

Recognition Instructors' **HANDBOOK**

TRAINING DIVISION, BUREAU OF AERONAUTICS, U. S. NAVY

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Recognition Instructors' HANDBOOK

THIS handbook has been prepared to serve as a concise file of information for the guidance of both trained and untrained personnel called upon to conduct a course in the recognition of planes, ships, and other implements of war.

At the start it should be emphasized that the problems to be encountered in the teaching of recognition are so varied, and the conditions under which recognition may be taught are so unpredictable, that it has been and is impossible to write an unchanging pattern, in the form of a syllabus, to which the instructor can adhere.

What is here attempted is to set up the general principles of recognition instruction that might apply under almost any set of conditions. There is included, however, an outline of certain definite material to be covered in 120 class periods; this material represents the basis of the recognition course for the Naval Aviation Pilot Training Program. There is included also a statement of the general

objectives of the official United States Navy Recognition Training System, which should be used where proper facilities, time, and equipment are available. In regularly established Naval Aviation Training Schools such prescribed routine and pattern can be followed; the present handbook, however, has been prepared primarily for the guidance of instructors at operating naval air stations, aboard ship, and in combat areas where conditions can vary with the tick of the clock.

At best, the material herein can be considered only as a secondary aid to the most important single factor in the successful teaching of any subject—the ingenuity of the individual instructor.

In many instances, the instructor will be called upon to plan his own course, to set up his own syllabus, to select his own material, and to adapt all these to fit unprecedented situations and conditions.

1. Problems of Recognition

The first requirement in warfare is the ability to distinguish friend from foe. Nowhere is this more difficult than in the air. Owing to the great speeds and heights attained by modern aircraft, Recognition is frequently dependent on a momentary glimpse. In the same way instant and accurate Recognition of surface craft, mechanized ground equipment, etc., is fraught with great difficulties owing to varying conditions of visibility, distance, and variety of types.

Before the outbreak of this war, few realized the grave problems of Recognition that the increasing dominance of air power would present. The existence of these problems was soon apparent when, after two months, the casualties of the British Advanced Air Striking Force in France amounted to: shot down by the Germans, eight; shot down by the French, nine! In those days the only question asked was, "Is it in range?" Since then mistakes in Recognition on the sea, on land, and in the air, have been too numerous to mention. Often these mistakes are attended by the most serious consequences.

It is now fully realized that the best way to prevent these occurrences is by demanding the highest possible level of Recognition proficiency throughout the services. This can be attained only by concentrated study. When proficient visual Recognition is coupled with the mechanical aids now available, it is believed that a long step forward will have been made toward reducing the chance of a

man being a danger not only to himself, but also to his comrades-in-arms.

The Navy's problem at sea, whether on warships or merchant ships, is to know as soon as possible whether any aircraft or ship within sight is friendly or hostile, what type it is, and how it is likely to attack; and, from that, to estimate the best method of defense.

The Army Ground Force's problems are varied. Anti-aircraft gunners should be able to recognize any airplane within range, or likely to come within range, whether flying directly toward the battery or not. Columns on the move may have to contend with the low-flying attack bomber or the dive bomber.

The Air Forces of both the Army and the Navy have even more problems to solve, because the views from which air crews may see the enemy are not confined to "underneath" views. The fighter pilot may hope to dive on the enemy from above and behind. The tail gunner needs the head-on view. All must know their aircraft well. In a completely different category are the photographic interpreters who have to recognize the top-plan views of aircraft dispersed on airdromes or in ports. In the past, too little attention has been paid to this important silhouette. Likewise, the accurate Recognition of mechanized ground equipment is of extreme importance.

The Ground Observer Corps is another unit to which Recognition is important. They, too, must instantly and accu-

rately recognize any aircraft within view, friendly or hostile—even through a momentary gap in the clouds.

The first thing to be appreciated is that Recognition does not begin and end with the ability to distinguish between friend and foe; **this is seldom sufficient.** It is essential to recognize the exact type. In the case of aircraft, this Recognition gives knowledge of the wing span, approximate speed, probable armament, and, if hostile, a reasonable deduction as to future actions. The situation is similar for surface craft, where Recognition has a tactical value and gives an idea of what the enemy can do and how he may be dealt with, once recognized.

Just what enables a person to recognize implements of war accurately and speedily? The process is no different from that of recognizing an automobile, a horse, a bird, or a friend. Let one ask himself the question, "When I see a friend walking down the street, do I look at every feature of him, and, having gone through a process of analysis, decide that it is Bill?" Of course not. Recognition is instinctive. One knows immediately that it is "Bill" because one is familiar with his whole appearance and general characteristics, such as the way he stands or walks. It is not difficult to translate these characteristics into terms of airplanes, ships, etc. The combination of all these characteristics into the over-all "effect" of an object is known scientifically as the "total form" of that object. But why did the observer get to know the "total form" of

a friend or automobile, or horse? The answer is simply because he was interested in him or it. Therefore, the primary requirement of efficient Recognition is familiarity based on a general knowledge of air or surface craft, tanks, or other military equipment; a knowledge which will be gained only by an aroused interest in and an adequate study of them. If this is borne in mind, there will finally be an end to those famous last words, "I think they're ours."

2. Objectives of the United States Navy Recognition Training System

The major objectives are three in number:

(α) To recognize planes, ships, etc., by a quick glance at a great distance, by "total form." Secondary Recognition features, such as radio masts, flaps, construction of cockpit canopies, etc., are indistinguishable further than a few hundred feet from a plane. Light stick masts, blast screens, searchlight platforms, or nests of torpedo tubes, cannot be seen within the range of the anti-aircraft guns of a destroyer. Furthermore, there is a real danger in attempting to decide the identity of a plane, etc., by any single part. Take the outlines of the wings of the P-51 and the Me 109E. They are very much alike. **But their "total forms" are different.**

(b) To estimate the number of objects in the field of vision to a close approximation of their actual number. A few people are born with this ability, the majority can attain proficiency only by continual practice. Estimation is a skill which can play an important part in modern warfare, and one which all members of the armed forces should attempt to acquire.

(c) To improve the general effectiveness of vision. Decisions as to the identity of planes, ships, etc., often must be made in split seconds. A hurried glance to starboard may be all that is possible. The pilot, gunner, etc., who can see all there is to be seen out of the corner of his eye, if necessary, has a considerable advantage over an opponent who must look twice to ascertain what is in his field of vision.

The first objective is attained by the presentation of slides of planes, ships, etc., on a projection screen; a several-minute view being given of each unit. The distinguishing features are pointed out, and then the outstanding features are hammered home as a "total form." These units are then reviewed day after day at exposures ranging from several seconds to $\frac{1}{100}$ of a second. The second objective is achieved by exposing various numbers of objects on the screen for $\frac{1}{10}$ of a second. The class is asked to write down its estimate of the number seen after each exposure. The third objective is reached not only

by practice in the Recognition of the types of slides described above, but also by the flash projection of rows of digits, gradually increased in number.

3. Instructional Equipment

(a) **Pictorial Manual.**—This manual is designed primarily for self-instruction and general use, but it can serve also as a text in Recognition courses. It includes four types of material: black-and-white silhouettes, wash drawings, photographs, and editorial matter.

Silhouettes are the foundation stone on which all Recognition training is based.—They may seem dull and uninspiring, but the fact remains that the "three-view" silhouette giving the head-on, plan, and side views shows every salient Recognition feature of a ship or plane just as an architect's drawing of plan, section, and elevations gives the essentials of a building. They are basic diagrams and their value is evident from the example in part 3, which shows the great contrast between the halves of two different airplanes and indicates in print the facts which an experienced observer can read directly from a silhouette. The wash drawings pick up where the silhouette diagrams leave off. By adding form and detail, they advance toward reality while still conveying predominant accurate facts. Both types of drawings should of course be studied for their over-all effect and not just for

details. Actual photographs give the final step toward a realistic impression. The editorial matter on each plane and ship page in the manual is intended to drive home that particular unit by lending it interest and appeal; the same is true of such data on performance, armament, etc., as can be released.

The material in this manual has been assembled and edited jointly by the Army and Navy training divisions. Much valuable assistance has been rendered by the British, particularly in supplying silhouettes. The bulk of the material came from intelligence and photographic sources in both the Army and Navy.

The data and dimensions are the most exact available. The Army and Navy can release only approximate performance figures for their own planes and ships, but the dimensions given have been obtained from their respective design sections. For foreign models, the best available figures are given; where reliable sources of information differ on dimensions, the more probable figure is given and the less probable one follows it in parentheses. It is suggested that when figures are definitely confirmed, the necessary corrections be made by the individual possessing the manual.

This pictorial manual will be constantly enlarged and amended.

(b) **Flashmeter equipment used in the official United States Navy Recognition System.**—This equipment was

developed and perfected for use by the United States Navy. It has been adopted since, with certain modifications, by the United States Army Air Force. It consists of a slide projector, a flashmeter (like a camera shutter) having exposure speeds up to $\frac{1}{100}$ th of a second, a screen, and a set of approximately 2,000 slides. This form of instruction is believed to be the best means of presenting "total form." It is being used extensively and successfully at the present time.

The slide set includes silhouettes, wash-drawings, and photographs of the more important planes and surface craft listed in the Operational List under part 3. Included also are digit slides which aid in the expansion of vision, counting slides for practice in estimation, and counting-and-identification slides for simultaneous estimation and Recognition (for advanced classes only).

(c) **Motion pictures and slide films.**—Motion pictures are an effective training aid because they so closely approximate actual Recognition conditions.

There are, at present, three types of training films available. The first, on both slide film and motion-picture film, is introductory and intended for presentation in the primary stages of training. Its object is to teach the beginner the meaning of such words and phrases as "dihedral," "taper," "under-slung," etc. The second type, on motion-picture film, deals with the Recognition of individual types of aircraft, ships, etc. This class of training

film is planned on the principle that it is of basic importance to have detailed knowledge. Flying shots are combined with close-up stills, diagrams, and animated drawings, all joining with the commentary to give to the human eye the visual directive which is so essential. This series may be used effectively, provided it is not accepted as a complete solution to the Recognition problem. An airplane, for example, cannot be "learned" just by memorizing its wings, engines, fuselage, and tail, separately and without regard to the "total form" effect they join to produce; in Recognition the whole is more than the sum of its parts. The third class of film is well represented by the "Quizcraft" motion pictures. This type comprises flying shots of various aircraft and is designed for use at a more advanced stage of training. It gives the student the opportunity to see aircraft in conditions as nearly as possible approaching reality. Emphasis, therefore, is placed upon distant shots under all conditions of visibility. The "test" element is secondary and introduced only to maintain interest.

Motion picture films and film strips are listed in Army FM 21-7, and in the catalog of United States Navy Training films.

(d) **Models.**—Sets of scale models of aircraft and surface craft are obtainable upon request from the Bureau of Aero-

navics. These models are highly accurate, and carefully constructed to a scale of one-seventy-second (1 inch equals 6 feet). Airplane models can be displayed suspended in various flying attitudes, but, even more important, they also can be given to the class for examination. The students may then satisfy themselves that certain features do exist which may well have been missed when seeing representations of the aircraft on former occasions. In addition, these models can be used effectively to bring out the differences in size between plane types and models within types. Similar use can be made also of models of ships and other war implements. These models are used extensively in improvised peep-boxes on naval air stations—in ready rooms, wardrooms, lounges, and recreation rooms.

(e) **Posters.**—A variety of posters have been distributed to both the Army and the Navy. They are satisfactory as a secondary aid for a course in Recognition; and, if nothing else is available, they can be made to serve as illustrations of the planes, ships, etc., to be introduced in the course.

There is a variety of other aids—such as flash cards, playing cards, balopticons, view masters, silhouette boxes, rotating devices, etc.—which can be used as supplementary material if conditions permit.

4. Importance of Instructor Ingenuity

Ingenuity in the preparation and conduct of the Recognition course has already been touched upon, but it deserves elaboration. As can be seen under section 3 above, a considerable amount of instructional equipment is available. When all of it is aboard, the course is an easy one to set up and present. However, the instructor must prepare himself for the unexpected; he must be prepared to repair, adapt or even construct equipment.

For example, let us assume that while using the flash-meter and slides, a number of slides are broken (they are fragile and require careful handling). He should anticipate this possibility, and make arrangement ahead of time with the photographic laboratory (if one is available) for such repairs. The photographic staff can also be helpful in making new slides of planes or ships photographed by the observation units. Slides can be improvised by the instructor on light vellum paper or even tracing paper. These work best between glass, but it is not essential. Silhouettes and drawings are usable in the same manner. If the shutter on the projector refuses to work properly and there is no replacement, the instructor should attempt to adapt one from a camera which is not in use, or make a cup or shield of metal or wood to rig or hold over the opening and operate manually. While far from ideal, this will suffice to project a flash image on the screen.

Or perhaps the projector is broken beyond repair. In that case, the ingenious instructor will improvise his own equipment. If a screen is not available, any smooth, light-colored surface may be used.

Another instructional aid for use when standard equipment is not available is the opaque projector or delinea-scope. While it does not equal the combination of flash-meter, projector, and slides, it possesses certain advantages over them. It is simple, inexpensive, and, if not readily purchasable, easily constructed on the spot. Drawings for suggested "homemade" models are included in part 3. There are many types and their design is regulated only by the materials available and the ingenuity of the constructor.

The instructor should also be prepared to revise his course syllabus at a moment's notice. Planes and ships, for example, are being continually altered, and the composition of our own and enemy forces are being continually shifted. If the instructor is in a combat area where, let us say, all SBD's have been withdrawn and SB2C's sent in to replace them, the SBD's should be dropped immediately and the SB2C's added if the syllabus does not permit the addition of another plane.

What it all boils down to is that a Recognition Instructor must be a great deal more than just a teacher—he must be also an inventor, improviser and "quick-change artist."

