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ADVANCE INTELLIGENCE CENTER
CinCPOA Advance Headquarters
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CONFIDENTIAL

MEMORANDUM

Subject: Bomb and Fuze Selection

Reference: Tentative Instructions - Night Carrier Task Group. (NIT CAR-1) as forwarded ltr. ComCarDiv 7 to CinoPac 20 March.

General Comments:

Arming plans such as set forth in the subject instructions may serve a very useful purpose in promulgating most effective bomb and fuze selections for common target types. This usefulness perhaps may be increased by indicating a definite order of preference for the suggested ordnance. In general, the weapon listed first for each target is the best selection, but this priority is not emphasized in all cases nor is the order of preference for alternative weapons clearly indicated, though it may be implied. Against most targets, there usually is a particular bomb and fuze combination which will yield optimum results. The use of any other combination dilutes the weight of attack and reduces the efficiency of the strike. Every effort therefore should be made to employ the maximum quantity of the most effective ordnance. Attacks in which mixed ordnance of varying degrees of effectiveness are employed unnecessarily are wasteful.

Against targets A, B, E, D, F, G, Q, R, and T as given in the arming table, two 1000-lb GP bombs are indicated as a possible loading for fighter bombers. Against all of these except target A, two 500-lb G.P. bombs are listed as an alternate arming. It is presumed that the inference is that two 1000-lb bombs should be carried against these targets if practicable. Against targets C, H, I, J, K, L, M, P, and U, two 500-lb G.P. bombs are given as a suggested armament for fighter bombers. No mention is made of arming with two 1000-lb GPs. It is obvious that, if circumstances permit, a load of two 1000-lb GP bombs will always be preferable to two 500-lb GP bombs, no matter what the target.

Specific Comments:

The comments which follow are grouped according to the reference letter of the bomb and fuze table of the subject report.

A. Battleships

Recent prisoners of war information (CinCPac-CincPoa Interrogation Report No. 111) indicates the possibility of a 2" armored weather deck on Jap BBs and CAs. If this information is correct, GP bombs could be expected only to produce damage above decks and, if used, should be fuzed instantaneously to prevent break-up. Greatest damage to the ship will be caused by bombs detonating well within the hull. Since the 1600-lb and 1000-lb AP bombs have the best chance of accomplishing such penetration and have the least chance of breaking up and detonating low order, it is believed that their use should have preference over GP bombs. The 1600-lb AP would be the most desirable bomb. Torpedoes are by far the most effective aerial weapons against these targets.

High velocity rockets with delay-fuzed armor piercing heads are recommended in the reference "for spreading destruction and confusion top side." Although information on the penetration capabilities of HVAR is scanty, data on hand (BuOrd Conf. Ltr. S78-1(119)) indicates that maximum penetration with nose plugs and delay base fuzes is one inch of armor at 0° obliquity and 3/4 inch at 45° obliquity, break-up of the rocket body being the limiting factor. Instantaneously fuzed HVAR may be expected to cause "serious damage" (minimum dimension of hole equal to or greater than caliber of rocket head) to armor 1½" thick and the danger of break-up and low order detonation is much less. When the damaging effect of fragments to exposed fire-control apparatus, personnel, and other topside targets is considered, it would appear that instantaneous fuzing may be the better choice.

B. Aircraft Carriers, Armored.

It is agreed that torpedoes are the primary attack weapon. The instructions include the 1000-lb GP and the 2000-lb GP with Mk. 243 nose fuze and AN-Mk. 230 hydrostatic tail fuze. It is stated that "The new Mk. 243 instantaneous non-water impact fuze with the Mk. 230 hydrostatic fuze on a 2000-lb GP will clear the flight deck on topside detonation and give maximum mining effect for near misses." BuOrd Pamphlet No. 988 gives this fuze 0.025 second delay and not instantaneous action. Data on hand here does not indicate the availability of a discriminating nose fuze with instantaneous action.

As pointed out in Bulletin of Ordnance Information 4-44, use of the 0.24 second delay primer detonator M-14 in tail fuzes of the AN-M100 A2 series as a companion to the AN-Mk 243 nose fuze has several advantages over combinations employing a hydrostatic tail fuze. This delay has been found to cause detonation at depths favorable for producing damage by mining.

Against carriers with armored flight decks, it is suggested that GP bombs be used only when SAP or AP bombs are not available, and if used, be fuzed instantaneously.

The use of 100-lb GP bombs, fuzed instantaneously, against armored flight decks is questioned. Facilities above this deck probably can be attacked more effectively with rockets and strafing.

D. Heavy Cruisers

Against torpedoes, AP bombs are considered to give best chance for lethal damage as maximum penetration will be obtained and there will be least possibility of break-up. The 1600-lb AP would have preference among bombs

E. Light Cruisers

Against torpedoes, SAP bombs fuzed 0.1 second delay are considered best for obtaining lethal damage by permitting sufficient penetration with little possibility of breaking-up.

G. - As pointed out under B above, the Mk. 243 fuze has a delay of 0.025 second. A hit on the deck of a merchant ship with this fuze will result in rupture of the GB case and low order detonation unless dropped from very low altitude, in which case the fuze delay is too short for safety.

L. - Bombs smaller than 500-lb GP are not considered large enough to be efficient in causing structural damage to hangars. If 0.01 second nose fuzes are available, their use is recommended. This fuze will insure detonation among the roof trusses and result in maximum structural damage. Against AA, use of the T4E3 (M-26) frag bomb cluster containing 20x20-lb frag bombs is suggested.

M. - The T4E3 (M-26) frag cluster is again suggested.

N. - Same as for M. Depth bombs are not considered an effective weapon against personnel although very effective for clearing jungle growth. A 500-lb GP bomb will have approximately the same blast effect as a 350-lb DB. In addition, the GP bomb is capable of causing considerable fragment damage while the fragmentation effect of the DB is negligible. Since equal number of either 500-lb GP or 350-lb DB can be carried by either VFB or VTB, it would seem that the 500-lb GP would be the preferred loading. Low level attack with parafrags is very effective against exposed personnel where conditions permit use of such tactics.

P. - Such light buildings in concentrated areas would be most vulnerable to incendiary attack if combustible. No GP bombs would be necessary. If used, GP bombs would preferably be fuzed instantaneous and non-delay as such buildings would be vulnerable to blast.

Q. - Use of incendiaries must be based on the combustibility of the contemplated target. If the target is readily combustible, GP bombs may not be necessary. If non-combustible, incendiaries would be of no value. The use of depth bombs against "buildings of more solid construction" is questionable. If used, instantaneous fuzing would be preferable to 0.01 second delay to prevent break-up and low order detonation.

R. - The use of the 0.01 second delay nose fuze is suggested against such industrial targets as single-story, steel framed, light engineering shops. Against heavy engineering works a delay of 0.1 second may be preferable to produce collapse by cratering and undermining columns. Against multi-story structures, a delay of 0.025 seconds may be desirable. It is suggested that such alternative fuzings be included in the arming plan. Depth bombs are not considered efficient against industrial plants.

S. - Attention is again invited to the T4E3 (M-26) frag cluster containing 20x20-lb frag bombs.

T. - It is suggested that for other than minimum altitude attack, the arming plan be enlarged to include non-delay and 0.01 second delay fuzing alternatives as these are considered best for certain types of bridges. The fuze delay of 0.025 seconds is not optimum against usual bridge types.

Tab D/1

From: Commander T.F.58(ComFirstCar T.F.-Pacific)
Admiral M.A. Mitscher

1. With regard to the recommendation of Commanding Officer, VT-9; orders have been issued and instructions included ~~in~~g in Task Force Instructions to employ selective arming on all S.P. bombs and HVAR.

2. Remarks relative to loading VF with bombs and rockets are concurred in.

Task Force 58 - Action Report:
Tokyo, Iwo Jima, Amai Gunto, 10 February - 1 March 1945.
aic r/s 7219 cincpac rs-051903 CONFIDENTIAL

From: Commanding Officer, Torpedo Squardon Nine - 3 March '45

4. Bomb and fuze selection were in many cases unfortunate. At times this was impossible to avoid, but in some cases the installation of two fuzes -- nose and tail -- would have permitted a proper selection at the last minute. It is especially important that all bombs have two fuzes, not only for last minute target changes, but also for greater assurance that the bomb will function properly on impact. There seems to be a shortage of fuzes available, and an understandable reluctance on the part of loading personnel to install these in the bomb nose. Where airfields are primary targets the instantaneous nose fuze is the optimum selection, but with a change at the target to buildings or merchant ships, a much better selection would be the .025 second delay. It is therefore strongly recommended that both nose and tail fuzes be installed in every case.

TF-58 -- Action Report: Tokyo, Iwo Jima, Amai Gunto - 10. Feb. - 1 March 1945 - AIC R/S:- 7219 CincPac R/S:- 051903

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File IV, A.
Subject: Bombs, availability
Subject: Bombs, availability
Fuzes, availability

NAVY DEPARTMENT
BUREAU OF ORDNANCE
WASHINGTON 25, D. C.

NAVORD OCL AV30-44
22 November 1944

(mm2d)
F41-6(48)

CONFIDENTIAL

BUREAU OF ORDNANCE CIRCULAR LETTER AV30-44

Subject: Aircraft Bombs, Bomb Fuzes, and Accessories - Status and Availability of.

Enclosures: (Herewith)
(A) Status and Availability of Aircraft Bomb Fuzes of Navy Design
(B) Status and Availability of Aircraft Bomb Fuzes of Army Design
(C) Status and Availability of Aircraft Bombs of Navy and Army Design
(D) Status and Availability of Aircraft Bomb and Bomb Fuze Accessories

1. The purpose of this Circular Letter is to inform the Fleet of the present status and availability of Aircraft Bomb Type Ammunition.

2. Pertinent references are indicated under "Remarks" opposite the individual items in Enclosures (A), (B), (C), and (D).

3. It is the intention of this Bureau to issue revisions of Enclosures (A), (B), (C), and (D) quarterly, in order to keep the Fleet continually advised of new developments and changes in the status or availability of Aircraft Bomb Type Ammunition.

G. F. HUSSEY, JR.
Rear Admiral, U. S. Navy
Chief of Bureau

Acting

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NAVORD OCL AV30-44
ENCLOSURE A

