

INTRODUCTION

From the attack on Pearl Harbor to the great raids on the Japanese mainland in 1945 the most conspicuous weapon in the Pacific war was the aircraft carrier. Both of the major navies involved in that war employed carriers extensively and on six occasions American and Japanese carriers fought each other. These battles were:

Battle & date	USN Carriers	IJN Carriers
Coral Sea May 1942	LEXINGTON*, YORKTOWN	SHOKAKU, ZUIKAKU, SHOHO*
Midway June 42	YORKTOWN*, HORNET, ENTERPRISE	AKAGI*, KAGA*, HIRYU*, SORYU
E. Solomons Aug 1942	ENTERPRISE, SARATOGA	SHOKAKU, ZUIKAKU, RYUJO*
Santa Cruz Oct 1942	ENTERPRISE, HORNET*	SHOKAKU, ZUIKAKU, JUNYO, ZUIHO
Philippine Sea June 1944	ENTERPRISE, LEXINGTON, WASP, HORNET, YORKTOWN, ESSEX, BUNKER HILL, KANZAKI BATAAN LANGLEY, BELLEAU WOOD, COWPENS, PRINCETON, CABOT, MONTEREY, SAN JACINTO	TAIHO*, SHOKAKU*, ZUIKAKU, JUNYO, HIYO*, RYUHO, ZUIHO CHITOSE, CHIYODA
Cape Enganyo Oct 44	WASP, HORNET, MONTEREY, COWPENS, INTREPID, HANCOCK, BUNKER HILL, CABOT, ESSEX, INDEPENDENCE, LEXINGTON, PRINCETON*, LANGLEY, FRANKLIN, ENTERPRISE, SAN JACINTO, BELLEAU WOOD	ZUIKAKU*, ZUIHO*, CHITOSE*, CHIYODA*, ISE, HYUGA

One is struck by the frequency of carrier battles in 1942, four major fights in six months, and the sudden disappearance of the Japanese carrier force in October (in fact HIYO and JUNYO were earmarked for the November operation [1942] which resulted in the three day Naval Battle of Guadalcanal but were withdrawn when HIYO developed engineering trouble). The nearly constant operations from the time of Pearl Harbor to Santa Cruz (11 months) killed the bulk of the excellent naval aviators who manned the Japanese carrier force on December 1, 1941 and the Japanese had no program for pilot replacement which met the needs of carrier v. carrier fighting. Had the aviators been available a carrier battle would have been an aspect of many American operations in the Pacific until the war ended or the Japanese ran out of carriers.

* Ship lost in this action.

Japanese participation in the battles mentioned above and Japanese carrier operations are chronicled in the following sampling of naval histories:

- ZERO! by Okumiya and Horikoshi. Well told and comprehensive history of the Japanese Naval Air Force in the War.
- MIDWAY, THE JAPANESE NAVY'S STORY, by Okumiya and Fuchida. Excellent history of the Japanese side of the U.S. Navy's greatest victory. Also very good coverage of the Japanese carrier force "from Pearl Harbor to Midway".
- THE END OF THE IMPERIAL JAPANESE NAVY by Ito. Good one volume history of the Japanese Navy's role in World War II.
- HISTORY OF U.S. NAVAL OPERATIONS IN WORLD WAR II by Morison
- vol 3-Pearl Harbor and operations up to Coral Sea
 - vol 4-Coral Sea and Midway
 - vol 5-Eastern Solomons and Santa Cruz Island
 - vol 8 Philippine Sea
 - vol 12 Cape Enganyo
- THE WAR AT SEA by Roskill
- vol 2 Indian Ocean campaign in good detail
also Coral Sea, Midway, E. Solomons, Santa Cruz
 - vol 3 pt. 2. Philippine Sea and Cape Enganyo

The sources consulted in preparation of this monograph were:

TACTICAL SOURCES

1. FIRST MOBILE FLEET DOCTRINE: First Mobile Fleet Ultrasecret Standing Order # 1 of 28 May 1944
2. APPENDIX TO MOBILE FLEET DOCTRINE: First Mobile Fleet Ultrasecret Standing Order # 17 of 23 August 1944
3. FOURTH AIRCRAFT CARRIER SQUADRON(4sf) DOCTRINE: 4sf Ultrasecret Standing Order # 20 of 27 Nov 1941
4. RESEARCH ON STRIKING FORCE TACTICS: Yokosuka Kokutai Very secret Serial # 45 of 20 May 1943
5. JAPANESE AERIAL TACTICS AGAINST SHIP TARGETS: Jicpoa Weekly Intelligence Bulletin of 20 Oct 1944. Consists of translations of various captured Japanese tactical documents with regard to air operations against ships.
6. TACTICAL PLANNING IN THE IMPERIAL JAPANESE NAVY. by M. Genda. History of prewar and early war development of Japanese carrier tactics by one of the principal architects of their carrier tactics.
7. THE JAPANESE MILITARY MISSION TO ITALY IN 1941. by Fioravanzo, Vice Adm G, (Italian Navy) Contains fairly complete discussion of Japanese carrier tactical thinking before Pearl Harbor as related to the Italian Navy. Based on Admiral Fioravanzo's personal notes of meetings with Japanese Naval Officers. Particularly their discussions of Japanese carrier tactics.
8. INTERROGATIONS OF JAPANESE OFFICIALS, USGPO

TECHNICAL SOURCES

1. NTJ # S-01-3 JAPANESE SURFACE WARSHIP HULL DESIGN
2. NTJ # O-47-N-1 JAPANESE NAVAL GUNS AND MOUNTS ART. L, MOUNTS UNDER
18"
3. NTJ # O-47-N-2 JAPANESE NAVAL GUNS AND MOUNTS-NAVAL MACHINE GUNS
4. NTJ # O-01-2 JAPANESE AIRCRAFT TORPEDOES
5. NTJ # O-23 JAPANESE BOMBS
6. NTJ # O-30 JAPANESE ANTI-AIRCRAFT FIRE CONTROL
7. NTJ # A-11 AIRCRAFT ARRANGEMENTS AND HANDLING FACILITIES
ON JAPANESE NAVAL VESSELS

NTJ=Reports of the NAVAL TECHNICAL MISSION TO JAPAN

Items 5-8 under the Tactical Sources are all secondary sources and any material in this monograph which is derived from those sources will be identified by appropriate footnotes. Since the balance are all primary sources they will not be identified by footnote.

AIRCRAFT CARRIER DOCTRINE AND AIR COMBAT REGULATIONS, IMPERIAL JAPANESE NAVY

I. AIRCRAFT CARRIER DOCTRINE

A. GENERAL-One of the aspects of the Sea War in the Pacific which distinguished it from the European Sea War was the extensive use of aircraft carriers by both sides. The Japanese entered the war with a fleet of excellent carriers equipped with aircraft which compared favorably with land based types (unlike carrier aircraft used in the European theater) and advanced doctrine for their use (though the Navy's leadership was still battleship oriented). Before the war the Japanese envisioned the aircraft carrier in much the same fashion it was viewed in other navies; as an excellent scout with good offensive capability, a sort of super battle-cruiser. Consequently they were originally assigned to the Scouting Forces (second Fleet) until the Fleet Problem of 1940 when the carriers demonstrated their offensive potential. After that time and until 1944 the Japanese carriers were organized into their own fleet. In March 1944 the Japanese surprisingly and belatedly recognized the primacy of the carrier in the combat arm and reorganized their navy to reflect this development.