TEACHING TECHNIQUE

1. Teaching Hints

Outlined below are a number of suggestions which the Recognition Instructor may find helpful:

(a) **Know the subject.**—The instructor should be the Recognition expert of his station—both in class and outside class. The degree of respect he receives from his class will be largely determined by its estimation of his expertness in the subject. Knowledge, coupled with enthusiasm, builds a self-confidence which is quickly sensed by the students. The instructor is cautioned against answering any question, or expressing any opinion on any topic bearing on Recognition, on which he is not absolutely sure of the correctness of his statement. If he does not know the answer he should frankly admit it—and try to find out as soon as possible. If possible the instructor should get out and see the planes, ships, etc. which he teaches, under conditions approximating those his class will face. He will thus gain a knowledge of his subject which no written source of information can equal.

(b) **Keep a notebook for reference purposes.**—The instructor should keep an up-to-date notebook, tabbed so that he can quickly refer to any of its pages. It should serve also as a model for his students to follow.

(c) **Keep control of the class.**—The instructor is the C. O. while the class is in progress and he should tactfully make this clear, regardless of the number or the rank of superiors present.

(d) **Prepare the syllabus carefully.**—Each session should proceed logically and exactly fit the time allotted. Nothing is more disconcerting to a class than a disorderly arrangement of material or the necessity of stopping in the middle of a plane presentation or halfway through a test.

(e) **Fit the syllabus to the capabilities of the class.**—It will be found that one group can be advanced rapidly because of previous training, familiarity with the material, ample time for outside study, etc., while another group of equal intelligence must be taught at a slower pace because of conditions beyond their control. The instructor should always make sure that each step is digested before moving on to the next one.

(f) **Stick to recognition essentials.**—The instructor is cautioned against irrelevant details regarding a plane's structural design. It should be remembered that this is a course in recognition, not airplane design.

(g) **Maintain a procedure for asking questions.**—Here is another place where tact is important. Irrelevant questions should be discouraged and other questions kept within the limits of the time allotted to them. Otherwise, the instructor will continually lag behind his course outline. It is also desirable to insist that questions be asked in a tone loud enough for all present to hear, and the answer should likewise always be given to the entire class.

(h) **Maintain interest at a high level.**—The instructor should avoid long, dry lectures. Break up long sessions with brief rest periods, **call on students to participate** in the presentation of new material, and ask individuals in the class to recognize and describe the planes, ships, etc., when a slide review is corrected. Change of pace keeps up interest, and there are many ways this can be accomplished within an orderly arrangement of the syllabus. The instructor is cautioned against reading from notes; he should also avoid speaking to the class when his back is turned (when writing on the blackboard, etc.).

(i) **Praise the worthy and climb on the lazy.**—This teaching axiom needs no elaboration.

(j) The class will find it helpful if a standard series of commands is used for the exposure of flashmeter equipment slides. Good results have been obtained with the following (words to be spoken are in capital letters): **READY**—(pause 1 second)—**NOW**—(pause 1 second)—then click the shutter. Or **ONE**—(pause 1 second)—**TWO**—(pause 1 second)—then click the shutter. The following rules are suggested for students to follow when the slides are flashed:

1. Maintain alert position with both feet on the deck.
2. Lean forward slightly at command "Ready."
3. Do nothing but see; don't talk to others, etc.
4. Wait a second or two after image is shown on screen.
5. Write down first impression; they are usually correct.

2. Preparation of Course Syllabus

A checklist can prove helpful in the preparation of the course. Following are the more important questions to be decided before the syllabus is laid out and the first class held:

(a) What instructional equipment is available?

Projectors, screens, slides, slide films, motion-picture films, models, posters, pictorial manuals and other publications, notebooks, notepaper and other stationery.

(b) Where is the class to be held?

Size of room, chairs, tables, speaker's stand, shades for darkening room, blackboard.

(c) When, how often, and how long are the class periods to be?

Preferably daily sessions of 45 to 60 minutes **when the men are rested.**

(d) How many are to attend the class?

The number per class is largely determined by the size of the room. Experience indicates that a class of 30-35 is about as large as can be handled efficiently.

(e) What material should be presented?

The Air Combat Information and other Intelligence officers in both the Navy and Army can be of great assistance to instructors who must select the planes and ships for inclusion in the course. The geographical destination of the class is also a valuable guide. So are the types of planes the students will fly and the positions they will occupy in the planes. For example, fighter pilots will be more interested in planes than in ships, crews of naval dive bombers should know their ships well, rear gunners in bombers must be proficient in head-on views of planes. The BuAer News Letter, O. N. I. Weekly and the Navy Department Bulletin are other helpful sources of information. This all-important question should be determined not only by the number of planes, ships, etc., that the class should learn to recognize, but also by the number they can digest in the time allotted for the course. The instructor should never attempt to cover more than the class can handle.

(f) Is there a sample course layout available?

The syllabus for the 120-period course in the Naval Aviation Pilot Training Program is found in part 3. It has been laid out in some detail for the guidance of the instructors at these schools. They should rigidly follow the outline, adhering to the material to be presented at each school. Models should be injected into the course as extensively as possible, and if available, motion pictures should replace some of the digit and counting drills.

The following observations regarding this outline are worthy of note by all instructors, but especially by those who must adapt the school's syllabus to their special needs, or who must prepare their own syllabus:

(i) Long lectures are kept to a minimum.

(ii) The syllabus is based on a standard daily routine, but the material is varied frequently.* The short lectures, for example, the one on United States Navy light cruisers, are inserted to bring out the outstanding characteristics of this type of ship. The lecture on the R. A. F. permits a brief talk on the composition and history of this air-arm. Additional lectures on such subjects as United States Army night-bombing tactics, United States Navy torpedo-plane tactics, German paratroops, Italian naval operations in the Mediterranean, etc., will add interest to the course if time can be found for them.

(iii) Normally only two planes or ships are introduced in any one session.

(iv) Dissimilar planes or ships are usually introduced together. The exceptions have been planned deliberately, since it has been found that they aid the students.

(v) United States Navy and Army planes and United States Navy ships are taken first, then those of our allies, then those of our enemies.

(vi) Daily tests and frequent examinations are included.

(vii) Written quizzes are used to test knowledge of plane and ship nomenclature.

(viii) The units are frequently reviewed on time exposure, particularly in the Pre-Flight and Primary sections where daily classes are not scheduled.

(ix) In the ship sections, carriers are given first because the students have the highest degree of interest in them. They are followed by DD's, then CL's, CA's, and BB's in that order. The DD's are injected early because they are the most difficult type and therefore deserve more reviews than BB's, which are comparatively easy. Classes of similar design are grouped together, since it is recognized that minor details are difficult to discern from a distance; in fact, often the most that can be done under combat conditions is to determine the nationality and type.

The exposure time for the various types of slides is not listed in the outline because it is believed that the individual instructor, or school, should decide them on the basis of the progress of the class. It is suggested that the course start with fairly long exposures for the slide reviews— $\frac{1}{10}$ second for planes, gradually shortened to $\frac{1}{100}$ second; 3 seconds for ships, shortened to exposures of one-half second each. The instructor will find that the class actually will prefer the fast speeds after a little practice; they make it easier to see the "total form." Toward the end of the course, however, in the final examinations, it is recommended that the plane slide exposures be moved back to one twenty-fifth second and ship slides to one second.

It is recommended that the daily plane and ship reviews and tests be made up of black-and-white, wash and photograph slides. Difficult shots should be avoided at the start of the course. The slides for the final examinations should be carefully chosen from the stock of photographs to represent the units from angles that will be encountered in actual combat. If possible, the examination slides should be new ones, or at least those that have not recently been shown to the class. The instructor naturally will choose for the reviews and tests slides of units currently being introduced. However, he should include those of units presented at earlier schools to make sure that no planes presented up to that point are slighted.

Care should be exercised in the selection of slides used in the introduction of planes and ships. The black-and-white head-on, plan, and side silhouettes, as well as several close-up shots, are recommended for planes; silhouettes, close-up side and top views for ships. Frequent use of slides of units unknown to the class will aid in keeping the class on its toes, and emphasize the danger of guessing. Occasional slides deliberately blurred will hammer home the fact that it is "total form," not detail, that counts in Recognition.

The digit slides should be identified orally, after each exposure, to permit the students to check on their errors. Estimation slides should be identified in a like manner to avoid memorization of their contents. It is suggested that the plane and ship slides in the tests and examinations

be reexposed at the end of each session, and identified by the instructor if time is short, by individuals in the class if time permits. Papers should be exchanged if the instructor suspects that they are not being marked correctly.

The training schools have found that 20 digit slides can be exposed and identified in approximately 15 minutes, 20 counting slides in 20 minutes, 20 plane slides in 15 minutes, and 20 ship slides in 20 minutes. A new plane or ship can be presented in 5 to 10 minutes. Approximately 1 minute should be allowed for the short questions and answers recommended for the nomenclature quizzes.

The instructor teaching several classes in succession, at different stages in the course, and with short intermissions between classes, may find it necessary to assign specific slides to each session. Such a scheduling of slides also minimizes the repetition of slides to the point where the slide itself is recognized rather than the material exposed. An adequate slide chart can be prepared somewhat as follows:

Material:	PBM-3			
Slide No:	56	57	58	59
Session No:	1	X		
	2	X		
	3		X	
	4			X

Weekly tests on which the students are graded are recommended because they serve as a yardstick by which the instructor and the class can measure their mutual progress. Such tests also stimulate greater effort on the part of those who are not getting satisfactory results.

Instructors at the Training Schools should note that it is planned that the cadets attending these schools will complete each school's syllabus before moving on to the next. This procedure may not always be possible, in which case special instruction on the units not covered, or those inadequately covered, may have to be given.

It is suggested that the light area of the slide in the presentation of a new unit be 34 inches across and that the initial reviews be given with the same size image. As the course progresses the size should be reduced to about 13 inches, and varied from day to day.

A sample report sheet used for slide tests in the training schools is included in part 3. A similar one can be printed or mimeographed at small cost. Ruled pad paper is adequate if a form is not procurable.

3. Introductory Lecture

The instructor's first lecture should be carefully prepared and presented in a way calculated to raise a feeling of deep concern in the minds of all who attend. Specific,

and preferably recent, examples of what has happened when planes, ships, etc., have not been properly recognized should be cited. The instructor should avoid such ridiculous statements as: "If you fellows don't settle down to hard work, you will not pass the examinations." The Navy does not want the students to **pass**, it wants them to **live** and keep on **living**. This is a subject in which a passing standard is not good enough. Eloquence is not required to put this preliminary lecture over. Nothing is more eloquent than cold, hard facts. The instructor should marshal them carefully, then hammer them home.

Students should be warned that Recognition is a subject which may prove boring at times. It will pay to emphasize the fact that proficiency in Recognition is 10 percent teaching and 90 percent learning, and may be achieved only by close adherence to three rules: (a) **Practice**, (b) **More practice**, (c) **Still more practice**. The class should be made to understand that everyone possesses the capacity to recognize individuals, cars, etc.—what they are now required to do is to extend this same faculty to implements of war.

This first lecture should also describe the scope and duration of the course, exactly what is expected of the students, and the method of instruction which will be followed.

4. Plane and Ship Nomenclature Lectures

These lectures are also important ones. Their number and the detail into which the instructor goes can be determined in part by the amount of previous training which the students have had. In some cases the instructor may have to feel his way along or give a nomenclature pre-test to measure the capabilities of the class. This is a phase of Recognition which should not be slighted. Tests at the Training Schools show that the poor Recognition student almost invariably does not know how to describe a plane or ship properly. The value of a standard nomenclature in all branches of the service should be emphasized. For example, a pilot may view a surface vessel which he has never seen before. If he can describe it properly, an intelligence officer may be able to recognize it positively from the description. Several slides illustrating the important parts of planes and ships from a Recognition standpoint are included in the slide sets, and can be used to advantage in these lectures.

An explanation of plane missions, symbols, names, and manufacturers should be considered a part of these lectures. Ship symbols, types, and class names need also to be learned.

Frequent written quizzes, consisting of short questions which can be answered by one word, can be a great help in assuring that nomenclature is thoroughly digested.

A glossary of the more important nomenclature terms for planes and ships is found in part 3.

5. Procedure for Introduction of Planes and Ships

The manner in which a plane or ship is first presented is all-important. The procedure should be calculated to arouse the interest of the class and the description should proceed logically and simply. The unit must be invested with its peculiar characteristics and its own personality. As has been previously stated, Recognition is not a matter of "appearance" alone. One must know what a plane, ship, etc., does; and why, when, and where it does it.

The following procedure is being used successfully in the United States Navy Recognition System and contains ideas that can be adapted to any method of instruction; the presentation is actually in six parts:

(a) General information or "breeze." (Project close-up photograph on screen.) The instructor brings out where and how the unit has been used; details of its development; when and where it is likely to be seen, and other related information.

(b) Specifications, including wing span and length, speeds, range, armament, bomb-load, ceiling, etc., on planes; dimensions, range, armor, armament, speed, etc.,

on ships. (Project another close-up photograph or wash drawing during this part.)

(c), (d) and (e) The three basic views on which recognition of planes is founded—namely, the plan, head-on and side views. (For ships, the view on the beam, from or near the surface, is most important.) These are described with appropriate slides so that the class may appreciate fully what they are seeing. It is during this process that the real value of the silhouettes is obtained, for in them there is no salient feature of an aircraft that is not plainly visible.

(f) A summary or recapitulation of the most important recognition features of the unit (with another close-up photograph exposed on the screen). This summing-up is brief, carefully considered, and emphatic.

The length of time necessary for the introduction of a new plane, ship, etc., varies with the difficulty of the unit. A plane such as the F4F can be presented in 5 minutes. Most planes and ships require 10 minutes.

Students should be encouraged to take notes, but the writing of lengthy ones in the classroom is not recommended. The salient points should be jotted down, and the details filled in later. If the student has his attention continually on his notebook he will not obtain the mental picture which the image on the screen can help to develop for him.

Specimen plane and ship presentations are included in part 3. Considerable information for the introduction of current planes and ships can be found in the Pictorial Manual, as well as the BuAer News Letter, ONI Weekly, and the Navy Department Bulletin. Air Combat Information officers and other Intelligence officers can of course be of the greatest help. But again it should be stressed that this important step in Recognition training depends to a large extent upon the initiative of the individual instructor.

