

FIFTH AMPHIBIOUS FORCE,
OFFICE OF THE COMMANDER,

U.S.S. PENNSYLVANIA (Flagship)
4 December 1943

ENCLOSURE
ANNEX (D)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF GALVANIC OPERATION

COMMUNICATIONS

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1. ASSEMBLY OF COMMUNICATION EQUIPMENT AND PERSONNEL

- (a) Strenuous efforts were made to assemble adequate communication personnel and equipment considerably in advance of receipt of plans for GALVANIC Operation. This was difficult because of the general scarcity of necessary types of radio equipment and trained personnel and because the communication needs for such an operation have not previously been thoroughly set forth and fully understood.
- (b) Experience has again demonstrated that no other type of operation requires such a large amount of communication personnel and equipment and such careful training, organization and coordination of communications. Adequate coordinated communications are one of the most important essentials of successful amphibious operations.
- (c) With the assistance of representatives of CinCPac, ComGen Pac, ComGenCenPac, ComAirPac and ComServPac, a minimum of the necessary men and equipment was assembled only just in time to go with the Northern Attack Force and Garrison Forces. It is not considered that adequate communication equipment or personnel were supplied to the Southern Attack Force. Specifically, additional equipments of the following general types were needed in varying amounts by elements of both forces:

1. For Ships:

TCS; TBS; TBX; SCR 610; voice modulators for TBL and TBK transmitters; High Frequency receivers of the selective type suitable for voice reception; VHF of SCR 639-640 type suitable for communication with aircraft.

2. For assault troops and shore objectives;

SCR 610; SCR 399; SCR 193 in jeeps with full frequency range 1500 to 9000 kcs; portable sets somewhat like TBX and SCR 284 but superior to both, (light weight but powerful and rugged portable equipment having full frequency range and capable of sustained operation does not appear to be available in any standard type); powerful, reliable, mobile VHF for air-ground communications, (SCR 522 and Navy 233A proved inadequate on the ground).

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3. No portable radar equipment of sufficient range and reliability and no infra-Red equipment was available for use either ashore or afloat.
4. All major commands required many more radio technicians and trained operators than were available. Material failures due to lack of technicians proved a serious handicap. Delays and confusion were caused by inexperienced radio operators.

2. TRAINING AND ORGANIZATION

- (a) The time available for training and organization was not adequate. A major portion of difficulties and losses were a direct result of this. The strenuous training efforts, exercises and rehearsals during the two weeks immediately preceding departure and the several days rehearsal enjoyed by the Northern Attack Force were absolutely invaluable. Additional communication rehearsals for assault forces and several rehearsals for base and garrison force communications should have been held.
- (b) Practical experience in setting up and operating equipment and in solving internal communication and organization problems is most essential. Adequate opportunity for this has not been provided any communications groups yet encountered. Instructors with experience are needed and should be made available. The need for more communication training of individual units prior to assembly of attack forces was obvious.
- (c) The Communication Plan was made from scratch in a very short time, yet it was received too late by all concerned. One coordinated plan for GALVANIC was achieved. Despite many minor errors and considerable room for improvement the basic plan appears sound. One plan, rather than a number of small plans, is essential and proved its worth. The size of the Communication Plan caused considerable comment. Some reduction can be made in future plans, but only if the same information is made available in other publications. Simple Tactical voice and CW calls are a problem requiring a better solution. Detailed comments and recommendations for improvement in the Comm Plan will be made in separate correspondence. The essential point to be noted here is that adequate organization and training could not have been achieved without the Comm Plan, even had time been available.

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USF 70 is not adequate; it needs improvement and expansion. A detailed Comm Plan for each operation must be distributed sufficiently in advance of departure dates of all forces concerned to permit organization, drills, check and calibration of equipment and practical rehearsals of communications. The Comm Plan should if possible precede the Operations Plan.

- (d) Communication training and organization was divided into the following general groups and accomplished separately during early stages of preparation: Air Liaison Parties; Shore Command Communication Stations; Shore Fire Control Parties; Fighter Director and Radar Groups; Beach Parties; Transport and Boat Group Communication Teams; augmentation of individual ship installations and personnel; Island Base Shore Stations. Each part was important but the combination of all into a coordinated network of communications was most important. Lack of time and inexperienced personnel made proper coordination impossible in the time available. Unification of communications is the most important single point to be stressed in preparations for future operations. This can only be achieved by having all groups study and have conferences on a single complete Comm Plan distributed well in advance.

3. APPROACH

- (a) After departure of Task Force 52 from Pearl, strict Radio Silence was observed on all channels except TBS and VHF. Simple exercises were held the first few days, then RADAR tracking, tuning and IFF exercises. During the last two days of approach no exercises were held, TBS use was reduced to a minimum, and listening watches for enemy RADAR and VHF were maintained. Jap Radar and what appeared to be Jap aircraft beacons were heard. A separate report has been made to CinCPac by dispatch. On D minus One Day considerable TBS traffic was heard from Task Force 53 which was in sight. VHF and fighter direction worked well during interception and destruction of an enemy patrol plane.
- (b) Visual traffic was heavy, and at first, slow. Visual communications improved with use, but it was necessary to assign sectors of signal responsibility to ensure rapid and reliable dissemination of collective messages. Present cruising instructions do not contain positive instructions on visual signalling within a large force. They have been unnecessary with small CV and CA-CL Task Forces. With prospects of continued use of larger forces, more detailed instructions on visual signalling should be incorporated in standard instructions. With TF 52 it was convenient to assign sectors by bearings and have senior large ship

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in each sector responsible for other. The transports were considered as a separate central sector and the carriers and their escorts as a rear sector. This resulted in five sectors, a 90° sector with center ahead on Fleet Axis, a port and starboard 90° sector with centers perpendicular to axis, the carrier sector which was 90° with center aft on Fleet Axis, and the transport sector. The system was promulgated by dispatch and worked reliably for blinker and flag hoist. Semaphore was used successfully only with nearby large ships and small vessels close aboard making mail trips or fueling. The peak visual traffic loads came on D minus Two, Three and Four Days and on D plus Three Day with a total of about 70 to 80 despatches per day. Once sector responsibilities had been established in the cruising disposition there was need for a procedure signal meaning "Pass to ships for which you are responsible." Under some circumstances a Task Group rather than a sector responsibility is more advisable.

- (c) TBS tests were needed and held soon after departure Pearl since only about 25% of the TBS's in the force worked properly until adjusted, then only about 75%. The need for better technical upkeep and adjustment of TBS was clearly demonstrated and continued to be apparent throughout the operation. Many ships did not have the AC heater modification and required over a minute to warm up. This delay is not acceptable during action or alert periods and absence of heater requires motor generator to be run continuously. Wide discrepancies were noted in ability of various ships to hear and be heard on TBS at ranges over 5 miles. Not over 50% were able to realize the full theoretical line of sight range. The need for TBS on AP, LST, and similar vessels, was shown throughout the operation and is the subject of separate correspondence. It would be of great value for Beachmaster and shore parties to be able to guard TBS channels.
- (d) Radar exercises were held frequently while enroute. A special exercise for tuning radars met with considerable approval and success. Comdr. Eller of CinCPac staff has recommendations for new and revised exercises developed during this period.
- (e) Special tests and exercises were held for IFF. Almost all ships present were tested on code two settings for BK. All ships were given an opportunity to see all effective BK settings in succession from a target vessel sent out to display same at about 10 miles. Very few BK's were set to correct code at first try and about 25% did not work at all. Several vessels appeared to have trouble with BL. Positive tests in port are needed for

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BL and BK and better technical installation and upkeep. At present the equipment is not reliable in most ships and is understood by few. The range at which BK can be seen on surface vessels is usually considerably less than the range at which they are first picked up by Radar.

4. ASSAULT

(a) Radio Silence was broken by TF 52 at minus 2 hours 20 minutes on D day. All necessary units of TF 52 were contacted on the various circuits without excessive testing or delays. Air Support, Fire Control and Task Force channels worked well between ships and between ships and aircraft throughout the attack on Makin.

(b) There was interference between the North and South Attack Force Gunfire Control channels 2496 and 2500 kes, but at no time did this interference interrupt or delay communications within TF 52 on 2500 kes. Some interesting information was intercepted from Southern Force on 2496. On the whole it would have been better had the channels been at least 20 kes apart. Communication between ships and most Shore Fire Control Parties was reasonably good as soon as parties got ashore. At one time CTF 52 communication with NLO 15 was the primary channel to CO Landing Force ashore. However, the equipment of the Shore Fire Control Parties left a lot to be desired in quality and reliability. Temporary breakdowns and weak signals were frequent. This was not too important as the parties needed were contacted and the opposition was light.

(c) A separate report on Support Aircraft Communications is being submitted. In general communications were good. Interference among circuits in the Pennsylvania was most annoying and caused delays several times. Difficulties can be at least partially removed by better radio engineering and improvement of Pennsylvania installation. However, trouble will always be experienced where a large number of transmitters and receivers are in use so close together. The new headquarters ship will probably have similar troubles. A large number of circuits can only be run perfectly from a shore base where receivers and transmitters can be separated. Frequencies for GALVANIC were carefully

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chosen to minimize interference between circuits. Air Liaison parties ashore had good communication with SAC on ship. Support Aircraft supplied a large part of information obtained on situation ashore. The training and energy put into organizing SAC communications paid dividends. However, the SAC ashore and Air Liaison parties ashore were not too successful in talking to airplanes. It was again clearly demonstrated that successful control of aircraft, either from ship or shore, depends on having a reliable and powerful radio transmitter, which the parties ashore did not have working during the assault phase.

- (d) Fighter director communications between BURNS and CAP's appeared satisfactory. KIMBERLEY was not used during assault phase. No fighter director or Radar was set up ashore until several days after initial assault. This delay might well have had serious consequences and should be investigated to avoid repetition of errors which caused it.
- (e) The H.F. Warning Net was used a great deal by TF 53. Many transmissions from both forces were unnecessary. Discipline on this vital channel must be improved. An analysis of traffic heard and unnecessary transmissions is made in the report on Support Air Communications.
- (f) Beachmasters were slow in getting communications established. Lack of training in use of equipment and lack of understanding of who to communicate with and how were evident. The communications between transports and boats appeared reasonably good. The SCR 610 equipment was very valuable and quite reliable. It proved superior to anything else so far used for this purpose. A separate channel was provided for each transport and another for Local Command. These SCR 610 sets provided useful and reliable ship to shore communication for several days and were often the only means of communication with and between parties ashore. More batteries were needed.
- (g) Landing Force Communications ashore were largely non-existent. There were no beach laterals and no command channels. Some breakage of equipment, delays in unloading, usual losses and confusion and a lack of command organization appear to be the major causes of an outstanding

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lack of communications. Equipments which were finally gotten ashore and in working condition were not utilized on channels as planned. The SCR 610 supplied for Local Command Channel was the only communication channel to ComLanFor ashore for several days. Command communications to forces afloat and to rear bases in accordance with plans were never established, as far as is known while CTF 52 was in the vicinity. ComLanFor ashore did come up on the Task Force Common CW channel at 0030 Z, D plus Two Day, but then had difficulty in decoding and internal routing of despatches. It was necessary for CTF 52 to communicate direct with Beachmasters.

5. CONSOLIDATION AND SUPPORT

- (a) Information received via Air Support and Gunfire circuits indicated that opposition was light. Unloading at beaches was difficult. Communication with Red Beaches was established on D Day. Communications with Yellow Beach and between Beaches were not good until D plus One Day. When it was necessary to withdraw ships during night of D plus One and D plus Two because of submarine menace, it is believed that forces ashore were not in communication with anyone off the island. Later, when some local circuits ashore were manned they appeared to close down at night. Had there been counter attacks or stiff opposition during the first four days the lack of planned communications would have been most serious. No Radar, air warning or fighter direction appears to have been in even partial operation until Dog plus Four Day. Radar and communication equipment appears to have been poorly loaded in inaccessible places.
- (b) Wire was laid ashore with reasonable speed. However, it was not used to advantage since there appeared to be little if any information available on what commands could be reached over what wires. It is believed that the general delay and confusion in communications ashore contributed to delays in unloading and in mopping up operations.
- (c) During D to D plus Four, CTF 52 communicated direct to Radio Honolulu on 4235 series and to Task Force and Task Group Commanders on local circuits when necessary. Radio Silence was usually maintained from about 1900 Y to 0600 Y while away from Butaritari Island at night.

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Intercept watches on TF 53 major channels were maintained continuously and kept CTF 54 informed of the Tarawa situation.

6. UNLOADING AND REASSIGNMENT OF UNITS.

(a) During reloading of elements of the 27th Division, the Signal Officer ashore was contacted by SCR 610 and agreed to leave certain communication personnel and equipment for use by garrison force until they could establish their own. All air liaison and fire control communication parties were reembarked. Improved radio equipment at Yellow Beach facilitated operations somewhat. SC-2 Radar was in partial operation on D plus Four Day but had to be moved later to a better location. SCR 610 communications between ships, LST's, boats and Beaches appeared to help loading and unloading considerably. The 3510 kcs Transport Division voice channel was also used to good advantage although efforts were made to avoid giving away information in plain language on this channel and it was not used during darkness.

