

SpecORG/1
(LO)2242-45
26 July 1945
Revised 11 September 1945

UNCLASSIFIED

ANTI-AIRCRAFT STUDY

No. 8

7.

AA DEFENSE OF THE FAST CARRIER
TASK FORCE
24 OCTOBER 1944 to 21 MARCH 1945

SPECIAL DEFENSE OPERATIONS RESEARCH GROUP
HEADQUARTERS OF THE COMMANDER IN CHIEF
UNITED STATES FLEET

UNCLASSIFIED

Office of Scientific Research and Development

Classification changed to ~~CONFIDENTIAL~~

by authority of *Sec 1.2.06.0034*

dated ~~7 FEB 1946~~ *20 Apr 59*

SpecORG/4
(LO) 2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED

ANTI-AIRCRAFT STUDY NO. 8

AA DEFENSE OF THE FAST CARRIER TASK FORCE

24 OCTOBER 1944 TO 21 MARCH 1945

I. Historical Introduction

This analysis opens with the decisive defeat by Task Force 38 during 23-26 October of the Japanese fleet units which had attempted to disrupt the progress of the Leyte landings. These actions also mark the beginning of suicide tactics.

During the period from 29 October to 24 December, Task Force 38 was engaged in support of the Leyte and Mindoro landings. This support consisted of destroying enemy aircraft and airfield facilities on Luzon and attacking enemy shipping Philippine waters.

From 30 December to 21 January Task Force 38 was engaged in supporting the Luzon landings. This support consisted of strikes against Formosa and China Coast airfields and against shipping in the South China Sea.

At midnight on 26 January Task Force 38 became Task Force 58. From about the middle of February to 21 March Task Force 58 was engaged in the support of the Iwo Jima landings and in the preliminary support of the Okinawa landings, which support consisted of strikes against the Tokyo area, strikes against and shelling of Iwo Jima and strikes against Kyushu airfields.

II. Summary of AA Defense

Suicide Attacks

During the period 24 October 1944 to 21 March 1945, fourteen ships of fast carrier task forces were damaged by hits or near misses of suicide planes. All of these attacks were made on carriers, except two which were made on destroyers. No ships were sunk by suicide planes and of those damaged only five carriers and two destroyers were put out of action and forced to leave the task force.

SpecORG/4
(LO)2242-45
26 July 1945

**DOWNGRADED TO
DECLASSIFIED**

It is estimated that 43 aircraft with suicide intent arrived over the Task Force. What happened to these planes is shown below in comparison with the results of all suicide attacks during the Philippines Campaign from 17 October to 13 January (ORG Report 49):

TABLE 1

Ship Damage by Suicide Planes

	<u>TF 38 and 58</u>	<u>All Ships Philippines</u>
No. of suicide planes which arrived over ships	43*	364
No. of planes which hit ships and damaged them	13 (30%)	115 (32%)
No. of planes which missed ships but landed close enough to damage them	4 (9%)	56 (15%)
No. of planes which missed ships completely and did no damage	26 (61%)	193 (53%)

* In arriving at this figure the number of known suicide planes was increased by a certain proportion of the planes shot down before their intentions as to suicide or non-suicide could be determined. In determining this proportion it was assumed (as was done in ORG 49) that the ratio of suicides to non-suicides in these uncertain kills is the same as the ratio of known suicides to known non-suicides.

The proportion of the planes which missed ships is seen to be 70% for the fast carrier forces and 68% for "All Ships, Philippines". Thus there appears to be no significant difference between the suicide attack experience of these two groups. One might have reasonably expected that the AA experience of the fast carrier task forces would have been better than that for all other kinds of forces, since the former group includes, as a rule, larger ships with better than average AA defense. However, many factors are involved which are different for the two groups. An attempt will be made to show how some of these factors contribute to the overall results.

SpecORG/4
(LO)2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED
SECRET

Non-suicide Attacks

In the incidents in which there were no known suicide attempts (which we will refer to as non-suicide incidents), one ship, the PRINCETON, was sunk and seven were damaged. Only in the case of the FRANKLIN was it necessary to send the damaged ship out of the operating area for immediate repairs.