6. Importance of Outside Study by Students

It is not an exaggeration to state, as we did, that Recognition training is 10 percent teaching and 90 percent study on the part of the student. For this reason, the class should be urged to set aside adequate time for study, to **make Recognition a hobby**. Students will find it helpful to keep a notebook, compiled from photographs, clippings, etc., collected outside the classroom. The very act of assembling this material can develop familiarity with the units to be learned. The Pictorial Manual is useful for study purposes but should not be expected to take the place of a personal notebook. Periodic inspection of notebooks will stimulate interest in their preparation. Good results have been obtained also by rating them as a part of the course grade.

The several Spotter's Guides on sale do not contain accurate silhouettes and photographs, but useful flash-cards can be made from them for review purposes. The making of models, the drawing of rough sketches of the units in and outside class, and the writing of brief word pictures of the units also help in Recognition proficiency. In fact, any device which develops a clear **mental picture** from every angle of the planes and ships to be encountered will be well worth using.

7. Preparation of Classroom

A well-ventilated room in a quiet portion of the ship or station will repay all the effort consumed in finding it. If a projector and screen is to be used, arrangements should be made to darken the room, or at least to eliminate any glare on the screen or in the eyes of the students. The instructor is cautioned to hang the screen and blackboard high enough for all to see. Damage to the equipment will be kept at a minimum if some thought is given to its protection in class and to its storage between classes.

Chairs with arm tables are ideal, but chairs and tables or even chairs alone have been used successfully. The rows of chairs should be staggered and the first few rows shortened so that all students can see the screen and blackboard without strain.

The instructor should always test the visibility in every part of the room before the first class is held, and then make sure that the chairs, etc., are properly arranged before every class.

8. Sketching

Having students under instruction sketch silhouettes and pictures of planes and ships is one of the best aids to memory an instructor can employ. Sketching need not require any artistic skill, and naturally no finesse in completed drawings should be expected of the students. The value of sketching lies primarily in the fact that it concentrates the student's attention on the plane or ship as it appears as a whole.

An example of simple outline instructions to follow in sketching planes and ships is shown on the following pages. Any form of graph paper, when available, will serve as the best material on which to work.

The sketching of the U. S. S. "North Carolina" Class BB from a silhouette is shown. The procedure to follow in figures 1, 2, and 3 to complete the drawing is as follows:

Figure 1:

- (a) Draw a straight line to represent the water line; approximate the over-all length as indicated on the water line.

- (b) Estimate the height of the foremast in proportion to the over-all length.
- (c) Locate the foremast by a vertical line in its relation to the bow and stern.

Figure 2:

- (a) Draw the deck line, the bow shape and the stern shape.
- (b) Approximate the general mass of the superstructure as indicated. (This is the most important phase of sketching and indicates the character of the construction of the ship.)

Figure 3:

- (a) Draw in the general masses; mast, midships housing, turrets, stacks, etc.
- (b) Add further details as desired.

NOTE.—If the general masses are indicated, this last step of details is unnecessary, as the purpose to be achieved is to represent the ship as a whole.

- (c) Fill in for silhouette effect.

The sketching of a plane in general principle is similar to the sketching of a ship. However, the three familiar silhouette views are necessary to represent the plane adequately. The plane sketched is the British Mosquito and the steps to follow in the sketching are as follows:



FIGURE 1

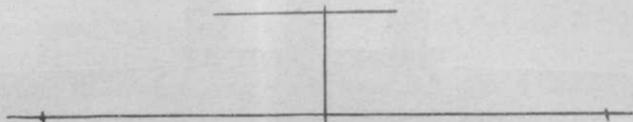


FIGURE 2



FIGURE 3

Head-on view:

(a) Draw a horizontal line to indicate the wing span, marking off on it the outer tips of the wings.

(b) In relation to this wing-span line, draw the shape of the fuselage (in this case, it is a high wing—the fuselage is drawn just below this line).

(c) Draw the shape of the wing—in this case, slight dihedral with thick wing roots tapering sharply.

(d) Locate the engines along the wing-span line in relation to the over-all length of the wing, and sketch in their general shape.

(e) Draw in the cockpit enclosure, the tail plane in relation to the wing, and the fin and rudder (keeping the proportions of its height and thickness).

Plan view:

(a) Draw horizontal line to represent the wing through its outermost tips, then along this line indicate the end of the wing tips.

(b) A vertical line crossing the wing line directly in its center indicates the line of the fuselage. Along this line indicate the length in proportion to the wing span indicated on the wing line.

(c) Sketch in the wing, leading edge first (in this case straight), the wing tips (curved and tapered), and the trailing edge (sharply tapered).

(d) Sketch in the general over-all shape of the fuselage (especially important).

(e) Sketch in the tail plane (elliptical leading edge, slightly tapered trailing edge).

(f) Sketch in the engines, keeping their location on the wing in direct proportion to the wing span and in line with their locations in the head-on view.

(g) Add any outstanding peculiarities (in this case, in-board wing panel set forward, odd shape of engine cowling, one protruding engine housing on trailing edge of wing).

Side view:

(a) Indicate the over-all length on a horizontal line.

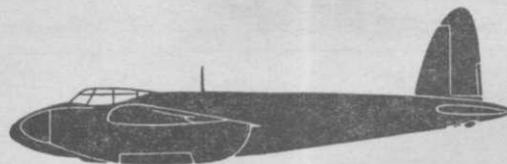
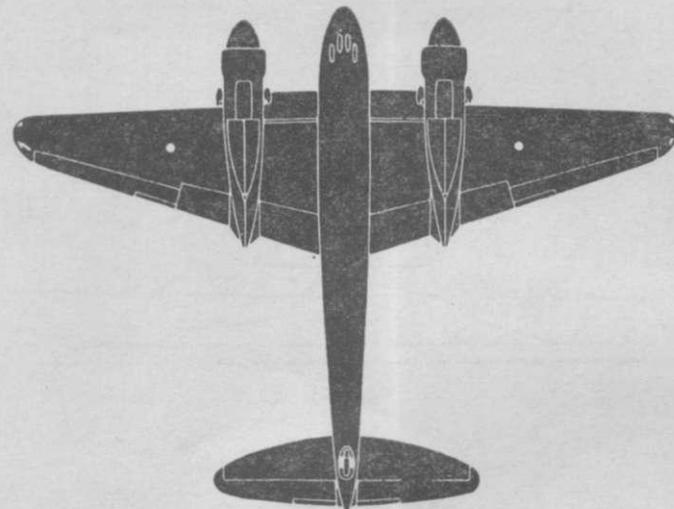
(b) Sketch the general shape of the fuselage. This is the most important step in this view as it indicates the entire character of the plane (graceful cigar shape tending to curve slightly downward in the nose).

(c) Draw the cockpit enclosure.

(d) Draw the fin and rudder, stressing its location in relation to the end of the fuselage and its peculiarity of individual shape.

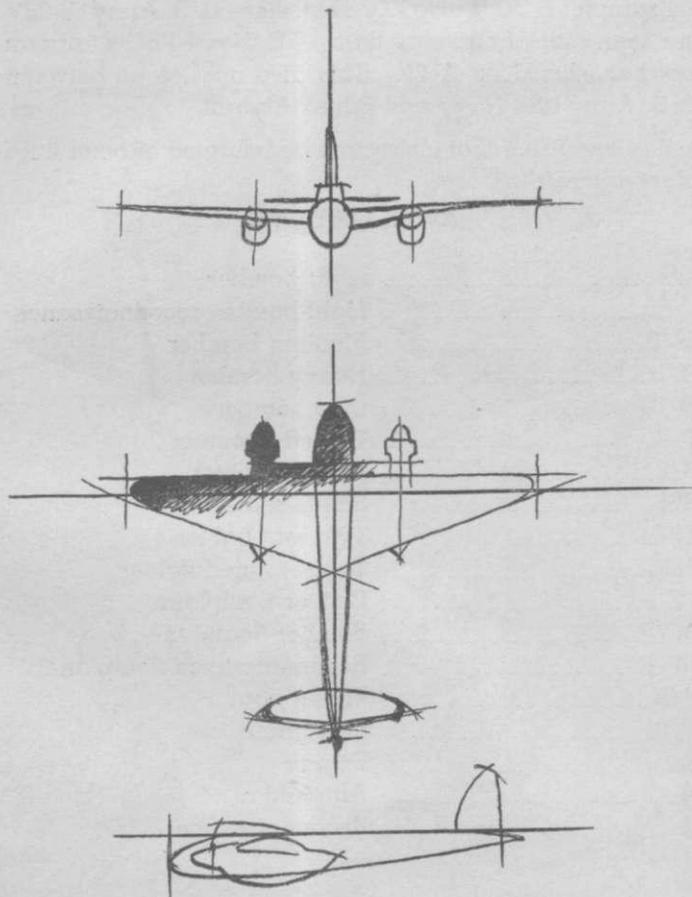
(e) Draw in the wing and engine, being careful to show any protrusions beyond the general outlines of the fuselage.

NOTE.—Fill in any of the above outline sketches to complete the silhouettes.



1. Operational List of Planes and Ships as of
March 16, 1943

(NOTE.—Future changes in this list will be covered by issue of revised
operational lists in the Navy Department Bulletin.)



Reference: Chief BuPers April 12, 1943.

Circular Letter No. 44-43.

Subject: Recognition Training:

Operational Lists, used in.

RESTRICTED

OPERATIONAL LIST, AIRCRAFT, USED IN RECOGNITION TRAINING

Explanatory Note:

1. Class A comprises Aircraft that are operationally most important.
2. Class B comprises Aircraft that are operationally important in some areas and/or are numerically less important than Class A; and also Aircraft which, though numerically important, are being gradually replaced.
3. No attempt has been made to include training planes not found in combat areas, or Aircraft numerically unimportant.
4. Emphasis is recommended on Class A. It is further recommended that Aircraft not included in Class A or B be eliminated from Recognition Training, and that material covering these units be considered obsolete.
5. Reference is made to the fact that aircraft have been treated under the category of their widest use.

Example: A-29 is also PBO; but, since U. S. Army A-29's are seen more frequently than U. S. Navy PBO's, aircraft has been listed as A-29. This also applies as between U. S. Army and Navy and British Aircraft.

It is suggested that instructors be informed of other titles of the aircraft.

ABBREVIATIONS

L/B.....	Light bomber
L/BR.....	Light bomber reconnaissance
M/B.....	Medium bomber
H/B.....	Heavy bomber
D/B.....	Dive bomber
T/B.....	Torpedo bomber
B/F.....	Bomber fighter
SSF.....	Single-seater fighter
TSF.....	Two-seat fighter
2EF.....	Twin-engined fighter
FF/P.....	Fighter floatplane
BF/P.....	Bomber floatplane
RF/P.....	Reconnaissance floatplane
F/B.....	Flying boat
F/P.....	Floatplane
E.....	Engine
A.....	Amphibian
R.....	Reconnaissance

U. S. NAVY

CLASS A

Designation	Common name	Type	Manufacturer
F4F.....	Wildcat.....	1E-Fighter.....	Grumman.
F4U.....	Corsair.....	".....	Vought-Sikorsky.
F6F.....	Hellcat.....	".....	Grumman.
SBD.....	Dauntless.....	1E-Scout Bomber.....	Douglas.
SB2C.....	Helldiver.....	".....	Curtiss.
TBF.....	Avenger.....	1E-Torpedo Bomber.....	Grumman.
SO3C.....	Seagull.....	1E-Scout-Observation.....	Curtiss.
OS2U.....	Kingfisher.....	1E-Observation-Scout.....	Vought-Sikorsky.
PBY.....	Catalina.....	2E-Patrol Bomber.....	Consolidated.
PBM.....	Mariner.....	".....	Martin.
PB2Y.....	Coronado.....	4E-Patrol Bomber.....	Consolidated.
PV.....	Ventura.....	2E-Patrol Bomber.....	Vega.

CLASS B

SOC.....	.....	1E-Scout-Observation.....	Curtiss.
I2F.....	Duck.....	1E-Utility.....	Grumman.
SNJ.....	Texan.....	1E-Scout-Training.....	North American.

U. S. ARMY

CLASS A

Designation	Common name	Type	Manufacturer
P-38.....	Lightning.....	2E-Fighter.....	Lockheed.
P-39.....	Airocobra.....	1E-Fighter.....	Bell.
P-40.....	Warhawk.....	".....	Curtiss.
P-47.....	Thunderbolt.....	".....	Republic.
P-51.....	Mustang.....	".....	North American.
A-20.....	Havoc.....	2E-Light Bomber.....	Douglas.
A-29.....	Hudson.....	".....	Lockheed.
A-30.....	Baltimore.....	".....	Martin.
A-31.....	Vengeance.....	1E-Dive Bomber.....	Vultee.
B17.....	Flying Fortress.....	4E-Heavy Bomber.....	Boeing.
B24.....	Liberator.....	".....	Consolidated.
B25.....	Mitchell.....	2E-Medium Bomber.....	North American.
B26.....	Marauder.....	".....	Martin.
C46.....	Commando.....	2E-Transport.....	Curtiss.
C47.....	Skytrain.....	".....	Douglas.
C54.....	Skymaster.....	4E-Transport.....	".....
C60.....	Lodestar.....	2E-Transport.....	Lockheed.

CLASS B

L1.....	Vigilant.....	1E-Liaison.....	Vultee.
L2.....	Taylorcraft Grasshopper.....	".....	Taylorcraft.
L3.....	Aeronca Grasshopper.....	".....	Aeronca.
L4.....	Piper Grasshopper.....	".....	Piper.
L5.....	Sentinel.....	".....	Vultee.
L6.....	".....	".....	Interstate.

BRITISH—R. A. F.