(b) With the arrival of Garrison forces in Task Group 54.8 and departure of transports for Pearl, regrouping and movement of vessels required a considerable volume of traffic. Had shore circuits from Makin to other bases been set up as planned, such traffic could have been handled by sending ashore. As it was, CTF 52 was required to work Radio Honolulu direct at all times. This facilitated rapid handling of CP dispatches but was not good from a security standpoint. Many long information dispatches of an important but not urgent nature should have been cleared from a local shore station.

7. SHIP - SHORE AND SHORE OBJECTIVE CHANNELS

(a) The REVENGE was needed for many duties and could not be used as a station communication ship. Transports or destroyers could have been used as such if CTF 52 had not been present. The wide coral reefs, conditions ashore, and need for all available craft in patrolling and unloading will probably always make it inadvisable to tie a vessel to shore by telephone wires and use the vessel as a

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radio station. It is absolutely essential, and not difficult, with reasonable organization and training, to set up necessary radio and visual communication centers ashore using mobile equipment. Only by so doing can beach conditions and unloading be improved and expedited. Limited range but reliable voice channels are of tremendous value and must be provided, with plenty of spares, for ship and boat to shore circuits and between shore parties.

- (b) A considerable amount of Japanese radio and Radar equipment appears to have been captured in good condition. Dispatch reports to CinCPac were made and a Naval Officer radio engineer sent from Pearl at ComLanFor's request. Some reports were received that souvenir hunters damaged captured radio equipment.

8.

RETIREMENT

- (a) After TG 54.8 (XAP's with garrison force) and screen entered the lagoon at Makin, the initial Makin Transport Group and Mississippi departed for Pearl. CTF 52 with remaining force moved to the southeastward to clear submarine area. Radio Silence on all except TBS and VHF was maintained when not near land. At one time a destroyer was sent to a point near Tarawa to send despatches to Honolulu rather than break Radio Silence.
- (b) A reliable VHF channel to a shore station at Tarawa or Makin would have been of great value to various elements of TF 54 and to groups of TF 50. For this operation, and for similar ones, a common CW channel on a frequency near TBS would have greatly reduced enemy interception of plain language traffic and taking of D/F bearings on our forces which had to break radio silence. A VHF CW channel for Task Force and Group Commanders would not be impossible to set up with equipment which can be obtained in a matter of weeks. Setting up this channel is of vital importance and will be the subject of separate correspondence.
- (c) Several air attacks were experienced at dusk by TF 52 and other forces operating to southeast of Makin. In each case the force or group was radically maneuvered on a very dark night using only TBS to make turn signals.

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Damage was avoided by this rapid and skillful maneuvering. Had TBS in Pennsylvania or any large vessel failed during these attacks damage to ships would probably have resulted and the force would have become scattered. There was no time for CW plain language or for use of a medium frequency channel to parallel transmissions, nor was there time to obtain receipts from units of the force on the TBS. Night action of this kind brings home most forcefully: That the most important radio in any ship is its TBS; that it must be kept at the peak of reliable condition at all times; that failure must be anticipated by frequent inspection and careful records and repaired before they happen; and finally that the most useful and practical arrangement would be two TBS in each ship, three in large vessels and flagships with multi-channel, push button control, and choice of voice or CW. Different powers and antenna heights would be valuable to afford a choice of reliable ranges when required. Reports of these air attacks should have been made to Tarawa and Makin rather than Honolulu had circuits been established.

- (d) On 28 and 29 November it was necessary to send considerable traffic in connection with final reassignment and movement of various units. These despatches were cleared by setting watch on a variety of circuits as necessary to reach each command direct. Interference and attempted deception was experienced from enemy stations on 12705 kcs while clearing traffic to Radio Honolulu. Enemy delayed movement of traffic considerably but did not stop it. As soon as operational priority traffic was cleared, CTF 52 shifted to other frequencies and cleared the traffic without interference. Several long reports were cleared direct to Honolulu on the 4265 series. After a lengthy search was made for suitable point to point frequencies on which it might be possible to work Honolulu direct, a few of the listed frequencies appeared to be in use. The only channel on which Tarawa appeared to be was the Island Base Net to Funafuti. If the enemy continues his attempts to create interference and deception it is believed it can best be overcome by using a variety of channels for ship to shore work rather than by attempting to change the ship to shore frequency periodically.

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Serial 00166

FIFTH AMPHIBIOUS FORCE,
OFFICE OF THE COMMANDER.

U.S.S. PENNSYLVANIA, Flagship,
December 4, 1943

From: Commander Task Force FIFTY TWO.
To : Commander in Chief, U.S. Pacific Fleet.
Via : Commander Central Pacific Force, U.S. Pacific Fleet.

Subject: Air Attack on Task Force FIFTY TWO, evening of
25 November 1943.

Enclosures: (A) Excerpt from CTF 52 Log, 25 November 1943.
(B) Track of U.S.S. PENNSYLVANIA and plot of
enemy aircraft movements.
(C) Diagram of Cruising Disposition 3L2 modified.

1. Task Force FIFTY TWO was subjected to attack by enemy aircraft on the evening of November 25, 1943. Numerous float lights and flares were dropped but concerted attacks were not pressed home, and apparently no bombs or torpedoes were launched. There was no damage sustained by any ship in the disposition. It is considered that radical maneuvers, always away from the attacking planes, resulted in the denial of a suitable attacking position and ultimate evasion of all attacking aircraft. A detailed account of the attack and the full staff log are given to permit complete analysis of the enemy's methods of attack, and our own methods used to defeat him.

All times are Plus TWELVE.

2. Intelligence information revealed that Japanese searches from the MARSHALLS were being made to obtain contact with our forces in the early afternoon. Numerous radar contacts, none of which were intercepted by our fighters due to the long range, confirmed these reports. Contact reports were made by those search planes sufficiently early to allow an attacking force to take off after receipt, and to reach the area of our forces at dusk. Task Force FIFTY TWO, on November 25, according to information received, was sighted by an enemy plane about 1400, and again at about 1730 by an advance scout of the attack group.

3. Recovery of our Combat Air Patrol was completed at 1751. Sunset was at 1810. First radar contact with one enemy aircraft was made at 1810, distance 20 miles. The plane closed to visual contact at about 1825 and was identified as a "BETTY" flying very low. This plane skirted the disposition from astern around to the port beam, reversed course, and was lost to sight on the port quarter due to darkness. Radar reported another snoopers on the starboard quarter and each was tracked along the course to about the beam. At 1838 and 1843 float lights

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were dropped on both beams so that the disposition was outlined along the direction of movement. These float lights burn an hour or more, and serve to mark the initial position of the ships under attack. It is also possible they serve as rendezvous points for scattered enemy planes. At 1850 $\frac{1}{2}$, several flares were dropped ahead on the port bow. Tracks of these snoopers are indicated in the track chart, enclosure (A). There was still some light, but the night soon became very black.

4. Radar contact was made at 1853 with what appeared to be two separate groups of attacking planes, one coming in from the northeast and one from the northwest. Later developments indicated a total of about twelve enemy planes. As indicated in the track chart, the former group passed ahead and turned westward, and the latter passed astern and remained to the westward for a time. It is believed that neither group had made positive contact with our force, although a few rounds of anti-aircraft were fired by various ships at this time. The enemy was possibly confused by a 120° simultaneous course change to the westward and a 180° simultaneous course change to the southeastward a few minutes later. The fact that the large attack groups had not made contact seems to indicate the absence of effective radar in the Japanese aircraft.

5. Apparently new searches were then instituted by separated snoopers, as several pips now appeared on the screen. At 1910 flares were dropped close astern of our ships, and at 1914 more flares were dropped close aboard on the port beam. Apparently, Task Force FIFTY TWO was then sighted by the enemy. As indicated on the track chart, each of the main groups turned toward the disposition, one passing to the northward skirting the disposition while the other passed close astern. Fire was opened by several ships at close range on this group with no apparent results. Again the attacking aircraft could not reach a favorable attacking position because of the continued radical maneuvers of the ships. Both groups could not reach firing positions simultaneously, although both tried several times, and both made several approaches. Twice at least they broke up into four groups and then reunited. Just how this was accomplished, and how the planes kept in formation on a black night, is not readily apparent. As soon as a radical maneuver was

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made, the enemy groups seemed to lose contact and retired to distances of three to eight miles before making another approach. Both groups finally cleared the disposition and at 1948 were several miles to the westward.

6. The enemy had then completely lost contact, for flares were dropped at 1951 $\frac{1}{2}$ and again at 1954 distance 16 and 18 miles to the westward. At 2002 the radar screen was clear of all enemy aircraft. It is not known whether or not the attackers dropped any torpedoes.

7. A summary of the maneuvers of the task force follows:

(a) In every case, the force was turned away from planes approaching or in a good torpedo position. If two or more groups were about in position, the disposition turned away from the nearest; shortly after, it turned away from the other.

(b) The first emergency turn was made at 1844, and the last at 2000. A total of 20 emergency turns were made in 76 minutes (average one every three minutes forty-eight seconds. Only one turn order was issued before the flagship had steadied on the new course, and that one was to increase the turn on the same direction.

(c) The total degrees turned by emergency turn signal was 1310°, or an average of 65° 33' per turn. One turn of 180° was made, two of 120° and three of 90°.

(d) In the disposition, which was 3L2, were 3 BB, 2 CVE, 2 CA, and 7 DD. Ships maintained excellent position. They had been drilled daily and nightly on turns by flag and TBS, both by executive and emergency methods, since departure from PEARL on November 10th. Similar night precision had previously been observed when there were 39 vessels in the disposition.

8. From the experience of this and a similar, but shorter attack the next night, the following remarks may be made:

(a) It seems evident that the Japs have no effective radar equipment in their "BETTY'S".

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(b) Radical maneuvers away from attacking aircraft are effective in denying suitable attack positions. Coordination between the illuminating plane and attacking groups appears to be so difficult that it is readily possible to evade one and then the other by radical course changes.

(c) Very long-burning float lights are dropped in advance of attack by snoopers aircraft, possibly to outline the initial position of the disposition in the direction of its advance. Then, coordinated with the float lights, very bright and long burning flares are laid ahead of the disposition to silhouette the disposition for the attacking planes. It is well to move promptly away from the float lights, as the enemy comes back to them again and again.

(d) Tracers from automatic weapons disclose the positions of the ships. Flashless powder functioned well.

(e) When any day light remains, the enemy planes fly very close to the water. As they come over the horizon, radar picks them up, but seemed to have difficulty in holding them as they drop below, on the near side of the horizon. As the night grows darker, the planes rise somewhat, and then the radar seems to pick them up again. On moonlight nights, it is probable the planes could continue to remain low. Whether or not this condition is due to multiple reflections from disturbed water that obliterates the plane pip, or to lack of skill of the operators or to some other cause, is not known.

(f) Difficult as it is to believe, the enemy planes definitely maintain rather close formations on very black nights; and groups apparently succeed in re-concentrating after sending out single snoopers or breaking up into smaller groups. For rendezvous points, they may use the float lights. Whether they accomplish this by means of hooded lights not visible to ships below or fighters above them; by luminous markings visible only to distances of a few hundred feet; by RDF; or by the use of "black" light outside the visible limits of the spectrum, is a matter of conjecture. The fact that they do actually accomplish reconcentration is believed not subject to dispute.

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9. In order to defeat enemy dusk and night torpedo attacks, the following recommendations are made:

(a) The development of carrier-based night fighters should be pushed with great vigor until it becomes practicable to launch, maintain, and recover night fighter patrols. The success obtained by Task Group 50.2 with night fighters in the GALVANIC Operation indicates the need for their immediate development and use by all task forces containing carriers. It is doubtful if CVE's (the only ones with Task Force 52) could employ night fighters.

(b) Combat information center personnel should be thoroughly trained to utilize to the utmost the radar facilities available. They should be capable of analyzing radar signals so that tracking of aircraft, low, high, distant, and close in, may be rapidly accomplished. They should be capable of tracking two or more groups of attacking planes simultaneously and of evaluating their numbers and intentions. Continuous information on all tracked aircraft should be rapidly issued to the officers served by the combat information center.

(c) Send out groups of fighters to form a picket line at 50 to 100 miles distance from our forces in the direction of most probable approach of enemy aircraft in the late afternoon, to shoot down enemy search planes, and intercept the attacking groups.

(d) It is suggested that tests be conducted in the matter of obtaining radar signals from low flying planes below, but on the near side of the horizon. It might be well also to test the installed radars in competition with portable radars placed on the lowest open deck. In action, destroyers should be warned to be especially alert, and make prompt report, of low flying planes not picked up by the high radars of larger vessels. It may be that special training of operators for meeting this condition may be required.

(e) The enemy apparently has some efficient device for night rendezvous and formation flying. Immediate tests by our own services along the following lines is suggested:

U.S.S. PENNSYLVANIA, Flagship
4 December, 1943.