B. TACTICS-Aircraft Carriers-The basic evolution unit is the Aircraft Carrier Squadron designated by the Arabic numeral-lower case Roman letter "sf" combination which corresponds with its squadron number thus; 1sf=First Aircraft Carrier Squadron etc. Speed signals with acceleration tables for modern fleet carriers are as follows:

SPEED	STAN 12	14	16	FULL 18	BS1 20	22	BS2 24	26	BS3 28	BS4 30	BS5 32
Time required to accelerate from one speed to the next	1-0	1-0	1-0	2-30	2-30	2-30	2-30	2-30	3-0	4-30	
TOTAL elapsed time	1-0	2-0	3-0	5-30	8-00	10-30	13-00	16-0	20-00		

Time in minutes-seconds; STAN=STANDARD SPEED; BS=Battle speed.

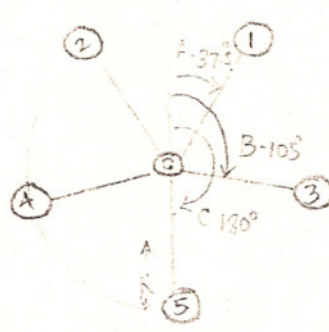
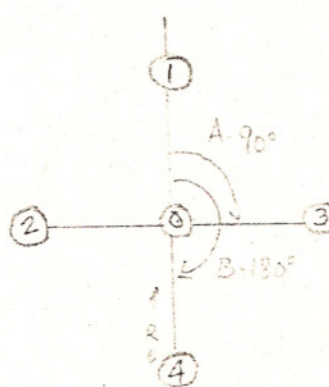
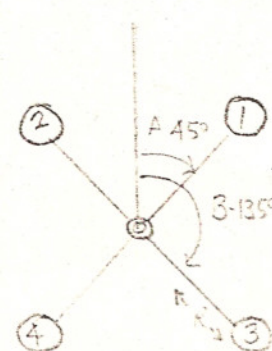
Such rapid acceleration would be uncommon in carriers because of the problems with parked aircraft. This table is structured on assumptions derived from examining Japanese Destroyer Doctrine. It is also based on modern ships of HIRYU, SHOKAKU, TAIHO and similar classes. The Japanese Navy operated a large number of converted carriers with maximum speeds less than 30 knots. The Battle Speed Signals are the carrier signalled speeds from 1944 MOBILE FLEET DOCTRINE.

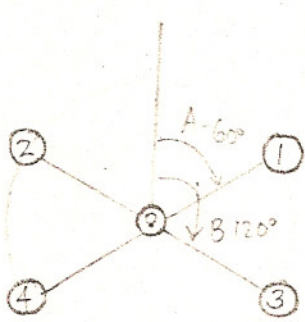
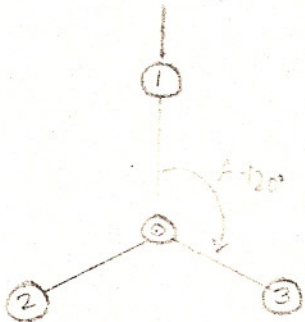
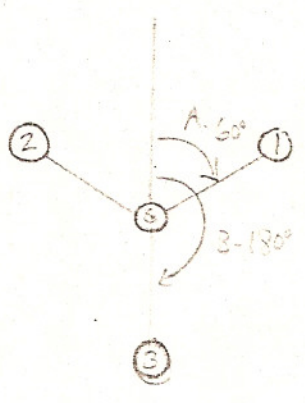
Sources: FMFDOCT; DESDOCT