CONFIDENTIAL

STATUS AND AVAILABLILITY OF AIRCRAFT BOMB FUZES - NAVY DESIGN

DESIGNATION	DESCRIPTION	USE	STATUS AND REMARKS
MK. 215 Mod 0 MK. 216 Mod 0 MK. 217 Mod 0	Tail, Long Delay, Impact. (M16 or M16A1 Primer Detonator)	MK. 215: 100-lb. and 250-lb. GP Bombs. MK. 216: 500-lb. GP and SAP Bombs. MK. 217: 1000-lb. GP and SAP Bomb 2000-lb GP Bombs, and 500-lb. & 1000-lb. Navy GP Bombs with M102 adapter-booster and adapter ring, OCL V8-43. For Minimum Altitude Bombing.	Available 1 January 1945. These fuses are exact copies of the M115, M116. and M117 Minimum altitude Bombing Fuses manufactured by the Navy from Army drawings and specifications to relieve critical stocks.
AN-MK. 219 & Mods	Nose, instantaneous, impact.	Navy 100-lb. GP; 100-lb. Chem.; 30 lb. Frag. With adapter ring and extra Auxiliary Booster, MK 1, in all other Navy GP bombs and all Depth Bombs. With adapter ring and one Auxiliary Booster, MK 4, in all Army bombs 100-lbs. or over except 100-lb. Chemical and Incendiary.	Service. In stock. MK. 219 Mod 1 Lots 1-10 & 20-70, AN-MK. 219 Mod 2 Lots 71-117 restricted to target use. For use of "ANTI-PERSONNEL" attachment see OTI AV9-43 and OCL AV74-43.
MK. 221 & Mods	Nose, short delay (.01 sec), impact.	500 & 1000-lb. Navy GP bombs and all Depth bombs.	Obsolescent. In stock. MK. 221 Mod 0 restricted to target use only.
MK. 223 & Mods	Tail, short delay (.01 sec), impact.	500 & 1000-lb. Navy GP bombs.	Obsolescent. In stock. MK. 223 Mod 0 restricted to target use only. MK. 223 (AS) Lots 39, 40, 45, & 46 to be turned in to the nearest NAD.
AN-MK. 224 & Mods	Athwartship, hydrostatic. (25', 50', 75', 100' selective depth setting, by disassembly.)	All Depth bombs except the MK. 53 & MK. 54 type. (Requires the use of a Spacer when employed in 650-lb. and 700-lb. bombs)	Obsolescent. In stock. MK. 224 Mod 0 and AN-MK. 224 Mod 1, series A,B, & C, and AN-MK. 224 Mod 2 (Stewart Warner) Lots 27, 29, 30, 31, 32, 34, 35, 37, 39, 40, 41, 42, 43, 47-101 incl. & 107, to be turned in to the nearest NAD for reworking. Being replaced by the AN-MK. 34
MK. 227 Mod 0	Nose, instantaneous, impact	All Anti-Aircraft bombs	Service. In stock.
AN-MK. 228 & Mods	Tail, short delay (.08 sec), impact.	All Navy design Armor Piercing bombs.	Service. In stock.
MK. 229 Mod 1,2 MK. 229 Mod 3	Tail, hydrostatic. (25', 50', 75', 100', & 125', selective depth setting.)	All 650-lb. & 700-lb. Depth bombs and Navy 500-lb. and 1000-lb. GP bombs.	MK. 229 Mod 1,2: Obsolescent. In stock. Being replaced by the MK. 229 Mod 3. MK. 229 Mod 3: Service. In stock. Incorporates safety features. Use "O" ring gasket and special Spacer Ring with both.*
AN-MK. 230 Mod 1,3 AN-MK. 230 Mod 4 AN-MK. 230 Mod 5	Tail, hydrostatic. (25', 50', 75', 100', & 125', selective depth setting.)	MK. 53 and MK. 54 type Depth bombs. AN-GP 60 series by removal of the adapter ring from the M115 adapter booster.	AN-MK. 230 Mod 1,3: Obsolescent. In stock. Being replaced by AN-MK. 230 Mod 4,5. AN-MK. 230 Mod 4: Service. In stock. Incorporates ANTI-CRASH features. AN-MK. 230 Mod 5: is an AN-MK. 230 Mod 4 converted from a MK. 229. Use "O" ring gasket and special Spacer Ring with all three.*
MK. 231 Mod 0	Tail, hydrostatic, (25' single depth setting.)	MK. 53 and MK. 54 type Depth bombs. AN-GP 60 series by removal of the adapter ring from the M115 adapter booster.	Under development. No availability date set.
MK. 232 Mod 1	Nose	Special fuze; not for general issue.	Limited availability. Procurred through NMD Yorktown and NAD Hawthorne.
MK. 233 Mod 0	Nose	Special fuze; not for general issue.	Limited availability. Procurred through NMD Yorktown and NAD Hawthorne.
AN-MK. 234 & Mods.	Athwartship, hydrostatic, (25', 50', 75', 100', 125' selective depth setting)	All Depth bombs except the MK. 53 and MK. 54 type. (Requires the use of a Spacer when employed in the 650-lb. and 700-lb. Depth bombs.)	Service. In stock. AN-MK. 234 Mod 2 (Stewart Warner) Lots 1-141 incl. to be turned in to the nearest NAD for reworking.
MK. 235 Mod 0 MK. 236 Mod 0	Nose Tail	Special fuze; not for general issue. Special fuze; not for general issue.	Limited availability. Limited availability.
MK. 237 Mod 0 MK. 238 Mod 0	Tail, Time delay (2, 10, and 30 hours).	MK. 237 Mod 0: AN-M64 and AN-M64A1 500-lb. GP bomb. MK. 238 Mod 0: AN-M65, AN-M66, & AN-M66A1 1000-lb. and 2000-lb. GP bombs. A1 series preferred.	Limited availability in early 1945.
MK. 239 Mod 0	Nose, short delay (.01 sec), impact.	All AN-M GP bombs, Depth bombs, or Navy GP bombs except the 100-lb. Navy GP bomb.	Limited availability in early 1945. This fuze is the MK. 221 with reduced diameter in booster end.
MK. 243 Mod 0	Nose, short delay (.025 sec), impact, with discriminating feature. Will function on ¼" plate, but not on water.	All AN-M GP bombs, or Navy GP bombs except the 100-lb. size.	Available in quantity. Service.

* Spacer Ring should be used with "O" Ring Gasket with all tail, hydrostatic fuzes except those incorporating " 'O' Ring Gasket Undercut" in fuze construction. Fuzes incorporating "undercut" are:
(a) Reo Motors AN-Mk. 230 lots 72, 75, and all lots thereafter.
(b) Aldon Products AN-MK. 230 beginning with carton No. 4999 of lot 26 and all lots thereafter.

STATUS AND AVAILABILITY OF AIRCRAFT BOMB FUZES - ARMY DESIGN

DESIGNATION	DESCRIPTION	USE	STATUS AND REMARKS
AN-M100A1 AN-M101A1 AN-M102A1	Tail, Short Delay Impact,(M14 Primer Detonator)	AN-M100A1: 100-lb. & 250-lb. GP's, 260-lb. & 500-lb. (T14)Frag. bombs AN-M101A1: 500-lb. GP, SAP, Chem., and Incendiary bombs. AN-M102A1: 1000-lb. & 2000-lb. GP, 1000-lb. SAP, and 500-lb. & 1000-lb Navy GP bombs with M102 adapter-booster and adapter ring OCL V8-43	All stocks being returned to the Army. If used should be pre-armed per OCL V38-42
AN-M100A2 AN-M101A2 AN-M102A2	Tail, Short Delay Impact, (M14 Primer Detonator)	AN-M100A2: 100-lb. & 250-lb. GP's, 260-lb. & 500-lb. (T14)Frag. bombs AN-M101A2: 500-lb. GP, SAP, Chem., Incend. and 1000-lb. (T15)Frags. AN-M102A2: 1000-lb. & 2000-lb. GP, 1000-lb. SAP, and 500-lb & 1000-lb Navy GP bombs with M102 adapter-booster and adapter ring,OCL V8-43	Service In Stock
AN-M103	Nose, Instantaneous or .10 second delay, Impact	All bombs weighing 100-lb. or over receiving a nose fuze, except Navy 100-lb. Mk.4 & Mods, AN-M47A2, and M70 bombs.	In Stock. May be used on carriers if no suitable substitute is available. To be replaced by the AN-M103A1. See OCL AV125-43 for restricted fuzes.
AN-M103A1	Nose, Instantaneous or .10 second delay, Impact	All bombs weighing 100-lb. or over receiving a nose fuze, except Navy 100-lb. Mk.4 & Mods, AN-M47A2, and M70 bombs.	Available November, 1944 Incorporates Anti-crash features.
AN-M104	Nose, Instantaneous Impact, Has Pyro-technic delay arming	Clustered parachute fragmentation bombs, AN-M40.	Classed Obsolescent by the Army. Replaced by AN-M120A1. Not for carrier use.
M105	Nose, Instantaneous or .10 Sec. Impact	Modified Mark Series bombs.	Obsolete. Never procured by Navy.
M106	Tail, Long delay Impact	G.P. Bombs	Restricted from Naval use, see OCL AV58-43
M107	Nose, Aerial Burst Mechanical Time	Obsolete 20-lb. Frag. bombs	Obsolete, Never procured by the Navy.
M108	Nose, Instantaneous Impact, Inst. arming	Light Case Chemical bombs	Return to NAD Hawthorne and Crane. Replaced by AN-M126A1
M109	Nose, Instantaneous Impact	Fragmentation bombs	Obsolete, Never procured by the Navy.
M110	Nose, Instantaneous Impact	Clustered fragmentation bombs, AN-M41, and Chemical bomb, M70.	Obsolescent, See OCL A24-43 and A24a-43. Replaced by the AN-M110A1.
AN-M110A1	Nose, Instantaneous Impact	Clustered fragmentation bombs, AN-M41, and Chemical bomb, M70.	Service, Available, See OCL A24-43 and A24a-43.
M111	Nose,Mechanical Time Aerial Burst, or Impact.(15-93 Sec.)	Parachute Flares, Photoflash bombs and some Aimable Clusters.	Obsolescent, limited availability. Replaced by the M111A2.
M111A1	Nose, Mech. Time, Aerial burst, or Impact. (5-92 Sec.)	Parachute Flares, Photoflash bombs and some Aimable Clusters.	Obsolescent, Available, Replaced by the M111A2.
M111A2	Nose, Mech. Time, Aerial Burst, or Impact. (5-92 Sec.)	Parachute Flares, Photoflash bombs and some Aimable Clusters.	Service, Available
M112 M113 M114	Tail, Long Delay, Impact, (M16 Primer Detonator)	M112: 100-lb. & 250-lb. GP bombs, M113: 500-lb. GP and SAP bombs M114: 1000-lb. & 2000-lb. GP, and 1000-lb. SAP, and 500-lb & 1000-lb Navy GP bombs with M102 adapter-booster and adapter ring OCL V8-43 For Minimum Altitude Bombing.	In Stock, but being replaced by the A1 series. Not safe for carrier use. M115-16-17 fuzes preferred.

DESIGNATION	DESCRIPTION	USE	STATUS AND REMARKS
M112A1 M113A1 M114A1	Tail, Long Delay. Impact, (M16 or M16A1 Primer Detonator)	M112A1: 100-lb & 250-lb GP bombs M113A1: 500-lb. GP and SAP bombs M114A1: 1000-lb & 2000-lb GP, 1000-lb SAP, and 500-lb & 1000-lb Navy GP bombs see OCL V8-43. For Minimum Altitude Bombing.	In Stock. Not safe for carrier use M115-16-17 fuzes preferred. (Fast Arming)
M115 M116 M117	Tail, Long Delay Impact, (M16 or M16A1 Primer Detonator)	M115: 100-lb. & 250-lb. GP bombs M116: 500-lb. GP and SAP bombs M117: 1000-lb & 2000-lb GP, 1000-lb SAP, and 500-lb & 1000-lb Navy GP bombs, see OCL V8-43. For Minimum Altitude Bombing	In Stock. Safe for carrier use, has gear reduction system
M118 M119	See T32 See T33		Not sucessful, destandardised to T32 and T33.
AN-M120	Nose, Instantaneous, Impact, 2.5 Sec. armin	Clustered parachute fragmentation bombs, AN-M40 and AN-M40A1	Not safe for CV use, not available in Navy clusters
AN-M120A1	Nose, Instantaneous, Impact, 1.5 Sec arming	Clustered parachute fragmentation bombs AN-M40 and AN-M40A1	Service, Available, not safe for carrier use.
M121 M122	Special Tail Fuze Special Tail Fuze	Special Special	Never procured by the Navy Never procured by the Navy
M123 M124 M125	Tail, chemical time, Impact, Available delays are 1hr, 2hrs, 6hrs, 12hrs, 24hrs, 36hrs, 72hrs, and 144 hrs. These fuzes have an anti-withdrawal device.	M123: 100-lb, & 250-lb, GP bombs M124: 500-lb. GP and SAP bombs M125: 1000-lb & 2000-lb GP, and 1000-lb. SAP bombs. The A1&A2 series of the above bombs are preferred. Note: Use only those fuzes whose lower fuze body is pinned to the upper fuze body to avoid aerial burst.	In stock, use not recommended from shipboard.Lots as follows restricted due to faulty ampoules:M123 PAE 82,83,85-87,101,108,109, 115,118-120,4129; M124 PAE 27,28,30,40,41,44-46,52,54, 58,62,80,96,99,103,107,112, 4121-123; M125 PAE 49-51,63, 70,72,78,81,100,106,111,124-128.
M123A1 M124A1 M125A1	Tail, chemical time, Impact, Delays available are 1hr to 144hrs	GP and SAP bombs as above. The A1 & A2 series bombs with staked parts are preferred	Not under procurement. Not safe for carrier use, no reduction gears.
AN-M126	Nose, Instantaneous Impact, (M110 M0 booster, and #/ primer det.	Chemical bombs 100-lb., M47A2	Obsolescent, replaced by the AN-M126A1
AN-M126A1	Nose, Intantaneous Impact, (AN-M110A1 W/ primer detonator)	Chemical bombs 100-lb., M47A2	Service, In stock.
M127	Nose, Mech. Time, Air Burst.(the M111A2 W/ the M110 booster)	Aimable Clusters, and 500-lb. & 1000-lb. Chem. bombs with M117 adapter-booster.	Not procured for Naval use. Not detonator safe. Formerly the T39
M128	Nose, Mech. Time Air Burst.(M111A2 W/ a an M120 booster,& alider)	Aimable Clusters, and 500-lb. & 1000-lb. Chem. bombs with M117 adapter-booster.	Available early in 1945, this fuze is detonator safe. Formerly the T55
M129 (M130) (M131)	Amidships, M129:Impact or aerial burst. M130: 10,20,or30 minute delay. M131: Anti-disturbance.	Fragmentation (Butterfly) bombs M83.(Shipped installed)	Available with bombs M83. M129: formerly the T47, M130 and M131: are now T48E1 and T49, not yet standardised by the Army.
M132 M133 M134	Tail, Chemical Time Delay (10 minute nominal delay)	M132: 100-lb & 250-lb GP bombs M133: 500-lb GP and SAP bombs M134: 1000-lb GP & SAP, and 2000-lb GP bombs.	Available in the Army, Formerly the T41.
M135	Nose, Mech. Time, Air Burst (M111A2 in the body of an AN-M103)	Can be used anywhere the AN-M103 fuse is used.	Not procured for Naval use Not suitable for Naval use Formerly the T56
(M136) (M137)	Similar to M135 Special	Same as M135 above Special	Not standard still T56E1 Not standard still T60
M138	M127 with booster	Aimable Clusters	Not procured, formerly T39E1
M139A1 M140A1	Nose,Impact, M139A1 is the AN-M103A1 W/ .01 sec delay,M140A1 W/.025 sec	Can be used anywhere the AN-M103 fuse is used.	Not procured, M139A1 formerly the T58, M140A1 formerly the T67.