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AIRCRAFT OPERATIONS

1. Air Support for Task Force 52 during GALVANIC was furnished three escort carriers of Carrier Division Twenty Four, LISCOMB BAY, CORREGIDOR and CCRAL SEA, supplemented by bombers and fighters from T.G. 50.2. This was the first extended operation of the Kaiser-built CVE. Each vessel carried 16 fighters or either the F4F or FM types and 13 torpedo planes, type TBF, a total in the three carriers of 48 fighters and 39 torpedo planes. Operations enroute to the GALVANIC area consisted only of training exercise in tactics, gunnery, and glide bombing, conducted by the Carrier air groups. Simulated coordinated glide bombing and torpedo attacks on the disposition were also made to exercise the radar tracking crews, anti-aircraft gun crews, and staff and ship tactical officers.

2. Upon arrival in an area to the eastward of the Ellice Group, on Dog minus 3 day, a four plane combat air patrol was maintained from sunrise to sunset. This patrol was increased to eight planes on Dog minus Two and Dog minus One days and supplemented by morning searches in the forward semi-circle to a distance of 175 miles on these two days. Wind was slightly abaft the starboard beam, force 3 to 4.

3. It was the intention to make an afternoon search on Dog minus One day but it was necessary to cancel this because of the great separation of the carriers from the main body due to travel up-wind during launching and recovery. The carriers several times were separated by such distance that they were unable to rejoin until dawn the following morning. The execution of excellent judgement in gaining distance ahead prior to launching and recovery and the execution of landings and take offs immediately upon turning into the wind is essential to minimize this separation.

4. The average availability of aircraft up until Dog Day was approximately 40 Wildcats and 30 Avengers. There were numerous operational losses due, it is believed, largely to the inexperience of these air groups in carrier operations.

5. Air Operations by Task Group 52.3 on Dog Day and subsequent there-to while at the objective were under the control

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of Commander Task Group 50.2 who was in direct charge of support of the landing operation. ComBatAir Patrols, Anti-Submarine Patrols, Bomber and fighter support Group, and Liaison planes were provided by the carriers. Report of operations during this period is covered by the Support Aircraft Commander, GALVANIC. It is of interest to note that only one plane, an Avenger, was lost in combat. There is reason to believe that the loss was due to structural failure while recovering from an excessively steep glide.

6. During the consolidation phase of the capture of MAKIN, while T.F. 52 was operating to the eastward in company with the carriers, a two to four plane combat air patrol and two to four plane anti-submarine patrol was maintained over the disposition until retirement was accomplished. Launching and recovery operations were satisfactorily accomplished in as much as the entire disposition conformed to the movements of the carriers.

7. At dawn of 24 November 1943 (plus 12) the LISCOME BAY was torpedoed and sunk by a Japanese submarine. Of about 107 officers and 852 men aboard, 54 officers and 648 men were lost, among them was Admiral MULLINIX, Commander Carrier Division TWENTY FOUR, and Captain WILTSIE.

8. Throughout the operation numerous radar contacts were made with aircraft not showing IFF that were later identified as friendly. Much time was lost in unloading since the air alerts thus ordered required all vessels to get under way, prepared to repel air attacks.

9. On several occasions a B-24 bomber was contacted by radar and identified by combat air patrols, aimlessly flying about the island of MAKIN and in and around our surface forces. IFF was never shown by this plane leading to the suspicion that it might have been a Japanese scout flying a recovered United States plane. Further investigation of the movement of all friendly B-24's is underway in order to identify the friendly or enemy character of this aircraft.

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10. A few cases of aircraft showing the old type IFF signal of the ABE equipment were observed. In one instance the plane was identified as an Avenger and on others as a B-24, subsequent information reveals that deranged ABK equipment might indicate such a signal. However, the possibility exists that the planes were in the hands of the enemy.

11. Prior to the departure of Task Force 54 for the GALVANIC operation all ships were directed to emphasize training of gun crews, lookout, signalmen, and anti-aircraft control parties in recognition of friendly and enemy aircraft. No case of any ship of T.F. 52 firing at friendly aircraft during the GALVANIC operation has been reported.

12. The operational requirements of Task Group 52.3 aircraft over the long period of the operation were rigorous and forced heavy flight loads on both pilots and aircraft. Nevertheless, CVE's have rather limited usefulness in combat operations. For the future, it is recommended that only fighters be carried by CVE, except for two or three TBF to be employed for liaison with troops ashore.

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GENERAL NOTES ON ATOLL ATTACK

1. LVT's (AMPHIBIAN TRACTORS)

- (a) Intelligence indicated that, for GALVANIC, the nature of the beaches, reefs, surfs and tides were such that the standard landing craft carrier by APA's and AKA's would experience great difficulty in landing and would be seriously limited as to times of landing with respect to stages of the tide. Furthermore, it was highly probable that obstacles, both natural (coral pinnacles and boulders) and artificial (wire, barricades and stone fish-traps) would have to be negotiated in the approach to the beaches over the wide flat coral reefs. To insure success in crossing the reefs and negotiating beach obstacles LVT's were provided for the assault waves. For MAKIN fifty LVT's were provided; sixteen being assigned to each battalion landing team and two held in reserve as spares. These vehicles tore up and cleared away wire most successfully, and knocked down heavy-looking barricades made of light iron or cocconut logs. They were most useful in pulling drowned trucks out of the water, and in freeing stranded boats from reefs and beaches.
- (b) The amphibian tractors, together with their crews and the assault troops to be landed in them, were transported from PEARL to MAKIN in LST's, sixteen or seventeen being assigned to each LST. This method of transportation proved highly satisfactory and simplified the execution of the initial ship to shore movement. The LST's were placed just to seaward of the line of departure; the doors were then opened, the ramp lowered and the LVT(2)'s then run out into the water where they quickly formed up and joined their assigned boat groups from the APA's. They had previously been trained as boat divisions and groups, and one LCVP was assigned to guide and maneuver each division.

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- (c) While transportation of LVT's by LST is satisfactory in other respects, one serious handicap is involved. Due to their reduced speed these ships must, under separate escort, precede the transports and support groups into the hostile area and in so doing are subjected to considerable risk from air attack. They also may disclose the destination. The advantages of this means of transportation for LVT(2)'s justify the risk, but the dangers should be recognized in planning.
- (d) A disadvantage of the LVT(2) is its low speed (4 to 4.5 knots). This low speed no doubt has to be accepted as an inherent characteristic. Other disadvantages are its lack of armor and difficulty of unloading troops and stores due to height of gunwale from the ground. In future operations the armored cargo type should be employed for the assault waves, but the addition of a ramp at the stern would be a decided improvement. The LVT is well adapted for mounting rocket launchers. In addition its armament of three .30 caliber machine guns and one .50 caliber give it high fire power.
- (e) No armored amphibian tractors or armored amphibious mounting the 37mm gun were employed in GALVANIC but the need for them existed. The armored amphibian with turret mount is particularly required for employment in the leading wave. While it is not believed that this amphibian tank is in every respect an adequate substitute for the light tank ashore yet its inclusion should reduce to some extent the total light tank requirements for any given operation. Due to shipping limitations serious consideration should be given to elimination of light tanks as turret mount armored amphibians become available.

2. LANDING ON CORAL REEFS

During the planning phase considerable attention was given to the selection of suitable beaches and to selection of proper tide conditions for the initial landings. Two beaches on the western end of BUTARITARI and one beach between ON CHONG'S WHARF and KING'S WHARF were selected after a study of all available intelligence.

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These beaches in actual use proved to be as good as any available on the island but, as landing beaches, they were highly unsatisfactory. The two on the west shore (Red and Red 2) were narrow, strewn with boulders and coral heads and, except at high tide, could not be worked by small boats. These beaches, however, were well sheltered from the winds and possessed excellent exits for dispersal and movement inland. LVT's were able to work these two beaches at all stages of the tide although coral heads interfered to some extent with the free movement of these vehicles. At low tide LVT's were employed to ferry between the landing craft at the edge of the reef and the beaches. The beaches inside the lagoon (Yellow and Yellow 2) were similar to the Red beaches except that they were wider and strewn with fewer boulders and coral heads, but they could not be worked for as long a period of high tide, and more congested conditions existed inland from these beaches.

3. SECTIONAL PONTOONS

Sectional pontoons were brought in on LST's and launched in the lagoon but early or effective use was not made of them. This failure is believed to be due to the lack of training and indoctrination, on the part of the Shore and Beach Parties, in the employment of these pontoons. The employment and usefulness of these pontoons should be exploited to the maximum. The availability of KING'S WHARF in good usable condition at MAKIN considerably reduced the necessity for employment of pontoons. In future operations wharves in immediate usable condition may not exist.

4. MEDIUM TANKS

- (a) Medium tanks and their crews were transported to KOURBASH in LSD-2. This method of transportation proved efficient and highly satisfactory. LSD-2 (BELLE-GROVE) entered the lagoon, and without difficulty flooded and launched her LCM(3)'s, each loaded with one medium tank, in time to meet the schedule for landing at Beach Yellow-2.

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They successfully launched from LCM(3)'s in 4.5 feet of water, and crossed the 500 yard fringing reef. The water was smooth. These tanks were of great value ashore, when properly employed. All tank traps and obstacles could be either crossed directly by this tank or circumvented without great difficulty. In crossing submerged reefs which have been subjected to bombing attack, caution must be exercised. Tanks are apt to turn over or be completely submerged if they fall into a bomb crater on a reef at high or half tide. This occurred in one or two instances. The addition of a considerable number of tank lighters for unloading cargo is a secondary but important benefit derived from the presence in the landing area of the LSD.

- (b) It is highly probable that one company of medium tanks supported by turret mount amphibians will be adequate for any one objective island. The elimination of all or any considerable number of light tanks would greatly simplify the ship to shore movement and ease the shipping requirements for all LVT's. Such is recommended if the tactical requirements will permit.
- (c) The reporting officer had little opportunity to observe the operations of the medium tank company (Company A 193d Tank Bn) attached to the 27th Infantry Division for the MAKIN operation. Therefore, the following is in the nature of a recommendation based on observation of the operation of medium tanks, plus a study of their characteristics, those of the light tanks, and the terrain common to a coral atoll.

(1) It is believed that the medium tank is superior to the light tank in operations on coral atolls and islands for the following reasons.

- (a) Even when not waterproofed, it can move through deeper water than the light tank without flooding.
- (b) Its heavier armor and armament will permit it to engage AT and emplaced weapons at closer ranges and with greater penetrating power of projectiles.

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- (c) Its speed is approximately equal to that of a light tank.
 - (d) Its ability to reduce field fortifications and obstacles is superior to that of the light tank.
 - (e) In the type of terrain and soil generally found on atolls of this type, it can move over the same ground as a light tank, and at the same speeds.
- (2) The disadvantages in using a medium tank are those inherent in bulk and weight. They are difficult to load and handle aboard an APA or AKA, most of which do not have booms of sufficient capacity to make the lift from a deep hold. They are, however, readily transported in LCM(3)'s docked in an LSD, as was done in this operation. There is, however, the deeper draft of an LCM(3) when loaded with a medium tank to consider in the landing. In this operation, they were successfully landed over the coral shelf in 4.5 feet of water, with the drowning of only one or two tanks due to falling in holes. The maintenance, repair, and supply of the medium tank is not appreciably greater than that of the light tank in a limited operation of this type; the most difficult item of equipment in connection with these activities being the wrecker, which is bulky and heavy, but can be loaded and operated out of an LST similar to the tank itself. It does require better landing conditions than the tank.
- (3) In similar operations for the future, it is recommended that medium tanks be employed and supported by light tanks in the ratio of a light platoon or equivalent number of turret mounted armored amphibians to a medium tank company.

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5. ATOLL ATTACK

- (a) Attack on an atoll resembles in many respects the assault of a fort or fortified locality with, of course, the added complication of having to initiate the assault with the ship to shore movement. The successful assault of such a position requires:
- (1) Early detailed information of the exact location, type, extent, strength and character of the defenses.
 - (2) Early distribution of the above information to all echelons for the preparation of detailed plans.
 - (3) Training of all echelons down to the smallest units in the details they are to execute in the assault. Replicas and dummies of hostile defenses should be constructed for the training of small assault units.
 - (4) Protracted and intensive preparation fires by all possible supporting weapons with a view toward maximum destruction of enemy installations, guns, obstacles, communications and supplies.
 - (5) Adequate cover and protection for the assaulting troops to insure they arrive within assaulting distance of the defenses.
 - (6) Once the position is broken into, the timely arrival of supports and reserves must be insured for the reduction of the garrison.
- (b) It is believed the GALVANIC operation has demonstrated that the above requirements for the successful attack of a fortified locality, at least in part, can be met for the attack of an atoll by including the following in the plans and training for the attack:

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- (a) Repeated photographic coverage will give accurate and dependable information as to the extent, strength, location and character of defenses to be encountered. Since the defender is confined to very small and clearly defined areas it is difficult, if not impossible for him to conceal the location and character of his defenses. Photographic coverage must be repeated at frequent intervals. It should be augmented by submarine and other reconnaissance as required when there is doubt concerning any important piece of information.
- (b) This information should be disseminated to that realistic training can be conducted on areas laid out to full scale with accurately placed replicas and dummies of the actual hostile defenses. Assault tactics should be stressed to cover particularly the advance from the line of departure, and the debarkation, reduction of beach obstacles and the assault of the initial beach defenses.
- (c) Air and naval gunfire preparations for two or three hours is not adequate. This preparation should begin several days prior to D-day and should be designed both for destruction and for unrelenting harassing effect. This preparation may be at times be augmented by secondary landing on adjacent islands either on or prior to D-day, for the purpose of placing artillery in position. Maximum use of beach barrage rockets and boat guns should be made in direct support of the assault waves.
- (d) To insure that the assault troops arrive on the beaches armored amphibian tractors and turret mounted amphibians should constitute the leading waves. The assault waves must be prepared to remove obstacles and clear passageways through mine fields both beach and underwater. Medium tanks should follow in accordance with the operational plan.