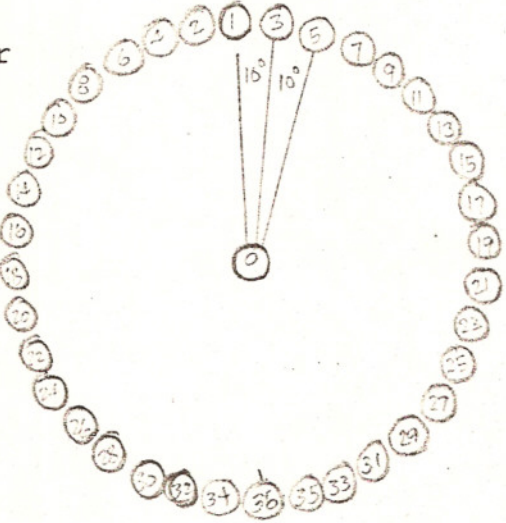
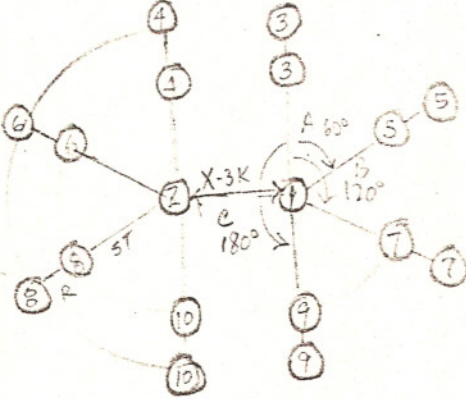
AD. CIRCULAR FORMATIONS (AA defense formations)

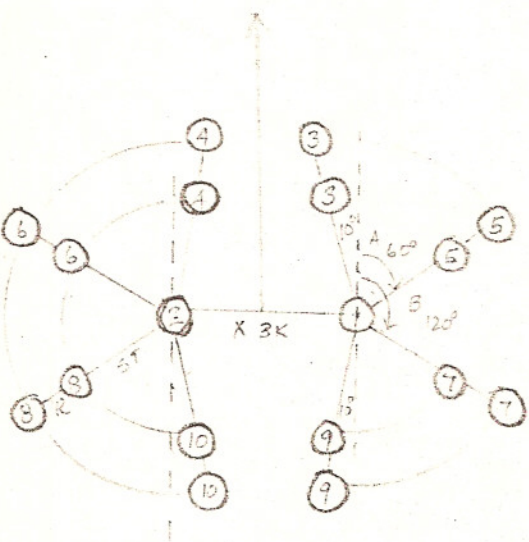
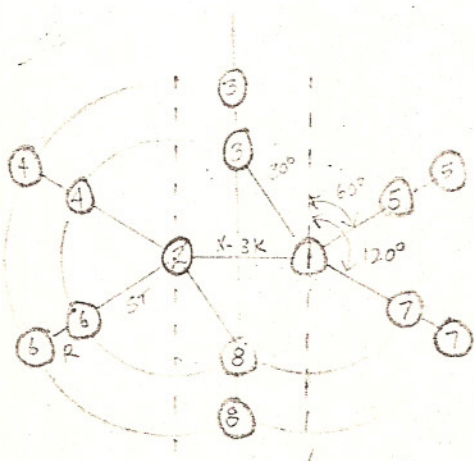
Japanese group(fleet) commanders gave each ship in his formation a number-letter designation for the purpose of determining station. Angles and distances were signalled as in the section regarding Cruising Under Alert.

SIGNAL	TEXT	FORMATION	NOTES
JIN ZA	Take circular formation A		
JIN ZB	Take circular formation B		
JIN ZC	Take circular formation C		

SIGNAL	TEXT	FORMATION	NOTES
JIN ZD	Take Circular Formation D	 Diagram of Circular Formation D: A central point is connected to five numbered nodes (1, 2, 3, 4, 5) arranged in a circle. Node 1 is at the top right, 2 at the top left, 3 at the middle right, 4 at the bottom, and 5 at the bottom left. Arcs indicate angles: A = 37° between nodes 1 and 2, B = 105° between nodes 1 and 3, and C = 130° between nodes 3 and 4. A dashed line labeled 'A' points from the center towards node 4.	
JIN ZE	Take Circular Formation E	 Diagram of Circular Formation E: A central point is connected to four numbered nodes (1, 2, 3, 4) arranged in a cross pattern. Node 1 is at the top, 2 on the left, 3 on the right, and 4 at the bottom. Arcs indicate angles: A = 90° between nodes 1 and 2, and B = 180° between nodes 2 and 3. A dashed line labeled 'A' points from the center towards node 4.	
JIN ZF	Take Circular Formation F	 Diagram of Circular Formation F: A central point is connected to four numbered nodes (1, 2, 3, 4) arranged in a cross pattern. Node 1 is at the top right, 2 at the top left, 3 at the bottom right, and 4 at the bottom left. Arcs indicate angles: A = 45° between nodes 1 and 2, and B = 135° between nodes 1 and 3. A dashed line labeled 'A' points from the center towards node 3.	

