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ANTI-AIRCRAFT STUDY

NO. 4

ANTI-AIRCRAFT ACTION IN THE PHILIPPINES CAMPAIGN

17 OCTOBER 1944 - 13 JANUARY 1945

UNCLASSIFIED

ANTI-AIRCRAFT OPERATIONS RESEARCH GROUP
HEADQUARTERS OF THE COMMANDER IN CHIEF
UNITED STATES FLEET

Office of Scientific Research and Development

Average Range of Opening Fire, in Yards

Type of Ship	In Harbor	Near Shore(a)	Out at Sea(b)	Under all Conditions
BB,CA,CL,DD,CV	5900	6500	6700	6400
All others	2600	3000	3100	2800
Average	3400	5000	5000	4400

Obviously, the average ranges are too short for both classes of ships, but it is especially clear that, due to the surprise nature of the attacks, the 5-inch guns are often not brought to bear in time. This accounts, in part, for the poor showing of 5-inch batteries in the Philippines campaign which will be pointed out below.

Target ships opened fire at even shorter ranges than the others, the average opening range of all target ships being 3700 yards as compared with 4400 yards for all ships.

Ammunition Performance: Automatic weapons have furnished the main defense against suicide attacks. On the basis of ships' claims, apportioned among assessed kills, the 40mm. and 20mm. accounted for about 80% of the planes shot down, as compared with about 15% by the 5-inch batteries and 5% by miscellaneous weapons(c). Because the suicide attack presents a close-in AA problem, the preponderance of automatic weapon successes is not surprising. Nevertheless, it is very apparent that the performance of the 5-inch gun left room for considerable improvement.

(a) Included in this category are ships within 50 miles of shore, the preponderance being within 10 or 15 miles.

(b) Included in this category are ships more than 50 miles from shore.

(c) It is to be noted that owing to the extreme difficulty of determining the type gun responsible for shooting down a plane, these results and the estimates of rounds per bird are not completely reliable. In particular, there is probably a tendency to overestimate the success of small caliber weapons, since before a plane reaches the short range of small caliber fire, it may have been damaged by longer range weapons.

Details of ammunition performance by month are given in the following tables for suicide incidents (actions in which at least one suicide crash was attempted, but some kills were planes not definitely identified as having suicidal intentions).

Planes Destroyed, by Ammunition Types

	5" Com.	5" VT	3" Com.	3" VT	40mm	1.1"	20mm	.50 cal.	.30 cal.	TOTAL
Oct.	2.0	3.5	1.0	-	15.0	-	9.0	.5	-	31
Nov.	3.5	5.5	2.0	-	33.0	-	19.0	-	-	63
Dec.	13.5	2.5	1.0	-	38.0	-	29.0	3.0	-	87
Jan.	3.0	5.5	1.5	.5	29.5	.5	21.5	2.0	2.0	66
TOTAL	22	17	5.5	.5	115.5	.5	78.5	5.5	2	247
% of total kills	8.9%	6.9%	2.2%	0.2%	46.8%	0.2%	31.8%	2.2%	0.8%	100%

Rounds Expended and Rounds per Bird, by Ammunition Types

	5" com.	5" VT	3" com.	3" VT	40mm	1.1"	20mm	.50 cal.	.30 cal.
Oct	1679	580	194	-	40936	70	95086	12370	1335
Nov	6888	1997	610	-	75385	335	149208	18077	2260
Dec	7029	1485	412	-	52728	-	141785	51873	5100
Jan	10706	3021	3451	544	118507	2290	259236	36912	5686
TOTAL	26302	7083	4667	544	287556	2695	645315	119232	14381
Average RPB	1196	417	849	1088	2490	5390	8221	21678	7191

It will be noted from the above tables that whereas only 21% of the 5-inch projectiles fired in these incidents were VT-fuzed, these fuzes accounted for 44% of the 5-inch kills.

B. Gunnery

Ammunition Performance: The 5-inch gun accounted for a considerably larger percentage of the planes shot down in non-suicide than in suicide incidents. Apparently this was due to the comparatively large expenditure of 5-inch ammunition in non-suicide incidents. Nevertheless, on the basis of ships' claims distributed among assessed kills, the automatic weapons still accounted for the majority of the kills, 35% being credited to 20mm fire and 28% to 40mm. Details of ammunition performance are given in the following tables.