STATUS AND AVAILABILITY OF AIRCRAFT BOMBS - NAVY AND ARMY DESIGNS

DESIGNATION	STATUS AND REMARKS
2-lb. AA, Mk.32 Mod 0 (2" Type C)	Being declared obsolete. Superseded by Mk.34.
2-lb. AA, Mk.32 Mod 0 (3" Type D)	Being declared obsolete. Superseded by Mk.34.
3-lb. Min. Practice Mk.3 & Mods	Being declared obsolete. Superseded by AN-Mk.23 and AN-Mk.43.
3-lb. Min. Practice Mk.4 Mod 0	Being declared obsolete. Superseded by AN-Mk.23 and AN-Mk.43.
3-lb. Min. Practice Mk.5 Mod 0	Being declared obsolete. Superseded by AN-Mk.23 and AN-Mk.43.
3-lb. Min. Practice AN-Mk.5 Mod 1	Service, limited availability. Superseded by AN-Mk.23 and AN-Mk.43.
3-lb. Min. Practice AN-Mk.23	Service, available.
3-lb. Min. Practice AN-Mk.23 Mod 1	Service, available in December 1944. Incorporates Tail Shroud.
4½-lb Min. Practice AN-Mk.43	Service, available.
4½-lb Min. Practice AN-Mk.43 Mod 1	Service, available in December 1944. Incorporates Tail Shroud.
5-lb. AA Mk.34 Mod 1	Service, available at NAD Crane, Hawthorne and Oahu.
13-lb. Min. Practice Mk.19 & Mods.	Service, available.
30-lb. Practice Mk.3 Mod 0	Being declared obsolete.
30-lb. Frag. Mk.5 & Mods	Being declared obsolete. Superseded by fragmentation clusters
50-lb. Smoke (Floating) Mk.1 Mod 0	Being declared obsolete. Superseded by Mk.1 Mod 1 Expend in Target Prac.
50-lb. Smoke (Floating) Mk.1 Mod 1	Service, available. To be superseded by Mk.1 Mod 2
50-lb. Smoke (Floating) Mk.1 Mod 2	Service, available in November 1944. (Longer burning time than Mk.1 Mod 1)
100-lb. Incendiary Mk.1 Mod 0	Being declared obsolete. Superseded by AN-M47A2. Expend as WF prac. bomb
100-lb. Incendiary Mk.2 Mod 0	Being declared obsolete. Superseded by AN-M47A2. Expend as WF prac. bomb
100-lb. Incendiary M47	Being declared obsolete. Superseded by AN-M47A2. Expend as WF prac. bomb
100-lb. Incendiary M47A1	Being declared obsolete. Superseded by AN-M47A2. Expend as WF prac. bomb
100-lb. Incendiary AN-M47A2	Service, available. WP or PT-1 filled.
100-lb. Smoke M47A2	Service, available in December 1944. WP or PAP filled.
100-lb. Smoke (Floating) Mk.3 Mod 0	Service, Available. HC Smoke Mixture filled.
100-lb. Chemical Mk.42 Mod 0	Being declared obsolete. Superseded by the M70. Available NAD Hawthorne.
100-lb. Demolition LTA Mk.52 Mod 0	Being declared obsolete. Limited availability at NMD Yorktown.
100-lb. Demolition Mk.1 & Mods	Being Declared obsolete. Limited availability for practice.
100-lb. GP Mk.4 & Mods	Being Declared obsolete. Limited availability for practice.
100-lb. GP AN-M30	Service, Available. Being superseded by the AN-M30A1.
100-lb. GP AN-M30A1	Service, limited availability at present. See OCL AV130-43.
100-lb. WP Practice Mk.7 Mod 0	Limited availability, superseded by the Mk.15 Mod 2
100-lb. WP Practice Mk.15 Mod 0	None available, superseded by the Mk.15 Mod 2
100-lb. WP Practice Mk.15 Mod 2	Service, available.
115-lb. Chemical M70	Service, available in quantity at NAD Hawthorne.
150-lb. GP T-1 (A modified M70 bomb)	Service, available November 1944. TNT loaded
250-lb. GP AN-M57	Service, available. Being superseded by the AN-M57A1.
250-lb. GP AN-M57A1	Service, limited availability at present. See OCL AV130-43.
250-lb. Fragmentation AN-M81	Service, available.
325-lb. Depth Mk.17 Mod 0	Obsolete, none available.
325-lb. Depth Mk.17 Mod 1	Being declared obsolete, expend in target practice.
325-lb. Depth Mk.17 Mod 2	Service, available, May be expended in target practice.
325-lb. Depth AN-Mk.17 Mod 2	Service, available, May be expended in target practice.
325-lb. Depth AN-Mk.41 (Flat nose)	Service, limited availability, may be expended in practice.
325-lb. Depth Mk. 53 (Flat nose)	Service, not available. None loaded. (Has screw-on type suspension lugs.)
325-lb. Depth AN-Mk.53 Mod 1. (Flat nose)	Service, not available. None loaded. (Has welded-on suspension lugs.)
350-lb. Depth AN-Mk.44	Service, limited availability NMD/Y. May be expended in target practice.
350-lb. Depth AN-Mk.47 (Flat Nose)	Service, available.
350-lb. Depth Mk. 54 (Flat nose)	Service, available. (Has screw on type suspension lugs.)
350-lb. Depth AN-Mk.54 Mod 1. (Flat nose)	Service, available 1945. (Has welded on suspension lugs.)
650-lb. Depth Mk. 29	Non-existant. Converted to the Mk 37 by replacing tail. (See OCL AV41-43)
650-lb. Depth Mk. 37	ASW use restricted. Available. May be expended for practice.
650-lb. Depth Mk. 38 (Flat nose)	ASW use restricted. Available. May be expended for practice.
700-lb. Depth Mk. 49 (Flat nose)	ASW use restricted. Limited availability. May be expended for practice
500-lb. Dem. Mk.3 and Mods	Being declared obsolete. None available.
500-lb. Dem. Mk.5 and Mods	Being declared obsolete. None available.
500-lb. Dem. Mk.9	Being declared obsolete. Limited availability. Expend in practice.
500-lb. G.P. Mk.12 and Mk. 12 Mod 1	Being declared obsolete. Limited availability. Expend in practice.
500-lb. G.P. Mk. 12 Mod 2	Service. Limited availability. May be expended in target practice.
500-lb. G.P. AN-M43	Service. Limited availability. Being replaced by the AN-M64A1.
500-lb. G.P. AN-M64	Service. Available. Will be replaced by the AN-M64A1.
500-lb. G.P. AN-M64A1	Service. Limited availability. (See OCL AV130-43)
500-lb. S.A.P. AN-M58	Service. Limited availability. Will be replaced by the AN-M58A2
500-lb. S.A.P.AN-M58A1	Service. Available. Will be replaced by the AN-M58A2.
500-lb. S.A.P.AN-M58A2	Service. Not available at present. (See OCL AV-130-43)
500-lb. Inc. AN-M76	Service. Limited availability NAD Hawthorne.
500-lb. Chem. AN-M78	Service. Available NAD Hawthorne. Not procured for general use.
500-lb. Prac. (WF) Mk. 5	None available. Superseded by the Mk. 21
500-lb. Prac. (WF) Mk. 11	Limited availability. Superseded by the Mk. 21
500-lb. Prac. (WF) Mk.21 Mod 0	Service. Available limited. Increasing production in February 1945
1,000-lb. Dem. Mk. 3 and Mods	Being declared obsolete. Limited availability. Expend for practice.
1,000-lb. Dem. Mk. 5 and Mods	Being declared obsolete. Limited availability. Expend for practice.
1,000-lb. Dem. Mk. 9	Being declared obsolete. Limited availability. Expend for practice.
1,000-lb. G.P. Mk. 13 and Mk. 13 Mod 1	Being declared obsolete. Limited availability. Expend for practice.
1,000-lb. G.P. Mk. 13 Mod 2	Service. None available.
1,000-lb. G.P. AN-M44	Service. None available. Replaced by the AN-M65A1.
1,000-lb. G.P. AN-M65	Service. Available. Being replaced by the AN-M65A1.
1,000-lb. G.P.AN-M65A1	Service. Limited availability. (See OCL AV130-43)
1,000-lb. S.A.P. AN-M59	Service. Available. Being replaced by the AN-M59A1.
1,000-lb. S.A.P. AN-M59A1	Service. Limited availability. (See OCL AV130-43)
1,000-lb. A.P. AN-Mk33	Service. Available.
1,000-lb. Chem. AN-M79	Service. Available NAD Hawthorne. Not procured for general use.
1,000-lb. Prac. (WF) Mk. 7	Limited availability. Superseded by the Mk. 22.
1,000-lb. Prac. (WF) Mk. 22	Service. Limited availability. Production will start, Feb. 1945.
1,600-lb. A.P. Mk. 1 and Mk. 1 Mod 1	Service. Available. (Employs suspension bands)
1,600-lb. A.P. AN-Mk.1	Service. Available. (Employs screw on attachments)
2,000-lb. G.P. AN-M34	Service. Limited availability. Being replaced by the AN-M66A1.
2,000-lb. G.P. AN-M66	Service. Available. Being replaced by the AN-M66A1.
2,000-lb. G.P.AN-M66A1	Service. Limited availability. (See OCL AV130-43)
2,000-lb. Chem. M80	Not procured for Naval use.
4,000-lb. Dem. AN-M66	Service. Limited availability. (Light Case bomb)
4,000-lb. Dem.AN-M66A1	Not procured for Naval use as yet. (Light Case bomb)
CLUSTERS FRAGMENTATION	
100-lb. Frag. M1 (6 bombs 20-lb. AN-M41	Obsolescent, limited availability. Replaced by the AN-M1A2.
100-lb. Frag. AN-M1A1 (6 bombs 20-lb. AN-M41 in cluster-adapters AN-M1A1 or AN-M1A2)	Service, available, cluster with AN-M1A1 cluster-adapter not suitable for Navy use, adapter AN-M1A2 (cluster designated S1ZVL) will fit
100-lb. Frag. AN-M1A2 6 bombs 20-lb AN-M41A1	Service, available early in 1945. Fuses will be shipped separately.
100-lb. Frag. AN-M4 3 bombs 23-lb. AN-M40	Service, available. Will be replaced by the AN-M4A1.
100-lb. Frag. AN-M4A1 3 bombs 23-lb AN-M40A1	Service, Available early in 1945. Fuses will be shipped separately.
100-lb. Frag. M28 24 bombs 4-lb. M83	Service, available, See OCL AV14-44
500-lb. Frag. M29 90 bombs 4-lb. M83	Service, available, cluster must be assembled before use.
500-lb. Frag. M27 6 bombs 90-lb M82	Service, limited availability, cluster shipped unassembled.
CLUSTERS INCENDIARY	**SEE OCL AV79-43**
100-lb. Incend. AN-M5 34 bombs 4-lb AN-M50A2	Service, stocks exhausted, additional procurement available in 1945.
100-lb. Incend. AN-M6 34 bombs 4-lb AN-M54	Being declared obsolete, not suitable.
100-lb. Incend. AN-M12 14 bombs 8-lb AN-M69	Service, stocks exhausted, new stocks available in 1945.
500-lb. Incen. M7 128 bombs 4-lb AN-M50A2	Service, available.
500-lb. Incend. M9 128 bombs, 4-lb AN-M54	Being declared obsolete, stocks exhausted, not under procurement.
500-lb. Incend. AN-M13 60 bombs 6-lb. AN-M69	Service Available. See OCL AV129-43
500-lb Aimable AN-M14 110 bombs 4-lb AN-M50T3	Available in 1945 ('T' denotes toxic element present)
500-lb Aimable AN-M17A1 110 bombs 4-lb AN-M50A2	Available in 1945
500-lb. Aimable M18 36 bombs 6-lb AN-M69	Available in 1945
CLUSTERS, SMOKE	
100-lb Smoke M21 14 bombs 10-lb M74	Not under procurement, test unsatisfactory.(M74 bombs WP filled)
100-lb. Smoke M25 14 bombs 10-lb M77	Service,available early in 1945. (M77 bombs HC Mixture filled)

