CURRENT TACTICAL ORDERS
AIRCRAFT CARRIERS
U. S. FLEET

USF--77 (Revised)

PREPARED BY
COMMANDER AIRCRAFT BATTLE FORCE
MARCH--1941.

AIRCRAFT, BATTLE FORCE
Fleet Air Detachment
Naval Air Station
Pearl Harbor, T. H.
April 14, 1941.

From: Commander Aircraft, BATTLE FORCE.
To : Holders of USF—77.
Subject: Current Tactical Orders—Aircraft Carriers, U . S. Fleet, USF—77, revised.

1. This publication, Current Tactical Orders, Aircraft Carriers, U. S. Fleet (USF—77) was prepared by Commander Aircraft, Battle Force and issued in accordance with directives from the Commander-in-Chief, U. S. Fleet for the use and guidance of the fleet. It contains only orders and instructions and is designed for ready use on the bridge. All recommended changes in this publication shall be forwarded to Commander Aircraft, Battle Force. Suggestions for changes in revision are invited.

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W. F. HALSEY
Vice Admiral, U. S. Navy

UNITED STATES PACIFIC FLEET
FLAGSHIP OF COMMANDER AIRCRAFT, BATTLE FORCE

% Fleet Post Office,
Pearl Harbor, T. H.,
March 9, 1942.

CONFIDENTIAL

Change No. 1 to USF-77 (Revised)

From: Commander Aircraft, Battle Force.
To : Holders of USF-77 (Revised).

Subject: Change No. 1 to USF-77 (Revised).

1. Make the following changes to USF-77 (Revised):

(a) Insert this letter as page II(a) after page II.

(b) Make proper notation on "Correction page" when Change No. 1 is completely entered.

(c) Page VII, insert new line under "II Original Blank page" to read "II(a) Change No. 1 Change No. 1." Delete the lines commencing with "Figure 2" and "11-16" and substitute the following:

"Figure 2	Change No. 1	Reverse side is blank
Figure 2(a)	Change No. 1	Reverse side is blank
11-12	Change No. 1	Text
13-16	Original	Text."

(d) Page 13, paragraph 404(b)(7), lines 2 and 3, delete the words "and to gain a little altitude."

(e) Page 14, subparagraph 404(c) and (d), change to "(b)" and "(c)" respectively.

(f) Delete and destroy by burning without report present Figure TWO (following page 10) and pages 11 and 12, and insert new Figures 2 and 2(a) and new pages 11 and 12.

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3. The methods of transportation authorized for this publication are prescribed in the Navy Regulations and the Registered Publication Manual.

4. It is not intended that this publication be carried in aircraft for use therein.

5. When not in use and until entered in USF-77 (Revised) this change is assigned Class C stowage.

W. F. HALSEY,
Vice Admiral, U.S.N.

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CHAPTER I

RESPONSIBILITY OF TASK FORCE, TASK GROUP COMMANDERS AND CARRIER COMMANDING OFFICERS

101. Everyone in a Task Group is subject directly to the orders of the Task Group Commander, although normally orders will be issued via the chain of command. Task Group Commanders are subject directly to the orders of the Task Force Commanders who created them. There is no intermediate authority in the chain of command between a Task Force Commander and Task Group Commanders. Carrier commanders will be informed of all orders issued by a Task Force Commander to Task Group Commanders embarked on their carriers.

102. The leader of a flight of aircraft units in the air, and engaged in the same mission, is responsible for the tactical disposition, coordination of movements, and the safe navigation of the flight as a whole.

103. Commanding officers of carriers are responsible for:

(a) The preparation of aircraft units for their mission, including the dissemination to them of necessary information and orders, their servicing and arming, their state of readiness, and the spotting of the flight deck.

(b) The launching and recovery of aircraft, and for informing the next senior in chain of command of launching and recovery.

(c) Maintaining communication with attached aircraft while in the air.

(d) Issuing orders to airplanes as to time of return based on fuel consumption.

(e) Maintaining records of position of attached aircraft while in the air; of informing them as to changed rendezvous conditions; and for the operation of measures designed to safeguard their flight, including the homing of lost planes.

(f) Defense of the carrier group through maneuver and gunfire, when not in division formation.

104. Commanding officers of other aircraft vessels or shore bases will be responsible for similar features, unless otherwise specifically provided for by the Type Instructions or orders of the Task Force Commander.

CHAPTER II

OPERATING INSTRUCTIONS TO CARRIERS, PLANE GUARDS AND OTHER VESSELS COMPRISING A CARRIER GROUP.

201. Standard Distance for aircraft carriers is 1,000 yards. Standard Interval equals the number of carriers in the unit (section or division) next toward the guide times the standard distance.

202. Full Speed for aircraft carriers is 5 knots greater than standard; if existing orders as to steam or engineering installations have set a limit less than 5 knots greater than standard speed, then full speed shall be the prescribed speed as so limited.

203. Flank Speed for aircraft carriers is 10 knots greater than standard; if existing orders as to steam or engineering installations have set a limit less than 10 knots greater than standard, then flank speed shall be the prescribed speed as so limited.

204. Standard Tactical Diameter for aircraft carriers is 1,000 yards; for Lexington and Saratoga, 2,000 yards. When in formation with Lexington or Saratoga all units will use 2,000 yard tactical diameter.

205. (a) Suitable flying stations of carriers within U. S. Fleet Dispositions depend on the direction and force of the wind, probable future movements of the Main Body, the direction of the enemy, the probable length of the time to be consumed in prospective launching or recovery operations, and especially, upon keeping carriers within gun protection of the disposition as long as possible during flight operations.

(b) When in a Fleet cruising disposition and flight operations are contemplated, carriers will normally be maintained in formation in an area suitable for launching, (ordinarily in an area to the leeward side of the disposition), and will be sent to flying stations in time to turn into the wind and make ready (as to speed, etc.) by the time set for launching planes.

(c) After launching, carriers will promptly return to the fleet disposition, but will ordinarily not return to division formation while planes are in the air, but will close the carrier flagship to within easy visual signal distance (about 3,000 yards). When the objective of the carrier air groups for air attack exercises is own or other carriers, these carriers will maintain their flying positions instead of closing the carrier flagship(s).

(d) When not placed in stations for operating aircraft, Carrier Divisions in Fleet Dispositions will occupy positions as prescribed by USF—10.

(e) When making turns to go to flying stations and when turning into (or out of) the wind, carriers shall indicate direction of turn by whistle signal, by day as well as by night.

206. IT IS IMPORTANT THAT CARRIERS EMPLOY MINIMUM SAFE WIND OVER DECK FOR LAUNCHING AND LANDING PLANES TO AVOID GAINING DISTANCE AWAY FROM FLEET DISPOSITION OR IN OTHER UNFAVORABLE DIRECTION. In this connection, 30 knots of wind should suffice for launching and 26 knots for landing.

207. The general plan of the provisions for conducting the flight operations of a number of carriers and of their air groups in company is premised on the application of the sector principle wherein the sectors are duly oriented to a reference direction. There are 2 phases involved:—

(a) The deployment of carriers to flying stations when they are required to be operated within or in proximity to a fleet disposition, or otherwise in company;

(b) The corresponding operation of carrier air groups when launched and while operating in proximity to the carriers.

208. The reference direction, the sectors assigned to the several carriers and their air groups, and the stations assigned as flying stations remain the same until the carriers are again

assembled in a close formation with all planes on board. They require close attention at all times in order to avoid confusion and delay and "lost motion."

209. The reference direction is:—

(a) The Fleet Axis or, if none:—

(b) The Base (Fleet) Course or, if none,

(c) The last signalled course

or

(d) A designated reference direction. IT IS DESIRABLE THAT THE REFERENCE DIRECTION BE SIGNALLED TO AVOID CONFUSION.

NOTE:— General signals are provided in SOPUS section of General Signal Book.

210. (a) Sectors of 60°, 90°, 120°, or 180° are prescribed with the several parent carriers as origins for their respective air groups, and are duly oriented to the reference direction. (See sketches in Figure 1 and 1 (a).)

(b) They extend outward and upward as far as may be required to enable air groups (squadrons) to operate effectively.

(c) The sectors so prescribed are the limits within which:—

(1) the initial assemblies (rendezvous) of air groups shall take place;

(2) air groups are to conduct their operations while in the vicinity of their parent carriers;

and

(3) simulated or practice attacks on parent (or other carriers designated) may be conducted.

211. (a) Standard separation of carriers for flying stations is 3 miles while launching or landing planes. Because of the number of carriers involved, the requirements for visual signalling, etc., separation greater than 4 miles will not be taken except when particular circumstances clearly require it; as in low visibility.

(b) The most compact disposition of 3 carriers is an equilateral triangle with sides 3 miles each.

(c) When air group attack exercises are to be conducted on targets towed by carriers in flying stations, the carriers take and keep 4 miles separation but only while such exercises are in progress.

212. (a) For 2 divisions of carriers, each is assigned a semi-circle; the right (leading) division to the right, the left (rear) division to the left, of lines parallel to the reference direction and separated by 3 miles. (Sketches C, D, E; Figures 1 and 1(a).)

(1) When the number of ships present in the division is 3 the sectors assigned are 60°.

(2) When there are but 2 ships in a division, the sectors are 90°.

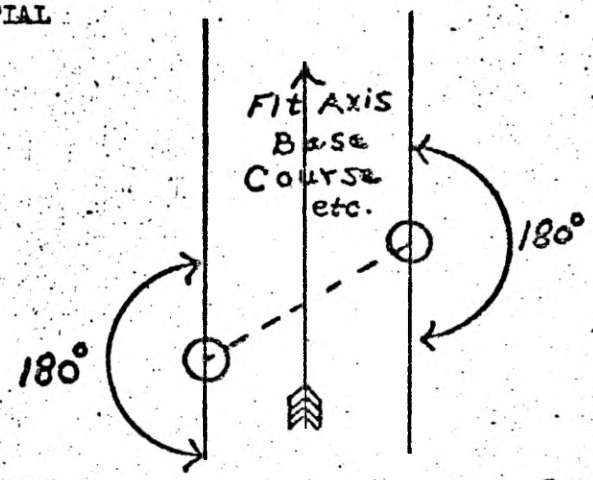
(b) For one division of carriers, if the number of ships is 2, the sectors assigned are the semi-circles as for 2 divisions in sub-paragraph (a) above; if the number of ships is 3 the sector assignment is sectors of 120° (Sketches A, B; Figure 1.)