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(e) To meet the possibility of tide or surf conditions changing adversely after the landing of first waves, the expeditious landing of supports and reserves must be assured by the presence of adequate LVT (2)'s and DUKW's to get these troops, supplies and ammunition across the reefs and ashore.

6. ATOLL DEFENSE

- (a) The shape and extent of the atolls forces the defender to occupy a relatively small and clearly defined area leaving him little or no room for maneuver and denying to him the use of large or general reserves. A strong defense at the waters edge can, however, be established and thus force the attacker to employ powerful air and surface elements before success in landing can be assured.
- (b) The first line of defense of an atoll is of course air and sea control of the surrounding areas. Once control of the sea and air is lost the defense of the atoll becomes untenable for any extended period of time against a strong, determined attack. The local defenses, however, can be adequate to prevent raids by small plane formations at low altitudes or raids by small surface forces and, depending upon their strength, can delay and make costly the reduction of the atoll by direct attack.
- (c) The only natural defensive position of an atoll is the shore line itself. The surf, the reef and the slight rise in ground along the beach line presents the best natural obstacles and line of defense. This line can be and was during GALVANIC greatly strengthened by mines, barbed wire, barricades, tank traps and other artificial obstacles. Some concealment is provided by the palm trees and other natural vegetation. On most of the occupied atolls, however, this concealment is inadequate for extensive defensive installations.

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- (d) Observation for the defender is poor. The ground is flat and rarely rises to more than twelve feet above sea level. Observation towers can be erected but these cannot be safely occupied during the conduct of the defense.
- (e) Field fortifications must generally be above the surface. The water level is only from 3 to 6 feet below the surface of the ground.
- (f) On most of the defended atolls a large portion (from 1/6 to as much as 1/3) of the island area is taken up by landing strips. This further materially reduces and restricts the defender in the depth and location of his defenses and makes extremely difficult the dispersion of guns, ammunition, food, water and other vital installations.

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I PLANS

1. Representatives of the FIFTH Amphibious Corps, ComGen 27th Division Artillery and Commander FIFTH Amphibious Force collaborated on the preparation of Naval Gunfire Plans. The Division representatives specified the location, timing, and quantity of gunfire desired, after a thorough study of intelligence charts, plan of maneuver, etc. The Force representative was then responsible for scheduling the gunfire to achieve these results considering the following:

- (a) Bombardment ammunition allowance of each ship.
- (b) Rates of fire considered reasonable.
- (c) Enfilade effect on narrow necks of land to avoid excessive overs and shorts in the water.
- (d) A variety of range bands to obtain both plunging and point-blank fire.
- (e) Necessary maneuvers of ships to stay in sectors assigned.
- (f) Visibility of target area.
- (g) Covering important areas with all 3 calibers from several different ships to minimize effect of possible interruption of fire.
- (h) Avoidance of cross-fire.
- (i) Avoidance of two ships or batteries firing at same or adjacent targets at the same time.
- (j) Minimum hazard to own ships, boats and troops.

All the above requirements are so intimately related that all those concerned actually worked together as one planning group. The close cooperation achieved was most satisfactory.

2. As a result of the rehearsals at Maui and Kahoolawe certain changes were found to be desirable in the Gunfire Annex and Schedule of Fires. The final Gunfire Annex had the following appendices:

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1. Sketch of Fire Support Sectors, Boat Waves, etc.
2. Intelligence chart of BUTARITARI Island with target squares overpointed in red (in two sizes).
3. Schedule of Fires. This consisted of a one-page diagram based on a time scale giving the following information for each fire-support ship:
 - (a) Bombardment ammunition allowance.
 - (b) Time of firing at each target, caliber, number of rounds, range band and sector in which ship must operate.
 - (c) Miscellaneous information and notes.
4. Topographical map suitable for accurate navigational and gunnery purposes.
5. Naval gunfire Communication Plan.

3. Several conferences were held. The following officers from troops and ships attended one or more of these:

Artillery Officers and Shore Fire Control Officers.
Gunnery Officers.
Communication Officers.
Commanding Officers of Destroyers.
Senior Aviators.
Navigators.

These conferences were invaluable in ironing out misunderstandings and improving the plans. They give the personal touch so necessary to make any plan function smoothly.

4. A word should be said about the special bombardment training of ships.

Daily communication drills were carried out in PEARL between the shore fire control parties and the ships who were to compose the fire support group. As a result shore fire control communications at the objective were gratifyingly good.

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- (b) A special effort was made to have all vessels of the Fire Support Group (and as many standby vessels as practicable) fire a bombardment practice at KAHOOLOAWE ISLAND. Commander Destroyers Pacific scheduled the practices and the FIFTH Amphibious Corps ran the Shore Fire Control end. It was not possible to schedule all ships due to their late assembly. This was a serious disadvantage.

II - Execution

5. All prearranged fires were delivered according to schedule. The MISSISSIPPI suffered a serious fire in Turret II but this did not prevent her from delivering remaining scheduled fires. The following observations were made:

- (a) Narrow sectors forced ships to steam at very slow speeds and to reverse course often. Course reversal is undesirable but was necessary to obtain fire effect sought.
- (b) Range patterns were in many cases very large. Deflection patterns were too small.
- (c) Many shots fell into the water, principally in the lagoon, due to failure to keep MPI on the land. Plane spotting seemed ineffective.
- (d) Half-salvos were fired by firing half the turrets. By firing all turrets every salvo, one or two guns from each, pattern should be reduced by less mutual interference between projectiles. Also, shift of MPI, by difference in turret alignment, will be minimized.

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- (c) Angle of fall was not great enough. Velocities are too great. If the range is increased to 15,000 yards to get a fairly large angle of fall low lying atolls are not visible enough to allow good accuracy. This is a matter of great urgency, and should be corrected by the Bureau of Ordnance.
- (f) Some duds were reported. Detailed information as to number and caliber is not available. It is believed that these are 14" and 8" without Mark 29 nose fuzes (50% of these calibers had steel nose plugs). Projectiles with both nose and base fuzes should all detonate.
- (g) It was feared that smoke and dust might obscure the island. Such fears were unfounded. A rain squall did obscure it for a time but did not seriously interfere.

6. The MINNEAPOLIS, DEWEY, and PHELPS were initially designated to deliver fires on request from Shore Fire Control Parties. Communication was satisfactorily established but no requests for fires were received. Call-fire ships were made available on D plus 1 and D plus 2 days also but again no requests were received. The PHELPS took a pilot and stood by all of D plus 2 and in the eastern part of the lagoon but received no request for fires. Commander Task Force 52 sent the DEWEY into the lagoon on D-Day to destroy two hulks reported to harbor machine gunners. Her fire was neither expeditious nor accurate and her reluctance to close the range resulted in danger to our forces from overs and ricochets.

7. Shore Fire Control Communications were excellent and were for a time the only link between the Task Force Commander and the authorities ashore.

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III EFFECT OF NAVAL GUNFIRE

8. In assessing the effect of naval gunfire, it is difficult to distinguish between damage and casualties directly resulting from such fire, and those caused by aerial bombardment and strafing. This is particularly true in the area lying between the east and west tank traps, which was subjected to heavy attack by surface vessel fires and by aerial bombardment on D-Day, and by aerial bombardment on D + 1. Therefore, a chart has been prepared showing the distribution of scheduled naval gunfire on target areas (Exhibit A), and succeeding paragraphs of this report will detail damage and casualties in target areas caused by naval and air bombardment without attempt to distinguish between weapons, except where such damage or casualties were obviously the result of a certain type of bombardment or attack.

9. Two items that affected the performance of both naval bombardment ammunition and aerial bombs were the unusual consistency of the coral making up the island, and the growth of tall coconut palms that covered a good deal of the surface area. The coral, being of comparatively equal consistency and without striation or lamination, apparently permitted a deeper penetration of a projectile on impact than that encountered in true earth, with a resulting tendency to funnel fragmentation upward. It also impacted more uniformly from the point of detonation, the craters of both bomb and shell being noticeably deeper, but less conical in form than those produced in earth. In several cases where 14" shells had landed at some distance from the center of the concentration, it was possible to obtain an excellent observation of the effect of the individual projectile. It was noted that in many cases, low brush from 2 to four feet in height and within four feet of the crater-lip was mud splashed and seared on the side near the crater, but was otherwise undamaged; coconut trees were cut off at heights ranging from 8 to ten feet at 10 yards from the crater, to 25-30 feet at 35 yards. Fragmentation was indicated on some trunks as low as three feet at 35 yards. The coconut trees, where dense, caused several heavy caliber shells and bombs to burst at heights estimated from six to twenty feet above the ground; and where this occurred, destruction of growth was exceptionally heavy for radii of from twenty five to seventy-five feet from the estimated point of impact.

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10. One other item to be taken into consideration in assessing the effect of naval and air bombardment in this operation, is the construction of defensive works encountered. The low land level of the island, with a resultant high water table, caused the defenders to construct the bulk of their shelters, revettments, pill-boxes, and other structures at least partially above ground. Very few excavations over two feet in depth were encountered, and although considerable quantities of cement were found on the island, very few structures were of concrete. The bulk of the shelters, pill-boxes, and other defensive works were constructed of logs and covered with coral blocks and earths for depths of from one to four feet. Living quarters, ware-houses, and other administrative structures were of very light frame-work with galvanized iron covering or roofing.

11. Four duds were observed by the reporting officer, 2 - 14", 1 - 8", and 1 - 500 lb bomb. The cause of failure to detonate is not known, although the lack of earth stain on one of the 14" projectiles indicated that it might have fallen at a very flat angle following water ricochet.

12. The detail of damage, destruction and casualties observed is as follows, and is reported by target areas for ready means of identification:

TARGET AREAS

EFFECT

801-828 incl:)	Damage in these areas generally confined to destruction of coconut trees. Four native huts were destroyed in 820 and four in 821. Dummy positions in 827 were badly damaged, including three direct hits by 14" shell in the trench area. Area was well covered, and distribution of fire was excellent. One direct hit by 14" on road in 903 stopped traffic until repaired by our engineer units. The near misses (see Photo #1).
901-905 incl:)	

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829-834 incl:) Very few installations in this area. Area
887-890 incl:) was generally well covered, although few hits
906) were noted close to the beach line on the
South shore in Targets 830, 831 and 838.
Dummy emplacements were damaged by fragments
and strafing. No Jap dead were noted in
this area. Several near misses on the road
in 833 were observed (~~see Photos #2 and #3~~).

891, 892, 893: Exceptionally thick undergrowth in this area
made careful survey of the area difficult.
Five Jap dead were counted in 891 and 892,
but these appeared to have been killed by
small arms fire of the ground forces. A 150
bbl fuel or lubricant dump near the road
bend in the NE corner of 891 was not destroyed,
although several of the barrels were hit
either by small fragments or strafing.

835, 836: This covers the western clearing of the west
Tank Trap, and the log barricade forming part
of the trap. This area was heavily attacked
by gunfire and aerial bombardment and strafing.
Neither the ditch nor the log barricade
of the Trap were seriously damaged, except
that the ditch suffered a direct hit from a
heavy bomb in the NE section of 836, ~~Photo~~
~~#5~~. The west edge of the clearing was well
covered by surface and air bombardment *
~~Photo #4~~. Eleven Japanese dead, apparant-
ly the crew of a machine gun emplaced in
the roots of a mangrove tree, were found in
edge of the clearing in SW 836. It is believ-
ed that a combination of strafing by aircraft
and small arms fire by troops accounted for
this group. About 15 dead were counted in
the open between the log barricade and the
east edge of the clearing, quite obviously
the victims of strafing by aircraft.