CLASS A

Part 3

Designation	Common name	Type	Manufacturer
.....	Spitfire, V, IX.....	1E-SSF.....	Supermarine.
.....	Hurricane.....	".....	Hawker.
.....	Typhoon.....	".....	"
.....	Mosquito.....	2E-2SF, LB.....	de Havilland.
.....	Beaufighter I, II.....	2E-2SF.....	Bristol.
.....	Beaufort.....	2E-T/B R.....	"
.....	Blenheim.....	2E-L/B.....	"
.....	Wellington.....	2E-M/B, T/B.....	Vickers-Armstrong.
.....	Whitley.....	2E-M/B.....	Armstrong-Whitworth.
.....	Lancaster.....	4E-H/B.....	A. V. Roe.
.....	Halifax.....	".....	Handley-Page.
.....	Stirling.....	".....	Short.
.....	Sunderland.....	4E-F/B.....	"

AMERICAN AIRCRAFT USED BY BRITISH (ON U. S. ARMY AND U. S. NAVY LISTS)

P-40.....	Warhawk.....	1E-SSF.....	Curtiss.
P-51.....	Mustang.....	".....	North American.
A-20.....	Havoc.....	2E-F.....	Douglas.
A-29.....	Hudson IV, V, VI.....	2E-L/B.....	Lockheed.
A-30.....	Baltimore.....	".....	Martin.
A-31.....	Vengeance.....	1E-D/B.....	Vultee.
B-25.....	Mitchell.....	2E-M/B.....	North American.
B-26.....	Marauder.....	".....	Martin.
B-34, PV.....	Ventura.....	".....	Lockheed.
B-17.....	Fortress I, II.....	4E-H/B.....	Boeing.
B-24.....	Liberator I, II, III.....	".....	Consolidated.
PBY-5.....	Catalina I, III.....	2E-F/B.....	"

CLASS B

.....	Master.....	1E-Trainer.....	Phillips & Powis.
.....	Oxford.....	2E-Trainer.....	Airspeed.
.....	Albermarle.....	2E-M/B.....	Armstrong-Whitworth.
.....	Hampden.....	".....	Handley-Page.

BRITISH—FLEET AIR ARM

CLASS A

Designation	Common name	Type	Manufacturer
.....	Fulmar.....	1E-SSF.....	Fairey.
.....	Barracuda.....	1E-T/B.....	"
.....	Swordfish.....	1E-T/B, R.....	"
.....	Albacore.....	".....	"
.....	Walrus.....	1E-A.....	Supermarine.

OTHER AIRCRAFT USED BY FLEET AIR ARM (ON R. A. F. AND U. S. NAVY LISTS)

.....	Seafire.....	1E-SSF.....	Supermarine.
.....	Sea Hurricane.....	".....	Hawker.
F4F.....	Wildcat (Martlet).....	".....	Grumman.
TBF.....	Avenger (Tarpon).....	1E-T/B.....	"
SB2C.....	Helldiver.....	".....	Curtiss.

RUSSIAN

CLASS A

Designation	Common name	Type	Manufacturer
I-16C		1E-SSF	State.
Mig-3 (I-18)		"	"
IL-2	Stormovik	1E-L/B (ground attack)	"
PE-2 (SB-5)		2E-D/B	"
DB-3F		2E-M/B	"
TB-7		4E-H/B	"
MBR-5 (PBY Catalina)		2E-F/B (M/B)	Consolidated (Russian license).
PS-84 (C47)		2E-Transport	Douglas (Russian license).

CLASS B

YAK-1 (I-26)		1E-SSF	State.
LAGG-3		"	"
PE-2B (PE-3)		2EF	"
SU-R		1E-L/BR	"
ER-2		2E-M/B	"
AR-2 (SB-3)		2E-D/B	"
YAK-4 (BB-22)		2E-1/BR	"
DB-3		2E-M/B	"
MBR-2		1E-F/B (L/BR)	"

GERMAN

CLASS A

Designation	Common name	Type	Manufacturer
Me 109.....		1E-B/F.....	Messerschmitt.
Me 110.....		2E-B/F.....	"
Me 210.....		".....	"
Fw 190.....		1E-B/F.....	Focke-Wulf.
Ju 87.....	Stuka.....	1E-D/B.....	Junkers.
Ju 88.....		2E-M/B, D/B.....	"
He 111K.....		2E-M/B, T/B.....	Heinkel.
Do 217.....		2E-H/B, D/B.....	Dornier.
He 177.....		2E-H/B, R.....	Heinkel.
Fw 200K.....	Kurier.....	4E-H/B.....	Focke-Wulf.
Ju 52.....		3E-Transport, Glider Tug..	Junkers.
Ju 90.....		4E-Transport.....	"

CLASS B

He 115.....		2E-RF/P, T/B.....	Heinkel.
Ar 196.....		1E-RF/P.....	Arado.
BV 138.....		3E-RF/B.....	Blohm & Voss.
BV 222.....		6E-RF/B.....	"
Do 26.....		4E-RF/B.....	Dornier.
Ju 86P.....		2E-L/BR.....	Junkers.
Ju 86K.....		2E-L/B Transport.....	"
Hs 129.....		2E-L/B.....	Henschel.
Fw 189.....		2E-L/BR.....	Focke-Wulf.
Ju 288.....		2E-M/B, D/B.....	Junkers.
Ju 290.....		4E-Transport.....	"

JAPANESE

CLASS A

Designation	Common name	Type	Manufacturer ¹
T97.....	Nate.....	1E-SSF.....	
T O Mark 1..	Zeke.....	".....	
".....	Rufe.....	1E-SSF F/P.....	
T O Mark 2..	Hap.....	1E-SSF.....	
T 1.....	Oscar.....	".....	
T95.....	Dave.....	1E-R F/P.....	
T O.....	Pete.....	".....	
T97.....	Kate.....	1E-T/B.....	
T99.....	Val.....	1E-D/B.....	
".....	June.....	1E-D/B F/P.....	
T97.....	Sally.....	2E-M/B, T/B.....	
T99.....	Lily.....	2E-M/B.....	
T 1.....	Betty.....	2E-M/B, T/B.....	
T97.....	Mavis.....	4E-RF/B.....	
MC20.....	Topsy.....	2E-Transport.....	

CLASS B

T96.....	Claude.....	1E-SSF.....	
T97.....	Adam.....	1E-TSF F/P.....	
T O.....	Harry.....	2E-SSF.....	
T96.....	Slim.....	1E-R F/P.....	
T O.....	Glen.....	".....	
T98.....	Ida.....	1E-L/B.....	
T96.....	Nell.....	2E-M/B, T/B.....	
".....	Eve.....	2E-M/B.....	
T 2.....	Emily.....	4E-F/B.....	

GERMAN AIRCRAFT REPORTED USED BY JAPANESE (ON GERMAN LIST)

Me 109.....	Mike.....	1E-SSF.....	
Fw 190.....	Fred.....	".....	
Ju 52.....	Trixie.....	3E-Transport.....	

¹Omission of manufacturers' names on Japanese aircraft is intentional. It is desirable to correct existing confusion. Since numerous types of Japanese planes are built by several manufacturers, inclusion of a single name, as for example, Mitsubishi, adds to the confusion when the same plane is manufactured by Nakajima, or Kawasaki. Therefore, it is recommended that future nomenclature relative to Japanese aircraft be treated as follows: Type 97: Single Engine Fighter; Code Name, "Nate."

ITALIAN
CLASS A

Designation	Common name	Type	Manufacturer
Cr 42.....	Freccia (Arrow).....	1E-SSF.....	Fiat.
Mc 202.....	Saetta II (Lightning).....	".....	Macchi.
Re 2001.....	Falco II (Falcon).....	".....	Reggiane (Caproni).
Cant Z.1007 bis.	Alcione (Kingfisher).....	3E-H/B (T/B).....	Cantieri Riuniti.
Sm 79.....	Sparviero (Hawk).....	3E-T/B (H/B).....	Savoia Marchetti.
Sm 82.....	Canguru (Kangaroo).....	3E-H/B (Transport).....	"
Sm 84.....	".....	3E-H/B (T/B).....	"
Cant Z.506B.	Airone (Heron).....	3E-BF/P (T/B).....	Cantieri Riuniti.

CLASS B

G 50.....	Falco (Falcon).....	1E-SSF.....	Fiat.
Mc 200.....	Saetta I (Lightning).....	".....	Macchi.
Re 2000.....	Falco I (Falcon).....	".....	Reggiane (Caproni).
Ro 37 Bis.....	".....	1E-L/BR.....	Meridionali.
Ca 309.....	Ghibli (Sandstorm or Desert Wind).....	2E-L/BR.....	Caproni - Bergamaschi.
Ca 311 and Ca 312 Bis.....	".....	2E-L/BR (T/B).....	Caproni.
Ca 313.....	".....	2E-M/B (T/B).....	"
Ba 201 (Ju 87B).....	Pichiatelli (Diver).....	1E-D/B.....	Breda.
P 108.....	".....	4E-H/B (T/B Transport).....	Piaggio.
Br 20M.....	Cicogna (Stork).....	2E-M/B (T/B).....	Fiat.
Cant Z.501B.	".....	1E-F/B (L/BR).....	Cantieri Riuniti.

Reference: Chief BuPers. April 2, 1943
Circular Letter No. 44-43.

Subject: Recognition Training:
Operational Lists, Used in.
RESTRICTED

OPERATIONAL LIST, SURFACE CRAFT,
USED IN
RECOGNITION TRAINING

March 16, 1943

Explanatory Note:

1. Class A and B lists are designed to simplify Recognition Training in Surface Craft. Where Surface Craft classes have been grouped, it is recommended that they be taught as single "Group-Classes" for Recognition purposes.

2. Where "— Class" appears, such indicates there is more than one unit in the class. A ship name indicates a single unit.

3. Class A comprises Surface Craft numerically most important.

4. Class B comprises Surface Craft numerically less important than Class A.

5. Emphasis is recommended on Class A.

6. Attention is invited to the fact that older units of all navies are undergoing modernization refits. Care should be exercised in the selection of Recognition training material covering these units.

OPERATIONAL LIST—U. S. SURFACE CRAFT

NOTE.—Vessels included under Class A comprise the "must list" for Recognition. Class B ships are lower priority supplementary units. Similarity, where it exists, is indicated by: a—a', b—b', etc.

CLASS A	CLASS B	
I. Battleships: (BB) (7)		
a. NEW YORK Class	a'. ARKANSAS	(3)
b. PENNSYLVANIA	b'. NEVADA	
c. NEW MEXICO Class	-----	
d. COLORADO Class	d'. TENNESSEE ¹	
e. NORTH CAROLINA Class	-----	
f. SOUTH DAKOTA Class	-----	
g. IOWA	-----	
II. Aircraft Carriers: (CV) (2)		
a. ESSEX Class	a'. ENTERPRISE	(3)
b. INDEPENDENCE Class	-----	
	c'. SARATOGA	
	d'. RANGER	
III. Auxiliary Aircraft Carriers:		
(ACV) (2)		(1)
a. BOGUE Class	a'. LONG ISLAND-CHARGER	
b. SANGAMON Class	-----	
IV. Heavy Cruisers: (CA) (3)		
a. PENSACOLA Class ¹	-----	(2)
b. NORTHAMPTON Class	b'. PORTLAND Class	
c. NEW ORLEANS Class	c'. WICHITA	

¹ Subject to immediate change in appearance.

V. Light Cruisers: (CL) (3)

- | | |
|--------------------|---------------------|
| a. OMAHA Class | ----- |
| b. BROOKLYN Class | b'. ST. LOUIS Class |
| c. CLEVELAND Class | c'. ATLANTA Class |

VI. Destroyers: (DD) (6)

- | | |
|---------------------------------------|--------------------|
| a. Old "Flush-deckers" | ----- |
| b. MAHAN-DUNLAP Classes | b'. PORTER Class |
| c. GRIDLEY-BAGLEY-BENHAM-SIMS Classes | c'. SOMERS Class |
| d. BENSON-LIVERMORE Classes | ----- |
| e. FLETCHER Class | ----- |
| f. Destroyer Escorts (DE-1 Class) | ----- |
| | g'. FARRAGUT Class |

OPERATIONAL LIST—BRITISH SURFACE CRAFT

NOTE.—Vessels included under Class A comprise the "must list" for Recognition. Class B ships are lower priority supplementary units. Similarity, where it exists, is indicated by: a—a', b—b', etc.

CLASS A

CLASS B

I. Battleships: (BB) (4)

- | | |
|----------------------------|--------------|
| a. ROYAL SOVEREIGN Class | a'. MALAYA |
| b. QUEEN ELIZABETH-VALIANT | b'. WARSPITE |
| c. NELSON Class | ----- |
| d. KING GEORGE V Class | d'. RENOWN |

II. Aircraft Carriers: (CV) (2)

- | | |
|----------------------|-------|
| a. FURIOUS | ----- |
| b. ILLUSTRIOUS Class | ----- |

(2) III. Auxillary Aircraft Carriers: (ACV) (1)

- | | |
|------------------|------------------|
| a. BATTLER Class | a'. ARCHER Class |
|------------------|------------------|

IV. Heavy Cruisers: (CA) (1)

(See NOTE.)

- | | |
|------------------------|-------------------|
| a. DEVONSHIRE Class | a'. CUMBERLAND |
| NORFOLK-KENT-AUSTRALIA | SUFFOLK |
| | BERWICK |
| | b'. HAWKINS Class |

V. Light Cruisers: (CL) (6)

- | | |
|----------------------------|---------------------------|
| a. DRAGON-CARLISLE Classes | a'. CALEDON Class |
| b. EMERALD Class | ----- |
| c. LEANDER Class | ----- |
| d. ARETHUSA Class | d'. HOBART |
| e. DIDO Class (5 turret) | e'. DIDO Class (4 turret) |
| f. FIJI Class | f'. SOUTHAMPTON Class |
| | g'. ADVENTURE |

VI. Destroyers: (DD) (6)

- | | |
|-----------------------|--------------------------------------|
| a. "Town" Class | ----- |
| b. "V-W" Classes | b'. "Wairs" |
| c. "A" to "T" Classes | c'. WALLACE-DOUGLAS-SAGUENAY Classes |
| d. "K" to "N" Classes | d'. "Tribal" Class |
| e. "O" Class | ----- |
| f. "Hunt" Class | ----- |

NOTE CA.—Devonshire and Norfolk classes and Kent and Australia as individual ships fall into one appearance group. Cumberland, Suffolk, and Berwick, all Kent class, but minor appearance variations.

NOTE DD.—"Wairs" are V-W class destroyers rearmed with anti-aircraft guns.