(c) When three (3) carriers are present, whether assigned to the same division or not, they will normally maneuver tactically as one division for the purpose of launching or recovery.

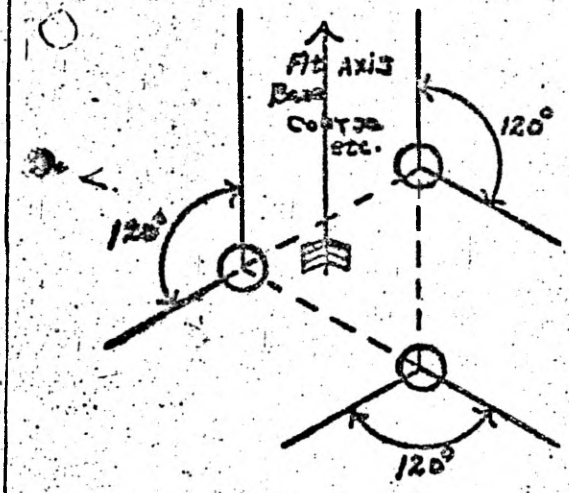
(d) A circle of 1 mile radius about each carrier is included in its sector area.

(e) The panels (3 miles wide) between adjacent sectors that result from compliance with the required separation of carriers afford a safety factor for the operations of adjoining air groups.

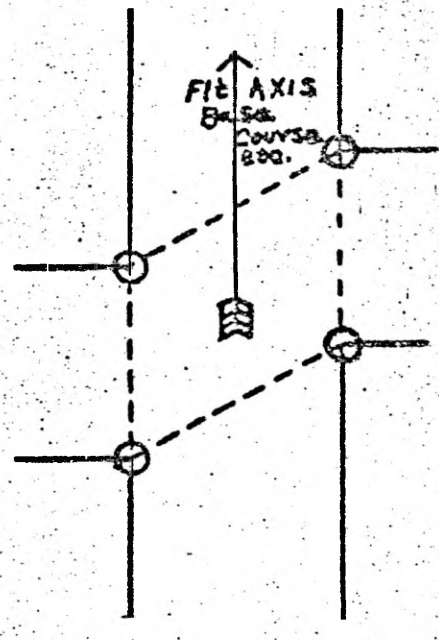
SKETCH A
TWO SHIPS



SKETCH B
THREE SHIPS



SKETCH C
FOUR SHIPS

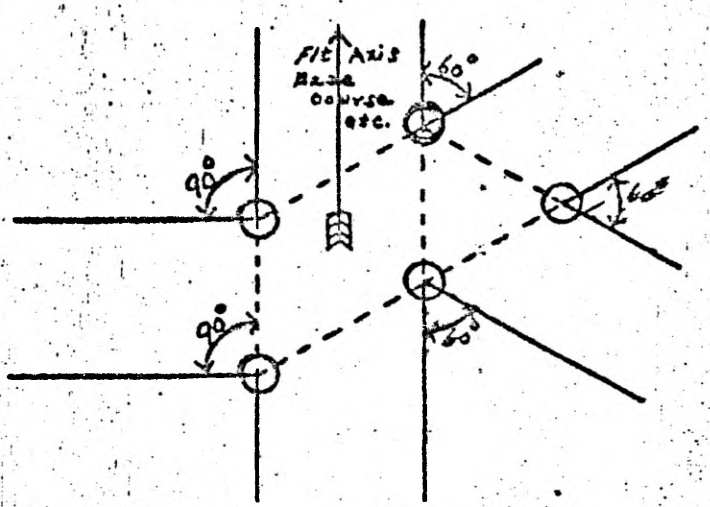


NOTE:-

ALL SEPARATIONS ARE 3 MILES

FIG. 1 (Illustrating paragraphs 210-214)

SKETCH D
FIVE SHIPS



SKETCH E
SIX SHIPS

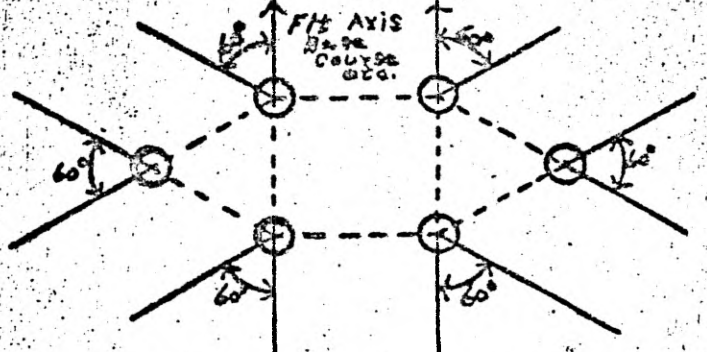


FIG. 1(a). (Illustrating paragraphs 210-214)

(f) The Carrier Group Commander should, whenever practicable, put the carrier formation on a course approximately the same as the reference direction before deploying to flying stations.

213. When more than 6 carriers are required to be operated in company, it becomes advisable to dispose them in 2 groups separated as circumstances permit - e.g. - on opposite flanks of fleet disposition - to a distance which should be of the order of 8 to 10 miles. Consequent to such separation into 2 groups, carrier operations can readily be conducted by the arrangements set forth above.

214. (a) The practical application of the foregoing paragraphs is to be effected by ships except the guide turning and proceeding promptly in the direction of their respective sectors and so, in general, to flying stations the relative location and minimum separation of which would, for example, be in accordance with the diagrams 1 and 1(a), figures A, B, C, D, and E.

(b) If, when turned into the wind to launch planes, it is found that other carriers are thus brought to bear ahead (or nearly so), those carriers which are thus astern may shift position to left (right) so as to bring about a clearance of about 1 mile but not to interfere with other carriers nor to decrease the required 3-mile separation; hence usually the shift will be required to be outboard.

(c) It is essential that carriers give constant attention to *maintaining their initial* flying stations relative to each other in order to avoid interference and consequent confusion among air groups.

215. (a) The carrier guide for these evolutions is normally the existing guide, as when that general signal is made which reads only:— "proceed to flying stations."

(b) When a guide other than the existing guide is to be used for these evolutions (as when it is desired to place the carriers as a whole in an advantageous position relative to the fleet disposition, a screen, the true wind, etc.), that general signal which includes "SOPUS" and reads in part "proceed to flying stations" will be used, as follows:— The numeral shown as the last flag of the signal indicates the guide and is the official CV number of the carrier, as 2 - LEXINGTON, 5 -YORKTOWN, etc.

(c) Emergency deployment, when required, will be indicated by showing the numeral (designating the guide) as the first flag of the signal. As soon as the signal is understood (without waiting for it to be hauled down) the guide will at once turn into the wind and begin launching, other ships turn and begin launching as soon as each has reached its proper relative flying station.

216. None of the provisions in the foregoing basic changes - or in the changes premised on them - are to be considered obligatory to the extent of rigid adherence to them in circumstances where sound judgement clearly requires their modification for the time being; as in poor visibility, low ceiling, night operations, or other compelling conditions.

217. Daily before dark at sea (when communication restrictions permit) carriers will report to the Task Force or Task Group Commander the available strength of each squadron, status of other aircraft, and the order of spot.

218. Whenever communication restrictions permit, carriers will immediately inform the Task Force or Task Group Commander of(1), strength, mission, and time of takeoff of each flight, and (2), the return of each flight, together with the results attained and the information gathered, unless such information has been previously supplied.

219. Carriers will avoid coming under gunfire from enemy vessels UNLESS their flight decks are already so damaged as to prevent aircraft operations until after return to port for repairs.

220. Except at night, and when launching and recovering aircraft, carriers will zigzag whenever the presence of enemy submarines is suspected. When in formation, the plan of zigzag will be prescribed by the division commander.

221. In order to maintain concentration, supporting cruisers shall be warned as to prospective changes of course and speed of carriers whenever possible. In case carriers become separated, the cruiser commander will be expected to detach cruisers to guard separate groups. Cruisers screening an aircraft carrier should normally remain concentrated on flank from which attack is most probable, prepared to interpose themselves between the carrier screened and attacking enemy ships.

222. (a) Plane Guards are under the orders of the carrier commanding officer only when carriers are operating singly or are in flying station; at all other times they are under the Command of the Carrier Division Commander.

(b) The senior Destroyer Officer in the Plane Guards is expected to be in readiness to take charge of and to operate the plane guards as a destroyer division if so directed.

(c) When launching and recovery operations are not actually in progress plane guards will normally be placed in anti-submarine screen, or sometimes close anti-aircraft screen, depending upon the probability of attack from either source. When carriers are not operating within a fleet disposition at night, plane guards may be placed in an anti-submarine or anti-destroyer screen.

(d) Attention is invited to the Typical Inner Anti-Submarine screens, Diagram No. 43, F. T. P. 188, and to other screens which may be effectively employed for suitable purposes. Consideration must be also given to the employment of some of the plane guards (always leaving at least one plane guard with each carrier) for protection in the direction of most probable attack, i. e., between the carrier(s) and most likely bearing of enemy surface forces. This may be particularly effective in the absence of aircraft pickets or combat air patrol and especially while launching or recovery operations are in progress. The Plane Guards so assigned should be in readiness to lay smoke to cover the retirement of the carrier(s) if necessary.

(e) Destroyers must be on the alert at all times to conform to the needs of the situation without waiting to be told where to go and what to do, thus enabling the number of signals to be kept to the minimum.