DESIGNATION	DESCRIPTION AND USE	STATUS AND REMARKS
PRIMER DETONATORS SEE OCL AV18-44		
M14 Non-delay	A removable primer detonator for use in AN-M100,-1,-2A1 and A2 series fuzes. Entire surface painted white.	Available assembled in fuzes AN-M100A2, and as 25% spares for other fuzes
0.01 Sec.	1/8 sector of base painted black	Available as 25% spares for the AN-M101, and AN-M102A2
0.025 Sec.	1/4 sector of base painted black	Available assembled in fuzes AN-M101A2 and AN-M102A2 and as 25% spares for the AN-M100A2.
0.10 Sec.	Entire base painted black	Available as 25% spares for the AN-M101, and AN-M102 A2.
M16 4-5 Sec.	Designed for Minimum Altitude bombing against marine targets (Masthead Bombing).	Available assembled in M112, M113, and M114 fuzes.
8-11 Sec.	Designed for Minimum Altitude bombing against land targets (Pedgehop Bombing).	Available as 50% spares for M112 through M117 fuzes.
M16A1 4-5 Sec.	For use in the M112A1 and M115 series fuzes.	Available, superseded the M16
8-15 Sec	For use in the M112A1 and M115 series fuzes will be supplied as 50% spares.	Available, supersedes the M16
M16A2 No delay	For use in the M123A1 and M132 series fuzes.	Available. Shipped with but not assembled to the Chemical Time fuzes. See OTI AV3-44.
ADAPTER-BOOSTERS		
M102	Installed in all AN-M GP bombs except the AN-M60 series, also installed in all SAP bombs and the 4000-lb Gen. bomb AN-M56, and the 260-lb. Frag. bomb AN-M81. Designed to receive and Army design tail fuze. May also be procurred separately for use in the 500-lb and 1000-lb. Navy GP bombs to adapt these bombs to take Army fuzes. See OCL V8-42.	Available, installed in bombs and separately. Being superseded by the M102A1
M102A1	Installed in the AN-M30A1 & 57A1 GP bombs and the A1 & A2 series SAP bombs. For use with anti-withdrawal type fuzes	Available installed in bombs. See OCL AV130-43.
M115	Installed in the AN-M60 series GP bombs for use with the Navy hydrostatic fuze AN-Mk.230	Available installed, being superseded by the M115A1.
M115A1	Installed in the AN-M60A1 series bombs for use with anti-withdrawal fuzes.	Available installed, See OCL AV130-43.
M117	For use in the nose fuze seat liner of any Army designed bomb to adapt small mechanical time fuzes of 1¾" diameter.	Not as yet procurred by the Navy.
BURSTERS AND IGNITERS		
M4	Tetryl burster, for use in M47, M47A1, AN-M47 A2 and Mk.28, 100-lb Smoke bombs(WP, FS or FM)	Available, separately, not installed.
M7	Black Powder burster, for use in M47, M47A1, AN-M47A2 and Mk.28, 100-lb Incend. bombs.	Available, separately, not installed.
M10	Tetryl burster for use in the M70 chemical bomb (115-lb)	Available separately, not installed.
AN-M12	Black powder and magnesium burster (450 grams of 50/50 mixture) for use in the 100-lb. Inc. bomb AN-M47A2.	None in stock, available from the Army. Does not require an igniter.
AN-M13	TNT and Tetryl burster for use in the 100-lb. Inc. bomb AN-M47A2 with igniter AN-M9 (WP) for land, or igniter E2 (metallic sodium) for water action.	Available separately. Not to be stowed assembled, or with AN-M47A2 bombs and their igniters.
AN-M14	Tetrytol burster for use in the 500-lb. Inc. bomb AN-M76 with the AN-M5 igniter.	Available, not to be stowed in or with bombs or igniters.
AN-M15	Tetrytol burster for use in the 500-lb Chem. bomb AN-M78	Available. Does not require an igniter.
AN-M16	Tetrytol burster for use in the 1000-lb. Chemical bomb AN-M79	Available. Does not require an igniter.

DESIGNATION	DESCRIPTION AND USE	STATUS AND REMARKS
BURSTERS AND IGNITERS(Cont'd)		
M17	Tetrytol burster for use in the M80 2000-lb Chemical bomb.	Available, requires no igniters.
(None)	Tetryl burster for use in the 100-lb. Chemical bomb Mk.42. Buord Drg. 328343.	Available.
AN-M5	WP igniter for use in the AN-M76 500-lb. Inc. bomb with AN-M14 burster.	Available.
AN-M9	WP igniter for use in the 100-lb. Incendiary bomb AN-M47A2 with the AN-M13 burster.	Available.
E2	Metallic sodium igniter for use in the 100-lb. Incendiary bomb AN-M47A2 with the AN-M13 burster	Available.
AUXILIARY BOOSTERS		
Mk.1	TNT booster (180 grams) shipped installed in nose and tail fuse cavities of Navy GP bomb, (over 100-lb.) and depth bombs Mk.17 & Mods and Mk.37. Additional booster Mk.1 is required in the nose fuze cavity when fuze AN-Mk.219 is used.	Available.
Mk.4	TNT booster (63 grams) for use in the nose fuze cavity of AN-GP bombs with fuze AN-Mk.219.	Available.
ADAPTERS AND ADAPTER RINGS		
BO Drg.294376	Designed to adapt fuze AN-Mk.219 to the nose fuze cavities of Navy GP bombs over 100-lb., and AN-GP bombs 100-lb. and over.	Available.
BO Sk. #9752	Designed to fit under adapter-boosters M102, or M102A1 when inserted into tail fuze cavities of Navy bombs for Army tail fuzes.	To be made up locally. See OCL V8-42
BO Drg341704B	Designed to adapt the Army tail fuzes to the M115 or M115A1 adapter-booster of AN-GP bombs.	Available installed in all AN-M60 series GP bombs.
BANDS, TRUNNION, HOISTING, AND SUSPENSION		
M1A1	Trunnion-hoisting, for bombs 500-lb. AN-M43-64	Available.
M2A1	Trunnion-hoisting for bombs 1000-lb. AN-M44-65	Available.
M4	Trunnion-hoisting for bombs 500-lb. SAP	Available.
M5	Trunnion-hoisting for bombs 1000-lb. SAP	Available.
AN-M7	Trunnion-hoisting for bombs 2000-lb. AN-M34-66	Not procurred by the Navy.
AN-M8	Trunnion-hoisting for bombs 4000-lb. AN-M56	Not procurred by the Navy.
BO Drg 294244	Trunnion band for bombs 500-lb GP Mk.12 Mod 2	Available.
BO Drg 294242	Trunnion band fro bombs 1000-lb GP Mk.13 Mod 2	Available.
BO Drg 328386	Trunnion-hoisting for bombs 1600-lb AP Mk.1	Available.
BO Drg 387706	Trunnion band for Depth bombs Mk.17&Mods.-41/47	Available.
Mk.10	Trunnion-hoisting-suspension band to adapt bombs 2000-lb AN-M34 & 66 to 14" suspension. Has hoisting lugs, and trunnions (screw-in type)	Available in December 1944.
ARMING WIRE ASSEMBLIES		
Mk.1	Single strand (.064" diam.) wire for bombs using one fuze up to the 2000-lb GP bombs.	Available early in 1945. (100 per air-tight can)
Mk.2	Double strand (.064" diam.) wire for bombs using two fuzes up to the 2000-lb GP bombs.	Available early in 1945. (50 per air-tight can)
Mk.3	Single strand (.033" diam.) steel wire all bombs and clusters using M111A2 type fuzes.	Available early in 1945. (100 per air-tight can)
Mk.1	Arming Wire Extension (.0626" diam.) cable for all clusters, and the 4000-lb bombs.	Available early in 1945. (100 per air-tight can)

31 JUL 1945

VT FUZES

VT fuzes were used in 500 lb. GP and 260 lb. fragmentation bombs for the first time in Fast Carrier strikes during this period. The performance of the fuzes was normal with about 85% functioning properly. The 260 lb. fragmentation bomb AN-M81 with T 50 E 1 fuzing gave good results and in one known instance silenced an AA position. The AN-M81 bomb was preferred over the 500 lb. GP bomb because of the better fragmentation characteristics of the former type. It is believed that this bomb, VT fuzed, is a very effective weapon against open AA positions, dispersed and revetted aircraft, and personnel either exposed or in open foxholes. The T 50 E 1 and T 50 E 4 type fuze must be released from high altitude in order to have the air travel necessary for arming. This undesirable feature makes delivery to service of T 91 and T 92 type fuzes urgent. Bridle interference prohibits catapulting VT fuzed bombs with F6F type airplanes. A fuze protector that will prevent accidental withdrawal of the arming wire, but permits the fuze to arm and function normally when released is urgently needed to permit unrestricted use of VT fuzes.

Extracted from: Action report of TASK FORCE 38, Action in support of the occupation of OKINAWA, period 28 May - 1 July 1945

AIC R/S 16803
CINCPAC R/S 56605

File: IV, A (Gen'l)

Bombs for VF Type Aircraft

The lack of effective bombs that can be carried externally by VF aircraft in attacks on airfields has been strongly felt. Every effort should be made to supply 500# frag, clusters and incendiary clusters for such purposes. In addition it should be practicable to provide some arrangements for carrying a larger number of 100# bombs. (See recommendation USS BLOCK ISLAND Action Report 30 April - 19 June, page 9 - Part VI).

Extracted from: CTF 58 report of operations in support of landings at Okinawa, 14 March through 28 May including actions against Kyushu, Nansei Shoto, Japanese Fleet at Kure, the Yamato, and operations in direct support of landings at Okinawa.

AIC R/S 15987

CINCPAC R/S 55493

File: IV, A (Gen'l)

FILE: IV, A, General

BOMBING SQUADRON NINE

FVB9/A16/ff

c/o Fleet Post Office
San Francisco, Calif.
10 June 1945.

From: The Commanding Officer.
To: Commander, Carrier Air Group NINE.

Subject: Additional Comments on Operations from 16 February 1945 to 13 June 1945.

1. There have been many occasions where squadrons have been launched on strikes against targets with an impractical bomb load or improper fuzes for the particular target. There are many considerations that enter into the picture.

2. On 16 February 1945 this group was loaded for a strike against parked airplanes and installations about an airfield in the Tokyo area. Just prior to launching time, the target was changed and the strike was launched against the Nakajima Ota Airframe Plant. The loading and fuzing were not changed. The one hundred pound bombs and non delay fuzes intended for use against parked planes were not the most effective bombs that could have been used against an airframe plant.

3. On one other occasion this squadron was loaded with 1000# SAP bombs with .1 delay fuzes and launched on a shipping sweep. When unable to locate the ships, we were ordered to attack an airfield. SAP bombs are not very effective against installations on an airfield. XXRXXXXXX These are situations which sometimes cannot be very well helped.