SIGNAL	TEXT	FORMATION	NOTES
JIN ZG	Take Circular Formation G	 A diagram showing a central point (5) connected to four points (1, 2, 3, 4) arranged in a circle. A vertical line passes through the center. The angle between the vertical line and the line to point 1 is labeled $A-60^\circ$. The angle between the lines to points 1 and 3 is labeled $B-120^\circ$.	
JIN ZH	Take Circular Formation H	 A diagram showing a central point (5) connected to three points (1, 2, 3) arranged in a circle. A vertical line passes through the center. The angle between the vertical line and the line to point 1 is labeled $A-120^\circ$.	
JIN ZI	Take Circular Formation I	 A diagram showing a central point (5) connected to four points (1, 2, 3, 4) arranged in a circle. A vertical line passes through the center. The angle between the vertical line and the line to point 1 is labeled $A-60^\circ$. The angle between the lines to points 1 and 3 is labeled $B-180^\circ$.	

SIGNAL	TEXT	FORMATION	NOTES
JIN ZK	Take Circular Formation K		In taking this formation, the positions to be occupied by the screening vessels are normally indicated in advance
JIN ZL	Take Circular Formation L		GROUP 1 1,3,5,7,9 GROUP 2 2,4,6,8,10

SIGNAL	TEXT	FORMATION	NOTES
JIN ZM	Take Circular Formation M	 The diagram shows two central points, 1 and 2, connected by a horizontal line labeled 'X-3K'. Point 1 is on the right and point 2 is on the left. Two concentric circles are centered on the line between them. Point 1 is connected to points 3, 5, 7, and 9. Point 2 is connected to points 4, 6, 8, and 10. Angles are marked: 30° between points 3 and 5, 60° between points 5 and 7, and 120° between points 7 and 9. There are also labels '5' and '6' near the angles at point 1. Points 3, 5, 7, and 9 are on the outer circle, while points 4, 6, 8, and 10 are on the inner circle.	GROUP 1 1,3,5,7,9 GROUP 2 2,4,6,8,10
JIN ZN	Take Circular Formation N	 The diagram shows two central points, 1 and 2, connected by a horizontal line labeled 'X-3K'. Point 1 is on the right and point 2 is on the left. Two concentric circles are centered on the line between them. Point 1 is connected to points 3, 5, 7, and 9. Point 2 is connected to points 4, 6, 8, and 10. Angles are marked: 30° between points 3 and 5, 60° between points 5 and 7, and 120° between points 7 and 9. There are also labels '5' and '6' near the angles at point 1. Points 3, 5, 7, and 9 are on the outer circle, while points 4, 6, 8, and 10 are on the inner circle.	GROUP 1 1,3,5,7 GROUP 2 2,4,6,8

SIGNAL	TEXT	FORMATION	NOTES
JIN ZO	Take Circular Formation O		GROUP 1 1, 3, 5, 7, 9 GROUP 2 2, 4, 6, 8, 10
JIN ZP	Take Circular Formation P		GROUP 1 1, 3, 4, 5, 6 GROUP 2 2, 7, 8, 9, 10

SIGNAL	TEXT	FORMATION	NOTES
JIN ZQ	TAKE CIRCULAR FORMATION Q		GROUP 1 2345678910 1,3,4,5,7, GROUP 2 2345678910 2,6,8,9,10
JIN ZR	Take Circular Formation R		Notes GROUP 1 1,3,4,5,8 GROUP 2 2,6,7,8