(f) The signal "take flying stations" in whatever form and however addressed calls for destroyers to accompany the carriers to which they are assigned without further signal. They will continue the appropriate screening or other stations relative to their respective carriers until carriers hoist the "two ball" signal at the dip when they shall be prompt to take plane guard stations and 8 P.M. 1341 to remain in such stations until the "two ball" signal is hauled down, when they shall resume the appropriate screening or other stations. When the carriers resume stations in formation, destroyers shall, without signal, resume their previous screening or other stations with reference to the formation which is taken up.

(g) Destroyers will also accompany their assigned carrier when she becomes separated from the formation for any cause, such as, breakdown or special orders.

223. PLANE GUARD DESTROYER FORMATIONS.

(1) Plane Guard Destroyer Formation No. 1—Flight stations:

(a) DAY OPERATIONS.

Form Plane Guard Formation Number One—(Day Operations).

Signal: "FORM EASY FOUR TACK ONE DOG."

Destroyer No. One (Senior)—in relative sector 175° to 185° from carrier and distant 1000 yards astern.

Destroyer No. Two (Next Senior)— 10° on the starboard quarter of carrier and distant 500 yards from the stern. When only one destroyer is available this station shall be manned.

Destroyer No. Three (Junior) (if assigned)—500 yards astern of Destroyer No. One.

(b) NIGHT OPERATIONS.

Form Plane Guard Formation Number One—(Night Operations).

Signal: "FORM EASY FOUR TACK ONE NEGAT."

Destroyer No. One—In the relative sector 350° to 0° from the carrier and distant 2000 to 4000 yards ahead.

Destroyer No. Two—Same position as prescribed for day operations.

Destroyer No. Three (If assigned)—On port beam of carrier and distant 2000 yards therefrom.

(c) CARRIER MOVING ASTERN.

When the bow arresting gear is used with the carrier moving astern, corresponding relative positions will be taken, considering the bow of the carrier as the stern.

(2) Plane Guard Destroyer Formation No. 2—High Visibility Cruising Stations or close Anti-Aircraft Screening Formation—Day or Night (See Article 224(f)—Joining Up).

(a) Destroyer No. One (Senior)—15° abaft port beam of carrier and distant 750 yards. (If only two destroyers are assigned, this vessel will occupy the station assigned to Destroyer No. Three).

Destroyer No. Two—45° on starboard quarter of carrier and distant 1000 yards.

Destroyer No. Three—45° on port quarter of carrier and distant 1000 yards.

(b) When changes of course are made by column movement the destroyers will regain the prescribed relative bearings expeditiously. Destroyers of the inside column will avoid, however, cutting in toward the carrier column. Changes of course by turn movement will be made by signal and true bearings will be maintained. Plane Guards in this formation will maneuver to keep clear of carriers if "Proceed to Flying Stations" is signaled, and also when carriers are maneuvering to join up in division column.

(3) Plane Guard Destroyer Formation No. 3—Low visibility Cruising Stations—Day or Night.

Under conditions of bad visibility, when ordered, plane guard destroyers will form column astern of last carrier.

224. PLANE GUARD SPECIAL LIGHTS.

During night flight operations, unless otherwise directed, plane guards in Formation Number One (night), will abide by the follcwing instructions:

(a) Destroyer No. One will display her usual navigational lights and when directed prior to launching, will turn on a searchlight trained horizontally on the beam away from the direction of probable attack or enemy forces. If no such danger exists this light shall be trained on the port beam.
Every effort should be made to keep this light trained horizontally as it serves to create a "false horizon."

(b) Destroyer No. Two will display her usual lights. Proper station keeping is essential inasmuch as the destroyer serves as a guide to the pilot in entering the groove and in judging his altitude, and as a reference mark to the Landing Signal Officer in judging the altitude of incoming planes.

(c) Destroyer No. Three will display her usual lights.

(d) Destroyer searchlights shall be kept manned and current turned on up to the light whenever airplanes are in the vicinity. In case of forced landings, searchlights shall be turned on promptly and the water illuminated well ahead of the plane in trouble; searchlight beams shall never be trained on airplanes unless they have already landed in the water.

225. The use of lights by carriers and by vessels in company with them will be held to the minimum both by day and by night. This applies especially to the use of flashing lights for signalling which, from the great distance they can be seen by day or night, may well serve to reveal the presence of carriers (or other vessels) when it is desired to avoid being located. Escort or other vessels in company may expect to be used as linking vessels to relay visual signals.

226. PLANE GUARD SPECIAL LOOKOUT.

When planes are in the air, destroyers shall maintain at least four special lookouts, assigned to lookout sectors, whose duty it shall be to watch all airplanes in their sectors, and to report forced landings or Very's stars fired (day or night) from any airplane.

227. CRASH AND SALVAGE OF DAMAGED PLANE.

When a plane lands in the water in the vicinity of the carrier, the carrier will sound the danger signal on whistle. During day or night operations, the destroyer NEAREST to the crashed plane shall stop and rescue personnel and stand by the plane until otherwise directed. The destroyer picking up personnel shall make immediate report of the fact to the carrier including injuries if any. The other destroyer(s) shall continue with carrier.

CHAPTER III

AIRCRAFT CARRIERS AND ATTACHED SQUADRONS

301. During war cruising, all ship-based airplanes and all shore-based airplanes in the vicinity of possible enemy activities shall constantly be kept fully armed and serviced for the most probable combat situation, except when undergoing checking or overhaul; checking will be so scheduled as to withdraw a minimum number of airplanes from any one squadron at one time, and when possible performed in the hangar during the night.

302. Airplanes may be ordered to assume a condition of readiness irrespective of that under which the parent vessel operates. Under the prescribed conditions airplanes and necessary personnel will be maintained as indicated below:—

(a) Condition 1—Airplanes kept warmed up. Flight personnel in flight clothing, in possession of latest available information of the tactical situation. Personnel and equipment ready to permit launching on ten minutes notice.

(b) Condition 2—Personnel and equipment in readiness to permit launching on twenty minutes notice.

(c) Condition 3—Personnel and equipment in readiness to permit launching on thirty minutes notice.

303. The general conditions of readiness for action during war prescribed by article 802, "War Instructions, U. S. Navy," apply to aircraft and aircraft carriers, together with the variations set forth in this chapter. Since the circumstances affecting the various carriers of an Aircraft Task Force may differ considerably, commanding officers are responsible for prescribing the condition that will be assumed by his flight deck and his vessel as a whole, and the order of spot of airplanes that will best insure compliance with orders and the needs of the tactical situation. When communication conditions permit, carriers will keep the next superior tactical commander informed as to the condition actually existing with respect to the flight deck.

304. During war cruising, unless otherwise instructed by superior authority, sufficient boiler power and engine power shall be kept in use in carriers and supporting vessels to permit launching within the time required under the various conditions of readiness.

305. Carriers have nine conditions of readiness for action:—

(a) Conditions 1, 2 and 3 refer to both ship and airplanes, and are defined in "War Instructions."

(b) Conditions 11, 12, and 13 refer only to airplanes and flight deck, and correspond to the definitions of Conditions 1, 2, and 3 respectively.

(c) Conditions 21, 22, and 23 refer to the ship and battery only and have no reference to airplanes; they correspond with this limitation to the definitions of Conditions 1, 2, and 3 respectively. When Conditions 21, 22, or 23 are prescribed, aircraft operations of any kind are not to be expected.

At times it will be found desirable to prescribe one condition of readiness for ship and battery and a different condition for airplanes and flight deck. Different conditions of readiness may also be prescribed for different squadrons, or other units of airplanes on the same vessel, depending on the requirements or circumstances.

306. Airplanes in Condition 1 or 11 will be kept warmed up and spotted, with plane crews at hand and ready, and the flight deck manned sufficiently for immediate takeoff. Air control Stations concerned will be completely manned and pilots of airplanes in Conditions 1 or 11, dressed for flight and in the Ready Room prepared to receive final orders; they will keep themselves fully informed of the existing tactical situation; the location of own fleet; weather conditions and probable position of the carrier rendezvous. Except for intricate and distant missions it should be possible from Conditions 1 or 11 to begin launching within ten minutes; for local missions such as attacking nearby enemy it should be possible to launch the first planes in materially less than ten minutes or as soon as the ship has attained the necessary launching speed.

307. Airplanes in Conditions 2 or 12 should be on deck, spotted for take-off, engine and cockpit covers off, and ready for flight, but engines are not required to be kept warmed up. Pilots, plane crews, and deck crews may be below decks and need not be dressed in flight clothes, but shall be ready for call over the loud speaker system. Pilots should be familiar with the tactical situation and other general conditions. Air Plot should be fully operative and all necessary Air Control communications manned.

308. Airplanes in Conditions 3 or 13 may have engine and cockpit covers on, have wings folded, and be either on the flight or hangar deck; it should be possible to prepare them for flight within about thirty minutes. Pilots and plane crews may be below decks and turned in, but their whereabouts must be known to their squadron commander or his designated representative. Air Plot should be partially manned, and talkers stationed on the more important Air Department telephones. Unless night launching is contemplated, Condition 13 will ordinarily be maintained during the night.

309. If Condition 1, 2, 11 or 12 is prescribed, and it is necessary to recover airplanes, the flight deck must be respotted for take-off promptly upon completion of recovery.

310. When in contact with important enemy forces, or if such contact appears possible:

(a) Condition 1 will be assumed, and all airplanes made ready for take-off by one half-hour before sunrise; a different condition may be assumed after sunrise when circumstances warrant it.

(b) Condition 1 will be assumed from one-half hour before sunset until dark.

311. When in contact only with enemy light forces, one of the carriers may be assigned as the Duty Carrier, and the others as the Relief Carriers. The service to be expected of the Duty and Relief Carriers will be specified in the operation order or by appropriate signal. Relief Carriers should be permitted to operate at low boiler power if practicable, and in Condition 3, in order to save fuel and to rest personnel.

312. The carrier shall furnish all carrier pilots with such of the following information as is available before take-off:—

(a) General tactical situation: Composition, disposition, course, speed and probable movements of own forces in the area; position, composition, disposition, and estimated intentions of enemy forces in the area; position of neutral vessels.