4. There are other occasions when the squadrons are not fully advised as to which targets are the most vital, how many tons of bombs might normally be expected to destroy them and what fuzing will achieve the best results. This applies to targets not analyzed by JICPOA publications. Without this type of information it is difficult for squadrons to organize effective strikes.

5. A new air group generally has much to learn about the effectiveness of various new type weapons and new ways of doing things in the fleet. It is therefore believed that a few informal discussions among the group and squadron commanders and staff officers prior to each operation would make for a better understanding of the general tactical situation. This might save them the time and expense of learning much of it by bitter experience.

Group and squadron Commanding Officers have little to say about the bombs or fuzes to be carried. However, they should know exactly what they are expected to accomplish with the load carried before they take off. With the intelligence and photographic coverage on enemy targets that we have today, we should be able to pick out the specific targets we want destroyed and destroy them without further ado. A get-together prior to the hop would help.

6. It is believe that if more detailed reports could be received from the ground forces on effectiveness and accuracy of support missions it would greatly aid squadrons in selection of fuzes and types of bombing attacks.

TONY F. SCHNEIDER.

FILE: IV, A, General.

31 JUL 1945

Nose Fuze Protectors for F6F Aircraft: The nose fuze protector described in Model F6F-3 Airplane Bulletin No. 19 of 23 November 1943 is not being stocked in sufficient numbers by aviation supply ships. The number of 500-lb. bombs dropped in this operation is so great that it was impossible to keep a stock of this item on board, despite the fact that there were well over 500 on board when this vessel left the United States, and every effort was made to manufacture them on board. When the fuze protector was not available and bombs were dropped minus a nose fuze, about 10% of the bombs were duds.

Shortage of Primer Detonators Mk14 for Tail Fuzes: In the forward areas there is a shortage of Mk14 .01-second-delay primer detonators. This shortage is believed to result from NAVORD OCL AV2-45 of 16 January 1945, which states that the AN-M100A2 fuze will be shipped with a non-delay primer detonator assembled and that 25% spares will be supplied only in .025-second-delay primer detonators. The fuzing for 100-lb. G.P. on most missions flown from this carrier was .01-second delay tail fuze. Since the present fuzing doctrine calls for many uses of the .01-second-delay and .025 second-delay primer detonators, it is recommended that 100% spares in these items be supplied as alternates.

USS SUWANNEE CVE-27 - Action Rpt., Operations in Support of Occupation of Okinawa, Nansei Shoto, 1 April - 16 June 1945.
CincPac R/S:- #19778A AIC R/S: 17014.

FILE: IV, A - General 31 JUL 1945

The normal load for VF was one 500 lb. GP bomb and six 5" HVAR rockets.

During the first two weeks of strikes against Sakishima Gunto many targets suitable for rockets were found and destroyed. However, on the succeeding strikes it was felt that in lieu of good rocket targets a better loading for VF would have been two 500 lb. G.P. bombs for cratering runways.

Considerable difficulty was experienced in the TBM with the poor performance of the Mark IV shackle. This shackle is being replaced with the Mark VIII.

There have been some instances of rockets failing to fire. Sometimes the pigtails came loose in flight and there were some instances where wires in the pigtails were broken.

A general conclusion from VT pilots was that their effectiveness would have been increased by leaving off rockets and increasing bomb loading accordingly. The VF planes should have had priority on the 5" HVAR rocket.

At the beginning of the operation the fuze selection was not good, as only instantaneous fuzes were being used. This was soon corrected, and towards the end of the operation selective arming was in use.

USS SUWANNEE CVE-27

Action Report, Operations in Support of Occupation of Okinawa, Nansei Shoto, 1 April - 16 June 1945.
CincPac R/S #19778A AIC R/S 17014

Aviation Ordnance

All aviation ordnance material and equipment performed satisfactorily. No use was made of Napalm, Smoke Tanks or Clusters, or Torpedoes during this period, while great emphasis was placed on the 100 pound GP bomb and occassionally the 500 pound GP bomb for cratering effect. All strike planes (VF&VT) carried rockets in addition to bombs. Little difficulty was encountered in releasing bombs, and it is believed that this success is primarily due to the Mk. 8 Mod. 0 shackle which is considered definitely superior to the Mark V shackles previously employed. The use of the AN-A2 arming control also has been more successful than the mechanical arming of the Mk. 4 shackle. "Hang-ups" which were formerly caused by the after suspension lug of the bomb impinging on the forward surface of the after suspension hook of the shackle (Mk. 4 shackle) have not occurred, primarily because the suspension hooks of the Mk. 8 Mod. 0 shackle point forward, and even in a steep glide the bomb is allowed to leave the shackle without interference. Rocket performance was excellent, and in the few cases of "Hang-ups", it was discovered that a broken plug was usually the cause, however, it two cases it was found that the pigtail had been severed. Long delayed fuzes were used for a harassing effect on the enemy. These fuzes were obtained for the first time by this vessel during replenishment at Kerma Retto on 20 June 1945. M123 and M123A1 tail fuzes with two hour and twelve hour delays only were available for this replenishment. Two hour delay fuzes were initiating explosions in approximately three quarters of an hour, which agrees fairly well with the predictions, considering the temperature existing of approximately 80° F. It is felt that the operations against the airfields would have been more effective if long delay fuzes had been available for all types of bombs used and if Butterfly clusters had been available to supplement the heavier bombs.

Extract from: Action Report USS SHIPLEY BAY - Operations in support of the occupation of Okinawa - 9-22 June 1945.

AIC R/S 16903
CINCPAC R/S 024460

File: IV, A (Gen'l)

ARMOR PIERCING BOMBS

31 JUL 1945

Armor piercing bombs are being removed from carriers because it is considered that such type bombs are unprofitable loadings. Dive bombing does not give the required velocity for the amount of penetration the bomb is designed to produce. The semi-armor piercing bomb is preferred for targets where armor piercing characteristics are necessary because (1) There is about twice the amount of explosive filling and (2) The velocity from dive bombing is of such nature that the semi-armor piercing bomb will penetrate as much armor as the armor piercing, both bombs failure to penetrate being due to low velocity in lieu of breaking up of the bomb.

Extracted from: Action report of TASK GROUP 38, Action in support of the occupation of OKINAWA, period 28 May - 1 July 1945

AIC R/S 16803
CINCPAC R/S 56605

File: IV, A, (Gen'l)

100 Lb. and 500 Lb. fragmentation clusters M-28 and M-29 31 JUL 1945

100 lb. and 500 lb. fragmentation clusters M-28 and M-29 have been loaded aboard the fast carriers in limited quantities. This bomb looks promising, particularly for night heckler missions. For this type work approximately 75% anti-disturbance fuzing is desired. For day missions the reverse is true and a large percentage of impact fuzed butterfly bombs are desired. It is believed that anti disturbance fuzed bombs will be relatively easy to clear in daylight but will present a much more difficult problem at night. The M-28 and M-29 clusters are difficult problems aboard a carrier and are certainly not entirely satisfactory for carrier use. The M-28 bomb is not catapult safe and the M-29 cannot be catapulted on F6F type airplanes because of the danger of bridle interference. Therefore the use for night missions is greatly limited inasmuch as practically all night missions are catapulted. The M-29 cluster presents a bad stowage problem and the gunnery and air ordnance people aboard the carriers are reluctant to stow and handle the assembled cluster. This is because of the fragile nature of the cluster and the potential danger should one open inadvertently and spill the contents about the deck. Safety measures are in use consisting of fastening safety wire or a safety strap around the cluster until it is loaded on the airplane bomb racks. Assembly of the M-29 cluster aboard ship is a slow and difficult process. Clusters must be assembled well in advance of arming time or arming the planes would take an excessively time. After assembly gunnery officers are loathe to stow the bombs in magazines with other bombs. However, since carrier bomb stowage is so limited there is no other magazine stowage. Therefore M-29 bombs must be stowed in magazines with other bombs. It is requested that consideration be given to shipping the M-29 clusters assembled and fitted with a safety strap around the cluster. Strengthening of the cluste and its locking cup is absolutely necessary before the bomb will be satisfactory for widespread carrier use.

Extract from: Action report of TASK GORCE 38, Action in support of the occupation of OKINAWA, period 28 May - 1 July 1945.

AIC R/S 16803
CINCPAC R/S 56605

File: IV, A (Gen'l)

31 JUL 1945

Destroyer fire at caves.

The Commanding Officer was later afforded the opportunity to inspect some of the Jap defense positions on OKINAWA. His strongest impression was that five inch fire against caves was little better than harassing - with no destruction thereof possible. In most instances, entrances were such that a direct hit on the mouth of the cave would cause little or no damage inside. Even if "caved-in" the entrances could be cleared in a short time by a few men with shovels. Therefore, it would seem that of our 16,000 rounds fired during this campaign, more than half of which were fired at caves, this half must be recorded as "harassing-fire". The Army seemed to know that and to desire it notwithstanding. If such expenditures are warranted by the results of harassing, then it should be continued; but, it would seem that for the same shipping space, much greater destruction could be had from larger caliber guns with delay-fuzes.

Extracted from: Action report of assault and capture of OKINAWA, 17 May to 23 June 1945 by the USS PICKING (DD685)

AIC R/S 16637
~~KINGFAC R/S~~ -

File: II, M

Bomb Selection and Fuzing

During the first phase of air support a blanket request was made for GP bombs fuzed with 8 to 11 second delay fuzes. No request for change in this fuzing was received and finally after it became evident that the bombs were being used in glides and dives, as well as low-level approaches, and that targets assigned varied from attacks on tanks to the destruction of towns and villages, Commander Task Force Fifty-Eight requested that more attention be paid to proper selection of bombs and fuzes. The forces ashore were further informed that unless otherwise specified, all bombs supplied in the future would be fuzed for selective arming, with instantaneous nose fuze and a .025 tail fuze.

Extracted from: CTF 58 report of operations in support of landings at Okinawa, 14 March through 28 May including actions against Kyushu, Nansei Shoto, Japanese Fleet at Kure, the Yamato, and operations in direct support of landings at Okinawa.

AIC R/S 15987

CINCPAC R/S 55493

File: II, M (Gen(1)

Target Selection

It was further requested that target locations be supplied for each day's support groups such targets to be attacked unless the group had to be used for close support. Information on new air targets was then furnished each day and picked up from OKINAWA by carrier plane; however, no attempt was made to specify which targets were important. It is recommedned that in future support operations primary and seconday targets be designated for each support group. Pilots of support groups will then be thoroughly briefed the night before on their assigned targets and whenever practicable they should be allowed to attack such targets. It is further recommended that each CASCU be assigned an expert on bomb selection and fuzing in order that the most effective combinations will be used. It is further recommended that CASCU's make some attempt to use air support groups as early in their period on station as possible. It has become habitual in the Pacific to keep air support groups circling until the last few minutes of their time on station and then to give them a target, or in some cases, giving them no target and directing them to jettison their bombs in the water. It is felt that improved planning anc coordination with the ground forces could result in the employment of air support groups during the first half of their time on station, rather than the last half. Pilots who have bee n circling in formation over an area for one and one half hours are primarily interested in getting rid of their bombs and getting back to base. The natural result is poor accuracy.

Extracted from: CTF % 58 report of operations in support of landings at Okinawa, 14 March through 28 May including actions against Kyushu, Nansei Shoto, Japanese Fleet at Kure, the Yamato, and operations in direct support of landings at Okinawa.

AIC R/S 15987

CINCPAC R/S 55493

File: II, M (Gen'l)

Selective Arming

Appreciation of the versatility afforded by selective arming is not fully recognized by pilots or CASCUS. There are but few cases where selective arming is not desirable and no opportunity should be neglected for utilizing this means of increasing the variety of targets that can be attacked effectively.

Extracted from: CTF 58 report of poerations in support of landings at Okinawa, 14 March through 28 May including actions against Kyushu, Nansei Shoto, Japanese Fleet at Kure, the Yamato, and operations in direct support of landings at Okinawa.

AIC R/S 15987

CINCPAC R/S 55493

File: XXX II, M (Gen'l)

NAPALM

The effectiveness of Napalm as opposed to the GP Bomb is not apparent in the results obtained against the usual targets. Successful ignition of napalm varied between Task Groups but prelimanary reports indicate that well over 80 percent satisfactory performance was realized.

