Five landings if conditions permit.
2. Squadron or Flight Commanders may schedule a definite mission or missions for this period consistent with the ability of the individual.

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Appendix 4

Troop Carrier Transition Programs of InstructionJune 1942-February 1943¹

Air	hours	Ground
Cockpit familiarization	1	Flying regulations
Hood or instrument training	4	Radio code and blinker
Contact flying	3	Cockpit procedure
Take-offs and landings, day	8	Communications
Take-offs and landings, night	2	Radio direction finding
Instruments and radio	5	Navigation
Cross-country, day	5	Physiological aspects of flying
Cross-country, night	5	and use of oxygen
	<u>33</u>	Engineering
		Pre-flight planning
		Loads and loadings
		Service with paratroops and infantry
		Gunnery
		Link trainer
		Future operational training

February 1943-January 1944²

Air	Minimum Desired		Ground
Cockpit familiarization,			Orientation
ground	2	2	Cockpit procedure
Cockpit check and co-			Engineering
pilot duties	1	1	Code and blinker
Air-work, instrument			Landings
(hood)	4	4	CAA Regulations
Air-work, contact	2	2	Radio direction finding
Landings and take-offs	4	5	Pre-flight planning
Intermediate progress			Navigation
check, ground blind-			Meteorology
fold cockpit		1	ATC procedure
Direction Finding and			Military courtesy
boxing	4	5	Physical aspects of flying
Night flying	2	2	SCR 578
Cross-country and make-			Intelligence
up	2	5	Weights and balance
Final Check	<u>1</u>	<u>1</u>	First aid
Ground time: 2:30 Air:	20	26	Flight principles

1. Unit History, 26th TC Sq., 89th TC Gp., 1 Feb. 1942-1 Sep. 1943.

2. Memorandum No. 5L-6, Hq., 89th TC Gp., 1 Feb. 1943.

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March 1944--3

Air	hours	Ground
Cockpit familiarization, ground	2	Flying regulations
Cockpit check and co- pilot duties	1	Pilots information file
Air-work, instrument (hood)	4	Code and blinker
Air-work, contact	4	Navigation
Landings and take-offs	6	Radio direction finding
Intermediate progress check, ground blind- fold cockpit	1	Meteorology
Direction finding and boxing	5	Engineering
Night flying	2	Weight and balance (loads and lashing)
Cross-country and make-up	6	Instrument flying (Link and study of T/O's)
Final Check	<u>1</u>	Z.B. adapter and radiocompass
Flight	30	VHF
Ground	2	Liaison set, command set interphone
		Marker beacon
		Sea-rescue set
		Localizer receiver
		Panels and pyrotechnics
		Radar altimeter
		Rebecca
		BABS
		IFF

3. Hq., I TCC, Training Directive, Replacement Training Units, 5 Feb. 1944.

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Appendix 5

Outline of Day Transition Training Flights for P-40 Type Aircraft at Advanced Flying Schools (Single-Engine, Fighter)¹

1ST TRANSITION FLIGHT P-40
(Approx. 1 Hour)

A. Instructions:

1. Follow pre-flight, starting, engine warm-up, and ground test procedures carefully.
 2. Make a normal take-off; do not attempt to "stall" the airplane into the air.
 3. Retract the landing gear after the airplane has attained enough speed and altitude so that there is no danger of the airplane settling back to the ground.
 4. Reduce the manifold pressure and RPM for climbing.
 5. Climb at an indicated airspeed of 140 MPH.
 6. Climb to an altitude of 12,000 feet, level off, reduce the manifold pressure and RPM for cruising, and trim the airplane for flight. Change fuel tanks, practice gentle and steep turns, chandelles, and lazy eights.
 7. With the propeller governor set for 2280 RPM, reduce the throttle to 12-15 inches of Hg., reduce speed to 120 MPH and with wheels and flaps up practice gliding turns to 8000 feet. At the end of the glide note oil and prestone temperatures.
- Climb back to 12,000 feet, lower landing gear, slow speed 120 MPH and lower flaps to full down; practice 90 degree gliding turns to the right and left to 8,000 feet. Climb back to 12,000 feet and repeat the above instructions.
- With the propeller governor set for 2280 RPM, reduce the throttle to 12-15 inches of Hg., practice partial stalls straight ahead, and in turns to the right and left. Accomplish this exercise with the landing gear and flaps up, with the landing gear down, and with the landing gear flaps full down. Always climb to 12,000 feet before starting each

1. FTO Memorandum No. 50-10-4, 21 Apr. 1943.

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individual stall. CAUTION: Practice only gentle, immediate recovery stalls. Make no attempt to force the airplane into a stall by tightening up a turn as it will be difficult to determine the exact stalling speed.

8. Turn landing gear level to manual and lower gear to down position by use of ratchet. Check pop-ups. Raise landing gear manually to fill up position and return to electric.

9. Lose altitude outside the traffic pattern.

10. Change fuel tanks to "Reserve" for landing, lower landing gear, and contact the control tower for permission to join traffic and land.