A comparison of the results of these actions with similar actions against "All Ships in the Philippines" campaign (ORG Report 49) is given below:

TABLE 2

Ship Damage in Non-Suicide Incidents (Figures refer to aircraft over the task force)

	<u>Task Forces</u> <u>38 and 58</u>	<u>All Ships</u> <u>Philippines</u>
No. of planes	174	845
Avg. No. planes per ship sunk or damaged	25	24
Percentage of planes which damaged ships	4.0%	4.4%
Percentage of planes shot down by AA	23 \pm 3%	18 \pm 2%
No. of planes lost per ship sunk or damaged	5.7	4.1

Here again the experience of the fast carrier task forces is about the same as that for all ships during the Philippine campaign. The small difference in the percentages for planes shot down can be accounted for by statistical fluctuation.

List of Fast Carrier Task Forces Ships Damaged in Aircraft Attacks

The following is a list of all ships of the fast carrier task forces sunk or damaged by enemy action during the period 24 October 1944 to 21 March 1945

SpecORG/4
(LO)2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED

TABLE 3

Fast Carrier Task Force Ships Sunk or Damaged
24 October 1944 to 21 March 1945

Suicide Attacks

<u>Date</u>	<u>Ship</u>	<u>Type of Damage</u>
29 Oct 44	INTREPID	Suicide hit - slight damage
30 Oct	BELLEAU WOOD	Suicide hit - serious damage. Pearl Harbor for repairs.
30 Oct	FRANKLIN	Suicide hit - serious damage. Pearl Harbor for repairs.
5 Nov	LEXINGTON	Suicide hit - signal bridge dam- aged. To Ulithi for repairs.
25 Nov	HANCOCK	Suicide near miss - slight damage.
25 Nov	INTREPID	Two suicide hits - flight deck inoperative. Returned to base for repairs.
25 Nov	CABOT	Suicide near miss and hit - moderate damage. Repaired by ship's crew and tenders.
25 Nov	ESSEX	Suicide hit on catwalk. Battle efficiency not impaired.
21 Jan 45	TICONDEROGA	Two suicide hits - serious damage. Convoyed to Ulithi.
21 Jan	MADDOX	Suicide hit - serious damage. Convoyed to Ulithi.
11 Mar	RANDOLPH	Suicide hit. Damaged while at anchor in Ulithi.
18 Mar	HORNET	Suicide near miss - slight damage.
18 Mar	INTREPID	Suicide near miss - slight damage.
20 Mar	HALSEY POWELL	Suicide hit - serious damage.

TABLE 3 (Cont.)

Non-Suicide Attacks

<u>Date</u>	<u>Ship</u>	<u>Type of Damage</u>
24 Oct 44	PRINCETON	Bomb hit. Sunk by own forces.
24 Oct	LANGLEY	Bomb near miss and strafing damage - slight damage.
21 Jan 45	LANGLEY	Bomb hit (suicide incident) - moderate damage. Repaired at sea within 3 hours.
18 Mar	ENTERPRISE	Bomb hit (suicide incident) - slight damage (bomb failed to explode).
18 Mar	YORKTOWN	Bomb hit - slight damage.
19 Mar	FRANKLIN	Bomb hit - serious damage. Convoyed to Ulithi.
19 Mar	WASP	Bomb hit - moderate damage. Operating within an hour.
20 Mar	BATAAN	Bomb near miss - slight damage.

III. Enemy Tactics - Selection of Targets and Time of Attack

Selection of Targets

Out of a total of 33 suicide attacks, 31 were against carriers and out of a total of 9 damaging non-suicide attacks, 8 were against carriers. Carriers are the most strategically important and from the point of view of self-defense the most vulnerable targets in the fast carrier task forces. Thus the enemy's concentration on carriers is highly to his advantage.

Effect of Day-Night-Twilight Conditions

A breakdown of non-suicide attacks reveals that most of them were made during the daytime. (This also holds for suicide attacks.) This breakdown also shows that the enemy's night and twilight attacks against the fast carrier task force ships were pressed less vigorously than in the case of all ships involved in the Philippines campaign.

SpecORG/4
 (LO)2242-45
 26 July 1945

**DOWNGRADED TO
 DECLASSIFIED**

Apparently night attacks against fast carrier task forces have been largely of a snooping nature.