(b) The mission.

(c) Special orders for the flight.

(d) Detailed instructions regarding the intelligence and communication plan for aircraft, including recognition signals.

(e) Position of carrier, geographically and with reference to POINT OPTION and the course and speed of POINT OPTION.

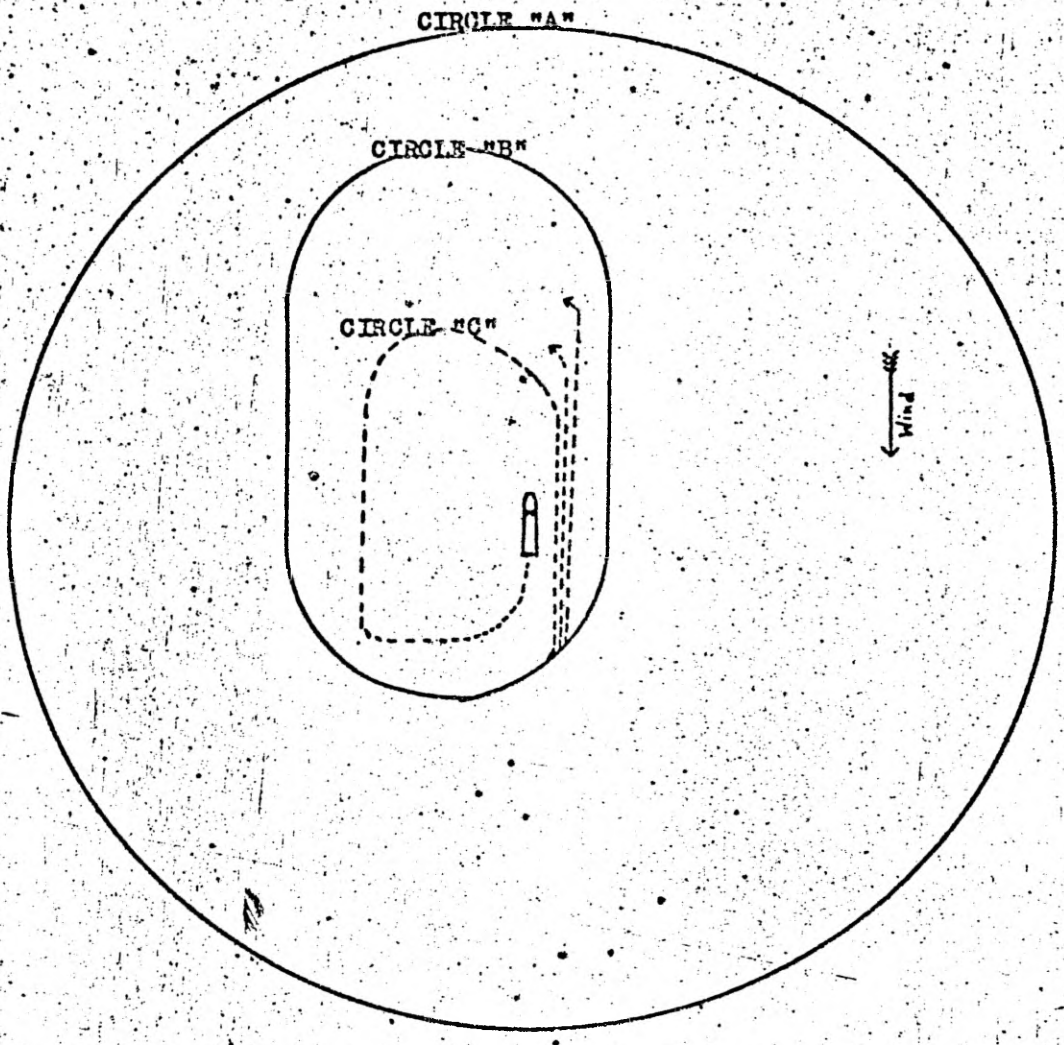
(f) Required time of return to carrier or base, based on existing rules as to fuel reserve.

(g) Rendezvous with carrier. Time and position with respect to POINT OPTION or with reference to a geographical position.

(h) Bearing and distance of nearest land if in the vicinity.

R.P.M. 1341 (i) Latest meteorological data with forecast. Planes in the air shall be notified of changes in the above data when such notification is necessary for the success of the mission or the safe return of the planes.

THE LANDING CIRCLE



CIRCLE "A": Group break-up circle above 1500 feet.
CIRCLE "B": Squadron break-up circle from 1000 to 500 feet.
CIRCLE "C": Approach circle from 300 to 100 feet.

FIGURE 2

THE APPROACH CIRCLE

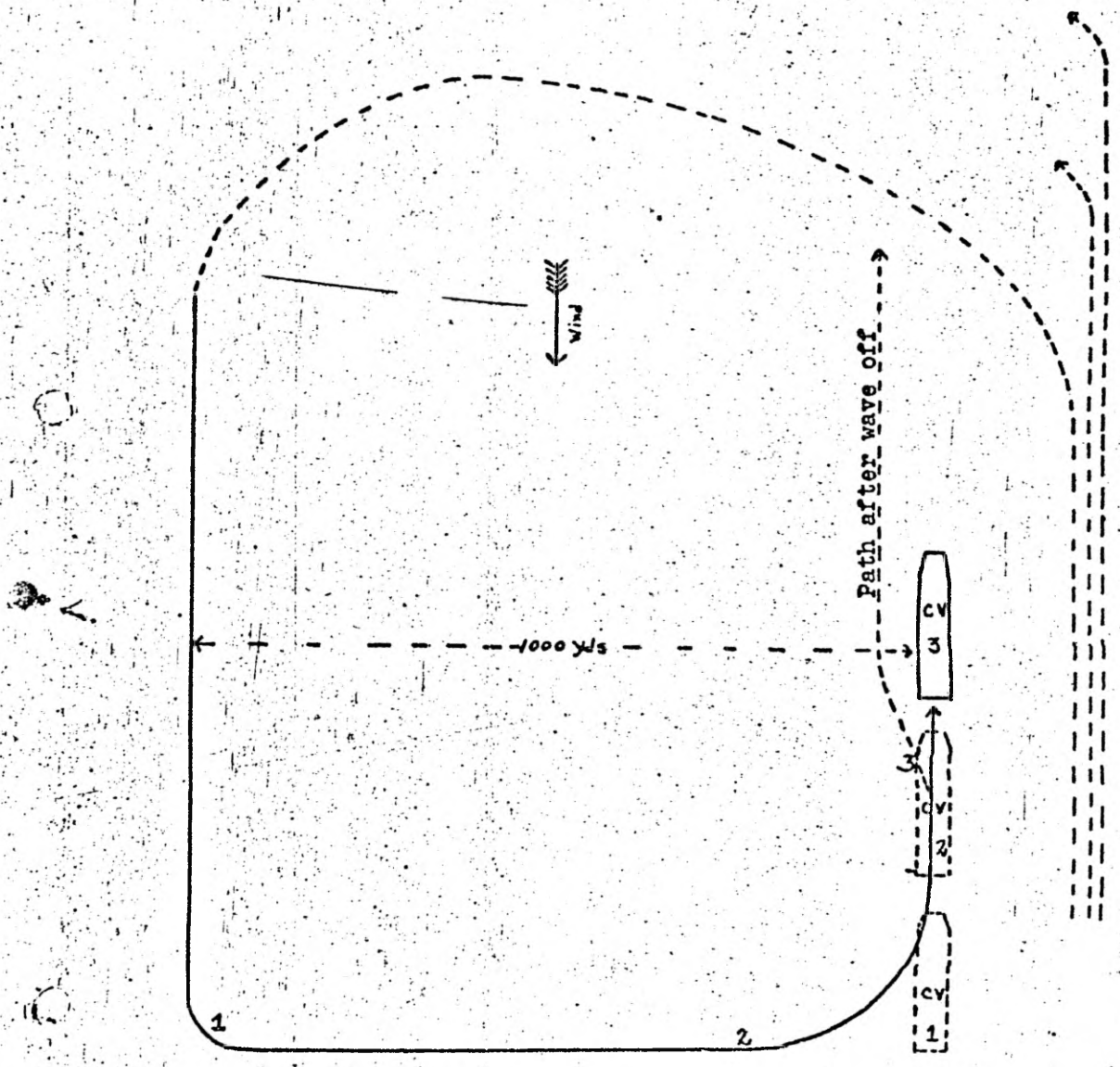


FIGURE 2(a)

CHAPTER IV

DAY CARRIER PROCEDURE

INTRODUCTION

401. The following instructions contain, for ready reference, certain existing orders, the latest carrier procedure, and the best squadron doctrine with the purpose of presenting as a whole the problem of landing aboard and taking off from the carrier. The procedure has been explained and amplified as necessary to promote uniformity in the squadrons and primarily to aid the new pilot reporting to a carrier squadron.

SQUADRON BREAK-UP

402. (a) Squadrons on returning to the carrier take position with the group in the "Group Break-up Circle" as shown in Figure 2. The squadron receiving a "Cast" or designated to land first, proceeds directly to the "Squadron Break up Circle." This circle conforms roughly to an ellipse whose axis is parallel to and on the port side of the carrier, and extends from the plane guard destroyers to such distance ahead of the carrier as allows comfortable turns. The level of this circle extends from 500 - 1000 feet. Upon arriving in the "Squadron Break-up Circle" all pilots accomplish the operations of the routine check off list. The procedure for lowering and checking hooks and landing gear and for placing sections in right echelon preparatory to landing shall be prescribed by each squadron. This latitude is permitted because of the wide variation in types of planes and installations. Immediately after the squadron break up signal is given, the first section proceeds to the "Approach Circle," breaks up from right echelon and begins landing aboard. The approach circle extends from forward of the plane guard destroyer to such distance ahead of the carrier as will permit the correct spacing of from three to six planes. The level of this circle is 300-100 feet. In the approach circle are those planes actually maneuvering to land aboard, never less than three nor more than six planes.