OPERATIONAL LIST—JAPANESE SURFACE CRAFT

NOTE.—Vessels included under Class A comprise the "must list" for Recognition. Class B ships are lower priority supplementary units. Similarity, where it exists, is indicated by: a—*a'*, b—*b'*, etc.

CLASS A	CLASS B
I. Battleships: (BB) (4)	(1)
a. KONGO Class	-----
b. FUSO	b'. YAMASHIRO
c. ISE Class	-----
d. NAGATO Class	-----
II. Aircraft Carriers: (CV) (1)	(1)
a. SHOKAKU Class	-----
-----	b'. HOSHO
III. Seaplane Carriers: (CVS) (1)	(1)
a. MIZUHO Class	a'. CHITOSE Class
IV. Heavy Cruisers: (CA) (3)	(3)
a. NACHI Class	a'. AOBA Class
b. ATAGO Class	b'. CHOKAI-MAYA
c. MOGAMI Class	c'. TONE Class
V. Light Cruisers: (CL) (2)	(3)
a. SENDAI Class	-----
b. KUMA-NATORI Classes	b'. TENRYU Class
-----	c'. KATORI Class
-----	d'. YUBARI (see DD's)
VI. Destroyers: (DD) (5)	(4)
a. MUTSUKI-KAMIKAZE Classes	a'. MINEKAZE-WAKATAKE- MOMI Classes

- b. FUBUKI Class, AMAGIRI Group
- c. SHIGURE Class
- d. ASASASHIO Class
- e. New one-stack Class

- b'. FUBUKI Class, SHINONOME & HIBIKI Groups
- c'. HATSU HARU Class
-
- e'. CHIDORI-OTORI Classes YUBARI (CL)

OPERATIONAL LIST—GERMAN SURFACE CRAFT

NOTE.—Vessels included under Class A comprise the "must list" for Recognition. Class B ships are lower priority supplementary units. Similarity, where it exists, is indicated by: a—*a'*, b—*b'*, etc.

CLASS A	CLASS B
I. Battleships: (BB) (2)	(2)
a. SCHARNHORST	a'. GNEISENAU
b. TIRPITZ	-----
c. -----	c'. SCHLESWIG-HOLSTEIN Class
II. Aircraft Carriers: (CV) (1)	(0)
a. GRAF ZEPPELIN	-----
III. Heavy Cruisers: (CA) (2)	(2)
a. ADMIRAL HIPPER	a'. PRINZ EUGEN
b. ADMIRAL SCHEER	b'. LUETZOW
IV. Light Cruisers: (CL) (2)	(2)
a. KOELN	a'. EMDEN
b. NUERNBERG	b'. LEIPZIG

V. Destroyers: (DD) (3)

- a. MAASZ Class
- b. "Narvik" Class
- c. T-1 Class

- a'. WOLF-MOEWE Classes
- b'. ROEDER Class
- c'. M-1 Class AM

(inserted for great similarity to T-1)

(3)

OPERATIONAL LIST—ITALIAN NAVAL VESSELS

NOTE.—Vessels included under Class A comprise the "must list" for Recognition purposes. Class B ships are lower priority supplementary units. Similarity, where it exists, is indicated by a—a', b—b', etc.

CLASS A

CLASS B

I. Battleships: (BB) (2)

- a. CAVOUR Class
- b. LITTORIO Class

b'. DORIA Class

(1)

I. Heavy Cruisers: (CA) (2)

- a. TRENTO Class
- b. BOLZANO

b'. GORIZIA

(1)

III. Light Cruisers: (CL) (3)

- a. MONTECUCCOLI Class
- b. GARIBALDI Class
- c. REGOLO Class

a'. SAVOIA Class

d'. CADORNA

(2)

IV. Destroyers: (DD) (4)

- a. TURBINE Class
- b. "Navigator" Class
- c. SPICA Class
- d. AVIERE Class

e'. "Generale" Class

(1)

2. Glossary of Terms Used in the Recognition of Planes and Ships

(1) Planes

AILERON—Hinged, movable portion of wing, usually at trailing edge, whose primary function is to induce a rolling motion on the airplane.

AIRFOIL—Any surface, such as an airplane wing, aileron, or rudder, designed to obtain reaction from the air through which it moves.

AIR SCOOP—A scoop or hood designed to catch the air and maintain the air pressure in internal-combustion engines, ventilators, etc.

AMPHIBIAN—An airplane designed to rise from and alight on either land or water.

ANGLE OF INCIDENCE—The acute angle between the plane of the wing chord and the horizontal axis of the airplane. The angle is positive when the leading edge is higher than the trailing edge.

ARRESTER HOOK—The device lowered by a carrier-based airplane to facilitate limited-space landings.

ARRESTING GEAR—The mechanism on an airplane and on the landing area used in limited-space landings.

AUTOGIRO—A type of rotor plane whose support in the air is normally derived from airfoils aerodynamically rotated about an approximately vertical axis, and whose forward speed is supplied by engine and propeller.

BALANCED SURFACE—A control surface that extends on both sides of the hinge line, or that has auxiliary extensions to effect a balance on the hinge line. Used frequently on rudders, ailerons, and elevators.

"BELLY"—Colloquial term for ventral portion of fuselage.

BIPLANE—An airplane with two wings placed one over the other.

"BLISTER"—A colloquial term for a streamlined transparent housing protruding from the fuselage, containing movable armaments.

BRACING—Struts, guys or other stiffeners used to brace any part of the structure of an airplane, externally or internally.

CABANE—An arrangement of struts.

CABIN—Compartment for one or more persons built entirely within the profile of the fuselage.

CAMBER—The curvature of an airfoil from the mean line of its chord section.

CANOPY—A hood, covering or enclosure.

CENTER SECTION—The central panel of a wing.

CHORD—The straight line joining the leading and trailing edges of an airfoil also called chord length.

COCKPIT—An open space in an airplane to accommodate the pilot and/or other persons.

COWLING—A removable covering, as over a cockpit or around part or all of an engine.

DIHEDRAL ANGLE—The acute angle between the longitudinal center line of the wing and an imaginary horizontal line. When a plane has positive dihedral the wings slope "up".

DIVE BRAKE—A flap or slot which when opened reduces the speed of an airplane in a dive.

DORSAL—Pertaining to the back or top portion of the fuselage.

EDGE-LEADING—The entering or forward portion of an airfoil or propeller blade.

TRAILING—The after or rearmost portion of an airfoil or propeller blade.

ELEVATOR—A movable auxiliary airfoil usually hinged to the stabilizer. Its function is to induce a pitching motion on the airplane.

ENGINE—The motive power of an aircraft "Radial" and "in-line" refer to the placement of cylinders about the propeller shaft. The former type is usually air-cooled; the later generally liquid-cooled.

FIN—A fixed or adjustable airfoil to afford directional stability, such as a tail fin or skid fin, etc.

FLAP—A hinged or pivoted airfoil forming the rear portion of an airfoil, used to vary the effective camber.

FLOAT—A completely enclosed watertight structure attached to an aircraft to give it buoyancy and stability when in contact with water.

FLOAT, inboard stabilizing—A stabilizing float placed relatively close to the main float or hull.

FLOAT, outboard (or wing-tip) stabilizing—A stabilizing float placed relatively far out from the main float or hull, usually at or very near the tip of the wing.

FLOAT, stabilizing (or side)—A float used in addition to a single float or hull and intended to provide lateral stability while the seaplane or flying boat is at rest on the water.

FLYING BOAT—A form of seaplane whose main body or hull provide flotation.

FUSELAGE—The body, of approximately streamline form, to which the wings and tail unit of an airplane are attached.

GAP—The distance separating two adjacent wings of a multiplane.

"GILL RING"—The adjustable after portion of the cowling of a radial engine used to effect efficient air cooling.

GLIDER—An aircraft heavier than air, similar to an airplane but without a power plane.

- PRIMARY-TYPE GLIDER**—A ruggedly built glider designed for use in elementary training of student glider pilots.
- SECONDARY-TYPE GLIDER**—A glider designed to have better aerodynamic performance than the primary type, but rugged enough for the use of pilots with limited training.
- PERFORMANCE-TYPE GLIDER**—A glider having a high degree of aerodynamic refinement and low minimum sinking speed.
- "GREENHOUSE"**—Colloquial term for the transparent canopy or hood over the cockpit.
- HEIGHT**—The vertical measurement of an airplane at rest; taken from the lowest point of contact to the topmost part of the airplane including the rotation arc of the propeller.
- HELICOPTER**—A type of rotor plane whose support in the air is normally derived from airfoils mechanically rotated about an approximately vertical axis.
- HINGE LINE**—The joint between a fixed and a movable surface, such as wing and aileron, stabilizer and elevator, fin and rudder.
- HOOD**—A covering, canopy, or cowling, usually applied to the fuselage.
- HOUSING**—A covering over a space used to enclose a movable part such as a retractable wheel gear.
- HUB**—The center portion of a propeller or wheel about which rotation occurs.
- HULL-SEAPLANE**—That portion of a flying boat which furnishes buoyancy when in contact with the surface of the water. It contains accommodations for the crew and passengers, usually combining the functions of both float and fuselage.
- LANDING GEAR**—The gear on the underside of the fuselage which supports an aircraft in take-off or landing.
- LANDPLANE**—An airplane which rises from and alights on land.
- LENGTH (OVER-ALL)**—The extreme forward-aft measurement of an airplane.
- LOOP**—Radio antenna formed of coils of wire.
- MAST, RADIO**—A fixed spar attached to an aircraft used for supporting a radio antenna.
- MONOCOQUE**—Term applied to fuselage construction which relies on the strength of the skin or shell for its structural stiffness. The shell is reinforced vertically by structural bulkheads.
- MONOPLANE**—An aircraft with a single plane or wing. There are four general types.
- LOW-WING**—A monoplane whose wing is located at or near the bottom of the fuselage.
- MID-WING**—A monoplane whose wing is located approximately at the mid point between top and bottom of fuselage.
- HIGH-WING**—A monoplane whose wing is located at the top of the fuselage.
- PARASOL-WING**—A monoplane whose wing is above the top of the fuselage and is supported by a cabane or other connections.
- MULTIPLANE**—An airplane having two or more wings, superimposed.
- NACELLE**—An enclosed shelter for personnel or for a power plant. A nacelle is usually shorter than a fuselage, and does not carry the tail unit.
- NOSE**—The foremost part of the fuselage.
- OVERHANG**—(1) One half the difference in span of any two wings of an airplane.
(2) The distance from the outer strut attachment to the wing tip.
- PANEL (AIRPLANE)**—A portion of an airplane wing constructed separately from the rest of the wing to which it is attached.

"PANTS"—Colloquial term for the housing of non-retractable landing gear struts.

PROFILE THICKNESS—The maximum distance between the upper and lower contours of an airfoil, measured perpendicularly to the mean line of the profile.

PROPELLER—Any device for propelling a craft through a fluid, such as water or air; especially a device having blades which, when mounted on a power-driven shaft, produce a thrust by their action on the fluid.

ADJUSTABLE PROPELLER—A propeller whose blades are so attached to the hub that the pitch may be changed while the propeller is at rest.

AUTOMATIC PROPELLER—A propeller whose blades are attached to a mechanism that automatically sets them at their optimum pitch for various flight conditions.

CONTROLLABLE PROPELLER—A propeller whose blades are so mounted that the pitch may be changed while the propeller is rotating.

GEARED PROPELLER—A propeller driven through gearing, generally at some speed other than the engine speed.

PUSHER PROPELLER—A propeller mounted on the rear end of the engine or propeller shaft.

TRACTOR PROPELLER—A propeller mounted on the forward end of the engine or propeller shaft.

RETRACTABLE LANDING GEAR—A type of landing gear which may be withdrawn into the body, nacelle, or wings of an airplane during flight in order to reduce parasitic drag.

RIB—A chord-wise structural member of the wing.

RING COWLING—A ring-shaped cowling placed around a radial air-cooled engine to reduce its drag and improve cooling.

ROOT—The "base" of the wing where it is attached to the fuselage.

ROTOR—The complete rotating portion of a rotary wing system.

ROTOR PLANE—A form of aircraft whose support in the air is chiefly derived from the vertical component of the force produced by rotating airfoils.

RUDDER—A hinged, auxiliary vertical airfoil whose function is to induce yaw or side-to-side motion on an aircraft.

SAILPLANE—A performance-type glider.

SEAPLANE—An airplane designed to rise from and alight on water.

SESQUIPLANE—A form of biplane in which the area of one wing is less than half the area of the other.

SHAFT—The part connected to the power plant which drives the propeller or rotor (of a helicopter).

SKID FIN—A fore and aft vertical surface, usually attached to the top of the wing to increase lateral stability.

SLAT—A movable auxiliary airfoil, attached to the leading edge of a wing, which when closed falls within the original contour of the main wing and which when opened forms a slot.

SLOT—The space between the "slat" and wing designed to improve the flow conditions of an airfoil.

SLOTTED AILERON—An aileron having an air passage between the nose of the aileron and the wing.

SPAN—The maximum distance from tip to tip of an airfoil.

"SPAT"—An aerodynamically designed housing to cover a nonretractable wheel.

SPINNER—A fairing of approximately conical or paraboloidal shape, which is fitted coaxially with the propeller hub and revolves with the propeller.

SPOILER—A small plate arranged to project above the upper surface of a wing to disturb the smooth air flow, with consequent loss of lift and increase of drag.

SPONSON—A protuberance from a seaplane hull designed to increase the beam or give lateral stability at rest.

SPRAY STRIP—A strip projecting from the hull of a seaplane to change the manner in which the spray is thrown.

STABILIZER—Any airfoil whose primary function is to increase the stability of an aircraft. It usually refers to the fixed horizontal tail surface of an airplane, as distinguished from the fixed vertical surface.

STABILIZER, STUB-WING—A projection from the side of the central hull of a flying boat intended to increase the buoyancy and stability of a flying boat while the boat is at rest, and to increase the hydrodynamic lift during the take-off. It is an integral part of the hull, and usually takes the form of a stumpy airfoil or a stub wing.

STRUT—A member of a truss frame.

OLEO STRUT—A shock-absorbing, telescoping strut in which an oleo gear is used.