Planes Destroyed, by Ammunition Types

	5" Com.	5" VT	3" Com.	3" VT	40mm	1.1"	20mm	.50 Cal.	.30 Cal	TOTAL
Oct	19.0	1.0	3.5	-	17.5	-	20.5	.5	-	62
Nov	.5	1.0	-	-	7.5	.5	8.5	1.0	-	19
Dec	15.5	7.5	-	-	10.0	-	13.0	-	-	46
Jan	3.0	1.5	-	-	7.0	-	11.0	1.5	-	24
TOTAL	38.0	11.0	3.5	-	42.0	.5	53.0	3.0	-	151
% of total	25.2%	7.3%	2.3%	-	27.8%	.3%	35.1%	2.0%	-	100%

Rounds Expended and Rounds per Bird, by Ammunition Types

	5% Com	5" VT	3" Com	3" VT	40mm	1.1"	20mm	.50 Cal	.30 Cal
Oct	11618	949	1439	9	87599	1968	242528	26665	50
Nov	4355	863	239	34	11168	685	28739	3571	400
Dec	7129	2016	529	-	29839	4	77625	25849	1186
Jan	6079	2143	1334	38	40642	1806	80461	14893	208
TOTAL	29181	5971	3451	81	169243	4463	429353	70978	1844
Avg RPB	768	543	1012	-	4030	8926	8101	23659	-

A comparison of ammunition performance by day and by night indicates that the rounds per bird are lower at night in the case of both the 5-inch and the automatic AA weapons. This is very difficult to explain. However, in the case of the 5-inch batteries, one possibility is that their performance is improved at night because they must be fired under radar control. And in the case of the automatic weapons, it appears that there is considerable useless firing in the daytime.

	5" Com	5" VT	3" Com	3" VT	40mm	1.1"	20mm	.50 cal	.30 cal	TOTAL
Planes Destroyed, by Ammunition Types										
Day	23.5	4.0	3.0	-	23.5	-	28.0	-	-	82
	28.7%	4.8%	4.0%		28.4%		34.1%			
Twilight	2.5	1.0	-	-	11.5	-	10.0	-	-	25
	10.0%	4.0%			46.0%		40.0%			
Night	14.0	5.0	-	-	7.5	-	11.0	1.5	-	39
	36.1%	13.0%			19.5%		27.4%	4.0%		
Rounds Expended, by Ammunition Types										
Day	16360	3051	2000	37	104960	813	252807	43391	705	
Twilight	5029	1109	1314	41	45683	2378	114775	17767	40	
Night	6596	1703	181	3	12756	1171	36736	5800	100	
Rounds per Bird, by Ammunition Types										
Day	696	763	667	-	4466	-	9029	-	-	
Twilight	2012	1109	-	-	3972	-	11478	-	-	
Night	471	341	-	-	1701	-	3340	3867	-	

III. Comparison of Suicide and Non-Suicide Attacks

During the Philippines campaign, suicide attacks were about 10 times as effective as non-suicide attacks in sinking ships, and about 6 times as effective in causing damage. The percentage of planes lost was about 6 times as great in suicide attacks as in non-suicide attacks, but this

factor is of minor importance because the major losses are always inflicted by our fighter defense, so that the survival probability of a Japanese pilot who sets out against our ships is extremely small, even if his mission is only an ordinary bomb or torpedo run. The detailed comparison is given in the following table:

Relative Effectiveness of Suicide and Non-Suicide Attacks

(Figures refer to aircraft over the task force (a))

	Non-suicide	Suicide
1. Average number of planes per ship sunk.....	198.	16.5
2. Average number of planes per ship sunk or damaged.....	20.7	3.2
3. Percentage of planes which damage ships.....	4.8 %	(b) 31.6 %
4. Percentage of planes lost to AA or in suicide crashes.....	(c) 15.0 %	(d) 100 %
5. Average number of planes lost to AA or in suicide crashes, per ship sunk.....	28.2	16.5
6. Average number of planes lost to AA or in suicide crashes, per ship sunk or damaged.....	3.1	3.2

(a) This tabulation is based on individual planes; the totals have been adjusted according to the method described on page 2.

(b) Only suicide hits are counted.

(c) This figure is somewhat lower than that for the war as a whole because a number of planes which came in and went off again without really attempting an attack are included.

(d) Observer planes are omitted.