(b) The success of any break up procedure depends primarily on the section leaders, as the procedure hinges on where and when each section leader breaks up his section. He maneuvers his section following in general the movements of the immediately preceding section leader, conducts his section to the "Break-Up Point" in the "Approach Circle," breaks up and takes interval on the last plane of the preceding section.

(c) "BREAK-UP POINT." The location of the "Break-up Point" with respect to the carrier varies with the type of plane, and is in general near the bow on starboard side of carrier, altitude 300 feet, horizontal distance to starboard approximately 300 yards. The actual location can best be determined by landing operations for each type of plane. The time of arrival at the "Break-up Point" is as important as the proper location in order that the section leader may take the proper spacing on the last plane of the preceding section. The best guide for this is the interval each section leader takes on the preceding section leader. In general, the section leader should arrive at the "Break-up Point" as the fourth preceding plane lands aboard. Provided the section has arrived at the "Break-up Point" at the proper time the section leader on glancing out the left hand side of the plane will find the last plane of the preceding section in the proper position for him to take interval. The wing planes proceed on ahead and break up, spacing themselves on the preceding plane. In no case should the wing planes make an additional circle before breaking up and turning down wind.

(d) THE APPROACH. Figure Two (a) represents the approach circle showing relative movement between carrier and approaching planes. On turning down wind altitude and speed should be gradually reduced, the plane should be correctly spaced behind the preceding plane and on course parallel to carrier about 1000-1200 yards abeam. The turn at position (1) should be fairly sharp. Upon reaching a heading normal to that of the ship, the plane should be heading directly at the ramp, maximum altitude 150 feet. Then continue on normal heading until reaching point (2). At position (2) the plane should start an easy turn toward the ramp. The landing signalman should be in view from this point to the "cut signal." Between positions (1) and (2) the plane will move astern of the ship. At position (3) the plane is 150 to 200 yards astern, lined up in the center of the "groove" at the correct altitude and correct speed. (The groove is considered as the flight deck extended astern of the ship.) At point (2) in Figure Two (a) the pilot should have approximately the correct approach set-up; i. e., altitude, speed, and attitude. This set-up resembles that of a power stall landing, with the exception that sufficient r. p. m.'s

are used to maintain a constant altitude. An air speed of from five to ten knots above stalling with a semi-stalled attitude will accomplish this with sufficient factor of safety for good control. This manner of coming in "on the prop" permits considerable accuracy in placing the plane on the deck. The new pilot will soon learn this approach set-up, and sufficient practice on the field will be given to insure that he can obtain it quickly and consistently. The period during which the plane is turning toward the ramp is utilized to correct the pilot's errors in obtaining the approach set-up. The experienced carrier pilot should require very few corrective signals. Normally, the signal officer will indicate errors in the following sequence: (1) altitude, (2) speed, and (3) position of plane with reference to center line of ship. A minimum number of signals will be given. Consequently, it is imperative that pilots give prompt and positive responses, being careful to avoid radical manipulation of the controls. It is very important to steady down in the turn as soon as possible. A clear view of the signal officer must be obtained early in the turn. It is important to avoid being too far to the right of the center of the deck. When close aboard in such position, the approaching plane will encounter excessive turbulence from the stack wash and will find itself "sucked in" behind the stack with the result that a wave-off or a ragged approach and landing will ensue. Also, in correcting his position, the pilot will almost invariably lose sight of the signal officer.

(e) WAVE-OFF PROCEDURE. Wave-offs may be due to: gear not ready, unsatisfactory approaches or excessive movement of the ramp due to the rolling and pitching of the carrier. In any case EXECUTION OF WAVE-OFF IS MANDATORY. Upon receipt of the wave-off signal apply throttle rapidly and make a left turn to clear the ramp and the island. This turn should not be radical nor should the plane be climbed excessively. Upon clearing the ramp and settling down on a course parallel to the carrier take position behind the section that is breaking up, and take interval on the last plane of that section. A wave-off will result in an additional plane being in the approach circle in which case the second succeeding section leader will have to break up farther forward in order to take proper interval.

BOW LANDINGS

403. In the case of Bow Landings the procedure is the same as that given in Paragraph 402, the bow becoming the stern, except that WAVE-OFFS are executed to the RIGHT.

SIGNALS

404. (a) SIGNALS. The signals are purposely few in number and simple, to avoid confusion. With four exceptions the signals indicate the error to the pilot. The exceptions are the "Come on," "Wave Off, "Cut" and Off Center," which direct the pilot's actions. The signals used with action required are as follows:

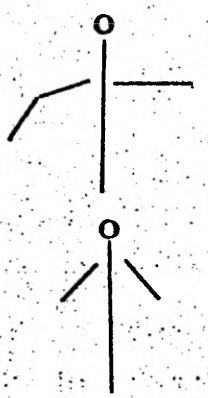
(1) "HIGH" Interpreted to mean plane is too high. Action required: Nose plane over and throttle down to prevent gaining speed. Resume approach attitude and throttle setting when signal officer comes to "R."

(2) "DIP HIGH" Interpreted to mean plane is slightly high. Action required: Nose

over slightly without change of throttle, then resume normal attitude in order to lose a little altitude without changing general approach.

(3) "R" Interpreted to mean approach is correct.

(4) "COME ON" Made by a rowing motion of the arms. Interpreted to mean plane is too slow, insufficient r. p. m. Action required: Increase r. p. m. The amount of gun required depends upon the speed and amplitude of this rowing motion. A slow easy motion would indicate a slight increase of throttle is needed, etc.



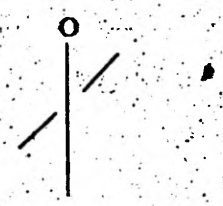
(5) "FAST" interpreted to mean plane is too fast, too much gun. Action required: Decrease throttle setting. It naturally follows that when a plane is much too fast it is also too flat. When speed is decreased in answer to this signal it is necessary to pull the nose up to assume proper attitude and prevent loss of altitude. The length of time this signal is displayed indicates the relative amount of throttle change necessary.

(6) "LOW" Interpreted to mean plane is too low. Action required: Increase altitude by pulling nose up and increasing throttle. Resume approach attitude and throttle setting when signal officer returns to "R".

(7) "DIP LOW" Interpreted to mean plane is slightly low and flat. Action required: Pull nose up slightly without change of throttle to assume normal approach attitude ~~and to gain a little altitude without changing general approach~~.

(8) "CUT" Made by drawing the right flag across the throat of the signalman. Action required: Quickly and completely close the throttle. LAND.

(9) "WAVE OFF" Made by waving flags over the signal officer's head. Action required: Give radical change of throttle and pull up and out of the groove. This signal is mandatory and must be answered immediately. DO NOT LAND.



(10) "TURN" or "OFF CENTER." This signal is the same as the semaphore "L." This signal is made to direct the pilot to tighten up his turn to prevent over-shooting the groove or if he is already in the groove, to indicate that he is too far to the RIGHT and must move over to the left. The signal to warn the pilot that he is turning too soon or is too far to the LEFT of the groove is made by the signal officer walking inboard onto the deck.

(11) "HOOK NOT DOWN" Made by tapping flags on platform to right of signalman. Action required: Drop hook. When practicing on the field this means land and confer with signalman.

(12) "EMERGENCY SIGNALS" A frantic agitation of "LOW" or "COME ON" indicates the plane is approaching a dangerous attitude and demands immediate and drastic response.

(b) COMMON ERRORS. A few common errors are listed below to forewarn the new carrier pilot:

1. Unsteady.
2. Gliding in.
3. Easing throttle closed before cut signal.
4. Over correcting.
5. Climbing just short of ramp.
6. Slow in answering signals.
7. Blimping gun after cut.
8. Holding plane off the deck.
9. Continually moving throttle in the groove.
10. Entering groove from too much altitude.
11. Going back too far in entering groove.
12. Failure to answer signals.
13. Too flat and fast.

(c) LANDING. During the approach, the pilot has the option of pulling out and making another approach at any time, however the cut signal is MANDATORY and planes receiving this signal must land. Upon receiving the cut signal the plane will be about 10 feet astern and 20 feet above the ramp. From this point the responsibility for landing rests entirely upon the pilot. The pilot will do well, if a normal approach has been made, to maintain the approach attitude to prevent landing wheels first. A sufficient excess of speed above stalling is allowed in the approach to insure perfect control of the plane. If the nose is dropped appreciably there will be neither altitude nor speed enough to get the tail down and the plane will land on its wheels. In case the carrier is pitching and the deck drops away after the cut signal, it may be necessary to drop the nose in order to engage the arresting gear. However, a quick dive for the deck may result in a high bounce without a wire. Conversely, deliberately holding the plane off the deck after receiving the cut signal may result in the plane gliding into the barrier. Keep feet off the brakes when landing.

COMING OUT OF THE ARRESTING GEAR

405. As the plane comes to a stop, the brakes should not be used until the plane has been allowed to roll backward approximately 6 feet, to allow the hook to be released from the engaged wire. Upon receiving signal from deck signal officer, who will be just forward and on the starboard side of the plane, retrieve the hook and taxi up the deck. Traffic signalman wearing yellow jerseys will be stationed at intervals along the deck to guide planes by means of hand signals in taxiing out of the gear and into their parking places. The following hand signals must be promptly and carefully obeyed to insure safe and expeditious movement of planes on the flight deck:

(a) STOP—Both palms toward the pilot. Put on brakes.

(b) COME AHEAD—Back of hands toward pilot. The speed desired depending upon the amount the signalman is moving his hands toward his body.

(c) SLOW DOWN—Palm of hands and back of hands alternately presented to pilot.

(d) HOLD LEFT BRAKE—Back of left hand presented to pilot with right hand pointing in direction of left wheel.

(e) HOLD RIGHT BRAKE—Back of right hand presented to pilot with left hand pointing in direction of right wheel.

(f) CUT SWITCH—Right hand moved across throat of signalman.