TABLE 4
Effect of Day-Night-Twilight
 Non-suicide Incidents

Time of Day	No. of A/C Attacking	Planes Shot Down	% of Planes Shot Down		No. A/C Damaging Ships	% of Attacking A/C Doing Damage	
			TF 38 & 58	All Ships Philippines		TF 38 & 58	Philippines
Day	85 (51%)	28	33%	18%	7	8%	4.5%
Twilight	22 (13%)	4	18%	16%	0	-	4.4%
Night	59 (36%)	6	10%	20%	0	-	3.6%
	166*(100%)	38*	23%	18%	7	4%	4.3%

The above table also shows that the percentage of planes shot down by fast carrier forces is considerably greater than for "All Ships - Philippines" during the daytime, but about the same for all time periods combined. However, a greater percentage of the planes attacking fast carrier forces did damage during the daytime. Since the immediate purpose of AA defense is to shoot down planes so as to prevent them from damaging ships, a more significant comparison may be made of exchange rates, that is, the number of aircraft lost per aircraft damaging ship. Thus in daytime attacks the fast carrier groups shot down about as many planes per plane damaging ships as did "All Ships - Philippines", namely, about four.

IV. Effectiveness of AA Defense

Effectiveness of Various Types of Ammunition

The "rounds per bird" is a rough overall measure of the effectiveness of an AA projectile. The table below

* The time of day was not known in several non-suicide incidents which included two planes shot down.

SpecORG/4
 (LO)2242-45
 26 July 1945

**DOWNLOADED TO
 DECLASSIFIED**

presents, for the four major weapons used in AA defense, the average values of this measure obtained in both suicide and non-suicide incidents involving the fast carrier task forces. A very satisfactory result for 5" VT ammunition, especially in suicide incidents, will be noticed.

For comparison, similar figures are given for "All Ships - Philippines". Different methods of assigning kills may account in part for the differences. In the analysis of the fast carrier task force actions, the assignment by type of ammunition was done with more care than was possible for the larger group. Therefore, the figures are thought to be more reliable indices of the performance of the different kinds of ammunition.

TABLE 5

AA Effectiveness of Different Types of Ammunition

	Planes Shot <u>Down</u>	- Rounds per Bird -			
		<u>20mm</u>	<u>40mm</u>	<u>5"Com</u>	<u>5"VT</u>
Fast Carrier Task Force					
Suicide	24	27,200	6000	1000	200
Non-suicide	41	30,100	4500	1000	550
All Ships - Philippines					
Suicide	233	8,200	2500	1200	420
Non-suicide	144	8,100	4030	770	540

Effectiveness of Type of Ship

The following table shows the roles played by different types of ships under different conditions of attack. It is strange that the effectiveness differs so drastically for different kinds of attack. Battleships appear to be the most effective in shooting down planes in suicide incidents and least effective in non-suicide incidents. Effectiveness is measured by dividing the number of planes shot down by the number of ship-plane actions.

SpecORG/4
 (LO)2242-45
 26 July 1945

**DOWNGRADED TO
 DECLASSIFIED**

TABLE 6

AA Effectiveness by Type of Ship

Type of Ship	- Suicide Incidents -			- Non-suicide Incidents -		
	No.Ship-Plane Actions	Planes Shot Down	% Planes Shot Down per Ship	No.Ship-Plane Actions	Planes Shot Down	% Planes Shot Down per Ship
BB	37	7.9	21%	65	2.4	4%
CV,CVL	88	9.8	11	85	8.5	10
CB,CA,CL	47	3.8	8	113	11.9	11
DD	92	2.5	3	266	17.2	6

Statistical fluctuations can explain the difference between battleships and other types in non-suicide incidents. However, such cannot explain the difference in the showings of battleships as between suicide and non-suicide incidents.

In this connection it is interesting to compute the "expected" distribution by type of ship of the 24 kills in suicide incidents, and to compare it with the actual distribution. The "expected" kills are obtained by assuming that in each ship AA action the "rounds per bird" are the same as the overall average for the particular range of opening fire involved.

TABLE 7

Comparison of Actual and "Expected" Kills
 Suicide Incidents

Type of Ship	"Expected" Kills	Actual Kills	Ratio Actual to Expected (%)
BB	3.8	7.8	200%
CV,CVL	10.0	9.8	98
CB,CA,CL	5.8	3.8	65
DD	<u>4.4</u>	<u>2.5</u>	57
	24.0	24.0	

Thus, in suicide incidents, battleships appear to have shot down twice as many planes as would have been expected on the basis of their opening ranges, the amount of ammunition they fired, and the average success attained by all ships under similar conditions.