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BOMBARDMENT

ENCLOSURE H

837, 838:

This area, particularly 838, contained a well defined trench system running parallel to the line of the Tank Trap and at right angles to the beach, with side bays or laterals of short length. These trenches were comparatively shallow (~~see Photo #7~~) and were revetted at ends and intervals with coconut logs (~~see Photo #10~~). This area, particularly 838, was heavily bombarded by both surface and aircraft, and was badly shot up. The revettments for AT guns were only slightly damaged as none of them received a direct hit. The trench ~~shown in photo (7)~~ received a direct hit ~~at a point directly in rear of the position of the photographer,~~ from a 2000 lb bomb, which considerably scrambled the trench, Japs and trees for some distance. Apparently the Japs had moved considerable troop strength into this area to oppose the YELLOW BEACH landing, as there were 62 dead counted in 837 and 838. The bulk of these were in the trench system described, and were the victims of a combination of concussion and air-bursts. There were twelve dead in a small section of trench near the revetment shown in Photo 10, all of whom were killed by fragmentation from air-bursts. This is indicated by positions of the bodies and the topping and scoring of trees in the vicinity. The high casualty rate suffered by the enemy in this area speaks well for the use of air-bursting 5" against personnel.

839-848 incl:)
894-895 :)

The effect of fire in this area is summarized as follows:

DESTROYED

On Chong's Wharf and buildings (~~Photo 14~~).
Warehouses, Pilots quarters, communication bldgs, community bath, miscellaneous bldgs of quarters or administrative type. (~~see Photos 11, 12, 13, 15~~).

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BOMBARDMENT

ENCLOSURE II

DAMAGED

Radar or navigational beam installation.
Lumber mill (~~Photo 16 and 17~~).
Sheet metal shop and warehouse (~~photo 17~~).
Signal tower (~~Photo 16~~).
Four shelters or pill-boxes.

ENEMY DEAD

At least 16 dead are known, all except 2 being apparently killed by concussion of heavy bombs while in shelters. A strong odor on D / 4 indicated that there might be other bodies in the water filled shell craters.

849-860 incl:
896-900 incl:

SUMMARY

DESTROYED

All buildings in areas 896, 848, 852 (including the church which had two-2000 lb bombs in its front yard) and the storehouse east of the church. All sheds, shops, etc. on KING'S WHARF. An aircraft repair shop in 852, including a stock of engine, fuselage and other plane parts. An estimated 1500 barrels of fuel and lubricants in three dumps. All buildings in 858.

DAMAGED

Three - 3" AA positions in 899. (~~Photos 19, 20, 21~~).

Control and spotting tower in 899.

Tobacco and dried fish storehouse in 858.

Two light tanks, revetted to act as pill-boxes.

Radar or navigational beam installation on STONE PIER (slightly).

King's Wharf (slightly).

Damaged and sank two Jap landing barges, three sampans, one small tug, one small barge - all off KING'S WHARF.

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BC
BOMBARDMENT

ENCLOSURE H

ENEMY DEAD

About twenty-five. Eleven of these were killed in shelters by concussion. The balance were either hit by strafing or small arms fire.

863-886 incl: Damage in this area, from the East Tank Trap easterly to and including BEACH BLUE 3, was scattered and affected coconut trees largely. Few hostile installations were in this area except the radio station, which was slightly damaged. Some native huts, and the lodge-house, near the Native Hospital were damaged. The area in and immediately to the east of the Tank Trap was heavily bombarded by shore artillery on D / 2. All areas west were observed by the reporting officer on D / 1 and D / 2. Areas east of the EAST TANK TRAP were not observed until D-3, and it was almost impossible to determine just what type of fires were responsible for the damage. Fifteen enemy dead were seen on the afternoon of D / 2, but it is believed these were killed either by the preparatory fires of shore artillery, or by the infantry assault that followed.

In general, it is believed that the effect of naval and air bombardment was highly satisfactory; and contributed materially in the reduction of hostile resistance. However, there was not enough of it.

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BOMBARDMENT

ENCLOSURE E

IV RECOMMENDATIONS

13.
fall by:

Projectiles should have a greater angle

- (a) Greater range or
- (b) Less velocity. This may be achieved by making up special charges or (in the case of bag guns) by using fewer bags. Spacers or some other device to keep the projectiles seated must be used in the latter method. Care must be taken not to reduce the rotational velocity so much that the fuzes will not arm. The possibility of larger patterns due to unfavorable loading density must be carefully considered also.
- (c) Whatever steps are taken they should be verified by actual firing as soon as practicable.

14.

All ships in the Support Group should:

- (a) Have a bombardment practice at KAHCOLANE.
- (b) Have repeated shore fire control communication drills.
- (c) Check alignment of batteries very carefully.
- (d) Fire on offset practice enroute to objective to determine correct ballistics and verify pattern sizes.

All half-salvos should have at least one mount or turret (except when only half the turrets will bear). In 3-gun turrets two should fire center guns while the other two fire wing guns.

More dispersion in deflection must be achieved by:

- (a) Setting parallax on infinity or
- (b) If this does not produce enough spread then by matching offset pointers in train indicators.

Dispersion in deflection should be at least 50% of that in range. This ratio must be chosen according to circumstances.

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BOMBARDMENT

ENCLOSURE H

17. Although indirect fire must be the basic method, every advantage must be taken of direct points of aim in the target vicinity. This is especially important during and after a turn. The technique of this must be more thoroughly mastered by all ships.
18. To enable plane spotters to distinguish own ships salvos it may be possible to give each ship's salvos a distinctive appearance either by deflection and range spread, timing, or number of shots in salvo, etc.
19. Ships with 5"/25 batteries should not be paired with those having 5"/38 batteries unless necessary. A suitable range for one may not be suitable for the other.
20. Gunfire charts, photos, and diagrams should include the following:
- (a) Offshore chart for navigation and indirect fire, 1" equal 2000 yards. Translucent for DRT use, 4 per ship.
 - (b) Inshore chart for same use when close to land, 1" equal 1000 yards. Translucent, 4 per ship.
 - (c) Contoured topographical, grid and target area chart with intelligence data thereon. Scale 1" equal 1000 yds for aviators and general reference; 1" equal 500 yds for accurate plotting and posting, 10 of each per large ship. 4 of each for small ones.
 - (d) Panoramic photos from sea level 3 sets per large ship, 1 set per small.
 - (e) Low obliques. Same number as (d).
 - (f) Vertical mosaic photos. One set per ship.
21. Control of gunfire can be divided into 3 periods:
- (a) From arrival at objective until after all prearranged fires are completed. Commander of Groups and Units must have control during this period due to the complexity of the situation.

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF NAVAL SHORE

BOMBARDMENT

ENCLOSURE H

- (b) From end of scheduled fires until demand for called fires tapers off. The Task Force Commander can best control the assignment of support ships during this period because he has the best information regarding the situation.
- (c) After the second period there is so little demand for called fires that it is much more convenient, and satisfactory to have all ships and shore fire control parties on the same frequency, the T.F. Comdr. still controlling.

22. There should be more close supporting fire and it should be on the flanks up to and beyond H-Hour provided this does not interfere with the strafers. LCI's armed with 40mm guns would be most useful as support boats after H-Hour.

23. The preparation fires in this operation are believed to be a minimum standard.

24. More major caliber projectiles should have super-quick fuzes. The Mark 28 base fuzes are not sensitive enough for the soft consistency of those islands.

APPENDICES

APPENDIX 1 - Chart showing distribution naval gunfire (referred to in paragraph 8 as EXHIBIT "A")

APPENDIX 2 - Identification list aerial photographs.

APPENDIX 3 - Twenty-one aerial photographs.

NOTE: Appendices 2 and 3 distributed only to CominCh, CinCPac, ComCenPac and ComGen5thFhibCorps.

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING

SHIP	ORG'N EMBARKED	PERSONNEL			TYPE OF CARGO	VEHICLES			CU FT	SHORT TONS
		OFF	EM	TOTAL		TRUCKS & TRKED	TRLR	GUNS		
<u>PART I - MAKIN</u>										
<u>MAKIN - ASSAULT ECHELON</u>										
LEONARD WOOD	Hq27Div, BLT 3-165	115	1675	1790	Combat Equip & Supp.	59	5	17	60156	1049.3
PIERCE	Div Spec Troops	89	1004	1093	same	74	10	18	80781	710.1
CALVERT	BLT 1-165	56	1311	1367	same	60	9	12	106600	996.0
NEVILLE	BLT 2-165	59	1210	1269	same	56	5	8	91189	1043.0
ALCYONE	27th Division	15	273	288	Combat Equip & Supply, Resupply, Init. Def. Equipment	57	10	11	132933	1456.0
LST No. 31	Detachment "X"	14	180	194	LVT's, Assault	16	-	-	43430	172.0
LST No. 78	Detachment "Y"	15	177	192	LVT's, Assault	17	-	-	46010	180.0
LST No. 179	Detachment "Z"	15	181	196	LVT's, Assault	17	-	-	46010	180.0
BELLE GROVE	Co A, 193d Tank Bn.	14	195	209	Medium Tanks	16	-	-	43400	486.2
Sub Total, ASSAULT ECHELON		392	6206	6598		372	39	66	650509	6272.6
<u>MAKIN - LST GROUP TWO</u>										
LST No. 476	804th Eng Bn & Det. ASSRON 3	10	193	203	Construction Mat'l.	34	19	-	108387	485.5

ENCLOSURE (I)

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING (CONT'D)

SHIP	ORG'N EMBARKED	PERSONNEL			TYPE OF CARGO	VEHICLES			SHORT TONS	
		OFF	EM	TOTAL		TRUCKS & TRKED	TLR	GUNS		
LST No. 477	Btrys A, C, 98th CA K, 93d CA; A, 57th CA	8	194	202	AA and Coast Defense Equipment	35	23	8	80810	462.5
LST No. 479	804th Eng Bn and Det. ASSRON 3	8	190	198	Constr. Equipment	35	22	0	108028	515.4
LST No. 480	Btrys A, B/98th CA K/93d CA, ASSRON 3	9	188	197	Defense Equipment	30	23	8	89687	473.0
LST No. 481	Btrys A, D/98th CA, L/93d CA, D/57th CA	5	193	198	Defense Equipment	42	11	8	81855	444.4
LST No. 482	Hq 1st Bn, 98th CA other CA Elements	5	162	167	Defense Equipment	37	12	5	83499	461.8
Sub Total LST GROUP TWO		<u>45</u>	<u>1120</u>	<u>1165</u>		<u>213</u>	<u>110</u>	<u>29</u>	<u>552266</u>	<u>2842.6</u>
TOTAL, THROUGH D PLUS ONE DAY		<u>437</u>	<u>7326</u>	<u>7763</u>		<u>585</u>	<u>149</u>	<u>95</u>	<u>1202775</u>	<u>9115.2</u>
<u>MAKIN - GARRISON GROUP</u>										
CAPE CONSTANTINE	7th Def. Battalion	2	110	112	Construction and Camp Materials, Def. Equip.	4	0	0	241367	5005.0
CAPE SAN MARTIN	ASSRON Detachment	3	100	103	AAF Supplies, Equip., resupply items	41	20	0	225507	2352.4
ISLAND MAIL	7th Defense Battalion	49	1024	1073	Defense & Constr. personnel & Equip.	34	12	0	165476	3989.3

ENCLOSURE (I)

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING (CONT'D)

<u>SHIP</u>	<u>ORG'N EMBARKED</u>	<u>PERSONNEL</u>			<u>TYPE OF CARGO</u>	<u>VEHICLES</u>				<u>SHORT TONS</u>
		<u>OFF</u>	<u>EM</u>	<u>TOTAL</u>		<u>TRUCKS & TRKED</u>	<u>TFLR</u>	<u>GUNS</u>	<u>CU FT</u>	
YOUNG AMERICA	7th Defense Battalion ASSRON 3	68	952	1020	Defense & Constr. personnel & Equipment	31	18	0	128886	1213.3
Sub Total, MAKIN GARRISON GROUP		122	2186	2308		110	50	0	761236	12560.0
Sub Total, MAKIN ASSAULT ECHELON AND LST GROUP TWO		437	7326	7763		585	149	95	1202775	9115.2
TOTAL - MAKIN, ASSAULT AND FIRST GARRISON ECHELONS		559	9512	10071		695	199	95	1964011	21675.2

PART II - TARAWA - ABEMAMA

TARAWA - ABEMAMA ASSAULT ECHELON

DOYEN	Support Troops	49	826	875	Combat Equipt & Supp.	32	6	8	47712	330.4
HARRIS	BLT 3 - 6	98	1669	1767	same	89	15	14	115257	894.7
ZEILIN	BLT 2 - 2	96	1651	1747	same	36	11	8	63031	432.1
HEYWOOD	BLT 2 - 8	69	1454	1523	same	52	12	9	119985	688.2
BIDDLE	1 Bn 10th Regt.	58	966	1024	Combat Eng Equipment	28	15	10	95521	583.0
HARRY LEE	BLT 1 - 2	47	1094	1141	Combat Equip & Supp.	18	8	0	60532	316.1
FELAND	BLT 1 - 6	46	971	1017	same	23	3	4	40590	305.3
J. F. BELL	BLT 2-6, 2d Def. Bn.	86	1762	1848	Same, plus Def. Equip.	65	20	21	108544	956.1