SIGNAL	TEXT	FORMATION	NOTES
JIN ZS	Take Circular Formation S		GROUP 1 1,3,4,5 GROUP 2 2,6,7,8,

Each ship in a Japanese tactical organization was given a number letter designation ^{for example} ~~thus~~ 9F. Screen positions were indicated thus:

KAN 9F 3 =Ship #9F take screen position #3

The inner circle in the formations is 2km while the outer circle is 3Km.

The standard distance(in other words unless signalled otherwise) was as follows:

TYPE OF SCREENING VESSEL	DISTANCE BETWEEN AIRCRAFT CARRIER AND SCREENING VESSEL		
	SYMBOL		DISTANCE (KILOMETERS)
Battleship	T		3.0
Cruiser	S		2.0
Destroyer	R		2.0

The letter symbols are as used in the accompanying diagrams.

To signal a distance other than that shown or an angle other than that shown the signal would be as follows:

JIN ZA S KEI 2H

JIN ZA=Take circular formation A

S KEI 2H=Distance between the carrier(s) and cruisers will be 2.5 km(H=1/2 of 1000 m)

or,

JIN ZA A 50 HO

JIN ZA=Take circular formation A

A 50 HO=Angle A shall be 50°

The carrier with the senior officer will be the guide unless otherwise signalled.

Generally circular formations will maneuver as a single unit.

When ships of inferior speed fall behind because of the speed of the aircraft carrier(s) in flight operations then the screens should be adjusted accordingly.

The general rules with regard to axis of a formation and course which applied to battleships and cruisers also apply to carrier circular formations. When the axis and course are different the signal will be thus:

1. JIN ZB 30 HO 250

JIN ZB=Take circular formation B

30 Ho 250=Axis 30, Course 250

2. JIN ZC 60 HO

JIN ZC=Take circular formation C

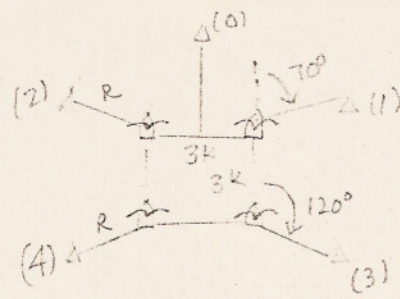
60 HO=Axis 60°, Course-continue on present course.

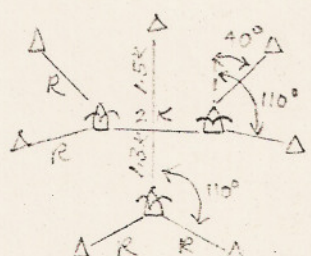
3. JIN ZC

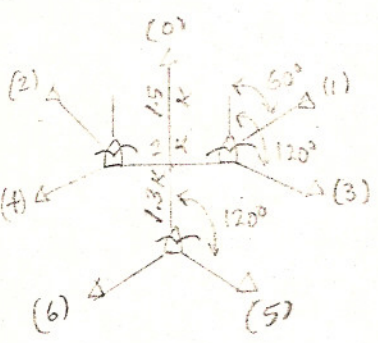
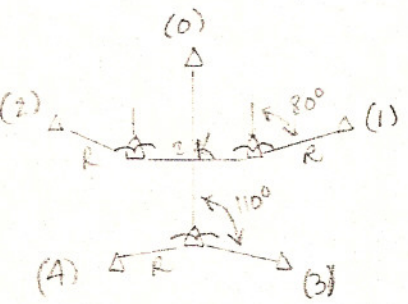
JIN ZC=Take circular formation C

The absence of any axis or course signal indicates that the axis and course remain as before.