Extracted from: CTF 58 report of operations in support of landings at Okinawa, 14 March through 28 May including actions against Kyushu, Nansei Shoto, Japanese Fleet at Kure, the Yamato, and operations in direct support of landings at Okinawa.

AIC R/S 15987

CINCPAC R/S 55493

File: II, M (Gen'l)

Ltr le II, M.

KNOW YOUR ORDNANCE

FTP 224

"Selection of Bombs and Fuzes for Destruction of Various Targets" has recently been issued jointly by the War and Navy Departments as Field Manual FMI-110 and FTP 224, respectively. This is a comprehensive 124 page, pocket-sized manual on bomb and fuze selection for all types of targets and for all altitudes and types of attacks. The classification is Restricted, to permit wide destribution. Distribution is being made through Registered Publications Issuing Office (the Manual is not registered), and units which do not receive copies in the near future should write the RPIO at Pearl or Guam for copies.

A preferable bomb loading and fuzing, and one or more alternate loadings, are given for each of 60 types of targets, separately for each of the following types of attack: minimum altitude, low altitude, dive or glide, medium altitude, and high altitude. In addition, the Manual contains excellent brief descriptions of the basic principles of bomb and fuze selections, the general characteristics and effects of standard types of aerial bombs, and the general requirements of land and sea targets. Tables and illustrations give full data on penetration of bombs in concrete, armor and earth, on the physical characteristics of each type of bomb, cluster and fuze, and other items of interest. EVERY PILOT SHOULD READ THIS MANUAL AND BE FAMILIAR WITH THE GENERAL MATERIAL THEREIN.

FTP 224 is the most comprehensive reference document available on bomb and fuze selection, and represents the best data available as of the time it was prepared (late 1944). However, the science of ordnance slection is subject to rapid development and change, and the specific recommendations in the Manual, while generally sound and of continued applicability, have in some cases already been rendered obsolete by new ordnance and more recent experience. It's suggested that the following factors be considered in following the specific loadings recommended:

(1) The Manual gives no recognition to selective aiming. Appropriate selective aiming fuze combinations should supersede the fuzing recommendations in FTP 224 whenever the targets which will be attacked by specific planes are not definitely known, and particularly in sweeps, airfield strikes, etc.

(2) The Manual does not provide for the individual loading limitations of different types of Naval aircraft. A type of bomb which may be best in VTB may be a less efficient loading for VFB or VSB, depending on the total loads which can be carried with various combinations.

(3) The Manual does not attempt to indicate the circumstances under which strafing, rocket fire or torpedoes may be superior to bombs. See ComAirPac ORTSel No. 7 for recommendations on use of rocket VS bombs.

(4) VT fuzes are not considered. See ComAirPac ORTSel No. 6 for recommendations on use of VT bomb fuzes.

Inter Office memo
TAS 021400 — Lt. Owen. ENCL. (A)

(5) Since the Manual was prepared, the MK. 243 water discriminating nose fuze with .025 delay, has been issued. This fuze, combined with .24 second delay tail fuzing, is believed superior to the .1 - .025 combination wherever the latter is specified by FTP 224 for use against shipping.

(6) Since the Manual was prepared it has been determined that a large percentage of short-delay tail fuzes do not actuate on hitting thin roofs. The M-139 and M-140 nose fuzes have been issued to provide position .01 and .025 delays against thin-roofed buildings. These should be used in place of the .1 nose fuzing against targets of this type when aerial detonation at 5 to 20 feet under the roof is specified as desirable.

(7) Against runways the special methods outlined in ORTSel No. 2 are believed preferable for use by carrier planes.

Subject to the above qualifications, it is believed the recommended loadings in FTP 224 are excellently adapted to use by Naval aircraft and should be studied and followed when possible.

File I-M

From: Commander T.F.58(ComFirstCar T.F.-Pacific)
Admiral M.A. Mitscher

1. With regard to the recommendation of Commanding Officer, VT-9; orders have been issued and instructions included xxx in Task Force Instructions to employ selective arming on all G.P. bombs and HVAR.

2. Remarks relative to loading VF with bombs and rockets are concurred in.

Task Force 58 - Action Report:
Tokyo, Iwo Jima, Amai Gunto, 10 February - 1 March 1945.
aic r/s 7219 cincpac rs-051903 CONFIDENTIAL

From: Commanding Officer, Torpedo Squardon Nine - 3 March '45
(USS Lexington)

4. Bomb and fuze selection were in many cases unfortunate. At times this was impossible to avoid, but in some cases the installation of two fuzes -- nose and tail -- would have permitted a proper selection at the last minute. It is especially important that all bombs have two fuzes, not only for last minute target changes, but also for greater assurance that the bomb will function properly on impact. There seems to be a shortage of fuzes available, and an understandable reluctance on the part of loading personnel to install these in the bomb nose. Where airfields are primary targets the instantaneous nose fuze is the optimum selection, but with a change at the target to buildings or merchant ships, a much better selection would be the .025 second delay. It is therefore strongly recommended that both nose and tail fuzes be installed in every case.

TF-58 -- Action Report: Tokyo, Iwo Jima, Amai Gunto - 10. Feb. - 1 March 1945 - AIC R/S:- 7219 CincPac R/S:- 051903

CONFIDENTIAL

In addition to their cooperation with ground troops, the bom b-armed fighters have proven to be our most effective weapon against targets such as brdiges, troop concentrations and supply dumps in the rear areas.

Their method of low level attack is to start about five miles from the target at an altitude of 1500 feet and maintain a shallow dive to just above 300 feet. This causes them to pick up speed, and by releasing the bomb in a shallow dive at an altitude a little above 300 feet the bomb does not skip. Out of 109 bombs dropped on one mission, only one skipped. After releasing their bombs they continue at deck level for four or five miles and then begin their climb to return home.

During the past two months the medium bombers have made 187 minimum altitude sorties against 61 bridges, destroying 23, severely damaging 10. This works out 4.3 sorties per bridge destroyed or severely damaged. The bomb-carrying fighters have made 478 sorties against 91 bridges, destroying 36 and severely damaging 38, giving them an average of 6.5 sorties for each bridge destroyed or severely damaged.

To achieve these results, the bomb-armed fighters have expended 3.4 tons and the medium bombers 7.4 tons of bombs per bridge destroyed or severely damaged.

Letter from Commanding General,
Tenth Air Force.

FILED: II, M

Extracted from "AIR OPERATION BRIEFS -VOL. 5"

AIC R/S No. 6430 Date of: 12 March 1945

File II, M

CONFIDENTIAL

March 13, 1945.

Extract from CinCPac-CinCPOA Item # 14,736:

Title: Information and Materials on Anti-Aircraft Defense No. 37 -- August 10, 1943.
Information Concerning the Construction of Air Raid Shelters
Army Construction Unit Headquarters.

Shelters on Surface of Ground: Thickness of Protective Walls.

"...although it is necessary to make changes corresponding to the conditions of the surroundings, standard thicknesses are as follows when using various materials:

Piled-up earth	70	centimeters.
Sand bags and boxes packed with earth	55	"
Earth between dam-boards and rock fill	50	"
Reinforced concrete walls	20	"
Piled-up square timbers	50	"
Piled-up mats	90	"
Piled-up bedding	100	"
Piled-up books and documents	40	"

Extracted from Action Report, Lingayen Gulf Operation, Luzon Island, P.I., 1 Jan to 18 Jan 1945 Incl. Encl. (A) USS COLORADO Action Report, Parts I to VIII Incl., for subject operation.

The Mark 8 Mod. 2 radar installed on our Main Battery director 2 was very effectively used for fire control purposes during shore bombardment. Prior to arrival in the area a careful study had been made of all available intelligence to determine objects for us as reference points in shore bombardment. A church tower was selected as one of the most likely objects available, because it was located on a flat plane and was much higher than any other buildings. Even though this object was 3,000 yards inland, the Mark 8 located it as soon it came within range and was able to range on it throughout the operation. For targets such as this one it was found that a reduction of gain on the Mark 8 radar causes the targets to stand out above the surrounding land. It was also possible to spot with the Mark 8 althought the signals received from land splashes were very weak.

The total ammunition expenditure against shore installations during the period of this operation is as follows:

(1) 16"/45 cal. H.C. - 378.
(2) 5"/51 cal. H.C. - 668.
(3) 5"/25 cal. MTF, Mk. 18 set on safe. - 959.

The effectiveness of our gun fire for shore bombardment is best determined from pictures taken of the target areas after firing. These pictures are submitted as enclosure (F) to this report. These pictures indicate that all tagets fired upon were effectively destroyed. Numerous fires were started which resulted in the destruction of many more buildings than were actually hit. It was found impossible to level buildings such as the Lingayen Captiol building and the auditorium, although the inner sections were destroyed. The use of 5"/25 cal. or 5"/51 cal. projectiles against houses or other frame buildings is not effective.

Five inch projectiles have very little destructive value against buildings.

File No. A16-3/BB(1) AIC R/S No. 06414

CONFIDENTIAL

Powers, Sub Station

Security & Intel Hq. AFS 50 S. Atlanta, Ga - 8 Jan. 1945

Extracted from Report No. PFI.-880-Japan-Kobe, Railroads Power station, Living Conditions, AA Battery. AK AFS 8E 3

A small compact power sub-station was located approximately 50 yards northeast of Rokko railroad station (see exhibit A). It is belived that this sub-station supplied power for the operation of the electrified trains from Kobe to Osaka. It is not believed that current was generated at this sub-station. as no high tension transmission lines were observed leading away from it.

File

II - 11

II, M

DIRECTOR OF INTELLIGENCE
HQ, AAF/POA

COPY

SECRET

INTELLIGENCE REPORT

28 December 1944
DTG 272300Z

From: COMGENAF 20

SECRET

TELECON MESSAGE NO. S-27-6

Subject: ASSIGNMENT OF TARGET NUMBER
To; COMGENBOMCOM 21, INFO TO DEPCOMAF 20

Ref: (a) FN-24-9
(b) S-14-12
(c) FN-26-34
(d) F-18-17
(e) FN-09-13

1. The following new targets and target numb rs have been assigned since the publication of revised Objective Folders:

NUMBER	NAME
90.17-1640	JAPAN STEEL BEARING COMPANY, TAMAKAWA PLANT
90.17-1641	TANAKA INSTRUMENT MFG CO.
90.34-1672	WAKAMATSU SHIPYARD
90.34-1673	TANOKUBI SHIPYARD (HIKOSHIMA)
90.34-1674	DAIRI RR YARDS AND TUNNEL ENTRANCE
90.25-1679	ANAGASAKI SYNTHETIC OIL CO.
90.27-1681	MITSUBISHI AIRCRAFT WORKS, MISHIMA PLANT
90.3 - 1683	MURORAN SHIPYARD
90.20-1684	UTSUBE RIVER OIL REFINERY (YOKKAICHI)
90.20-1685	MITAKI RIVER OIL REFINERY (YOKKAICHI)
90.17-1686	HITACHI ENGINEERING WORKS, KAMEARI PLANT (TOKYO)
90.17-1687	MITSUI MACHINE TOOL CO., OKEGAWA PLANT
90.17-1688	HITACHI MACHINE TOOL CO. (KAWASAKI)
90.17-2008	TACHIKAWA ARMY AIR ARSENAL (RIKUGUN KOKU KOSHO)
90.17-2009	HITACHI AIRCRAFT (TACHIKAWA)
90.20-2010	AICHI AIRCRAFT ENGINE WORKS, ATSUTA PLANT
90.18-2011	SHIZUOKA AIRCRAFT ENGINE WORKS
90.21-2012	NAKAJIMA AIRCRAFT, HAMAMATSU PLANT
90.21-2013	JAPAN MUSICAL INSTRUMENT CO., PLANT NO. 2
90.17-1682	NAKAJIMA AIRCRAFT WORKS, TAMA PLANT Note: The existence of this plant as a separate target is doubtful and the target number has tenatively been cancelled.