ENCLOSURE (I)

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING (CONT'D)

SHIP	ORG'N EMBARKED	PERSONNEL			TYPE OF CARGO	VEHICLES			CU FT	SHORT TONS
		OFF	EM	TOTAL		TRUCKS & TRKED	TFLR	GUNS		
MIDDLETON	BLT 3-2, 2d Def Bn.	58	1376	1434	same, plus Def. Equip.	37	14	12	77610	495.4
MONROVIA	BLT 3 - 8	101	1243	1344	Combat Equip. & Supp.	55	8	10	91275	459.2
ORMSBY	6th Regt (- 2 BLTs)	54	997	1051	same	33	11	15	79136	713.3
SHERIDAN	Div Units	81	1556	1637	QM & Med Supp. LVTs	48	16	4	95837	830.5
LA SALLE	Div Tank Units	75	1174	1249	Tanks, Arty, Supplies	46	2	9	77921	726.5
BELLATRIX	2d MarDiv	4	157	161	General Combat Equip.	16	8	0	173406	2199.9
THUBAN	2d MarDiv	11	212	223	General Resupply Items	33	31	4	173890	1670.3
VIRGO	BLT 1 - 8	10	224	234	LVTs, Med. Resupply	55	25	0	248973	1538.4
ASHLAND (LSD)	Med. Tank Battalion	9	155	164	Medium Tanks (in LCM)	16	0	0	35000	500.0
LST No. 34	2d Amphib Battalion	2	61	63	LVT's	16			43000	178.0
LST No. 242	2d Amphib Battalion	2	61	63	LVT's	17	0	0	44000	180.0
LST No. 243	2d Amphib Battalion	2	61	63	LVT's	17	0	0	44000	180.0
Sub Total ASSAULT ECHELON		958	17670	18628		732	205	128	1835220	14177.4
<u>TARAWA - LST GROUP TWO</u>										
LST No. 20	2d Defense Bn. (M)	9	196	205	Personnel & Equipment	21	20	4	50430	476.4
LST No. 23		10	185	195		19	11	12	46980	399.2
LST No. 69		12	182	194		26	22	4	52120	488.3

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING (CONT'D)

SHIP	ORG'N EMBARKED	PERSONNEL			TYPE OF CARGO	VEHICLES			CU FT	SHORT TONS
		OFF	EM	TOTAL		TRUCKS & TRKED	TCLR	GUNS		
LST No. 169	2d Defense Bn. (M)	10	190	200	Personnel & Equipment	20	20	4	47720	416.7
LST No. 205		9	198	207		20	16	8	46580	372.5
LST No. 484		5	205	210		18	14	12	44460	329.8
Sub Total, TARAWA - LST GROUP TWO		55	1156	1211		124	103	44	288290	2482.9
<u>TARAWA GARRISON GROUP</u>										
DASHING WAVE	Acorn 17	33	636	669	Constr. Equip. & Supply	46	30	0	153477	2008.8
CAFE FEAR	Acorn 18	7	88	95	same	71	19	0	263408	2799.8
JUPITER	Acorn 18	3	87	90	same	75	16	0	372296	3697.1
PRESIDENT POLK	Acorn 18	67	695	762	same	16	4	0	95869	920.5
LST No. 84	Acorn 18	5	105	110	Vehicles, Fuel	19	17	0	52096	490.1
LST No. 218	Acorn 18	5	90	95	Vehicles, Fuel	24	6	0	52659	487.2
LST No. 478	Acorn 18	4	102	106	Vehicles, Fuel	37	15	0	62884	505.5
Sub Total TARAWA GARRISON GROUP		124	1803	1927		288	107	0	1052689	10909.0
<u>ABEMAMA GARRISON GROUP ONE</u>										
CAFE STEVENS	Acorn 16	53	1016	1069	Constr. Equip. Fuel	65	47	0	262981	2681.2
CAFE ISABEL	Acorn 16	5	80	85	Vehicles, Refrig. Equip.	65	45	0	257189	2165.1

ENCLOSURE (I)

ENCLOSURE (I)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF DETAILS OF LOADING OF GALVANIC SHIPPING (CONT'D)

SHIP	ORG 'N EMBARKED	PERSONNEL			TYPE OF CARGO	VEHICLES			CU FT	SHORT TONS
		OFF	EM	TOTAL		TRUCKS & TRKED	TRLR	GUNS		
ROBIN WENTLEY	95th C B	6	89	95	Vehicles, Refrig, Equip.	52	29	0	129060	724.4
PRESIDENT MONROE	CASU 18, ARGUS 12, 95th C B	46	865	911	Heavy Vehicles	26	13	0	93700	591.7
Sub Total, ABEMAMA GARRISON GROUP ONE		110	2050	2160		208	134	0	742930	6162.4
ABEMAMA - GARRISON GROUP TWO										
LST No. 19	8th Defense Bn. (M)	10	102	112	Personnel and Equipment for Atoll Defense	19	15	6	52150	492.3
LST No. 240		8	106	114		15	17	8	47270	401.7
LST No. 241		8	106	114		19	20	8	49980	413.2
LST No. 244		9	98	107		22	24	8	60080	506.5
JANE ADDAMS		26	744	770		48	40	14	258727	1156.4
Total, ABEMAMA - GARRISON GROUP TWO		61	1156	1217		123	116	44	468207	2970.1
TOTAL, MAKIN		559	9512	10071		695	199	95	1964011	21675.2
TOTAL, TARAWA		1137	20629	21766		1144	415	172	3176199	27569.3
TOTAL, ABEMAMA		171	3206	3377		331	250	44	1211137	9132.5
TOTAL		1867	33347	35214		2170	864	311	6351347	58377.0

ENCLOSURE (I)

OFFICE OF THE COMMANDER
FIFTH AMPHIBIOUS FORCE, PACIFIC FLEET
SAN FRANCISCO, CALIFORNIA

From: Support Aircraft Commander, GALVANIC, U. S.
Pacific Fleet.
To : Commander FIFTH Amphibious Force, U.S. Pacific
Fleet.
Subject: GALVANIC Air Plan, implementation and execution,
together with conclusions and recommendation for
future similar operations.

References:

- (a) CinCPac OpOrd 13-43.
- (b) ComCenPac OpPlan Cen 1-43.
- (c) ComAirCenPac Serial 0005 dated October 19,
1943.
- (d) Search Plan Ordnance Mitz Chart.
Annex "J" to ComCenPacFor OpPlan Cen 1-43.
- (e) Annex "C" to ComTaskFor 54, OpPlan A2-43.
- (f) ComCenPac OpPlan Cen 1-43 Annex "A" - Comm
Plan, Appendix III Air Support and CTF 54
A2-43 Annex "C" Support Aircraft Plan -
Appendix III - Comm.
- (g) ComAirCenPac OpPlan for shore based aircraft -
not received.
- (h) ComGen 27th Div. F.O. # 21 - Northern Attack
Force Landing Attack Order.
- (i) ComTaskGroup 50.1 OpOrder No. 41-43 Annex "A".
- (j) ComTaskGroup 50.2 OpOrder No. 5-43 Annex "A"
and "B".
- (k) ComTaskGroup 50.3 No. ____ (Adn. Montgomery's
Plan - not received).
- (l) ComTaskGroup 52.3 No. 1-43.

Maps

- (1) Whole set showing ALPHA, BETA, GAMMA, DELTA
areas. Appendix II to Annex "F" ComCenPacFor
OpPlan No. Cen 1-43.
- (2) Air-gunfire chart MAKIN.
- (3) Air-gunfire chart TERAWA.
- (4) Sub search chart MAKIN.
- (5) Sub search chart TERAWA.
- (6) Blue searches annex "J" to ComCenPacFor OpPlan
Cen 1-43.

1. Summary of Air Plan. Summarizing, the following
tasks were assigned for air:

OFFICE OF THE COMMANDER
FIFTH AMPHIBIOUS FORCE, PACIFIC FLEET
SAN FRANCISCO, CALIFORNIA

Subject: GALVANIC Air Plan, implementation and execution, together with conclusions and recommendation for future similar operations.

(a) Land based aircraft.

- (1) Photographic reconnaissance of objectives and their supporting bases.
- (2) Long range searches in the objective areas and in the sea approaches thereto.
- (3) Night strike against objective and their supporting bases.
- (4) Routine fighter protection of friendly land bases.

(b) Carrier based aircraft.

- (1) Establishment and maintenance of aerial superiority.
- (2) Destruction or neutralization of enemy defenses on objectives.
- (3) Support of the assault.
- (4) Medium range searches forward of each Task Unit.
- (5) Fighter protection of each Task Unit, and of objectives after friendly troops landed.
- (6) Anti-submarine searches adjacent to each Task Unit.
- (7) Gun fire spotting for fires on objectives.
- (8) Continuous observation and report of situation on objectives.

2. Implementation. The above air plan was implemented as follows:

(a) Assignment of land based aircraft.

BASE	No. & type aircraft.				
	VB(H)	VB(M)	PV	PVY	VF
NANOMEA	-	-	-	-	22
NUKUFETAU	14	-	-	-	24
FUNAFUTI	-	-	2	27	24
WALLIS	-	36	-	-	18
SANOA	-	16	13	-	-
CANTON	7	15	-	3	24
BAKER	-	-	-	-	19
Total land based.	21	67	15	30	131

OFFICE OF THE COMMANDER
FIFTH AMPHIBIOUS FORCE, PACIFIC FLEET
SAN FRANCISCO, CALIFORNIA

Subject: GALVANIC Air Plan, implementation and execution, together with conclusions and recommendations for future similar operations.

(b) Assignment of carrier based aircraft.

(1) T.G. 50.1.5 Rear Admiral POWNALL (area Alpha)

Base	No. and type aircraft		
	VF	VSB	VTB
YORKTOWN	37	36	18
LEXINGTON	37	36	18
COWPENS	24	-	10

(2) T.G. 50.2.5 Rear Admiral RADFORD (area Beta)

Base	No. and type aircraft		
	VF	VSB	VTB
ENTERPRISE	36	36	19
BELLEAU WOOD	26	-	9
MONTERERY	24	-	9

(3) T.G. 52.3 Rear Admiral MULLINIX (area Gamma)

Base	No. and type aircraft		
	VF	VSB	VTB
LISCOMB BAY	16	-	12
CORREGIDOR	16	-	12
CORAL SEA	16	-	12

(4) T.G. 50.3 Rear Admiral MONTGOMERY (area Delta)

Base	No. and type aircraft		
	VF	VSB	VTB
ESSEX	37	36	18
BUNKER HILL	37	32	18
INDEPENDENCE	24	-	9

(5) T.G. 53.6 Rear Admiral RAGSDALE (Area Delta)


Base	No. and type aircraft		
	VF	VSB	VTB
SANGAMON	12	9	9
SUWANNEE	12	9	9
CHENANGO	12	9	9
NASSAU	46 Hellcat Garrison Aircraft on NASSAU		
BARNES	and BARNES.		

(c) Total aircraft available.

	<u>VB(H)</u>	<u>VB(M)</u>	<u>VSB</u>	<u>VTB</u>	<u>VF</u>	<u>VB(H)</u>	<u>VB(M)</u>	<u>VSB</u>	<u>VTB</u>	<u>VF</u>
Land based	21	82	-	-	131					
Carrier based	-	-	203	191	366					
Total	21	82	203	191	497					

(d) Air liaison and flagship communications teams. Each landing force unit, down to and including the battalion, was furnished an air liaison team for the purpose of assisting the Unit Commander.

OFFICE OF THE COMMANDER
FIFTH AMPHIBIOUS FORCE, PACIFIC FLEET
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in the selection of suitable air targets, and conveying these target designations to the Support Aircraft Commander at each objective.

The Assault Force Flagship at each objective was equipped with an air communications net containing sufficient channels to direct, or listen in on, all phases of air activity. These channels were guarded by operators specially trained for the purpose. The nets were supervised by specially trained air support communications officers, for insurance of continuous efficient functioning. Over this system the Force Commander imposed his will on air activity through his Support Aircraft Commander.

A mobile shore based air communication net, duplicating that installed in the Flagship, was furnished the commander of the landing force for his use ashore, when command of Support Aircraft was relinquished by the Assault Force Commander.

Each Air Liaison party was trained to supplement radio communications by the use of simple panel signals which assisted aircraft in the location of targets designated for attack.

- (e) Fluorescent Panels. Troops of the landing force were furnished individual fluorescent panels for display preceding an air attack, for the purpose of marking their positions and thus avoiding accidental attack by friendly planes.
- (f) Liaison Planes. An experienced senior aviator conversant with the ground plan and in radio contact with the Support Aircraft Commander, maintained constant surveillance of the objective.
- (g) Fighter Direction. Fighter direction for GALVANIC components was accomplished as follows:
 - (1) Land bases - by established directors.

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- (2) Task Units underway - by designated carrier in the Unit.
- (3) Task Units at objectives - two destroyers equipped with fighter director radio manned by experienced fighter director personnel were designated fighter director and standby fighter director respectively. An alternative standby fighter director was located in each of the Assault Force Flagships. Fighter director units ashore at each objective took over when set up and established.