Planes will not be moved unless directed by a signalman. If you cannot see a signalman directing you—STOP. The directing of a plane is shifted from one signalman to another by the former pointing to designate the new control signalman. Stay in the plane if parked on the elevator, ride it to hangar deck and man the brakes until chocked. Do not leave your plane until wheels are chocked and if the ship is rolling wait until wing lines are secured. Report to ready room immediately after the plane is parked.

ENGINE CONTROL ON DECK

406. (a) STARTING—The command for starting engines shall be given by Air Control and relayed as necessary by flight deck personnel. The following procedure is prescribed:

(1) "Stand by to start engines." At this command, man CO2 fire extinguishers, see propellers clear, prime engines, etc.

(2) "Stand clear of propellers." At this command mechanics bring starters up to speed.

(3) "Start engines," accompanied by one blast on air whistle. Engines shall not be started until this last command has been given.

(b) CONTROL AFTER STARTING.

(1) One long blast on the air whistle or yodle (may be repeated at intervals of approximately three seconds): Idle engines.

(2) Three short blasts: Stop engines.

TAKE OFF

407. Except for the first few planes to take off which are taken off from their position in the "Take-off spot," planes will be taxied up to the take-off position in response to signals from the flight deck signalmen. Keep tail wheel locked when coming out of a spot in order to prevent damage to tail surfaces from adjacent propellers. The signalman will make the following signal when it is desired that the tail wheel be unlocked: "Index finger of right hand pointed at tail, then swing left and right in a sweeping horizontal motion." The take-off spot is one in which the plane is centered on the deck with sufficient run for take-off, the position varying with the type of plane and its load condition. The plane should be as nearly ready for take-off as possible before taxied to take-off spot. The Fly I Officer will stop the plane in the proper spot and check to insure the correct propeller (low pitch) and flap settings before signalling the take-off. The circular motion of a flag by this officer directs the pilot to hold brakes and open the throttle slowly up to the stop. The pilot completes the check-off list and signifies readiness by a nod of the head. When the flag is dropped toward the bow, RELEASE BRAKES and makes a normal take off, keeping the plane in the center of the deck with a slight pull off at the bow to insure against dropping. Do not answer the take-off signal unless you are satisfied that you have sufficient throttle and that the engine is functioning properly. Upon taking the air make an easy but definite turn to the right as soon as you can comfortably do so. Climb gradually to the squadron level. DO NOT ZOOM TO GAIN THIS ALTITUDE. This turn carries your slipstream away from the flight deck and the path of the plane next behind you, and is continued only long enough to accomplish this purpose. 1941

RENDEZVOUS

408. During primary training and qualification exercises when carrier is operating singly the rendezvous of squadrons after take-off will be accomplished in the following manner:

(a) When the squadron leader has left the deck, made the slight turn to the right and is comfortable, he will assume the launching course of the carrier and, after attaining a predetermined altitude, he will assume a constant r. p. m. This altitude and speed should be known to the squadron either through doctrine or by special information in the light of any particular situation. He will continue on this course and at this speed for a period equalling in seconds, the number of planes in his squadron times the average launching interval for his type of plane. He will then make a gentle left turn in such a manner as to attain a reverse course passing about 1,000 yards abeam of the carrier. During this turn and while on the reverse course following planes and/or sections should cut across and form the squadron. Whether sections are formed along the line of advance or whether the individual planes maintain their intervals is discretionary with each squadron concerned.

(b) Section leaders, once they have attained their proper position in sequence along the line of advance, should assume the speed of the squadron leader until such time as he makes his turn.

(c) Whenever practicable, during day operations, section leaders' planes should be spotted for take-off with their sections in their normal sequence. At night this provision is mandatory.

(d) When carrier is operating singly, group rendezvous may be effected as indicated in Figure Three.

(e) When two or more carriers are operating in company this procedure will be modified as follows: (1) Squadron Rendezvous will be accomplished by reducing the reach ahead as necessary to avoid interference with carrier next ahead. Upon reaching the parent carrier on reverse course circle her to the left within a radius of one mile, turning left into the prescribed sector; (2) Group rendezvous will be accomplished within the prescribed sector.

409. (a) Plans for flight operations include 20 minutes for launching and 40 minutes for landing a full air group (74 planes). Such times are considered normal and readily to be attained.

(b) Skilled pilots and trained flight deck crews can, of course, materially reduce these times. However launching times less than 18 minutes and landing times less than 35 minutes for a full air group (74 planes) require thorough examination and consideration to insure that adequate safety is being maintained.

VISUAL CARRIER SIGNALS

410. (a) LANDING. The landing of planes will be controlled from Air Control by the large green, red, and yellow lights on the after side of Air Control or by red and white flags displayed at Air Control. The Air Control landing lights or flags, together with certain flags displayed at the ramp, have the following meanings:

(1) Red light (red flag), red flag at ramp: Ship not ready. Do not attempt to land.

(2) Red light (red flag), yoke flag at ramp: Day forced landing signal. All planes except the one disabled get clear of landing circle at once. When ship is ready to receive plane in trouble, green light (white flag) at Air Control will be displayed.

(3) Green light (white flag), white flag at ramp: Land planes.

(b) TAKE OFF. The launching of planes will be controlled by small red and green lights mounted beneath the landing control lights or by red and white flags displayed at Air Control. The lights or flags have the following meanings.

(1) Red light (red flag): Do not launch planes.

(2) Green light (white flag): Launch planes.

The following signals are sent by visual or radio. Visual letter signals may be made by stationing personnel on the flight deck in form of the desired letter:

B—Make passes.
C—Land.
D—Delay; reform and gain altitude.
F—Flaps are not down; or check pitch of propeller.
H—Hook is not down.
K—Proceed on mission assigned.
L—Landing gear is damaged.
M—Proceed to base or carrier in accordance with doctrine or orders.
S—Group Commander fly alongside to read signals.
U—(See night carrier procedure.)
X—Previous landing order cancelled.

Governing flags (A, P, I, N, O) may be used with the above.

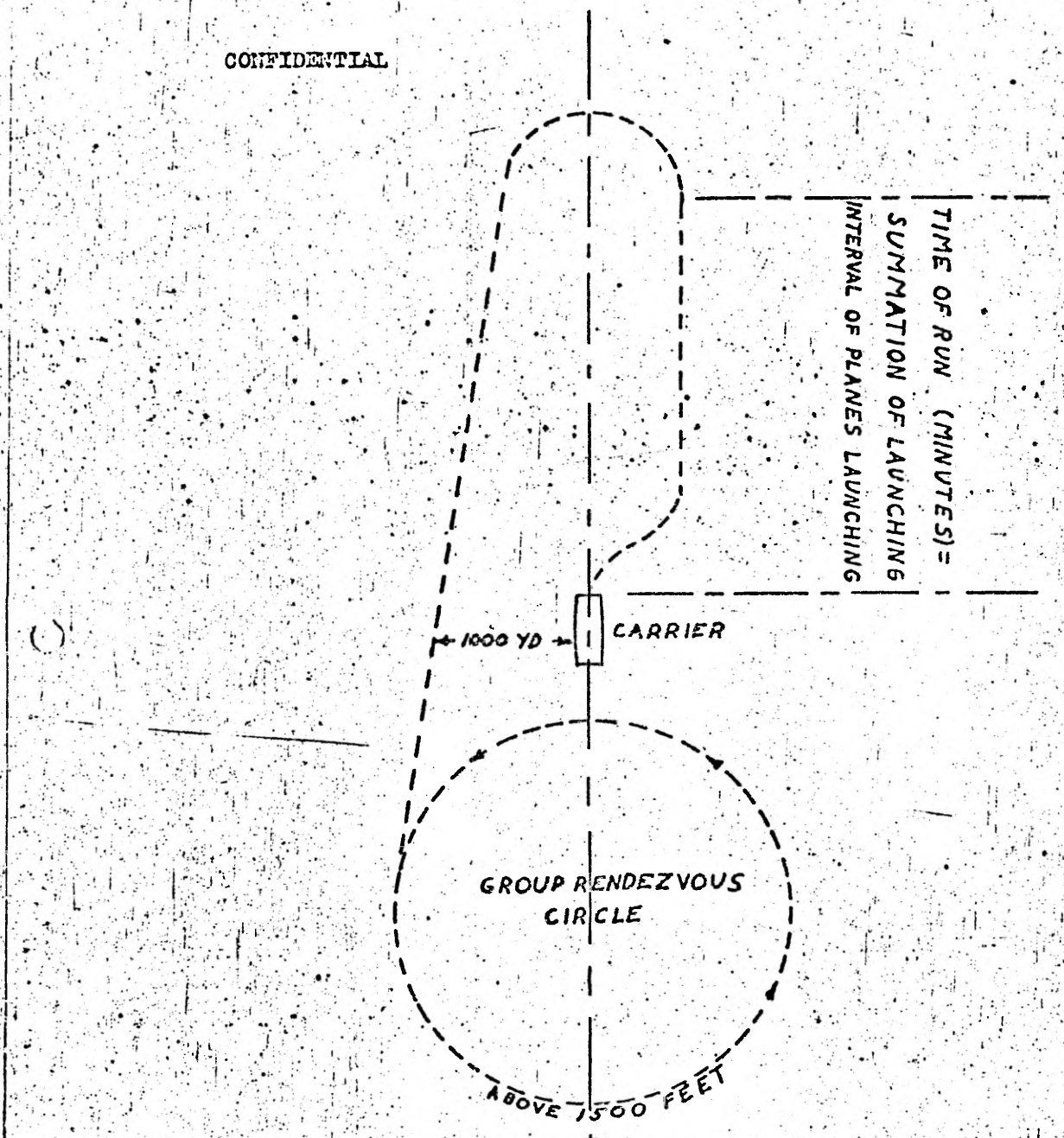


FIGURE THREE
Group rendezvous circle-
Carrier operating singly.

VISUAL FORCED LANDING SIGNALS

(c) THE YOKE FLAG shall be displayed from the ramp at any time that a forced landing, delayed or emergency, has been signalled. All other planes will clear the landing circle immediately.