SIGNAL	TEXT	FORMATION AND NOTES
JIN 2A (JIN 7A)	Employ Antisub method A. Sections in column in numerical(reverse) order. (Employ Antisub method A. Sections inline in numerical(reverse) order.	NOTES: 1. Order when omitting the direct escort ship-(7) (0) 2. GROUP 1, Section 1-0,1,3,5 (Section 1-0,1,2,3) GROUP 2, Section 2-2,4,6,7 (Section 2-4,5,6,7) The section figures within brackets apply when the signal JIN 7A is given. The same applies to all of the formations which follow.
JIN 2B (JIN 7B)	Employ Antisub method B. Sections in column in numerical(reverse) order. (Employ Anti-sub Method B. Sections inline in numerical (reverse) order.	1. Order when omitting the direct escort ship-7, 0 2. GROUP 1, Section 1-0,1,3,5 (Section 1-0,1,2,3) GROUP 2, Section 1-2,4,6,7 (Section 1-4,5,6,7)

SIGNAL	TEXT	ANTISUBMARINE FORMATION AND NOTES
JIN 2C (JIN 7C)	Employ Antisub method C. Sections in column in numerical(reverse) order. (Employ Antisub method C. Section in line in numerical(reverse) order.	 NOTE: When the direct escort ship is missing omit 0.

JIN 8A	Employ Antisub Method A, using triangular formation, odd numbers on right(left)	 NOTE: When the direct escort ship is missing omit 0 GROUP 1-I,0,1,3; (I,0,2,4) GROUP 2-II,2,4; (II,1,3) GROUP 3-III,5,6
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SIGNAL	TEXT	ANTISUBMARINE FORMATION AND NOTE
JIN 8B	Employ Antisub Method B, using triangular formation, odd numbers on right(left)	 NOTE: When the direct escort ship is missing omit 0
JIN 8C	Employ Antisub Method C, using triangular formation, odd numbers on right(left).	 NOTE: When the direct escort ship is missing omit 0 GROUP 1-I- 0,1(I,0,2) GROUP 2-II- 2 (II,1) GROUP 3-III-3,4

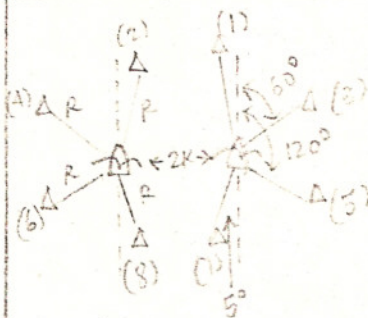
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TEXT

ANTISUBMARINE FORMATION AND NOTES

JIN 6 A

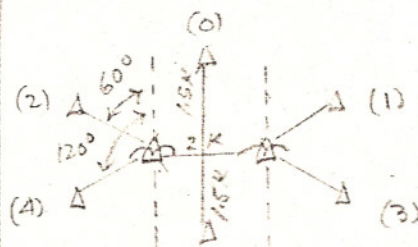
Employ Antisubmarine Method A, single line in numerical (reverse) order.



- NOTES: 1. When the direct escort ship is missing, omit 0. In this case 7 will take a station between 1.5 km to the rear of I and I
2. GROUP 1-I 1,3,5,7(I 2,4,6,8
GROUP 2-II 2,4,6,8(II 1,3,5,7

Employ Antisubmarine Method B, single line in numerical (reverse) order.

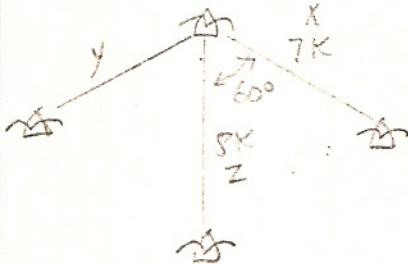
JIN 6B

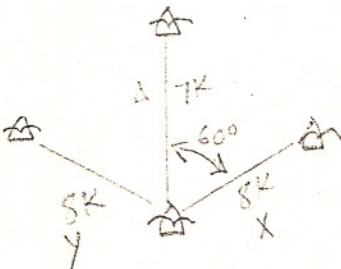


- NOTES: 1. The order when the direct escort ship is missing is 5,4. But when 4 is missing the angle of station of 2 is 80°
2. Group 1-I 0,1,3(I 0,2,4)
Group 2-II 2,4,6(II 1,3,5)