The table below shows the average amount of ammunition fired by each ship at each plane engaged by the ship and gives, in part at least, an explanation of the discrepancy in performance of battleships in suicide as compared with non-suicide incidents. It will be noticed, in the case of BBs, that the fire of automatic weapons is 40% to 50% greater in suicide incidents and that the five-inch fire is only about one-fourth as great as in non-suicide incidents. This indicates that battleships do proportionately more firing at long ranges - less effective ranges - in non-suicide incidents. This situation appears to hold to a different degree for the other ships as well; that is, the amount of automatic ammunition fired as compared with the five-inch fire indicates that proportionately more firing was done at long ranges in non-suicide incidents.

TABLE 8

Comparison of Rounds Fired in
 Suicide and Non-Suicide Incidents

	- Rounds Fired per Plane per Ship -			
	<u>20mm</u>	<u>40mm</u>	<u>5"Com</u>	<u>5"VT</u>
BB: Suicide	470	190	6.6	10.0
Non-suicide	310	140	23.0	45.0
CV,CVL: Suicide	730	380	5.8	3.5
Non-suicide	350	210	8.6	5.5
CB,CA,CL: Suicide	150	97	15.0	18.0
Non-suicide	160	120	24.0	19.0
DD: Suicide	80	39	10.0	5.0
Non-Suicide	50	44	19.0	13.0

Self-Defense of Target Ships

The assignment of kills in suicide incidents is such as to result in the following conclusion: about 40% of the planes shot down in suicide incidents were shot down by the target ships and about 60% by screening ships. Since, on the average, four other ships besides the target ship fired at each attacking plane, the preceding statement means that each screening ship which fired was about one-third as effective in defending the target ship as was the target ship itself.

SpecORG/4
(LO)2242-45
26 July 1945

**DOWNGRADED TO
DECLASSIFIED**

In the table below the AA defense of ships which were hit by suicide planes is compared with that of ships which were attacked but not hit and with that of ships which were not attacked. Ships which were hit before being able to fire a shot were not considered in determining the average opening range or the average amount of ammunition expended.

TABLE 9

Comparison of AA Effectiveness of Ships
in Suicide Incidents

	No. Ship- Plane Actions	- Rounds per Ship per Plane Fired at -				Average Open- ing Range
		20mm	40mm	5"Com	5"VT	
Ships Hit	24	930	490	6.5	7.3	3250
Ships Attacked but not Hit	18	1580	600	8.0	4.0	3700
Other Ships Firing (not attacked)	222	201	119	9.2	7.9	5300

As was to be expected from the fact that ships not attacked do more of their firing at long ranges than do ships attacked, the figures show a comparatively small amount of automatic weapons fire and a comparatively large amount of 5-inch fire by the ships not attacked. More interesting is the comparison between ships hit and those attacked but not hit. It will be noted that the average opening range is slightly less and the amount of 20mm and 40mm ammunition fired at each attacking plane is 40% and 20% less in the case of ships which were hit.

Comparison by Periods of Operations

The table below shows how the fast carrier task force fared in defending its ships in suicide incidents during different operational periods. The periods represent (1) the support of Philippine landings and (2) the support of Iwo Jima landings and preliminary support of Okinawa landings.

TABLE 10

COMPARISON BY PERIODS OF OPERATIONS
 SUICIDE INCIDENTS

<u>Period</u>	<u>No. of Planes Attacking</u>	<u>No. of Planes Shot Down</u>	<u>% Attacking Planes Shot Down</u>	<u>No. of Planes Which Hit Ships</u>	<u>% Attack- ing Planes Which Hit Ships</u>
24 Oct-26 Jan	34	13	38%	11	32%
27 Jan-21 Mar	<u>17</u>	<u>11</u>	<u>65</u>	<u>2</u>	<u>12</u>
	51	24	47%	13	26%

It is quite evident that fast carrier task forces had much better success against planes in suicide incidents during the later period than during the earlier period. This still holds, although not to the same degree, when both suicide and non-suicide incidents are combined as shown in Table 12 below.

TABLE 11

COMPARISON BY PERIODS OF OPERATIONS
 SUICIDE AND NON-SUICIDE

<u>Period</u>	<u>No. of Planes Attacking</u>	<u>No. of Planes Shot Down</u>	<u>% Attacking Planes Shot Down</u>	<u>No. of Planes Which Hit Ships</u>	<u>% Attack- ing Planes Which Hit Ships</u>
24 Oct-26 Jan	99	25	25%	12	12%
26 Jan-21 Mar	<u>126</u>	<u>39</u>	<u>31</u>	<u>6</u>	<u>5</u>
	225	60	27%	18	8%

The possible causes of the greater success during the later period which we are able to investigate are:

- (1) Greater effectiveness of AA fire per round fired.
- (2) Greater volume of AA fire per attacking plane.