(d) THE RED FLAG shall be displayed from the ramp in addition to the Yoke Flag when the ship cannot permit a plane to land. During the time the Red Flag is displayed, the plane shall not land aboard under any circumstances. This flag will be removed as soon as the carrier can receive an emergency landing, even though it may not be into the wind nor up to speed. Following the removal of the Red Flag and while the Yoke Flag alone is being displayed, the plane should remain in the air if it can, but it may come aboard if the urgency of the emergency makes an immediate landing necessary.

(e) THE WHITE FLAG shall be displayed with Yoke Flag when the carrier is in all respects ready to receive the forced landing. All deferred forced landings should be made when the White and Yoke Flags are being displayed together. "Cast" by searchlight, radio, or both will be given when the White Flag is displayed.

FORCED LANDING—DAY PROCEDURE

411. Plane having forced landing or its standby plane fly by carrier close to the port side (if forced landing is of a deferred nature such that time permits carrier to turn into wind) drop hook, and blimp engine. Fly by on starboard side and give same signals if forced landing is an emergency landing and time does not permit carrier to turn into wind. The question of whether a plane, either without power or with insufficient power to answer the landing signalman's signals, shall land aboard, is one which must be decided at the time by the carrier commander and the pilot concerned. The decision will depend on various factors, such as the type of plane, whether maneuverable or unwieldy; the state of the sea; the deck situation, whether time permits its being rigged, or whether the landing if unsuccessful might jeopardize a deck load of planes. The decision of the carrier commander that the plane may not land aboard (Negat Cast by searchlight or radio, red flag at the ramp) is mandatory on the pilot and he must land in the water. The decision that the plane may land aboard (Cast by searchlight or radio, white flag at the ramp) is not mandatory and the pilot may use his discretion.

CHAPTER V

NIGHT CARRIER PROCEDURE

501. Night carrier procedure shall be, in general, the same as that prescribed by Chapter IV for Day Carrier Procedure except as noted in this chapter.

502. Prior to commencement of night carrier qualifications, all pilots shall be familiar with the stations and lights prescribed for plane guards by Chapter II.

FLIGHT DECK PROCEDURE

503. (a) Prior to the commencement of individual pilot night carrier qualifications, pilots, plane captains, and flight deck handling crews shall be instructed in procedure and safety precautions.

(b) No personnel other than those at Flight Quarters, necessary handling crews, and plane crews shall be allowed on the flight deck while flying is in progress.

(c) All ship and plane lights shall be tested prior to sunset. Spare batteries and flashlights shall be made available and at hand. The Flight Deck Officer shall see that repair and maintenance electricians are stationed at Flight Quarters at each light control station. Squadron Duty Officers will report to the Flight Deck Officer prior to one-half hour before sundown that planes are in all respects ready for night flying: batteries tested and installed, running lights tested, and ballast secured in each multi-seat plane.

(d) Normally, for individual pilot night carrier qualifications not more than three planes shall be in "APPROACH CIRCLE" at any one time. The Plane Dispatching Officer shall not dispatch a plane just as another plane is about to land.

(e) Each pilot will if practicable fly in the plane to which normally assigned. No passengers will be carried during qualifications without specific authority of the Air Officer. In the event that it becomes impossible to land planes that are in the air they will be ordered to return to base by searchlight signal; ("M" on searchlight). In the event that a plane cannot locate the carrier after take-off, which might occur in bad weather, it will return immediately to base and report arrival to carrier.

(f) Planes shall turn on navigational lights just before take-off and extinguish them again after landing aboard and after passing the barrier. The dispatcher shall not dispatch any plane until he has checked to see that running lights are on.

CARRIER LIGHTS

504. (a) Deck Landing Lights. For landing operations only the regularly installed deck landing lights will be used. Flood Lights in Fly I, (except in the extreme bow during take-off) Fly II, and III will be kept in the upright position, ready for instant use.

(b) Ramp Lights. The ramp lights will be used for all night landings. They should be dimmed to minimum intensity consistent with proper effectiveness. Planes operating from the carrier at night are informed that the deck is in readiness for landing by the display of the ramp lights. When the ramp lights are out, this is a signal to the planes in the air that they are NOT TO LAND ON BOARD. If for some reason, such as a casualty to the ramp lights which would prevent their being turned on, GREEN VERY'S stars shall be fired at intervals from the landing signal station to indicate that planes shall continue landing.

(c) Take-off Lights. Take-off lights will consist of a row of lights in the deck parallel to and about six feet outboard of the port yellow stripe. The lights will be equipped with lenses throwing the light forward against small rubber reflectors about two inches high. Lights should be spaced about eight feet apart. In addition, two larger similiar lights will be shown on either bow.

(d) Landing Signal Wands. One spare set of landing wands must be immediately available.

(e) Darkened Ship Lights. When instructions as to darkening ship permit, the carrier will carry emergency navigation lights, except that the stern light shall not be displayed. Recognition lights to distinguish between the carriers will be designated as required. No other lights not necessary to flight operations should be shown above the level of the flight deck during launching and recovery. Flood lights may be used for respotting the deck as considered desirable. The use of signal searchlights and blinkers will be kept at a minimum while landings are in progress.

(f) Wake Lights. At discretion, special wake lights to illuminate the surface of the water astern of the carrier may be turned on in lieu of other methods of illuminating the wake, but care shall be employed that the wake light shall not be directly visible to pilots approaching for a landing. Conflicting reports exist as to the usefulness of these lights. Float lights may be used from the port quarter when conditions require them.

(g) Air Control Lights. Operations will be controlled by use of the red and green lights at Air Control.

(h) Very's Signals. Very's pistols and ammunition will be available to landing signal stations ready for immediate use as required for "Emergency Night Landing Procedure."

(i) Signal Searchlights. Signal searchlights shall be manned and when the situation permits may be used to identify planes flying close aboard, to ascertain if they have hooks down, or to examine a plane having trouble with hook. These uses of the searchlight shall be restricted to a minimum, and when examining the hook care shall be taken not to prolong the examination nor to flash the searchlight on the pilot from a direction ahead of plane.

(j) Miscellaneous Lights.

(1) A red warning lamp and buzzer will be rigged in the landing signal station and operated by the Assistant Landing Signal Officer by remote control from the starboard landing platform. This will be turned on from the starboard landing signal station when a plane approaching is too far to starboard to make a safe landing and, also, when the carrier is pitching to such an extent as to make good landings doubtful. When this signal is made the Landing Signal Officer will give the conventional wave-off signal to the incoming plane. The Assistant Signal Officer will note the period and amplitude of pitch by observing the bow of the ship.

(2) Two Westinghouse Airport Traffic Lights (or other similiar lights) will be kept available at the starboard landing signal station for landing planes with lights out or to assist the Landing Signal Officer as required. A signal circuit from port to starboard landing signal stations will be rigged with a push button at the port station and a red light at the starboard station. The flashing of the signals will notify the Assistant Landing Signal Officer to turn the air port traffic light on the plane in the groove. The lights will not be turned directly on the pilot.

(3) Electric torches, RED and GREEN, shall be used for controlling traffic on the flight deck. The GREEN light rotated means "Proceed." The RED light pointed at one wing and the GREEN rotated means "Come ahead but hold brakes as indicated." The RED light pointed at the pilot means "STOP." When Signalmen are giving these signals they will point the light on the deck in the direction of the pilot and not in the eyes of the pilot. The "Cut" signal consists of the RED light passed horizontally across the signalman's throat. After receiving "Cut' the pilot shall not release brakes until the propeller is completely stopped; he shall not leave his plane until the wheels are chocked.

(4) A YELLOW electric torch shall be used by the plane dispatcher in lieu of a checkered flag and in the same manner.

(5) The Fly III Officer shall show a GREEN light to the landing signal station when the barrier is ready after a plane passes forward; the landing signal station acknowledges with a GREEN light. The Fly III Officer will show a Red flashlight to the Landing Signal Officer and the Air Control for a "delay" in Fly III after a landing. He will show a GREEN flashlight to the Landing Signal Officer and Air Control when landings may be resumed. In each case the Landing Signal Officer and Air Control will acknowledge with a similarly colored light.

R.R.M. 1941

(6) WHITE flashlights shall not be used about the flight deck (especially in Fly I) except when absolutely necessary. They should then be shielded as practicable.

INDIVIDUAL NIGHT CARRIER QUALIFICATION PROCEDURE

505. (a) Day refresher landings should be made during the daylight period immediately preceding night qualification landings except when recent experience and state of training of pilots concerned renders such refresher unnecessary.

(b) Pilots man planes. Start engines.

(c) Taxi to take-off position guided by RED and GREEN lights of signalman.

(d) Take-off on signal and be guided so as to pass between lights at end of take-off lane.

(e) Fly straight away until comfortable and plane is oriented on destroyer ahead. Drop hook.

(f) After dropping hook pilot shall ease off to the right, as in day time procedure, then turn to left gradually and pass down the port side of the ship at an altitude to permit checking the hook.

(g) As the pilot passes the port side he signals "my hook is down" by blinking his running lights.

(h) Make approach and landing, following orders of the Landing Signal Officer.

(i) Cut throttle and land when given "Cut" Signal.

(j) Taxi up the deck obeying implicitly signals given by the relay taxi signalmen.

INDIVIDUAL SQUADRON NIGHT QUALIFICATION

506. (a) Each squadron shall qualify singly.

(b) To facilitate rendezvous planes shall, so far as practicable, be spotted in numerical order.

(c) After rendezvous the signal "CAST" shall be made to the Squadron Commander who then conducts the Squadron circle, and breaks up, one section at a time. R.P.17.1341

(d) Section leaders shall use their judgement in breaking off and entering the approach circle but shall observe the precaution that not more than three planes shall be in this circle at one time. Pilots who have been waved-off shall fall in at the rear of those planes that are in the landing circle at the time.

(e) When "CAST" is given a squadron, hooks shall be dropped by all planes, and checked in sections as for day procedure.

COMMUNICATIONS AND SPECIAL SIGNALS

507. (a) Normally the same one-letter signals shall be used at night as are used in day operations. The letter "U" (UNIT) is added to the carrier signals and means "Your lights are not turned on."