3. Execution MAKIN.

- (a) Air Supremacy. Air strikes prior to D-Day gained; and the covering carrier force maintained, complete aerial supremacy during the assault. Enemy air activity was limited to an occasional snoopier and, in the later stages, unsuccessful night attacks.
- (b) Support. The air schedule for D-Day was executed exactly as planned. Attacks were effectively coordinated with gunfire and furnished material assistance in landing troops. No beach resistance was offered during the primary landing on Beaches Red, and only very minor resistance met the landing on Beaches Yellow. Adequate support aircraft were available on station throughout the day and thereafter during the assault.
- (c) Communications. Contact was maintained between the Flgship, all air activities and the Air Liaison parties ashore throughout the entire assault phase and thereafter.
- (d) Radio procedure. Minor discrepancies in radio procedure wasted time and placed unnecessary traffic on the air net. This obviously arose from lack of thorough indoctrination of pilots in procedure due to inadequate time for sufficient preparatory exercises.

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- (e) Fighter Direction. Due to apparent misunderstanding, fighter direction was the weakest of all air activities. It was intended that the strongest possible combat air patrols should be automatically maintained over the objective area by the adjacent carrier group, that each patrol coming on station should report direct to the designated fighter director destroyer, and that the fighter director would keep the flagship informed of the current combat air patrol strength. Combat air patrol flights upon being relieved on station, were to report to the Support Aircraft Commander for support strafing missions, prior to returning to base. The following discrepancies in the above plan were noted: (1) Some flights reported to the Support Aircraft Commander, rather than to the Fighter Director, when coming on station. (2) Some flights failed to report to the Support Aircraft Commander upon relief from Combat Air Patrol. (3) The fighter Director base rarely informed the Support Aircraft Commander of the status of combat air patrols. (4) One Fighter Director was out of contact with his Combat Air Patrol for a long period without informing anyone or transferring control to an alternate Fighter Director. This resulted in failure to intercept a snooper who came near the objective area.
- (f) Bogies. Failure to insure proper functioning of the IFF on each aircraft entering the objective area, or failure of the aircraft commander to turn it on, caused an inordinate number of "Friendly Bogies" This one item alone caused more trouble and unnecessary confusion than any other. It applied equally to Army search planes and naval aircraft.
- (g) Anti-Submarine search. Search sectors were laid out in the Air Plan, and it was intended that the carrier group adjacent to the objective area should furnish and automatically maintain aircraft over these sectors. For the information of the Assault Commander, each flight was to report on station to the Support.

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Aircraft Commander, and, upon being relieved on station by the succeeding patrol, again report to him for a support mission prior to returning to base. Discrepancies in this plan were noted as follows: (1) Some flights failed to report on station. (2) Some flights failed to report upon being relieved. (3) Some flights upon arriving on station reported for assignment to a support target. One such flight was assigned a target and then went on anti-submarine patrol unarmed until the situation was ascertained and remedied.

- (h) Air Liaison Parties. The Air Liaison Parties functioned as planned and by their zeal and resourcefulness kept the Assault and Landing Force Commanders informed of the situation ashore in so far as it was intelligible to them.
- (i) Liaison Plane. The most valuable source of information concerning the situation ashore was the Liaison Plane (CLIFFER).
- (j) Fluorescent Panels. The value of support aircraft was curtailed due to the failure of the ground troops to display their fluorescent panels. This was also a contributing factor to the dropping of one bomb on a target other than that assigned. Had these panels been displayed as planned, far greater assistance might have been rendered ground troops by aircraft.
- (k) Destruction of Defenses. Close observation of conditions ashore disclosed the fact that the destruction of defenses by preliminary aerial bombing and ship gunfire was less than generally expected. Whereas considerable damage was inflicted upon buildings, fuel dumps and other structures and installations above the ground, dugouts, tank traps, and heavily revetted installations remained relatively undamaged and completely serviceable.

Numbers of enemy dead in open topped trenches appeared to have been killed by shrapnel from five inch air bursts. Unwounded enemy dead in dugouts, adjacent to large bomb craters, appeared to have

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been killed by the shock of two thousand pound daisy cutters. One heavily revetted and concrete emplaced gun position was put out of action by a two thousand pound bomb that landed nearly one hundred feet away. The entire base was tipped at an angle and part of the revetting caved in on the gun.

On the other hand all bodies inspected, except those found in the one dugout referred to above, showed that they had been directly hit by a lethal dose of shrapnel. Even in trenches adjacent to five hundred pound bomb craters and fourteen inch shell craters no unmarked dead were observed. One ammunition dump and one oil dump were observed undamaged in the vicinity of several "near misses."

The enemy officers who committed harikari apparently did so as a result of mental frustration rather than shock, as they were in a relatively undamaged area, and unwounded.

- (f) Air losses. As the operation progressed, air losses, particularly those from operation, took a severe toll of our air strength. Those operational losses were particularly heavy on the CVE's and tended to increase as pilot fatigue became apparent.

4. Conclusions.

- (a) Air Supremacy. It is believed that with our preponderance of carriers and superior airmanship it is possible to establish mastery of the air at any given time and place in the Japanese held island bases. Maintenance of this mastery over any protracted period will require maintenance of initial air strength by an adequate system of replacements for both fatigued pilots and damaged aircraft.
- (b) Support. The system evolved for the utilization of aircraft for support missions is sound. The efficiency could be greatly increased by:

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- (1) Going over the entire plan with all pilots prior to embarking on the operation.
 - (2) Comprehensive rehearsals with the landing, troops, air liaison parties and aircraft.
 - (3) Chalk talks and CPA's enroute to objective.
 - (4) The compilation of a pilot's cockpit file including:
 - (a) Target chart and/or photographs.
 - (b) Radio calls and procedure for each type mission.
 - (c) Panel code.
 - (d) Shackle code for the day.
 - (e) Authenticator for the day.
 - (5) Indoctrination of ground troops in the use of fluorescent marker panels.
 - (6) Careful selection, special training and correct use of liaison pilots.
- (c) Fighter direction. Fighter direction over the objective areas can be improved by:
- (1) Unmistakably placing responsibility for its establishment and maintenance with the adjacent carrier group.
 - (2) Selecting competent, experienced, aggressive fighter director personnel completely conversant with their grave responsibility and indoctrinated in procedure.
 - (3) Eliminating "friendly bogies" by strict IFF discipline.
 - (4) Indoctrinating CAP pilots in procedure.
- (d) Anti-submarine search. A-S search over the objective area can be improved by:
- (1) Unmistakably placing responsibility for its establishment and maintenance with the adjacent carrier group.
 - (2) Eliminating "friendly bogies" by strict IFF discipline.
 - (3) Indoctrinating A-S pilots in procedure.
- (e) Destruction of defenses. Present methods for the destruction of enemy defenses are inadequate. In

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order to reduce our casualties incidental to the assault and occupation of island bases, more efficient methods of enemy reduction must be adopted prior to the landing of troops.

From the observation of results, the following conclusions are reached:

- (1) Heavy concentrations of ship gunfire for short period (two or three hours) are relatively ineffective against dug in targets.
 - (2) Five inch air bursts are more effective against personnel than fourteen inch contact bursts.
 - (3) Heavy caliber long and mid range ship fire is relatively inaccurate against point targets.
 - (4) Blast effect of General Purpose bombs is negligible.
 - (5) Many points of impact and explosion are preferable to fewer points of impact and heavier explosion for area destruction.
 - (6) Two thousand pound daisy cutters are efficient against:
 - (a) Troops in dug outs.
 - (b) Buildings.
 - (c) Strong points.
 - (d) Large gun emplacements.
 - (7) Direct hits are necessary to kill personnel or destroy dug in heavily revetted targets.
 - (8) Short periods of ships fire and air bombardment do not impair the fighting qualities of uninjured personnel.
 - (9) Bombing accuracy increases with:
 - (a) Decrease in altitude of release.
 - (b) Decrease in hostile AA fire.
 - (c) Good visibility.
 - (10) Pilots in this area are not trained and are not equipped for low altitude "mast Head" bombing.
- (f) Air losses. Air losses, particularly operational losses on CVE's will be high and will increase as the operation continues, and pilot fatigue becomes an accumulative factor.

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(g) Night fighters. Since it may be assumed that enemy air activity will be largely at night, the need for night fighters becomes apparent.

5. Recommendations.

(a) Support. It is recommended that the system of utilizing aircraft for support missions employed for GALVANIC be adopted as standard by the Fleet.

Sufficient air liaison and air command parties should be trained immediately for future operations. Training and equipping of these parties by the Corps, should follow the standard set by the Force and should include exercises with the Force aircraft whenever possible, and preferably while attached to the ground units they will serve in action. Although radio equipment should be standardized, it should not be allowed to become static, but should work toward lightness, mobility and dependability as new developments are involved.

(b) Fighter direction. It is recommended that fighter direction for objective areas as employed for GALVANIC be adapted as standard. Improved as indicated in paragraph 4 Supra, it should prove effective. Fighter director equipment should be set up ashore as rapidly as possible to serve as standby for the destroyers and to take over in the event that they are directed from the area.

(c) Night fighters. It is recommended that immediate steps be instituted to procure equipment and train pilots as night fighters so that they may be available in adequate numbers for FLINTLOCK.

(d) Replacements of pilots and aircraft. FLINTLOCK should include a definite progressive plan for maintaining carrier aircraft and pilots at initial strength. Rear bases should be stocked prior to the assault phase and replacements should be staged forward as required.

(e) Masthead bombing. It is recommended that the Wagner low altitude bomb sight be procured for all aircraft in this area capable of carrying bombs, and that all pilots be trained in its use.

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(f) Destruction of defenses. It is recommended that far more attention be paid to the destruction of enemy defenses before landings are attempted. Preliminary air attack should start many weeks in advance of the assault with the primary purpose of destroying fuel, ammunition and supplies of all kinds. Replenishment of supplies should be denied by air, submarine and surface forces operating together as hunter killer combinations.

The assault should be preceded by several days (not hours) deliberate bombardment and day and night air attacks. Defenders should be given no rest day or night for at least a week prior to the landing.

After bombardment and dive bombers, employing two thousand pound daisy cutters, have neutralized heavy and medium A.A. weapons, large formations of Army heavy bombers should saturate the defense area with 100 pound demolition bombs and fragmentation clusters from such altitudes that misses are impossible. Fighter defense of these bombers should be furnished by carrier aircraft.


Prior to the landing, the selected beach should be subjected to a devastating bombing and bombardment with part of the 100 pound demolition bombs being dropped on the reef along the route to be followed by landing craft for the purpose of detonating mines and destroying barriers.

If it is possible to do so, islands adjacent to the objective island should be used as bases for land artillery for several days prior to the main landing.

It cannot be too strongly stated that troops landing on a heavily defended shore are pitifully vulnerable and are subject to annihilation at the hands of the defenders. The following pattern to be followed in the destruction of his defenses is recommended:

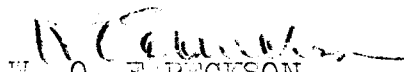
- (1) Destroy his supplies.
- (2) Deny replenishment of supplies.
- (3) Harass him day and night for a long period.
- (4) Destroy his heavy defense weapons.

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- (5) Move in nearer and saturate his defenses
with devastating loads of explosives.
- (6) Blast out a safe avenue of advance.
- (7) Cover the landing with gun fire and air.
- (8) Use every possible means of mopping up
quickly.


W. O. ERRECKSON

FIFTH AMPHIBIOUS FORCE,
OFFICE OF THE COMMANDER.

U.S.S. PENNSYLVANIA, Flagship,
4 December 1943.

ENCLOSURE (K)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF GALVANIC OPERATION

MISCELLANEOUS RECOMMENDATIONS

Following are various recommendations for changes and improvements in tactics, technique, existing instructions, and material based largely upon the results of the GALVANIC operation. Other recommendations more detailed in nature will be found in other enclosures.

1. Supply and Equipment of Assault Troops for Atoll Warfare.

a. In the GALVANIC operation, assault troops were supplied with five units of fire, and thirty days' consumable supplies. It is estimated that, on the average, they used less than one unit of fire. A large portion of the assault troops were withdrawn at the end of four to eight days, and therefore did not consume the supplies.

b. When these levels were suggested by Commander FIFTH Amphibious Force, it was done with the realization that the affair would be over in a very short time, win or lose; and that in all probability only a small fraction of the ammunition and supplies would be consumed. However, the suggestion was made while NAURU was still in the picture, and it seemed wise in order to provide for three contingencies:

(1) Forced withdrawal of covering naval forces (fuel or enemy action) before evacuation of assault troops could be effected, and consequent interruption of supply lines for a considerable period. During this time the troops would be "on their own" against hostile attack and failure of replenishment.

(2) Reduction in the quantities of supplies required initially by the garrison troops.