To check on the effectiveness of the AA fire during the two periods we have computed the "expected" kills and

SpecORG/4
 (10)2242-45
 26 July 1945

**DOWNGRADED TO
 DECLASSIFIED**

compared them with the actual results, in a manner similar to that which was used for Table 7. The results are given below:

TABLE 12

Comparison of Actual and "Expected" Kills
 Suicide Incidents

	<u>"Expected" Kills</u>	<u>Actual Kills</u>	<u>Ratio: Actual to "Expected"</u>
24 Oct-26 Jan			
Luzon	10.6	12	
Formosa	<u>3.0</u>	<u>1</u>	
	13.6	13	96%
27 Jan-21 Mar			
Kyushu	<u>10.4</u>	<u>11</u>	<u>106%</u>
	24.0	24	100%

This table shows the AA effectiveness per round fired to be about the same for each period.

The volume of AA fire per attacking plane may be measured by dividing the total rounds fired by each gun type by the number of aircraft fired at. This is shown in the table below. Apparently the fast carrier task force was able to fire about 50% more ammunition at each attacking plane during the Kyushu operations than during the earlier operations.

TABLE 13

Rounds Fired per Attacking Plane
 Suicide Incidents

	<u>No. A/C Attacking</u>	<u>- Rounds Fired per Attacking Plane -</u>			
		<u>20mm</u>	<u>40mm</u>	<u>5"Com</u>	<u>5"VT</u>
24 Oct-26 Jan					
Luzon	27	1750	960	43	30
Formosa	<u>7</u>	<u>1200</u>	<u>480</u>	<u>26</u>	<u>47</u>
	34	1640	860	40	33
27 Jan-21 Mar					
Kyushu	17	2380	1180	58	51

SpecORG/4
(LO)2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED

The question arises at this point as to whether the greater volume of fire per attacking plane is due to opening fire at greater ranges or to more ships firing at each plane as it comes in. However, the table below indicates that neither of these two possible causes explains the difference in volume of fire.

TABLE 14

Average Number of Ships Firing and
Average Opening Ranges
Suicide Incidents

	<u>Avg. No. Ships Firing at Ea. Plane</u>	<u>Avg. Range of Ships Attacked</u>	<u>Open Fire All Ships Firing</u>
24 Oct-26 Jan			
Luzon	5.0	3800 Yds.	6300 Yds.
Formosa	<u>4.5</u>	<u>2600</u>	<u>3900</u>
	5.0	3400	5600
27 Jan-21 Mar			
Kyushu	5.4	3700	4400

The only remaining possibility is that, on the average, each ship was able to fire a greater volume of ammunition per attacking plane. This could result from (1) a greater rate of fire per gun firing, (2) bringing more guns to bear or (3) firing at a smaller number of planes simultaneously. Unfortunately, the information available in action reports is not sufficiently complete nor accurate to permit us to determine the relative importance of these three factors. One thing we can do, however, is examine the number of aircraft fired at as indicated in the AA action reports. This will throw some light on the last of the three factors mentioned above. The average values are shown in the following table.

SpecORG/4
 (LO)2242-45
 26 July 1945

DOWNGRADED TO
 DECLASSIFIED
 SECRET

TABLE 15

Average Number Aircraft Engaged per Ship Action
 Suicide Incidents

	<u>No. AA Reports</u>	<u>No. Ship- Plane Actions</u>	<u>Avg.No.A/C Engaged per Ship Action</u>
24 Oct-26 Jan	110	172	1.6
27 Jan-21 Mar	<u>82</u>	<u>92</u>	<u>1.1</u>
	192	264	1.4

It appears that there was a slight reduction in the number of aircraft engaged per ship action during the period. Part of the explanation of Task Force 58's greater volume of fire per attacking planes during the later period is to be found in this fact.

Comparison of AA Effectiveness by Task Group

There is actually little difference in the effectiveness of various Task Groups within the Task Force insofar as AA defense is concerned. This is indicated in the table below.