SIGNAL	TEXT	FORMATION AND NOTES
JIN 0 A	Employ Antisub Method A single column in numerical (reverse) order.	NOTES: GROUP 1-I 0,1,2,3(I 4,5,6,7) GROUP 2-II 4,5,6,7(II 0,2,2,3)
JIN 0 B	Employ Antisur Method B single column in numerical (reverse) order.	NOTES: When the direct escort ship is missing omit 7 GROUP 1-I 1,2,3,4(I 5,6,7) GROUP 2-II 5,6,7(II 1,2,3,4)
JIN 0 C	Employ Antisub Method C single column in numerical (reverse) order.	NOTES: When the direct escort ship is missing the angles of station 1 and 2 will be 80° GROUP 1-I 0,1,2(I 3,4) GROUP 2-II 3,4(II 0,1,2)

4F. FLIGHT OPERATIONS FORMATIONS

SIGNAL	TEXT	FORMATION AND NOTES
UN KO 1	Assume Take off and Land- ing Formation 1	 NOTES-Applicable to all Take off and Landing Formation 1. A formation in which the positions of the aircraft carriers have been interchanged from left to right will be the alternate method. It will be designated by adding the BANGO bennant to the regular signal; For Example: UN KO 1 BAN UN KO 1 Assume take-off and landing formation 1 BAN Use alternate Method.

UN KO 2	Assume Take-off and land- ing Formation 2	
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NOTES-Applicable to all Take off and Landing Formation continued

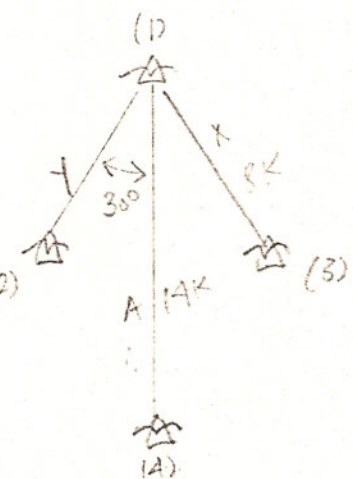
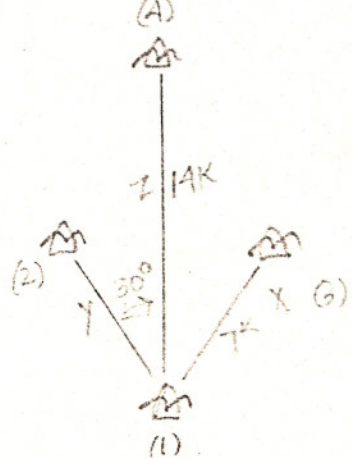
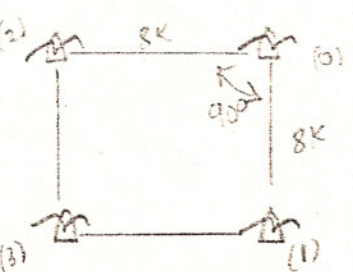
- The signal when altering the distance between each aircraft carrier and the angle of position will be as follows;

UN KO 2 A 45 HO X KEI 6

UN KO 2=Assume T.O. and L. Formation 2

A 45 HO=A angle will be 45°

X KEI 6=X distance will be 6 km.

SIGNAL	TEXT	FORMATION AND NOTES
UN KO 3	Assume take off and landing Formation 3	
UN KO 4	Assume Take Off and Landing Formation 4	
UN KO 5	Assume Take Off and Landing Formation 5	
UN KO 6	Assume Take off and Landing Formation 6	