2. The following changes have been made in target names and or numbers since the publication of revised Objective Folders:

OLD NUMBER AND NAME	NEW NUMBER AND NAME
90.17-274 SHIPYARDS AND DOCKS OF YOKOSUKA NAVAL BASE	90.17-274 YOKOSUKA NAVY YARD

SECRET

TELECON MESSAGE NO. S-27-6 (Cont'd)

(YOKOSUKA NAVY YARD - 90.17-274 - cont'd)

Note: Target 90.17-277 (Refitting Berths for Battleships and Cruisers) has been cancelled: It is now covered by target number 274. (Experimental labs and ordnance plants of Yokosuka, etc has also been cancelled and is covered by target number 274

90.17-297	HAKO POINT OIL TANKS	90.17-297	AZUMA OIL STORAGE
90.17-898	JAPAN MILITARY GOODS	90.17-898	JAPAN MILITARY GOODS CO., SHONAN PLANT
90.17-899	JAPAN MILITARY GOODS CO LTD.	90.17-899	JAPAN MILITARY GOODS CO., TOMIOKA PLANT

3. You will be informed of any additions or changes in the future.

C O P Y

SECRET

File II, M.

SECRET

BOMB AND FUZE SELECTIONS FOR 5TH FLEET OPERATIONS AS ARRIVED AT BY CONFERENCE WITH COMMANDER NORTH, 5TH FLEET GUNNERY OFFICER.

AIRFIELDS:

Sweeps: VF - guns and rockets.
VF - 2x500# frag clusters (if available) or 2x500# G.P., instantaneous.

Strikes: VF - guns and rockets.
VF - 2x500# G.P., 0.01 delay.
VB - 2x500# G.P., 0.01 delay.
2x250# G.P., 0.01 delay.
VT - M-47 or M-74 I.B.'s (½ planes)
4x500# G.P., 0.01 delay (½ planes).

AIRCRAFT ENGINE PLANTS:

VF - 2x500# G.P., 0.01 delay.
VB - 1x1000# G.P., 0.01 delay.
2x250# G.P., 0.01 delay.
VT - Either 1x2000# G.P., 0.025 delay
or 4x500# G.P., 0.01 delay.

AIR SUPPORT:

VF- 2x500# frag clusters, if available, or
VB - 2x500# G.P. instantaneous.
2x250# G.P. or 2x260# FRAG, instantaneous.
VT -12x100# G.P., instantaneous.

Note: Use of selective arming was suggested for bombing missions against airfields and for air support. If used for such missions, fuzing should be nose instantaneous and tail short delay (0.01 or 0.025). Where targets require a short delay, the nose fuze may then be dropped safe. Where instantaneous action is desired, both fuzes would be armed.

SECRET

F. II, M.

JICPOA

MEMORANDUM

From TCW Date 3 Jan/44

To Grassy, Stephan, File Time

Subject Comairforward Bomb & Fuze Recommendation.

Airpac has returned Grassy's comments with remarks that in general they concur, but think one or two criticisms minor.

Comdr Holmes does not want to do anything further since AAF POA has already received our comments on the matter.

S. Shurcliff
Dick Tracy ...

Pl. note + return

Could we get a copy of the handbook referred to?
RBK

C O P Y | CONFIDENTIAL

HEADQUARTERS
COMMANDER SHORE BASED AIR FORCE
FORWARD AREA, CENTRAL PACIFIC
APO 241

LFJ/3e

471.

11 July 1944

SUBJECT: Correct Fuzing of Bombs.

TO: See Distribution.

1. From a study of recent photographs of enemy-held Marshalls Islands, it has been determined there are still many structures, including ammunition magazines, bomb-proof shelters, and gun positions which are still intact. The fact that these facilities are still in usuable condition proves that it is very difficult to totally destroy enemy installations by saturation bombing, or by dive bombing, when the target is very small and well protected.

2. Aircraft Action Reports show that in most cases the bombs being used against the gun positions are fuzed with an instantaneous nose fuze and with various delays in the tail fuze. All bombs are being dropped with both fuzes armed. Planes not equipped with selective arming gear should carry bombs with both fuzes armed for the same delay. When no definite targets are assigned and when the planes are equipped for selective arming, the nose fuze should be set for instantaneous action and the tail fuze for short delay (0.10, 0.01 or 0.025 seconds). If above ground, unprotected targets are encountered, i.e., planes on the ground, vehicles, light buildings, personnel, etc., the bombs should be dropped with both fuzes armed. This will give instantaneous action, with the tail fuze as a safety factor in case the nose fuze fails to function. When well protected targest, such as those discussed below are encountered, the bomb should be dropped with the nose fuze safe, thus allowing the bomb to partially penetrate the target before detonation. A direct hit on a gun position tion will definitely put the gun out of action, regardless of whether the bomb is fuzed for delayed action or not. If, however, a near miss is scored, the possibility of damaging the gun by blasting away part of the surrounding concrete and earth revetment is greatly increased by fuzing the bomb for delayed action. The ammunition magazines and bomb-proof shelters are all covered with either several thicknesses of sandbags or heavy concrete roofs, or both. These installations, in some cases, are close enough to be hit by bombs intended for the gun positions. Bombs with instantaneous fuzes have little or no effect on these structures, whereas a 500-pound or larger bomb fuzed for 0.10 second delay might possibly penetrate the roof, or, at least, cause some damage. Bombs fuzed for 0.10 second delay produce a deep steep-sided crater, while shorter delays (i.e., 0.01 and 0.025 second) produce broad shallow craters. It is difficult to determine whether a bomb fuzed for 0.10 second delay or one fuzed for shorter delay would be more effective in destroying a gun emplacement when a near miss is scored, but it is thought that a delay of 0.10 second will produce better results because of the increased mining effect. When AP or SAP Bombs are used they will be fuzed with a 0.10 second delay. Normally against armored or high quality reinforced concrete targets, short delay fuzes are used to prevent the bomb case from shattering before detonation occurs, but with targets protected by a cover of earth, sandbags, or a thick slab of poor quality concrete, a 0.10 second delay fuze will be more effective.

3. The conclusions to be drawn from this discussion are that if selective arming is not used, both nose and tail fuzes should be set for 0.10 second delay whenever the target is a bomb-proof shelter, magazine, or similar structure, and that it is probably better to use a 0.10 second delay in both nose and tail fuzes

when attacking gun positions. In any case, some delayed action should be used. Gun positions should never be bombed with fuzes set for instantaneous action.

4. The information set forth above does not apply to low level attacks when an 8-to-11 second, or 8-to-15 second delay fuze is used, or to attacks on the many other types of land and sea targets that may be assigned. This information is being published principally for the use of the units which are being assigned targets on the enemy-held Marshall Islands, but is being distributed to all units of this command to be used as a guide whenever similar targets are encountered. Information on the tactical use of bombs and fuzes was recently distributed by this office to all units of this command. As additional information becomes available, it will be distributed.

By command of Major General HALE:

/s/ L. F. JOHNSON
Lt. Col., AGD,
Adjutant General.

DISTRIBUTION: --

CONFIDENTIAL

Reference: (a) Confidential letter from Headquarters Commander Shore Based Air Force, Forward Area, Central Pacific, APO #241, dated 11 July 1944.

1. The following excerpts from Reference (a) are quoted with pertinent comments.

2. "Planes not equipped with selective arming gear should carry bombs with both fuses armed for the smae delay."

Comment: This is not always possible. The commonly used nose fuse AN-M-103 will only function either instantaneous or with 0.1 second delay. There are no settings of 0.01 second or 0.025 second on this fuse. Against many installations, the 0.01 and 0.025 second delay fuses are desirable. In such cases, the tail fuse should be set with the proper delay, 0.01 or 0.025 seconds whichever may apply, and the nose fuse should be set at 0.1 as insurance against the bombs being "duds".

3. "A direct hit on a gun position will definitely put the gun out of action, regardless of whether the bomb is fused for delay action or not."

Comment: This is a rater loose statement and its application hinges somewhat upon what is meant by a gun position. If a hit within the protecting revetment is referred to, the statement is not necessarily correct. Whether or not usch a hit will put a gun out of action will be influenced by such factors as the size of the bomb, inside diameter of the revetment, presence or absence of a protecting shield, calibre of the gun, and similar features. Differentiation must also be made as to the length of time the gun may be out of action. A hit within a revetment may only cause minor damage which can be repaired in a few hours or less.

4. "It is difficult to determine whether a bomb fused for 0.1 second delay or one fused for shorter delay would be more effective in destroying a gun emplacement when a near miss is scored, but it is thought that a delay of 0.1 second will produce better results because of the increased mining effect."

Comment: A delay fused bomb may damage a gun by cratering the foundation, by hurling damaging debris at the gun, and by displacing the foundation by earth shock. Fragmentation and blast will contribute only to a minor extent. Craters of maximum size will have the best chance of cratering the foundation or damaging the gun by debris. With regard to earth shock, experimental data on hand here indicates that earth displacements are independent of the depth of burial provided only that the bomb is completely buried. It is thus apparent that the fuse delay producing the maximum crater should be chosen. This will vary with the type of soil and the size of the bomb, and frequently delays of 0.01 or 0.025 would be preferable.

5. "When AP or SAP bombs are used they will be fused with a 0.10 second delay."

Comment: The only available fuse delay for AP bombs is 0.08 seconds. Against open emplacements AP bombs with this fusing will be very inefficient in producing damge from either fragmentation, debris, or cratering and would have very low priority against gun positions of this type. SAP bombs with delay fusing would be definitely inferior to GP bombs of equal weight against guns in open emplacements.

6. "Gun positions should never be bombed with fuses set for instantaneous action."

Comment: Data available here indicates that this statment is incorrect. Against guns not protected by a revetment, instantaneous fusing is preferable for damaging the gun. Fragmentation bombs have been found to be effective against guns less than 75 mm. in size, and of course these bombs must be fused instantaneously. Choice as to whether delay or instantaneous fusing is preferable can only be made after evaluating such factors as size and type of revetment, calibre of the gun, nature of the soil, and type of auxiliary installations. If the soil will not produce effective debris, the revetment is over 40 feet in diameter, and there is no concrete pavement in the revetment, instantaneous fusing is considered preferable, especially with smaller bombs.

COPY

CONFIDENTIAL

HEADQUARTERS
COMMANDER SHORE BASED AIR FORCE
FORWARD AREA, CENTRAL PACIFIC
APO 241

LFJ/ge

471.

11 July 1944

SUBJECT: Correct Fuzing of Bombs.

TO: See Distribution.

1. From a study of recent photographs of enemy-held Marshalls Islands, it has been determined there are still many structures, including ammunition magazines, bomb-proof shelters, and gun positions which are still intact. The fact that these facilities are still in usuable condition proves that it is very difficult to totally destroy enemy installations by saturation bombing, or by dive bombing, when the target is very small and well protected.

2. Aircraft Action Reports show that in most cases the bombs being used against the gun positions are fuzed with an instantaneous nose fuze and with various delays in the tail fuze. All bombs are being dropped with both fuzes armed. Planes not equipped with selective arming gear should carry bombs with both fuzes armed for the same delay. When no definite targets are assigned and when the planes are equipped for selective arming, the nose fuze should be set for instantaneous action and the tail fuze for short delay (0.10, 0.01 or 0.025 seconds). If above ground, unprotected targets are encountered, i.e., planes on the ground, vehicles, light buildings, personnel, etc., the bombs should be dropped with both fuzes armed. This will give instantaneous action, with the tail fuze as a safety factor in case the nose fuze fails to function. When well protected targest, such as those discussed below are encountered, the bomb should be dropped with the nose fuze safe, thus allowing the bomb to partially penetrate the target before detonation. A direct hit on a gun position tion will definitely put the gun out of action, regardless of whether the bomb is fuzed for delayed action or not. If, however, a near miss is scored, the possibility of damaging the gun by blasting away part of the surrounding concrete and earth revetment is greatly increased by fuzing the bomb for delayed action. The ammunition magazines and bomb-proof shelters are all covered with either several thicknesses of sandbags or heavy concrete roofs, or both. These installations, in some cases, are close enough to be hit by bombs intended for the gun positions. Bombs with instantaneous fuzes have little or no effect on these structures, whereas a 500-pound or larger bomb fuzed for 0.10 second delay might possibly penetrate the roof, or, at least, cause some damage. Bombs fuzed for 0.10 second delay produce a deep steep-sided crater, while shorter delays (i.e., 0.01 and 0.025 second) produce broad shallow craters. It is difficult to determine whether a bomb fuzed for 0.10 second delay or one fuzed for shorter delay would be more effective in destroying a gun emplacement when a near miss is scored, but it is thought that a delay of 0.10 second will produce better results because of the increased mining effect. When AP or SAP Bombs are used they will be fuzed with a 0.10 second delay. Normally against armored or high quality reinforced concrete targets, short delay fuzes are used to prevent the bomb case from shattering before detonation occurs, but with targets protected by a cover of earth, sandbags, or a thick slab of poor quality concrete, a 0.10 second delay fuze will be more effective.