SWEEPBACK—Term applied to a wing whose leading and trailing edges are further aft at the tips than at the center.

TAB—An auxiliary airfoil attached to a control surface for the purpose of reducing the control force or trimming the aircraft.

TAIL—The after part of an airplane consisting of stabilizers, elevators, fin, and rudder.

TAIL BOOM—A spar or outrigger connecting the tail surfaces and the main supporting surfaces.

TAIL SKID—A skid for supporting the tail of an airplane on the ground.

TAIL WHEEL—A wheel for supporting the tail of an airplane on the ground.

TAPER—A gradual diminishing of the chord length or chord thickness of an airfoil.

TIP—The outermost part of an airfoil or propeller.

TURRET—A transparent movable enclosure housing armament. It may be free or power-driven. It may also be retractable.

UNDERCARRIAGE—See Landing Gear.

VENTRAL—The lowermost part of a fuselage.

WING—Main supporting surface or airfoil of an airplane. A wing can have many plan shapes, the most usual of which are:

- (a) **STRAIGHT**—When leading and trailing edges are straight, parallel and at right angles to the direction of flight.
- (b) **TAPERED**—When leading and/or trailing edges are not at right angles to the direction of flight, but diminish in chord length toward the tip.
- (c) **ELLIPTICAL**—When leading and trailing edges are elliptical in general shape.
- (d) **CURVED**—When leading and/or trailing edge is rounded.
- (e) **SWEPTBACK**—When the general wing shape sweeps aft toward the tips.
- (f) **SWEPTFORWARD**—When the general wing shape sweeps forward toward the tips.

Wings are also classified by their front view shape.

- (1) **HORIZONTAL**—When the wing axis forms a horizontal.
- (2) **DIHEDRAL**—When the wing axis slopes up or down from the horizontal.
- (3) **GULL**—When the inner panel has positive dihedral and the remainder of the wing to the tip is horizontal or has less positive dihedral.
- (4) **INVERTED GULL**—When the reverse is true, i. e., inner panel has negative dihedral and outer panel is horizontal or has positive dihedral.

(2) Ships

ABAFT—Behind; toward stern from.

ABEAM—At right angles to the keel.

AMIDSHIPS—The middle portion of a vessel.

ARMOR—Steel plating designed to defeat shells, bombs, or underwater explosion.

ARMOR BELT—Band of armor extending along a ship's sides above and below waterline.

ATHWART—Across; from side to side; transversely.

BEAM—Extreme width of ship.

BREAK—The point at which upper decks are discontinued.

BRIDGE—Raised forward platform from which ship is conned and navigated.

BULWARKS—Light plating or wooden extension of ship's sides above upper deck.

CASEMATE—Armored gun mount built into the sides or superstructure of a ship.

CLASS—Vessels of the same type built to a common basic design.

CONNING TOWER—Armored ship control station. In submarines, the main deck structure.

COUNTER—Side of a vessel's quarter.

COWL—A smoke baffle located on top of a funnel; opening of a ventilator.

DISPLACEMENT—The weight of water displaced by a ship.

FANTAIL—After section of the main deck.

FORE—That part of a ship lying between bow and amidships section.

FORE AND AFT—Lengthwise of a ship.

FORECASTLE—Deck; a forward upper deck extending to bow.

FREEBOARD—Height of ship's sides from water line to a weather deck.

FLYING BRIDGE—A light self-supporting structure extending from side of ship's bridge.

GUN HOUSE—A lightly protected, rotating mount for guns of lesser calibre.

GUN SHIELD—Any protection for gun crews which does not completely enclose mount.

HALYARDS—Light lines used in hoisting signals, flags, etc.

HATCH—Opening in deck.

HAWSE PIPES—Tubes leading anchor chains from deck down and forward through bow plating.

HULL—Main body of a vessel exclusive of elements of superstructure.

ISLAND—A free-standing section of a ship's superstructure. On aircraft carriers, the ship's superstructure.

KNOT—A unit of speed, equalling one nautical mile (6,080.20 feet) per hour.

LIST—Transverse inclination of a vessel.

MAIN BATTERY—The heaviest calibre gun armament carried by a naval vessel.

MAIN DECK—A ship's highest continuous deck.

MULTIPLE MAST—An exposed mast having one or more supporting elements.

PEAK (fore and aft)—Compartment at the extreme bow or stern of vessel below decks—usually a tank.

PORT—Left-hand side of a vessel when looking towards bow; an opening.

QUARTER—That portion of a vessel's side near the stern.

QUARTER DECK—Part of upper deck reserved for officers; also the deck near the stern.

RADIO DIRECTION FINDER—Device for determining direction of source of radio impulses.

RAKE—Fore and aft inclination from vertical.

RANGEFINDER—Optical instrument for determining distance to a target or other object.

RIGGING—Collective term for ropes and chains employed to support masts, yards, and booms of vessel.

SECONDARY BATTERY—The gun armament next in calibre to main battery.

SHEER—Longitudinal upward or downward curvature of deck or gunwale.

SHEER LINE—Line formed by intersection of deck and sides of ship.

SPLINTER SCREEN—Light armor shields for protection of crew.

STACK—Exposed uptake from ship's boilers; funnel.

STARBOARD—The right hand side of a vessel when looking toward the bow.

STEM—Extreme forward line of bow.

STERN POST—The main vertical post in the stern frame upon which the rudder is hung.

SUPERSTRUCTURE—Any structure built above a ship's hull.

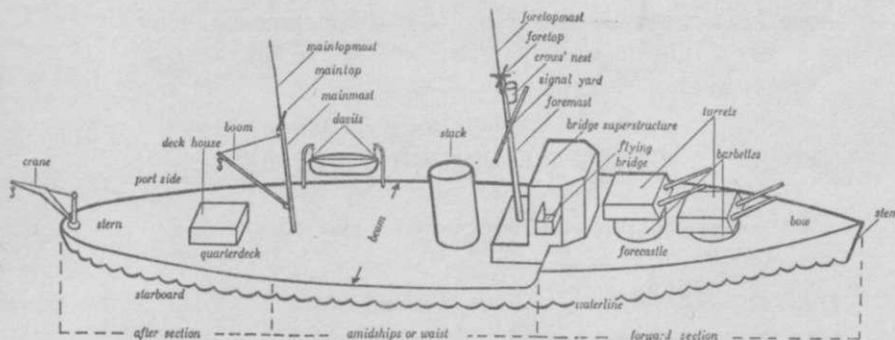
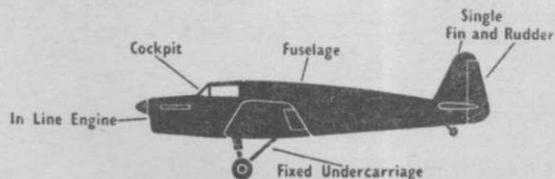
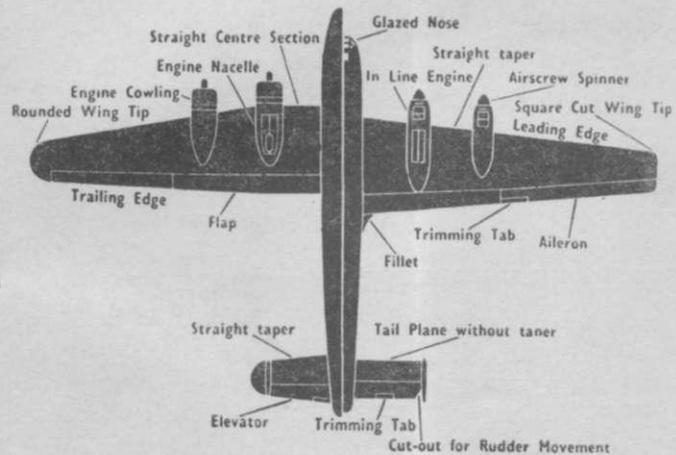
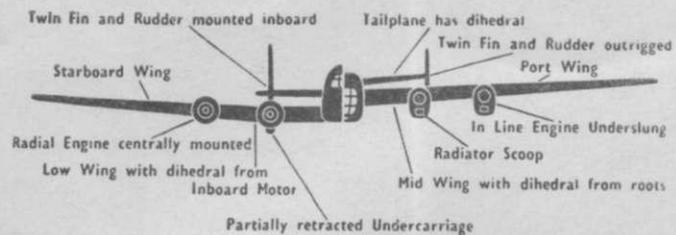
TURRET—A rotating mount enclosed by armor for guns of large calibre.

TWIN TURRET—A turret housing two guns.

TYPE—All vessels built or converted for the same purpose.

WEATHER DECK—Any deck exposed to weather.

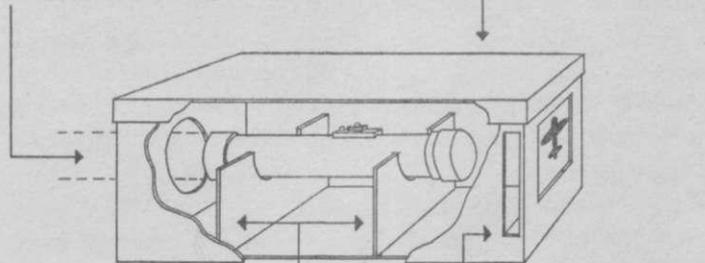
WELL—A lateral opening in a ship's hull or superstructure.



3. Nomenclature diagrams
Plane and Ship

SIZE OF IMAGE ON SCREEN
ADJUSTED BY MOVING FLASH-
LIGHT BACK AND FORTH
THROUGH OPENING

BEST RESULTS WITH
TOP OF BOX ON
DURING EXPOSURES

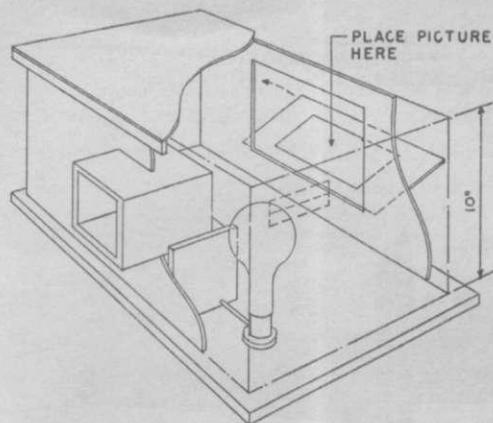


BULKHEADS TO
HOLD FLASHLIGHT

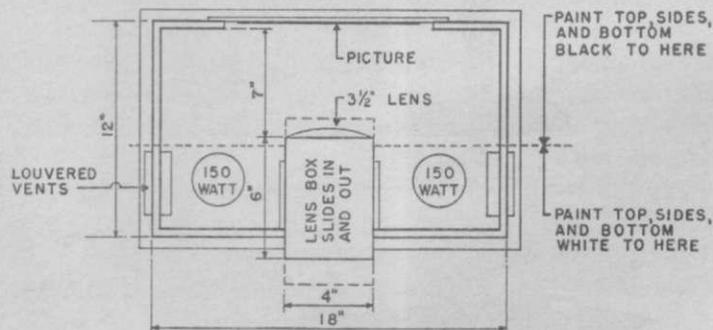
SLOT TO INSERT
SLIDE, TRANSPARENT
OR DRAWING

3" X 5" CARD FILE BOX OR SHOE BOX

DESIGN 1



DESIGN 2 A



PLAN VIEW

DESIGN 2 B

4. Designs for improvised projector

5. Specimen Plane and Ship Presentations

(a) Plane—F4F-4 Grumman "Wildcat".

A single-place carrier-based fighter. It is a single-engined mid-wing monoplane with a single fin and rudder and retractable landing gear.

The wing span is 38 feet 0 inches and the length is 29 feet 0 inches.

The F4F is the standard Navy shipboard fighter. It is the first Navy plane to embody land plane characteristics. The squared-off wing tips give the maximum area for the span and eliminate wing tip stall characteristics so that the pilot has absolute control landing. Like all Navy fighters, it emphasizes maneuverability as opposed to speed and fighting power. This is the plane used by Commander O'Hare when he shot down five Jap planes in one operation. The Wildcat is very sturdy. After running out of ammunition some pilots have rammed Zeros, cut a wing off their victim, and then returned safely to their carriers.

The F4F-4 is powered by one 9-cylinder Wright Cyclone R-1800-G205A, rated at 1,200 H. P. at takeoff and 1,000 H. P. at 12,500 feet. The maximum speed is 310 m. p. h. at 15,500 feet. The cruising speeds range between 200-260 m. p. h. depending upon the mission involved. The normal range is 925 miles at 210 m. p. h., which can be increased to 1,360 miles with two 50-gallon wing tanks. The initial rate of climb is 1,950 FPM, and the service ceiling is 27,000 feet.

The standard fighting armament is two .50 mg's in each wing, each firing 430 rounds. There is provision for an extra gun in each wing but these guns are not being mounted currently, in order to give increased ammunition to the present four guns. The F4F may also carry one fragmentation bomb under each wing.

Head on view.—The fuselage is round and barrel-shaped, surmounted by a tall, narrow cockpit cover. There is marked dihedral to the main plane which is thick in section. The tail plane is mounted low, and the rudder is just visible.

Plan view.—The nose is short and blunt. The main plane is stubby with slight taper on the leading edge, marked taper on the trailing edge, and square-cut tips. The fuselage is short and fat tapering to the tail plane which, in contrast to the main plane, has pronounced taper on the leading edge and slight taper on the trailing edge. Again the tips are square-cut and there is a wedge-shaped cutout for rudder movements.

Side view.—The nose is blunt. The fuselage is short and stubby. The top line is broken sharply by the cockpit cover; then there is marked taper to the base of the fin. The fin, which is faired into the fuselage, has considerable taper on the leading edge. The top is square-cut, and the trailing edge of the rudder is practically vertical. The bottom of the fuselage curves down as far as a point beneath the cockpit cover, and then sweeps up to the base of the rudder.

Summary.—Briefly the F4F is a single-seat radial-engined mid-wing monoplane. The main plane, tail plane, and fin and rudder are noticeable for their straight lines and square-cut appearance. The airplane is characterized by its thick-set, sturdy appearance.