11. Be certain to make a thorough cockpit check, from left to right, prior to landing.

12. Land, complete the landing roll before raising flaps and taxi back.

13. Return to the line after the landing, and report to the transition instructor.

SECOND TRANSITION FLIGHT P-40

A. Instructions:

1. Take off and climb to 12,000 feet. After each maneuver that entails a loss of altitude climb back up to 12,000 feet.

2. When climbing to your altitude observe any changes in engine instruments. Always re-check engine instruments closely after leveling off and at frequent intervals during the flight. If anything unusual occurs, question your instructor about it upon completion of the mission.

3. Practice immediate recovery stalls, power-on and power-off, wheels and flaps up and down. Always practice stalls at the beginning of each mission. Different airplanes of the same type may have slightly different stalling characteristics.

4. Practice gentle and medium turns, both in level flight and while making shallow dives and climbs for 15 minutes. Concentrate on coordinating perfectly through all turns.

5. Adjust the airplane to cruising RPM and manifold pressure settings. Note airspeed, oil pressure, oil temperature, and coolant temperature while cruising straight and level. Check for five minutes.

6. After making a thorough check of instruments listed in (4) above, increase manifold pressure slowly to maximum cruising 35 Hg.,

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2400 RPM and note any changes in the same instruments. (Use coolant and oil flaps to maintain proper temperatures). Check instruments for (3) minutes.

7. Lose altitude outside the traffic pattern.

8. Reduce manifold pressure to desired cruising. Practice precision chandelles and lazy eights for remainder of period.

THIRD TRANSITION FLIGHT P-40

A. Instructions:

1. Practice landing stage--minimum of five (5) landings to be accomplished.

- a. Particular attention will be paid to engine temperatures.
- b. A minimum of one (1) landing will be made having lowered the gear manually.

FOURTH TRANSITION FLIGHT P-40

A. Instructions:

1. Take off and climb to 12,000 feet. Begin all maneuvers at 12,000 feet. Fill out Performance Data Card while on this flight.

2. Practice immediate recovery stalls for the first few minutes of the mission. Note particularly if there is any difference in stalling speed or characteristics between this ship and the others you have flown of the same type.

3. Reduce power and practice several stalls by placing the ship in a double needle-width turn and tightening the turn gradually, at the same time reducing airspeed without increasing the degree of bank. Recover immediately by relaxing the back pressure on the stick.

4. Level out at 10,000 feet and adjust RPM and manifold pressure to desired cruising. Note all instrument readings. Increase RPM slowly to 2,400. Increase manifold pressure slowly to 35 Hg., attempt to hold the ship perfectly straight and level, trimming as is required, for three minutes. At the end of this time note airspeed, oil pressure, oil inlet temperature, and coolant temperature.

5. Practice precision chandelles and lazy eights for the remainder of the period.

6. When losing altitude to return to the field, push the nose down gently and allow the airspeed to reach 300 MPH in a shallow dive, making

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gentle turns to the right and left. Reduce speed at 4,000 feet. Approach field and land in the normal manner.

FIFTH TRANSITION FLIGHT P-40

A. Instructions:

1. Climb to 12,000 feet, level off, and fly straight and level for three minutes. Use gyro compass and rate of climb indicator. Try to fly at exactly the same altitude during the three minute period.
2. At the same altitude do precision 360° turns at varying degrees of bank up to vertical holding exactly the same altitude during the turn by use of altimeter and rate of climb indicator.
3. Slow airplane to 170 MPH. Lower and raise the landing gear electrically and note readings on ammeter.
4. Use remainder of period practicing precision chandelles and lazy eights. Concentrate on needle and ball.

SIXTH TRANSITION FLIGHT P-40

A. Instructions:

1. Put oxygen mask on. Start using oxygen before starting engine. Have instructor check oxygen equipment before take-off. Take off and climb to 20,000 feet using 2400 RPM and 32" Hg. Fill out Performance Data Card on this flight.
2. Practice medium and steep turns, stalls, chandelles and lazy eights.
3. Lose altitude gradually and return to field.

SEVENTH TRANSITION FLIGHT P-40

A. Instructions:

1. Altitude flight to ceiling of airplane repeating same procedure as in sixth transition flight.

EIGHTH TRANSITION FLIGHT P-40

A. Instructions:

1. Practice landing stage - minimum of five (5) landings to be

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accomplished.

- a. Particular attention will be paid to engine temperatures.
- b. A minimum of one (1) landing will be made having lowered the gear manually.

NINTH TRANSITION FLIGHT P-40

A. Instructions:

1. Take off and climb to 5,000 feet.
2. Have compass courses drawn on a map for a local cross country prescribed by your instructor.
3. Complete a Performance Data Card while on this trip.
4. Return to the field and practice landings for the remainder of the period. Continue filling out the performance card. On each take-off climb to 4,000 feet, leave traffic and then re-enter.
5. Report to instructor.

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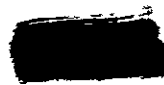
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