3. The conclusions to be drawn from this discussion are that if selective arming is not used, both nose and tail fuzes should be set for 0.10 second delay whenever the target is a bomb-proof shelter, magazine, or similar structure, and that it is probably better to use a 0.10 second delay in both nose and tail fuzes

when attacking gun positions. In any case, some delayed action should be used. Gun positions should never be bombed with fuzes set for instantaneous action.

4. The information set forth above does not apply to low level attacks when an 8-to-11 second, or 8-to-15 second delay fuze is used, or to attacks on the many other types of land and sea targets that may be assigned. This information is being published principally for the use of the units which are being assigned targets on the enemy-held Marshall Islands, but is being distributed to all units of this command to be used as a guide whenever similar targets are encountered. Information on the tactical use of bombs and fuzes was recently distributed by this office to all units of this command. As additional information becomes available, it will be distributed.

By command of Major General HALE:

/s/ L. F. JOHNSON
Lt. Col., AGD,
Adjutant General.

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CONFIDENTIAL

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Comment: This is not always possible. The commonly used nose fuse AN-M-103 will only function either instantaneous or with 0.1 second delay. There are no settings of 0.01 second or 0.025 second on this fuse. Against many installations, the 0.01 and 0.025 second delay fuses are desirable. In such cases, the tail fuse should be set with the proper delay, 0.01 or 0.025 seconds whichever may apply, and the nose fuse should be set at 0.1 as insurance against the bombs being a dud.

3. "A direct hit on a gun position will definitely put the gun out of action, regardless of whether the bomb is fused for delay action or not."

Comment: This is a rater loose statement and its application hinges somewhat upon what is meant by a gun position. If a hit within the protecting revetment is referred to, the statement is not necessarily correct. Whether or not usch a hit will put a gun out of action will be influenced by such factors as the size of the bomb, inside diameter of the revetment, presence or absence of a protecting shield, calibre of the gun, and similar features. Differentiation must also be made as to the length of time the gun may be out of action. A hit within a revetment may only cause minor damage which can be repaired in a few hours or less.

4. "It is difficult to determine whether a bomb fused for 0.1 second delay or one fused for shorter delay would be more effective in destroying a gun emplacement when a near miss is scored, but it is thought that a delay of 0.1 second will produce better results because of the increased mining effect."

Comment: A delay fused bomb may damage a gun by cratering the foundation, by hurling damaging debris at the gun, and by displacing the foundation by earth shock. Fragmentation and blast will contribute only to a minor extent. Craters of maximum size will have the best chance of cratering the foundation or damaging the gun by debris. With regard to earth shock, experimental data on hand here indicates that earth displacements are independent of the depth of burial provided only that the bomb is completely buried. It is thus apparent that the fuse delay producing the maximum crater should be chosen. This will vary with the type of soil and the size of the bomb, and frequently delays of 0.01 or 0.025 would be preferable.

5. "When AP or SAP bombs are used they will be fused with a 0.10 second delay."

Comment: The only available fuse delay for AP bombs is 0.08 seconds. Against open emplacements AP bombs with this fusing will be very inefficient in producing damge from either fragmentation, debris, or cratering and would have very low priority against gun positions of this type. SAP bombs with delay fusing would be definitely inferior to GP bombs of equal weight against guns in open emplacements.

6. "Gun positions should never be bombed with fuses set for instantaneous action."

Comment: Data available here indicates that this statment is incorrect. Against guns not protected by a revetment, instantaneous fusing is preferable for damaging the gun. Fragmentation bombs have been found to be effective against guns less than 75 mm. in size, and of course these bombs must be fused instantaneously. Choice as to whether delay or instantaneous fusing is preferable can only be made after evaluating such factors as size and type of revetment, calibre of the gun, nature of the soil, and type of auxiliary installations. If the soil will not produce effective debris, the revetment is over 40 feet in diameter, and there is no concrete pavement in the revetment, instantaneous fusing is considered preferable, especially with smaller bombs.

Pending File
12/4/44

Spec. gen. to Comairpac
Cincpac
CASU Poa

COPY

CONFIDENTIAL

HEADQUARTERS
COMMANDER SHORE BASED AIR FORCE
FORWARD AREA, CENTRAL PACIFIC
APO 241

LFJ/Be

471.

11 July 1944

SUBJECT: Correct Fusing of Bombs.

TO: See Distribution.

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when attacking gun positions. In any case, some delayed action should be used. Gun positions should never be bombed with fuzes set for instantaneous action.

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COPY

CONFIDENTIAL

HEADQUARTERS
COMMANDER SHORE BASED AIR FORCE
FORWARD AREA, CENTRAL PACIFIC
APO 241

LFJ/Be

471.

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SUBJECT: Correct Fuzing of Bombs.

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C O P Y

CONFIDENTIAL

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FORWARD AREA, CENTRAL PACIFIC
APO 241

LFJ/ge

471.

11 July 1944

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for Major Miller

Remarks on Conf. letter from Comairfwd dated 11 July, file 471, subject "Correct Fuzing of Bombs"

The following comments are made similarly to those made by Jicpoa, with corresponding para nos.

2. Jicpoa remarks are concurred with. The .01 and .025 sec delays are normally more desirable than other types, as a g.p. bomb will ordinarily have reached its maximum penetration within that period, and there is no advantage in a (.01). This is true for average loam soil (.025 sec), 4000 psi concrete (.01) and armor plate. longer delay. In production now, but not yet available in this theatre are the M139 and M140 nose fuzes with .01 and .025 sec. delay, respectively. Like the M103, they can be set for instantaneous action. They are designed for use with tail fuzes equipped with a primer detonator of similar delay.

3. Comairfwd statement ~~re~~ regarding a direct hit on a gun position should be qualified. Jicpoa remarks are appropriate.

4. Jicpoa remarks appear logical. The soil type should be considered in choosing the most desirable delay in order to obtain the maximum cratering effect.

5. Jicpoa statement regarding delay for AP bombs is correct, but SAP bombs can be equipped with non delay, .01 sec, .025 sec., and 0.1 sec tail fuze delay. There is no justification in using these bombs against unarmored or unprotected

targets, their only advantage over G.P. bombs being the ability to reach maximum penetration without the bomb case breaking up. A G.P. bomb may break up before reaching maximum penetration depth in concrete or armor plate. Delays for SAP bombs should be chosen for the particular target being attacked.

6. Depot remarks appear appropriate.

I believe Command has tried to make selection of fuze delays entirely too simple to accomplish maximum results. Their remarks concerning delay selection for unprotected targets above ground including planes, vehicles, light buildings etc (unprotected gun positions should be included in this category) are good. Instantaneous nose fuze settings should be used for these targets when G.P. bombs are employed. In many cases frag bombs can be used more effectively against this type of target than G.P. bombs.

Command's choice of 0.1 sec delay for all attacks requiring a delay, except where the bomb case is expected to rupture, is not advisable. In choosing a delay element, the following three primary factors must be considered when attacking a specific target, after the type of bomb to be employed has been determined:

1. altitude
2. material requiring penetration.
3. Depth of penetration desired.

other considerations such as cratering effect, fragmentation effect and blast will depend on the degree of penetration and material which is penetrated.

Specific information regarding choice of delays for various targets is included in the 7th AF and O's Handbook. Col. Cox, and O of Comair fwd has a copy of this Handbook.

(Above notes are by Capt Black of AAF POA - Ordnance Sec)

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Results were often disappointing, however, because bombs fuzed with 11-second delay detonators would sink so deeply in marshy ground prior to functioning that the detonation was in many instances almost entirely muffled. This was particularly noted at Tamu, where 500 lb. bombs hit as close as 10 feet to grass bashas without destroying or even badly damaging them. The problem is a difficult one, for using instantaneous fuzes will force fighter-bombers up to release altitudes that will make accurate close support impossible. Parafrag bombs offer a possible solution.

ONI Intelligence Report 234-44
INDIA AND BURMA -
JAPANESE EXPLOSIVE CHARGE
JICPOA 54362 CE R/S 23580

It is an obvious conclusion that the weapon to prevent the enemy from using his close-in defensive weapons against our attacking troops is a well controlled and coordinated air strike using strafing and small bombs. It is not necessary to destroy a position or a gun to silence it. If by strafing and bombing, the enemy is driven down into his hole so that he cannot use his weapons until the infantry is upon him, those weapons have, to all practical intents and purposes, been silenced. As noted above, however, the attacks and the advancing troops must be coordinated so that the infantry is in striking position before the air attacks end.

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SECRET

SECTION II - The relative effectiveness of various type bombs and fuzes against strategic and tactical objectives.

A study of the targets actually attacked by support air during the initial phase showed that the change from delay to instantaneous was opportune. The terrain was in general swampy and soft. There were few protected installations. Hence, greater effect was obtained by blast and fragmentation than by cratering. The following Japanese Intelligence Bulletin issued 31 December 1943, also reveals that the enemy in similar terrain has found our instantaneously fuzed bombs most to be feared. Source ATIS 1392 SWPA.

"The bombs used depend upon the objective of the attack. In raids upon our air bases in the Southeastern area, heavy bombs are not used very much; rather, they are wont to use smaller types, 50 kg. and below, in hugh quantities. Moreover, they resort to strafing as well as releasing a great number of parachute bombs in low-level flying; their main objective being to inflict casualties on the personnel. The heavy boms are dropped in vain in the soft ground of the Southeastern area because they merely burst upwards with a diminished burst effect leaving a deep hole in the ground. On the other hand, when small bombs are employed, their horizontal burst effect is great and they prove very effective against objectives which have inadequate cover." (The underlining is ours.)

In close air support it was noted that the targets attacked fell generally into two categories. (a) Those against which fragmentation bombs are most effective, i.e., troop concentrations, truck parks, mortar positions, etc., and (b) those against which heavy bombs with delay action fuzes are required, i.e., caves, deep, well dug-in defensive positions, underground storage tanks, etc.

In many cases it is believed that a 100 or 500 pound cluster of 20 fragmentation bombs could have been used more effectively than the 100 or 500 pound bombs.

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As a result of study, it became evident that Naval Gunfire and Air Bombardment could both operate in the same coastal area simultaneously with an attendent increase in overall bombardment volume and efficiency, provided the maximum ordinates of gunfire trajectories were restricted to 1200 feet above sea level for aircraft protection. The plan adopting these restrictions was known as Plan Victor and was put into effect during the period of simultaneous Naval Gunfire and Air Bombardment. While Plan Victor was in effect, pilots were instructed to remain above 1500 feet in the maximum ordinate areas.

EVALUATION BOARD - AAFPOA Report No. 3
THE OCCUPATION OF LEYTE, PHILIPPINE IS.
JICPOA No. 50843 CE RS;-21230

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SECRET

Simultaneous Naval Gunfire and Air Bombardment

A. As a result of study, it became evident that Naval gunfire and air bombardment could both operate in the same coastal area simultaneously, with an attendant increase in overall bombardment volume and efficiency, provided the maximum ordinates of gunfire trajectories were restricted to 1200 feet above sea level for aircraft protection. The plan adopting these restrictions was known as Plan Victor and was put into effect during periods of simultaneous Naval gunfire and air bombardment. While Plan Victor was in effect, pilots were instructed to remain above 1500 feet in the maximum ordinate areas.

B. Simultaneous Naval gunfire and air bombing not only increased the material and psychological damage to the enemy, but decreased the intensity and accuracy of enemy anti-aircraft fire.

Recommendation - Simultaneous Naval gunfire and air bombardment should be regularly used in amphibious operations wherever practicable. Careful study should be made considering the possibilities of a similar plan affecting the union and cooperation of artillery and air bombardment.

Subject: BRIEF of "Air Support", Enclosure (C) of Action Report by Commander Task Force FIFTY THREE (Commander Group TH REE, Amphibious Forces, Pacific), Amphibious Operations for the Capture of Guam. R/S 7152.

JICPOA 49350
CE R/S 20709

File II, M.