(b) RED and GREEN Very stars have the meanings assigned elsewhere in this procedure and no other meanings. No other rockets of any kind shall be used.

(c) Planes equipped with voice radio shall man it during individual pilot qualifications but its use shall be restricted to routine signals such as "hook down," etc., and for possible use in emergency. Voice radio may be used at discretion for assisting in landing planes.

EMERGENCY NIGHT LANDING PROCEDURE

508. (a) All forced landings shall be considered emergency landings.

(b) The plane informing the carrier of the impending forced landing shall, if possible to do so, fire a RED Very star, fly by close aboard on the STARBOARD SIDE and blimp his engine. This signal shall be answered by the carrier turning immediately into the wind (if necessary) and firing a Red Very star from the ramp. The latter signal is a warning to all planes other than the disabled plane to clear the landing area. Ramp lights must be displayed before the disabled plane may land. At no time shall a landing be attempted on the carrier unless the disabled plane has sufficient engine power and control to answer the Landing Signal Officer's signals and to make a power stall approach. In other circumstances the disabled plane has no alternative but to land in the water close aboard one of the vessels of the group.

(c) The plane acting as a stand-by to a disabled plane will accompany it to the carrier and upon reaching the vicinity of the carrier will fire a RED star at intervals to attract the attention of the carrier and to notify other planes in the air to keep clear. If a landing in the water appears imminent before reaching the carrier, the stand-by plane or the squadron liaison plane shall endeavor to drop a parachute flare from 1,200 feet altitude, and in such a position as to give maximum assistance to the plane about to land.

(d) If a plane in the landing circle has to make an emergency landing, it shall, if practicable, fly by on the starboard side, as a notification of an emergency. The carrier shall fire a RED Very star, other planes will haul clear, and the disabled plane will be landed aboard ahead of all other planes.

(e) Aircraft in danger of emergency landing in the water may employ its landing lights or light one landing flare well before landing in order to attract attention.

(f) When carriers are operating airplanes at night they will have all searchlights manned and arcs shall be struck and lights burned with shutters closed for five minutes of each half hour. Communication should be maintained between the bridge and a talker at each searchlight, by means of fire control telephones. Carriers shall maintain at least eight special lookouts on the bridge, assigned to sectors, and who shall constantly watch all airplanes operating in their sectors. In case of forced landing in the water, the carriers will promptly turn their searchlights on the water ahead of the airplane to assist the landing, but shall be careful never to turn them directly on the airplane until after it has landed in the water.

(g) If a carrier observes a crash, one or more carbide life buoys should be dropped and the bearing of the crash observed. Upon returning to the life buoys it should be possible to run down the bearings and thus locate the scene of the crash.

SAFETY PRECAUTIONS

509. All safety precautions applicable to normal day operations are doubly important at night. Everyone concerned with these operations will exercise and exact strict obedience to safety rules and regulations. Airplanes not equipped with landing lights will carry landing flares. One airplane of each section of airplanes designed to carry parachute flares will carry two such flares during night operations that require the section to leave the immediate vicinity of the carrier. Squadrons equipped with airplanes not designed to carry parachute flares will have at least one airplane of the squadron carry two such flares; care shall be exercised that the airplanes carrying flares in outside bomb racks, or in improvised holders, will not dive nor pull out at high speeds.

CHAPTER VI

SAFETY PRECAUTIONS—AIRCRAFT

(Aircraft Safety Precautions appear in USF—10. They are cross-indexed here for information purposes only, but are not reproduced in this publication.)

CHAPTER VII

SECTION I

CARRIER—AIRCRAFT NAVIGATION PROCEDURE

DEFINITIONS

701. The following are standard definitions as applied to air navigation:

BEARING — The direction of one object from another, expressed as an angle measured clockwise from true North. Bearing is true unless otherwise designated.

HEADING — The angular direction of the longitudinal axis of the aircraft with respect to true North. In other words it is the course with the drift correction applied. It is true heading unless otherwise designated.

COURSE — The direction over the surface of the earth, expressed as an angle, with respect to true North, that an aircraft is intended to be flown. It is the course laid out on the chart or map and is always the true course unless otherwise designated.

TRACK — The actual path of an aircraft over the surface of the earth. Track is the path that has been flown. Course (true) is the path intended to be flown.

POINT OPTION — A point moving on a specified course and speed such that at any instant it represents the predicted position of the carrier, with an allowable error of less than half the radius of visibility.

AIRCRAFT NAVIGATION EQUIPMENT

702. (a) The Mark III and Mark IV Plotting Boards are standard equipment for carrier-based aircraft. The methods covered in the instruction books supplied with these boards, and in "Tactical Graphics for Aircraft Operations," published by the Hydrographic Office, are to be used in conjunction with these boards.

(b) Every effort shall be made to eliminate errors in aircraft navigation instruments. Air speed meters and compasses shall be checked frequently and an accurate record kept of all errors which cannot be eliminated. Deviation tables shall be posted in the vicinity of each compass.

REQUIRED TYPE OF NAVIGATION PLOT.

703. Contact reports are required to be made in latitude and longitude. It is therefore essential that all aircraft maintain a geographical chart plot. Geographical templates supplied for use with the Mark III and IV plotting boards simplify the maintenance of a chart plot. The plot should include the track of the aircraft, of "POINT OPTION," and of enemy forces after contact.

WIND DATA AND WEATHER CONDITIONS

704. (a) Wind data available on the carrier will normally be used. However, since distance from the carrier, time, altitude and changing weather conditions all contribute to inaccuracy in this data, whenever practicable aircraft on extended flights should modify wind data as may be indicated by careful analysis of the appearance of surface conditions.

(b) Parent vessels shall inform aircraft of material changes in weather conditions which may effect their safety or navigation.

705. The following Wind Force Prediction Table has been found by experience to be fairly accurate:

VELOCITY IN KNOTS.	
0—	Smooth slick sea.
2—	Small occasional ripples.
3— 4	Small ripples all over - no calm areas.
5— 6	Well developed waves - smooth with no breaking.
7— 9	Occasional white caps.
10—11	Pronounced waves, frequent white caps which carry a short distance.
12—13	White-caps close together, carrying over a distance equal to the wave height. Slight traces of wind streaks.
14—16	Clearly defined wind streaks whose lengths are equal to about 10 wave lengths. Light traces of wind streaks.
17—19	Long well defined streaks; waves and streaks coming from same direction.
20—22	Streaks are long and straight; white-caps on every crest; wind picks up and carries mist along; large waves.
23—26	Large seas with waves forming on them; wind picks up and carries occasional wave crest.
27—30	Heavy seas; pronounced white streaks; ~~white streaks~~; wind picks up frequent wave crests and carry along; breaking, rolling waves are forming.
31—37	Continual rolling waves; wind carries along all wave crests for a distance equal to ½ wave length; scud or foam streaks.
34—38	Well defined waves form on the heavy seas; scud or foam streaks; waves and sea breaking and rolling.

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NOTES:—

1. When streaks are long and straight the wind is steady in force and direction for that locality.
2. When streaks are curved, be alert for a change in wind direction.
3. When a distinct line appears on the surface as is caused by a rip tide be alert for a reversal of wind direction.

"POINT OPTION" METHOD OF NAVIGATION

706. (a) Whenever aircraft may be expected to operate outside of sight contact with the carrier, the "POINT OPTION" system of navigation shall be used. As early as is practicable prior to launching aircraft, the carrier shall designate to all pilots an initial *geographical* position, time of departure, course and speed of "POINT OPTION." This initial position is the predicted position of the carrier when launching of aircraft is commenced. The course and speed of "POINT OPTION" is the course and speed which the carrier expects to make good from the initial position of "POINT OPTION."

(b) Normally the carrier will draw away from "POINT OPTION" during launching, and aircraft will take departure from the carrier rather than from "POINT OPTION." The greatest accuracy practicable is necessary in fixing a definite geographical point for the departure of aircraft. To this end carriers shall provide all pilots prior to take-off with last minute information of the current bearing and distance of the carrier from the initial position of "POINT OPTION."

(c) Upon completion of launching, the carrier, insofar as practicable, shall operate to intercept "POINT OPTION" and thereafter maintain its designated course and speed.

(d) When, due to a temporary change of course or speed on the part of the carrier, or to other unforseen circumstances, there exists a fixed and unchanging error in the position

of "POINT OPTION" in relation to the carrier of over one-half the radius of visibility, a "POINT OPTION TWO" shall be established and all aircraft notified in the following manner:

Message: "POINT OPTION TWO bearing ..... distant..... miles from POINT OPTION at ....." (effective time).

Should similar errors subsequently occur, "POINT OPTION THREE, FOUR, etc." shall be established in a like manner by giving effective time, bearing and distance from "POINT OPTION". (not from "POINT OPTION TWO, THREE, etc.)

(e) When, due to a change in course or speed, or both, on the part of the carrier, there exists a changing error in the position of "POINT OPTION" in relation to the carrier, which is or may become greater than one-half the radius of visibility, such error will be handled as outlined in (d) above except the new course and speed of "POINT OPTION" ("OPTION TWO, OPTION THREE, etc.) must also be given. All changes in "POINT OPTION" whether given in bearing and distance as in (d) above, or in bearing and distance, course and speed shall be consecutively numbered.

MEANS OF KEEPING CARRIER INFORMED OF POSITION OF AIRCRAFT.

707. (a) The carrier shall maintain a chart of the courses assigned to all attached aircraft operating outside visibility distance of the ship.

(b) If during a flight, aircraft make a marked and permanent departure from the assigned or contemplated courses, the carrier shall be informed.

(c) The leader of each aircraft group or unit shall, upon starting return to the carrier, report that fact and the expected time of arrival.

(d) Carriers shall obtain and record direction finder bearings of all radio transmissions from aircraft made on the key and homing frequencies. These bearings shall be used as a check on the carrier's plot of aircraft positions. They will also prove useful in connection with lost planes or homing procedure, if either is later required.