(b) **Ship—South Dakota Class.**—There are four ships in the class—the "South Dakota," "Indiana," "Massachusetts," and "Alabama"—commissioned in 1942. These ships mark a new era in the design of United States capital ships and embody the spirit of the offensive.

The "South Dakotas" are 35,000 tonners, 680 feet overall and with beams of 108 feet. Their horsepower is given as 115,000 and their rated speed as 27 knots (actually destroyers are hard pushed to keep up with them at their actual top speed which is restricted). The main battery is made up of nine 16-inch guns. The secondary battery consists of twenty 5-inch guns, 2 to a turret. There are 10 such turrets, 5 to each side of the superstructure amidships. These guns, supported by others of smaller calibre, give tremendous antiaircraft fire power. It is reported that a ship of this class brought down, unaided, 32 out of 33 attacking Japanese dive-bombers.

Each ship carries three observation scout planes.

Silhouette.—The deck is flush and clean-looking fore and aft of the turrets. The superstructure is massed amidships. Noticeable is the cluttered tower foremast with several

platforms, with splinter screens attached at varying heights. There is a very short stick mainmast, just abaft the stack. There is a single, vertical and massive-looking stack close aft of the foremast. Its top is higher forward than it is aft. The secondary batteries are quite prominent, three turrets well above the deck, two close to the deck. The main turrets, two forward and one aft, are flat-looking.

Topside.—The deck is obviously flush, and narrows noticeably forward of the No. 2 turret. The deck is also clean-looking forward of the No. 1 turret and aft of the No. 3 turret. The three turrets, two forward and one aft, are very wide and flat-looking, with the guns widely spaced in them. The superstructure is concentrated amidships and banked each side by the secondary gun-turrets. The tower foremast looks cluttered, and the unusual streamlined single-stack is very noticeable just aft of the foremast. The circular splinter screens on the stern can be seen from a considerable distance.

Summary.—The "South Dakota" class of four ships is one of our newest and most effective classes of battleships. The ships are modern-looking, with massive but sleek lines. Remember them as flush-deckers, with the superstructure massed amidships, cluttered tower foremasts, large single stack, practically no mainmast, two flat turrets forward and one aft, and five secondary gun-turrets on each side of and outboard of the superstructure.

6. Outline of 120-Period Course for the Naval Aviation
Pilot Training Program

FLIGHT PREPARATORY SCHOOLS

[54 sessions—50 minutes each—3 sessions per week for 3
weeks and 5 sessions per week for 9 weeks]

SESSIONS

Week 1

1. Introductory Lecture.
2. Plane Nomenclature, Lecture I: Plane parts important in recognition.
3. Plane Nomenclature, Lecture II: Symbols, missions, names, manufacturers.

Week 2

4. Digits: 20 slides—15 minutes.
Counting: 15 slides—15 minutes.
Present: F4F, PBM—20 minutes.
5. Digits: 20 slides—15 minutes.
Counting: 15 slides—15 minutes.
Present: F4U, PBX—20 minutes.
6. Digits: 20 slides—15 minutes.
Present: F6F, PB2Y—20 minutes.
Slide Review: 15 slides—15 minutes.

Week 3

7. Lecture: Navy Air Organization—15 minutes.
Present: SBD, PV—20 minutes.
Slide Review: 20 slides—15 minutes.
8. Counting: 15 slides—15 minutes.
Present: SB2C—OS2U—20 minutes.
Slide Review: 20 slides—15 minutes.
9. Digits: 20 slides—15 minutes.
Present: TBF, SO3C—20 minutes.
Slide Review: 20 slides—15 minutes.

Week 4

10. Lecture: Army Air Forces—15 minutes.
Present: P38, B17—20 minutes.
Slide Review: 20 slides—15 minutes.
11. Review: Navy Planes—15 minutes.
Present: P39, B24—20 minutes.
Slide Review: 20 slides—15 minutes.
12. Tests: 30 slides; 20 questions—50 minutes. (Plane parts, symbols, names, etc.)
13. Counting: 15 slides—15 minutes.
Present: P40, B25—20 minutes.
Slide Review: 20 slides—15 minutes.
14. Digits: 20 slides—15 minutes.
Present: P47, B26—20 minutes.
Slide Review: 20 slides—15 minutes.

Week 5

15. Counting: 15 slides—15 minutes.
Present: P51, C46—20 minutes.
Slide Review: 20 slides—15 minutes.
16. Digits: 15 slides—12 minutes.
Present: A20, C47—18 minutes.
Slide Review: 25 slides—20 minutes.
17. Counting: 15 slides—15 minutes.
Present: A29, C54—20 minutes.
Slide Review: 20 slides—15 minutes.
18. Test: 30 slides; 20 questions—50 minutes (same as 12).
19. Digits: 20 slides—15 minutes.
Present: A30, C60—20 minutes.
Slide Review: 20 slides—15 minutes.

Week 6

20. Review: Army and Navy Planes—25 minutes.
Present: A31—10 minutes.
Slide review: 20 slides—15 minutes.
21. Ship nomenclature: Lecture I—Ship parts important in Recognition.
22. Ship nomenclature: Lecture II—United States Navy ships, symbols, missions, types.
23. Digits: 15 slides—12 minutes.
Counting: 10 slides—10 minutes.
Slide review: 30 slides—28 minutes. (Ships to be recognized by type only.)
24. Test: 40 plane slides; 20 ship slides—50 minutes (for type only).

Week 7

25. Lecture: CV's—15 minutes.
Present: "Essex" class, "Independence" class—20 minutes.
Slide review: 20 planes—15 minutes.
26. Present: "Enterprise," "Saratoga," "Ranger"—25 minutes.
Slide review: 20 planes; 10 ships—25 minutes.
27. Lecture: ACV's—15 minutes.
Present: "Bogue" class, "Sangamon" class, "Long Island-Charger" class—25 minutes.
Slide review: 10 ships—10 minutes.
28. Lecture: DD's—15 minutes.
Present: Old "Flush Deckers," "Farragut" class—15 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
29. Digits: 10 slides—8 minutes.
Present: "Mahan-Dunlap" classes, "Porter" class—17 minutes.
Slide review: 15 planes; 15 ships—25 minutes.

Week 8

30. Test: 20 plane slides; 15 ship slides—20 questions. (Ship parts, types, characteristics.)
31. Counting: 10 slides—10 minutes.
Present: "Gridley" (etc.) classes; "Somers" class—15 minutes.
Slide review: 15 planes; 15 ships—25 minutes.

32. Present: "Benson" (etc.) classes; "Fletcher" class; Destroyer Escorts (DE-1)—23 minutes.
Slide review: 15 planes; 15 ships—27 minutes.
33. Lecture: CL's—15 minutes.
Present: "Omaha" class, "Atlanta" class—20 minutes.
Slide review: 15 ships—15 minutes.
34. Present: "Brooklyn" class, "St. Louis" class, "Cleveland" class—25 minutes.
Slide review: 20 planes; 10 ships—25 minutes.

Week 9

35. Lecture: CA's—15 minutes.
Present: "Wichita" class, "Pensacola" class, "New Orleans" class—25 minutes.
Slide review: 10 ships—10 minutes.
36. Test: 20 plane slides; 15 ship slides—20 question. (Same as 30.)
37. Digits: 10 slides—8 minutes.
Present: "Northampton" class, "Portland" class—17 minutes.
Slide review: 20 planes; 10 ships—25 minutes.
38. Lecture: BB's—15 minutes.
Present: "Arkansas", "New York" class—20 minutes.
Slide review: 20 planes—15 minutes.
39. Review: CV's and ACV's—15 minutes.
Present: "Tennessee", "New Mexico" class—20 minutes.
Slide review: 15 ships—15 minutes.

Week 10

40. Review: DD's—15 minutes.
Present: "Pennsylvania", "Nevada"—20 minutes.
Slide review: 20 planes—15 minutes.
41. Review: CL's—15 minutes.
Present: "Colorado" class, "Iowa"—20 minutes.
Slide review: 15 ships—15 minutes.
42. Test: 30 plane slides—25 ship slides.
43. Counting: 15 slides—15 minutes.
Present: "North Carolina" class, "South Dakota" class—17 minutes.
Slide review: 10 planes; 10 ships—18 minutes.
44. Lecture: R. A. F.—15 minutes.
Present: Spitfire, Wellington, Sunderland—20 minutes.
Slide review: 15 ships—15 minutes.

Week 11

45. Review: BB's—10 minutes.
Present: Hurricane, Lancaster—20 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
46. Digits: 15 slides—12 minutes.
Present: Typhoon, Halifax—18 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
47. Present: Mosquito, Whitley—20 minutes.
Slide review: 20 planes; 15 ships—30 minutes.
48. Test: 30 plane slides—25 ship slides.
49. Present: Beaufighter, Stirling—20 minutes.
Slide review: 20 planes; 15 ships—30 minutes.

Week 12

50. Present: Beaufort, Blenheim—20 minutes.
Slide review: 20 planes; 15 ships—30 minutes.
51. Review: difficult planes—50 minutes.
52. Review: Difficult ships—50 minutes.
53. Exam: 60 plane slides—50 minutes.
54. Exam: 50 ship slides—50 minutes.

PRE-FLIGHT SCHOOLS

[33 sessions—60 minutes each—3 sessions per week—11 weeks]

SESSIONS

Week 1

1. Lecture: Scope of course at Pre-Flight—5 minutes.
Pre-Test: 30 planes; 30 ships—55 minutes.
2. Review: 60 minutes. Planes and ships most often missed in pre-test.
3. Review: 60 minutes. Planes and ships most often missed in pre-test.

Week 2

4. Lecture: British Fleet Air Arm—15 minutes.
Present: Fulmar, Albacore, Walrus—20 minutes.
Slide review: 20 planes; 10 ships—25 minutes.
5. Review: 15 minutes. Planes and ships most often missed in pre-test.
Present: Barracuda, Swordfish—20 minutes.

- Slide review: 10 planes; 20 ships—25 minutes.
6. Lecture: British Navy—15 minutes.
Test: 25 plane slides; 20 ship slides—45 minutes.

Week 3

7. Lecture: British CV's and ACV's—15 minutes.
Present: "Furious", "Illustrious" class—20 minutes.
Slide review: 20 planes; 10 ships—25 minutes.
8. Review: 15 minutes. Planes and ships most often missed in pre-test.
Present: "Battler" class, "Archer" class—20 minutes.
Slide review: 10 planes; 20 ships—25 minutes.
9. Test: 60 minutes. 30 plane slides; 30 ship slides—10 questions (Plane nomenclature).

Week 4

10. Lecture: British DD's—15 minutes.
Present: "Town" class, V-W classes, "Wairs"—25 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
11. Digits: 20 slides—15 minutes.
Present: A to I classes, "Wallace" (etc.) classes, "Tribal" class—25 minutes.
Slide review: 10 planes; 15 ships—20 minutes.
12. Present: K to N classes, O class, Hunt class—25 minutes.
Test: 20 planes; 20 ship slides—35 minutes.

Week 5

13. Counting: 15 slides—15 minutes.
Review: U. S. and British DD's—15 minutes.
Slide review: 20 planes; 15 ships—30 minutes.
14. Lecture: British CL's—15 minutes.
Present: "Fiji" class, "Dido" class (4 and 5 turrets),
"Southampton" class—25 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
15. Present "Leander" class, "Arethusa" class, "Hobart"—25 minutes.
Test: 20 plane slides; 20 ship slides—35 minutes.

Week 6

16. Digits: 20 slides—50 minutes.
Present: "Emerald" class, "Dragon" (etc.) classes
"Caledon" class—25 minutes.
Slide review: 10 planes; 15 ships—20 minutes.
17. Counting: 15 slides—15 minutes.
Review: United States and British CL's—15 minutes.
Slide review: 20 planes; 15 ships—30 minutes.
18. Test: 60 minutes. 30 plane slides; 30 ship slides—
10 questions. (Ship nomenclature.)

Week 7

19. Lecture: British CA's—15 minutes.
Present: "Devonshire" class, etc., "Cumberland"
etc., "Hawkins" class—25 minutes.

- Slide review: 10 planes; 15 ships—20 minutes.
20. Lecture: British BB's—15 minutes.
Present: "King George V" class, "Nelson" class,
"Renown"—25 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
21. Present: "Queen Elizabeth"—"Valiant", "War-
spite"—20 minutes.
Test: 25 plane slides; 20 ship slides—40 minutes.

Week 8

22. Digits: 20 slides—15 minutes.
Present: "Royal Sovereign" class, "Malaya"—20
minutes.
Slide review: 15 planes; 15 ships—25 minutes.
23. Lecture: Japanese Air Force—15 minutes.
Present: Zeke, Rufe, Mavis—25 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
24. Present: Nate, Topsy—20 minutes.
Test: 25 plane slides; 20 ship slides—40 minutes.

Week 9

25. Review: United States and British CA's—15 minutes.
Present: Hap, Betty, Kate—25 minutes.
Slide review: 10 planes; 15 ships—20 minutes.
26. Review: United States and British BB's—15 minutes.
Present: Oscar, Sally—20 minutes.
Slide review: 15 planes; 15 ships—25 minutes.

27. Present: Pete, Lily—20 minutes.
Test: 25 plane slides; 20 ship slides—40 minutes.

Week 10

28. Counting: 15 slides—15 minutes.
Present: Val, June, Dave—25 minutes.
Slide review: 15 planes; 10 ships—20 minutes.
29. Review: Difficult planes—30 minutes.
Slide review: 20 planes; 15 ships—30 minutes.
30. Test: 60 minutes.
30 plane slides; 25 ship slides—15 questions.
(Plane and ship nomenclature.)

Week 11

31. Review: Difficult ships—30 minutes.
Slide review: 20 ships; 15 planes—30 minutes.
32. Exam: 70 plane slides.
33. Exam: 60 plane slides.

PRIMARY SCHOOLS

[33 sessions—45 minutes each—3 sessions per week—11 weeks]

SESSIONS

Week 1

1. Lecture: Scope of course at primary—5 minutes.
Pre-Test: 20 plane slides; 20 ship slides—30 minutes.
Lecture: German Luftwaffe—10 minutes.