(3) Establishment in the forward areas of stock piles from which supplies could be withdrawn for positions later captured still further forward.

c. However, reductions were not made in the supplies carried in by the garrison troops, to allow for ammunition and supplies not used by the assault forces.

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d. The Tables of Basic Allowances for troops, whether of equipment or consumable supplies, envisage a more or less unlimited warfare of movement over large land areas. It is realized by all that there is no movement in atoll warfare, and that the need for much of the equipment, and the consumption of supplies, is less in many items than the expectancy indicated in the tables. Nevertheless, there is a reluctance on the part of the troops to part with property issued to them. The result is unnecessarily heavy loading of transports, unnecessarily great effort in unloading, and the ultimate waste of valuable material. On the other hand, there are numerous articles of equipment and materials required for atoll warfare which do not appear on the Tables of Basic Allowances.

e. It is recommended that:

(1) Army, Navy and Marine authorities agree on curtailed Tables of Allowances of equipment and supplies for ground troops and shore based air units, appropriate for atoll warfare, and applicable both to assault elements and garrison troops. The tables should also take into consideration the probable duration of occupation of the captured positions. Troops going into the islands should be equipped only for that particular service.

(2) Equipment, ammunition, and supplies of assault and garrison troops be consolidated into a single list, so as to avoid duplication of the types of material carried by both categories of troops.

2. Landing Technique.

a. The inclusion of a considerable number of LVT's in the boat group landing an assault battalion landing team, as is now clearly indicated, is going to require some changes in the technique of the ship to shore movement. If the LVT's have to be transported in LST's while the troops are in APA's the problem of the ship to shore movement becomes more complicated and a satisfactory system has to be worked out. Due to the slow speed of the LVT it is best to launch them from the LST's near the line of departure. LCI's, LST's, or even the standard landing boats could be used to get the troops from the APA's to the vicinity of the line of departure.

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b. Each battalion landing team must be adequately prepared with the proper materials and trained personnel to remove beach mines and obstacles as indicated by intelligence, and be prepared to improve landing beaches by use of demolitions on coral heads and boulders.

c. When available, armored amphibians should constitute the leading wave.

d. By a combination of LCI's and LST's it is practicable to bring troops into the landing area from distances as great as six to eight hundred miles. By this method reserves based in the GILBERTS could be employed in FLINTLOCK.

3. a. Additional LCT(5)'s are required for rapid unloading of AP's and AK's. These craft are not useful where long distances are involved, but are most valuable for harbor unloading. If advance preparations are made for launching from LST's, they can be ready for use in a very short time. In one instance, at MAKIN, an LCT was launched, in commission and equipped, and operating within one hour after immediate preparations began.

b. The use of the sectional pontoons should be exploited to the maximum in spite of the difficulty of transporting them. Trained crews for installing causeways have not yet been assembled and made available.

c. For waves other than assault waves DUKW's should prove a valuable supplement to crossing coral reefs. However, the transportation problem for both types of vehicles is very serious.

4. Previous Training and Instruction in Landing Technique.

Instruction of the individual and of units assigned to an operation must be based on the situation as known and estimated for the terrain and enemy disposition, and must be detailed in every phase that can be foreseen. The final rehearsals in particular should be carried out as much in detail as possible, and should include the movement of material, vehicles, and supplies from ship to shore, the use of demolition units clearing obstacles for the improvement of beaches and the tactical deployment of troops. Training and instruction in basic amphibious operations is not sufficient; it must be directed specifically toward the accomplishment of the operation intended. It is realized that equipment will be lost and damaged in carrying out any such program, but it is believed

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that these losses will be more than justified by the reduced losses in the actual operation due to handling by experienced personnel, and that the tempo of the operation will be greatly speeded up.

5. Naval Gunfire.

In order to increase the effectiveness of naval gunfire the following steps are recommended:

- a. Greater angle of fall through greater range or lower velocity.
- b. Smaller range patterns and better control.
- c. Larger deflection patterns.
- d. More training, through bombardment practices and shore fire control communication drill.
- e. Closer and much more intensive supporting fire both by destroyers and support craft such as LCI's armed with forty millimeter guns.
- f. Bombardment for several days in advance.

6. Air Operations.

a. The outstanding deficiency observed in GALVANIC was the failure of aircraft to identify themselves with proper IFF, either as a result of faulty equipment or carelessness of personnel. On several occasions ships of Task Force 52 were obliged to get underway, form up, and prepare to repel air attack when approaching planes were actually friendly. Considerable unloading time was lost, thus exposing ships in forward areas longer than was necessary. Positive steps should be taken by all activities operating aircraft to insure that IFF is on and functioning properly. Aircraft whose IFF is inoperative should be grounded until equipment is placed in working order. Pilots and radiomen need instruction in order to recognize when their IFF is inoperative, and radiomen need training in making minor emergency repairs in the air. In case of doubt, approaching aircraft must make the proper approach procedure required by PAC-10, and ready to identify themselves by light, using the daily identification signals.

b. Pilots and radiomen need to be thoroughly familiar with the use of the proper codes available in the IFF

ENCLOSURE (K)

COMMANDER FIFTH AMPHIBIOUS FORCE REPORT ON GALVANIC OPERATION

equipment. Numerous cases were observed of aircraft on anti-submarine patrol showing the code assigned to search and attack aircraft. Many cases of improper use of the emergency signal were observed.

c. Inasmuch as it appears reasonable to believe that the Japanese are, or may some times be operating recovered United States aircraft, the desirability of periodically changing identification markings appears to be necessary. An easily applied and easily removed paint wash might be developed in various colors so that the identification insignia could be varied in color, shape and location.

d. Every attempt should be made to furnish at least a minimum requisite of night fighters to all carriers so that each force containing a carrier will have night fighters to break up the Japanese night torpedo attacks. This is an extremely important problem, whose solution should be vigorously pursued.

e. All vessels should be furnished and should use flashless powder during night air attacks. On the night of 25 November one of the carriers of Task Force 52 was completely illuminated by the flame of ordinary smokeless powder being fired by one of the destroyers of the screen. Tracers from automatic weapons also disclose ships positions. It might be well to eliminate tracers when firing at aircraft at night.

f. It is recommended that the system of using aircraft for support missions employed for GALVANIC be generally adopted as standard. Sufficient air liaison and air command parties should be trained immediately for future operations. Methods of training and allowances of equipment of these parties should be standardized and should include exercises with aircraft whenever possible, and preferably while attached to the ground units they will serve in action. Although radio equipment should be standardized, it should not be allowed to become static, but should tend towards lightness, mobility and dependability as new development are evolved.

g. FLINTLOCK should include a definite progressive plan for maintaining carrier aircraft and pilots at initial strength. Bases in the GILBERTS should be stocked prior to the assault phase and aircraft and equipment be staged forward as required.

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COMMANDER FIFTH AMPHIBIOUS FORCE REPORT OF GALVANIC OPERATION

MISCELLANEOUS RECOMMENDATIONS

h. Far more attention should be paid to the destruction of enemy defenses before landings are attempted. Preliminary air attacks should start many weeks in advance of the assault with the primary purpose of destroying fuel, ammunition and supplies of all kinds. Replenishment of supplies should be denied by air. The assault should be preceded by several days (not hours) by deliberate bombardment and day and night air attacks. Defenders should be given no rest day or night for at least a week prior to the landing. After bombardment and after bombers, employing two thousand pound daisy cutters, have neutralized heavy and medium AA weapons, large formations of heavy bombers should saturate the defense area with one hundred pound demolition bombs and fragmentation clusters from such altitudes that misses are impossible. Prior to the landing the selected beaches should be subjected to a devastating bombing and bombardment with part of the one hundred pound demolition bombs being dropped on the reef along the route to be followed by landing craft for the purpose of detonating mines and destroying barriers.

7. Intelligence Activities.

Attention is invited to Enclosure (C) of this report for detailed recommendations.

8. Communications.

Attention is invited to Enclosure (D) of this report for detailed recommendations.

SECTION	14"	8"	5"	TOTAL
1	856	595	3361	4812
2	120	120	500	740
3	270	300	1502	2072
4	444	302	938	1684
5	194	318	682	1194
6	46	60	1214	1320
(a)	60	80	180	320
TOTAL	1990	1775	8377	12142

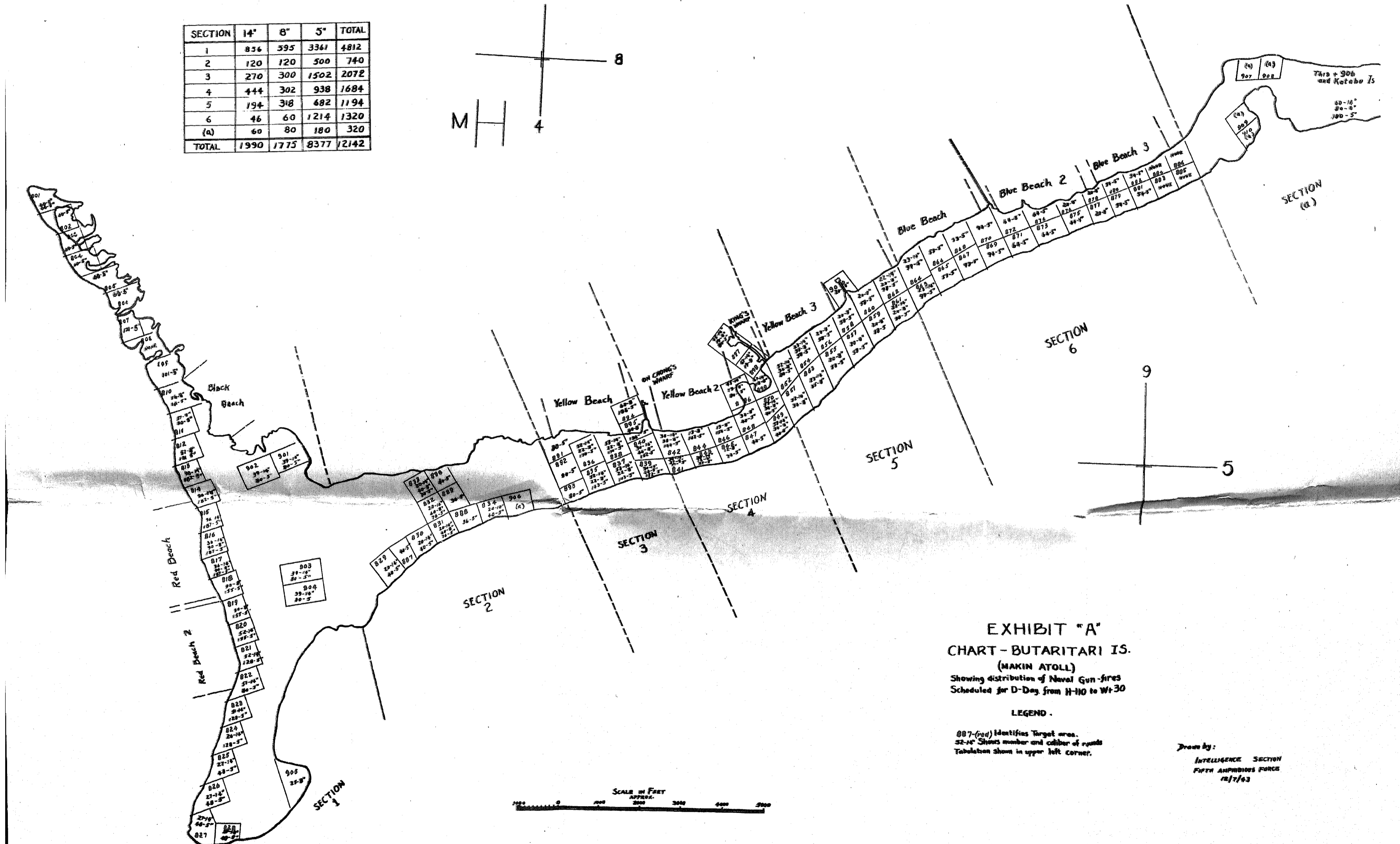
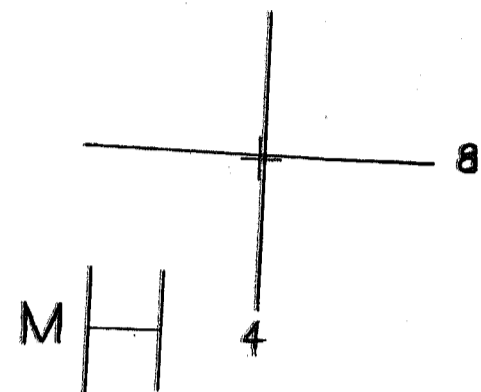


EXHIBIT "A"
CHART - BUTARITARI IS.
(MAKIN ATOLL)
 Showing distribution of Naval Gun-fires
 Scheduled for D-Day from H-10 to W+30

LEGEND.

007-(00) Identifies Target area.
 52-14 Shows number and caliber of rounds
 Tableted shown in upper left corner.

Drawn by:
 INTELLIGENCE SECTION
 FIFTH AMPHIBIOUS FORCE
 12/7/63