TABLE 16

Comparison of Task Group
 Suicide and Non-suicide Incidents

<u>Task Group</u>	<u>No.A/C Fired at</u>	<u>No. Planes Scoring Hit On Ships</u>	<u>A/C Shot Down</u>	<u>% Planes Scoring Hit On Ships</u>	<u>% Planes Shot Down</u>
38.1	12	1	1	8%	8%
38.2	28	4	9	14	30
38.3	49	5	11	10	22
38.4	<u>10</u>	<u>2</u>	<u>4</u>	<u>20</u>	<u>40</u>
	99	12	25	12%	25%
58.1	41	1	13	2%	32%
58.2	41	3	12	7	29
58.3	14	1	6	7	43
58.4	17	1	7	6	41
58-	<u>13</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>8</u>
	126	6	39	5%	31%

SpecORG/4
(LO)2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED

However, on the basis of exchange rates (the ratio of the number of planes shot down to planes scoring hits) TG 58.1 had the best performance with a 13 to 1 ratio, whereas other groups varied between 1 to 1 and 1 to 7.

V. Summary and Conclusions

Summary

(a) In both suicide and non-suicide attacks the AA defense of the fast carrier groups during the period 24 October 1944 to 21 March 1945 appears to be no better than that of all ships engaged in the Philippines campaign between 17 October 1944 and 13 January 1945.

(b) Most of the attacks in these actions were directed at carriers. Twelve carriers and two destroyers were damaged by hits or near misses in suicide attacks. In non-suicide attacks one carrier was sunk, five were damaged and one destroyer was damaged. Of the twenty ships damaged, only eight were put out of action and forced to leave the task force.

(c) Most of the attacks occurred during the daytime. During night and twilight enemy attacks were pressed less vigorously than during the day as evidenced by lower AA success rate and lower ship damage rates. This situation did not hold for all ships engaged in the Philippine campaign, which had night and twilight experiences similar to their daytime experience.

(d) A comparison of Rounds per Bird between the fast carrier task force and "All Ships - Philippines" shows a greater effectiveness of five inch VT fuzed ammunition fired by the fast carrier task force than that fired by "All Ships - Philippines". For other types of ammunition the effectiveness is not as good for the fast carrier task forces. Part of these differences may be due to different methods of distributing kills.

(e) In comparing the relative AA effectiveness of different types of ships, it was found that BB's were most effective in suicide incidents but least effective in non-suicide incidents. Further investigation indicated that in non-suicide incidents BB's engaged in more long-range firing than other types of ships. This resulted in a lower relative effectiveness. In suicide incidents this situation did

SpecORG/4
(LO)2242-45
26 July 1945

DOWNGRADED TO
DECLASSIFIED

not hold and the BB's AA effectiveness was twice as good as would have been expected on the basis of overall experience.

(f) A most important result was obtained in regard to the contribution of screening ships to the protection of the ship under attack. It was found that about 60% of the kills were made by screening ships and about 40% by the target ship. Since, on the average, four other ships beside the target ship fired at each attacking plane, it follows that each screening ship which fired was about one-third as effective in defending the target ship as was the target ship itself.

(g) The volume of ammunition fired per ship-plane action by ships which were attacked but not hit was considerably greater than that fired by ships which were hit, indicating that the volume of ammunition which a ship under attack was able to fire at the plane had a definite effect on the plane's success.

(h) A comparison of the AA effectiveness by operational periods shows that the fast carrier task force had much better success against planes in suicide incidents during the period 27 Jan. to 21 March than during the period 24 Oct. to 26 Jan. The fact that TF 58 encountered a smaller number of planes per AA action was encountered during the later period, which allowed the ships to fire a greater volume at each attacking plane, accounts for part of the better showing during the later period. Other possible causes are a greater rate of fire per gun firing and bringing more guns to bear.

(i) There appears to have been little difference in the AA effectiveness of various Task Groups within the Task Force. Task Group 58.1 had a notably high ratio of planes shot down to planes scoring hits on ships.

Conclusions

Aside from the measurement of the effect of various elements involved in the AA defense of ships in the fast carrier groups, this analysis emphasizes certain points of importance leading to further studies. These are

(1) The importance of the screen in the defense of the target ships emphasizes the importance of studies regarding the disposition of ships in the screen.

(2) The effect of volume of fire indicates the importance of increasing the volume of fire per attacking

SpecORG/4
(LO) 2242-45
26 July 1945

**DOWNGRADED TO
DECLASSIFIED**

plane by bringing more guns of each ship to bear on the target and by closer support of screening ships.

Approved by:

A. F. Kip
A. F. KIP,
Supervisor, SpecORG.

Submitted by:

W. L. DeVries
W. L. DeVRIES,
SpecORG.