2. Review: 30 minutes. Planes and ships most often missed in pre-test.)
Present: Me 210, Ju 52—15 minutes.
3. Present: Me 109, FW 200 K—15 minutes.
Slide review: 30 planes; 20 ships—30 minutes.

Week 2

4. Review: 10 minutes. (Planes and ships missed in pre-test.)
Present: FW 190, Ju 90—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
5. Review: 10 minutes. (Planes and ships missed in pre-test.)
Present: Ju 87, He 177—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
6. Present: Ju 88, Do 217—15 minutes.
Test: 25 plane slides; 20 ship slides—30 minutes.

Week 3

7. Counting: 15 slides—10 minutes.
Present: Me 110, He 111—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
8. Lecture: German Navy—10 minutes.
Present: CV—"Graf Zeppelin", "BB-Scharnhorst", "Tirpitz"—20 minutes.
Slide review: 10 planes; 15 ships—15 minutes.
9. Lecture: German DD's—10 minutes.
Present: "Maasz" Class, "Narvik" Class, T-1 Class—15 minutes.

Test: 20 plane slides; 15 ship slides—20 minutes.

Week 4

10. Lecture: German CL's—10 minutes.
Present: "Koeln", "Nuernberg"—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
11. Lecture: German CA's—10 minutes.
Present: "Admiral Hipper", "Admiral Scheer"—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
12. Review: German planes—10 minutes.
Test: 25 plane slides; 25 ship slides—35 minutes.

Week 5

13. Lecture: Japanese Navy—10 minutes.
Present: CV-"Shohaku" Class, CVS-"Miszuho" Class—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
14. Lecture: Japanese DD's—10 minutes.
Present: "Mutsuki" (etc.) classes, "Fubuki" (etc.) classes—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
15. Present: "Shigure" class, "Asasashio" class, New one-stack class—15 minutes.
Test: 25 plane slides; 20 ship slides—30 minutes.

Week 6

16. Lecture: Japanese CL's—10 minutes.
Present: "Sendai" class, "Kuma-Natori" classes—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
17. Lecture: Japanese CA's—10 minutes.
Present: "Nachi" class, "Atago" class, "Mogami" class—20 minutes.
Slide review: 15 planes; 10 ships—15 minutes.
18. Counting: 15 slides—15 minutes.
Test: 25 plane slides; 20 ship slides—30 minutes.

Week 7

19. Lecture: Japanese BB's—10 minutes.
Present: "Kongo" class, "Ise"—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
20. Counting: 15 slides—10 minutes.
Present: "Fuso", "Nagato" class—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
21. Lecture: Italian Air Force—10 minutes.
Present: CR 42, Cant Z-1007 bis—15 minutes.
Test: 20 plane slides; 15 ship slides—20 minutes.

Week 8

22. Review: Japanese ships—10 minutes.
Present: MC 202, SM 82—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.

23. Counting: 15 slides—10 minutes.
Present: RE 2001, Cant Z-506b—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
24. Present: SM 79, SM 84—15 minutes.
Test: 25 plane slides; 20 ship slides—30 minutes.

Week 9

25. Lecture: Italian Navy—10 minutes.
Present: DD-"Turbine" class, "Navigatore" class—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
26. Review: Italian planes—10 minutes.
Present: "Spica" class, "Aviere" class—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
27. Lecture: Italian CA's—10 minutes.
Present: "Trento" class, "Bulzano"—15 minutes.
Test: 20 plane slides; 15 ship slides—20 minutes.

Week 10

28. Lecture: Italian CL's—10 minutes.
Present: "Montecuccoli" class, "Garibaldi" class, "Regolo" class—15 minutes.
Slide review: 15 planes; 15 ships—20 minutes.
29. Lecture: Italian BB's—10 minutes.
Present: "Cavour" class, "Littorio" class—15 minutes.
Slide review: 20 planes; 15 ships—20 minutes.

30. Review: Difficult planes—25 minutes.
Test: 20 plane slides; 15 ship slides—20 minutes.

Week 11

31. Review: Difficult planes and ships—45 minutes.
32. Exam: 70 planes.
33. Exam: 60 ships.

7. Coverage of Planes and Ships in 120-hour Syllabus for Naval Air Primary Training

(Based on Operational Lists)

Flight Preparatory

Planes:	A Group	B Group	
U. S. Navy.....	12—all	Omitted	
U. S. Army.....	17—all	Omitted	
British R. A. F.....	13—all	Omitted	
	42	0	42
Ships: U. S. Navy.....	23—all	14—all	37
			—
		Total units	79
			==

Pre-Flight

Planes:			
British Fleet Air Arm.....	5—all	None	
Japanese.....	15—all	Omitted	
	—	—	
	20	0	20
Ships: British Navy.....	20—all	14—all	34
			—
		Total units	54
			==

8. Sample Report Sheet Used in the U. S. Navy Recognition Training System

	Primary		
Planes:			
German.....	12 (Ju 288 omitted)	Omitted	
Italian.....	8—all	Omitted	
—	—	—	
	20	0	20
Ships:			
Japanese.....	16—all	Omitted	
German.....	10—all	Omitted	
Italian.....	11—all	Omitted	
—	—	—	
	37	0	37
			—
		Total units	57
			==
		Grand total	190

NOTE—Russian planes omitted entirely.

U. S. NAVY BUREAU OF AERONAUTICS DEPARTMENT OF RECOGNITION TRAINING		
	DATE _____ 194__	
	Base _____	
	Instructor _____	
Name _____	Hour _____	Series _____
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30

9. Explanation of Naval Aircraft Designations

In the Navy, plane types are designated by letters and numbers as follows: Table 1 gives the symbol for the plane type and table 2 for the Manufacturer.

Table 1.—Type Symbols

B—Bombing.	Z—Lighter than air.
F—Fighting.	A—Amphibian. ²
S—Scouting. ¹	G—Single-engine transport.
O—Observation.	R—Multi-engined transport.
T—Torpedo.	J—Utility.
P—Patrol.	X—Experimental.

Table 2.—Manufacturers' Symbols

A—Brewster.	M—Martin.
B—Boeing or Beech.	N—Naval Aircraft Factory.
C—Curtiss.	O—Lockheed.
D—Douglas.	P—Spartan.
E—Bellanca.	Q—Stinson.
F—Grumman.	R—Ryan.
G—Great Lakes.	S—Vought-Sikorsky.
H—Hall.	T—Northrup.
J—North American.	U—Vought-Sikorsky.
K—Fairchild.	W—Waco.
L—Bell.	Y—Consolidated.

¹ Planes with SB for the first two designation letters are Dive Bombers.

² The letter A designating amphibian is always placed at the end of the symbol. (PBY-5A designates Patrol Bomber, Consolidated, Fourth Modification, Amphibian, since PBY-1A would be the original.)

NOTE 1.—The first letter in a plane designation indicates the plane's primary mission. (TBF-Torpedo Bomber Grumman, indicates that the plane's main function is torpedo work but that it can also be used as a bomber.)

NOTE 2.—The letter V in front of the type indicates heavier than air. The letter Z in front of the type indicates lighter than air. These V and Z prefixes are only used when referring to general types.

Naval Aircraft symbols are put together in the following manner:

1. The first letter in a plane's designation is the **Primary Mission**.

2. There may be a second type letter to indicate a plane's **Secondary Mission**. (TBD indicates B as a secondary mission. In F4U there is no secondary mission.)

3. Where a number appears between the mission and maker's symbols it indicates the **Model** number of that particular plane. (SB2U means Scout Bomber, **Second Model**, Vought-Sikorsky, which means that **Major Changes** in design have been made between the SBU and SB2U.)

4. Where a number appears in a symbol at the end, after a dash (PBY-5), it indicates that the model described has had a **Minor Modification** and that the modification has not been severe enough to change the basic model. The number "1" is usually assumed on the original model, the number "2", therefore, indicates the **first** minor modification since the original. (A-5 would indicate the fourth minor modification of the original model.)

5. The method of combining these symbols is as follows: First letter—primary mission; second letter—secondary mission; next letter—the model number (if any); next—the manufacturer's symbol; and last—if there has been a modification not severe enough to change the model, there should be a dash followed by the number indicating the total minor modifications since the original model. (OS2U-2 means O—observation, primary mission; S—scouting, secondary mission; 2—second model; U—Vought-Sikorsky; 2—first modification of the OS2U model.)

The following table shows how plane designations are formed.

Mission		Model	Maker	Modification	Final symbol
Primary	Secondary				
T	B	.....	F	None	TBF
O	S	2	U	1	OS2U-2
P	B	2	Y	None	PB2Y
F	.....	4	F	None	F4F
P	B	.....	Y	4	PBY-5
J	R	.....	B	None	JRB-1
S	O	3	C	1	SO-23C

10. Explanation of Army Aircraft Designations

In the Army, planes are designated by letters indicating

the type of plane, followed by a number indicating the particular model of the plane, and then followed by a letter, indicating the modification of the basic model (such as P-40F). There is always a dash between the plane type letter and plane number. (B-17E.)

Model Designation of Army Aircraft

Designation	Type
A	Bomber (light bombers and attack planes, also dive bombers in this class).
B	Bomber (medium and heavy).
P	Pursuit (interceptor).
P	Pursuit (fighter).
O	Observation.
OA	Observation amphibian.
F	Army reconnaissance (photographic).
PT	Trainer (primary).
BT	Trainer (basic).
AT	Trainer (advanced).
C	Transport (cargo and personnel).
L	Liaison.

Miscellaneous

G	Autogiro.
CG	Glider (cargo).
TG	Glider (training).
R	Rotary wing.

In Army aircraft designations, manufacturers are not assigned the same identifying symbol for each plane they make that is accepted by the Army.

Instead, when a plane is accepted by the Army, it is assigned a type letter and a number (usually the next number above the last one issued to that particular type of plane, irrespective of who the manufacturer might be). To illustrate this, if the Bell Aircraft Factory submits a new fighter plane to the Army and its design is accepted, it is assigned the symbol of its type (P) and the next number above the one last assigned to an accepted type or fighter plane. (For example, if the last fighter accepted by the Army was the P-38, made by Lockheed, the new plane would be assigned the next higher number or 39. Thus, the symbol of the new Bell Army fighter plane would be P-39.) This is the basic model designation. As modifications to the basic model are made, letters are placed at the end of the symbol to show the number of modifications and indicate the plane described. The basic model is without a trailing letter (such as P-39), and the **first** modification will be the P-39A, the second modification becomes the P-39B, etc.

The following table shows how Army plane designations are formed:

Type	Number	Modification	Complete symbol
O-	47	A	O-47A
P-	40	F	P-40F
F-	2	.....	F-2
A-	20	A	A-20A
P-	47	.....	P-47
B-	17	E	B-17E

11. British, German, and Italian Aircraft Manufacturers

NOTE.—Japanese aircraft omitted because several manufacturers make the same model.

(1) British:

- Airspeed Ltd.
- Blackburn Aircraft Co.
- Boulton Paul Aircraft Co.
- DeHavilland Aircraft Co.
- Fairey Aviation Co.
- Handley Page Ltd.
- Phillips and Powis Ltd. (Miles Aircraft).
- Short Bros. Ltd. (associated with Pobjoy-Short and Short-Harland).
- Percival Aircraft Ltd.

Saunders—Roe Ltd.
 Vickers-Armstrong Ltd. (Supermarine).
 Westland Aircraft Ltd.
 Hawker-Siddley Ltd. (incorporating): Armstrong-Whitworth Aircraft; A. V. Roe Ltd. (Avro); Hawker Aircraft; Gloster Aircraft Ltd.; and Armstrong-Siddley Motors).
 Rolls-Royce Ltd.

NOTE.—This list gives the names of the better-known manufacturers. Although these manufacturers naturally give their own serial number to their products, once the aircraft goes into service use it is given a name. Frequently (but not invariably), this name is alliterative. For example the Hawker "Hurricane," Bristol "Beaufighter," or Short "Stirling."

(2) German:

Title	Abbreviation
Arado Flugzeugwerke.....	Ar
Blohm & Voss.....	Ha or Bv
Bucker Flugzeugbau.....	Bu
Dornier-Werke.....	Do
Gerhard Fieseler Werke.....	Fi
Focke-Wulf Flugzeugbau.....	Fw
Gothaer Waggonfabrik.....	Go
Ernst Heinkel Flugzeugwerke.....	He
Henschel Flugzeug-Werke.....	Hs
Junkers Flugzeug-und-Motorenwerke...	Ju

Messerschmitt A. G.....	Me
(Incorporating Bayerische Flugzeugwerke).....	
Argus Motoren Gesellschaft.....	
Bayerische Flugmotorenbau.....	B.M.W.
(Incorporating the B.M.W. Flugmotoren-Werke Brandenburg).....	Bramo
Daimler-Benz Aktiengesellschaft.....	D.B.

NOTE.—The titles of German aircraft are normally composed of the makers abbreviation letters plus a makers number. Examples, Ar 196, Ju 88, Do 218. Where additional letterings or numerals occur, as in Ju 88-A6 or Do 217-E2 these merely imply a modification of the type.

(3) Italian:

Title	Abbreviation
Costruzioni Aeronautiche Novaresi.....	C.A.N.S.A.
Cantieri Riuniti Dell'Adriato.....	CANT
Societa Italiana Caproni.....	Ca
The products of some of the companies controlled by Caproni appear under their own names, notably:	
Bergamaschi.....	
Caproni-Vizzola.....	
Reggiane.....	Re
Campini.....	

Isotta-Fraschini.....	
Aeronautica D'Italia S.A. (Fiat).....	FIAT
Aeronautica Macchi.....	Macchi
Societa Italiana Ernesto Breda.....	Breda
(Incorporating the Meridionali Co.)..	Ro
Societa Anonima Piaggio.....	P
Societa Italiana Aeroplani Idrovolanti	
"Savoia-Marchetti".....	S.M.
Societa Anonima Alfa-Romeo.....	Alfa

NOTE.—In many instances the initial of the designer is placed between the makers name and the serial number of the aircraft. For example, "Macchi C 202," where "C" stands for the designer, Castoldi; or again, "Fiat B.R. 30," where "B.R." stands for Bombardamento Rosatelli (Rosatelli Bomber).

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