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Submarine warfare
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Lecture by

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Naval War College

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ADMIRAL ^{Blair} GENTLEMEN; IT IS A VERY REAL PRIVILEGE TO BE INVITED TO THE WAR COLLEGE TO DISCUSS A SUBJECT THAT HAS BEEN OF THE FIRST ORDER OF IMPORTANCE IN TWO WORLD WARS, AND WHICH APPEARS TO BE NO LESS IMPORTANT FOR THE FUTURE.

IT WOULD BE FRUITLESS THAT REMARKS MADE HERE BE CONFINED TO A STEREOTYPED DESCRIPTION OF SUCCESSFUL A/S OPERATIONS OF THE TENTH FLEET IN WORLD WAR II. EVEN AT THE EXPENSE OF POSSIBLY, OR PROBABLY, TREADING ON SOME TOES, THE SUBJECT MATTER IS SO VITAL TO THE FUTURE THAT I FEEL IT TO THE BEST ADVANTAGE OF ALL, THAT ERRORS AND OMISSIONS OF ALL SERVICES BE STATED AND RECOGNIZED, TO THE END THAT AT LEAST THOSE OF THE TYPE THAT DID OCCUR SHALL NOT RECUR. I THINK I SHOULD WARN YOU NOW THAT SOME OF THE MATTERS THAT WILL BE TOUCHED ON ARE IN A "CLASSIFIED" CATEGORY.

AT THE BEGINNING OF WORLD WAR II THE NAVY WAS SERIOUSLY UNPREPARED FOR A/S WARFARE. EVEN THOUGH THE OPERATIONS OF ALL GOVERNMENT DEPARTMENTS IN PEACETIME ARE FORCED TO SUIT CONGRESSIONAL APPROPRIATIONS, THIS LACK OF PREPAREDNESS CAN ONLY BE LAID AT THE DOOR OF THE NAVY. IT WAS WELL KNOWN THAT ON AN OVER-ALL APPRAISAL, THE U-BOAT HAD ALMOST WON WORLD WAR I, AND THIS WE SHOULD HAVE CLEARLY RECOGNIZED AS A WARNING SIGNAL FOR THE FUTURE. AS YOU UNDOUBTEDLY KNOW, AND AS WILL BE DEVELOPED LATER IN MORE DETAIL, WE ARE NOT MAKING THAT ERROR AGAIN. THE A/S PROGRAM, NOW ONE OF THE MOST DIFFICULT OF SOLUTION, HAS TOP PRIORITY AND I FEEL THAT IT WILL SO CONTINUE FOR A LONG PERIOD OR INDEFINITELY, FOR THERE IS NO ABSOLUTE SOLUTION, BECAUSE AS COUNTER-MEASURES ARE DEVELOPED SUBMARINE OFFENSIVE STRENGTH IS EITHER INCREASED OR NEW METHODS OR DEVICES COME INTO BEING.

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AS YOU WILL RECALL, WITH THE ADVENT OF WAR IN DECEMBER 1941 THE NAVY WAS HARD PUT, TO PROVIDE EVEN THE MOST ELEMENTARY PROTECTION TO SHIPPING. BY SENDING REPRESENTATIVES TO OTTAWA, WHERE DETAILS OF THE BRITISH CONVOY SYSTEM WERE AVAILABLE, WE WERE ABLE GRADUALLY TO SHAPE UP A SIMILAR SYSTEM IN THE NAVY DEPARTMENT. THERE WERE, HOWEVER, FEW COMPETENT ESCORTS OF THE DESTROYER TYPE AND THE HASTY CONVERSION OF YACHTS AND OTHER ACQUIRED CRAFT AND THE EMPLOYMENT OF THE CIVIL AIR PATROL WERE POOR SUBSTITUTES. WE SIMPLY DID NOT HAVE THE TOOLS NOR DID WE HAVE ANY BROAD PLAN FOR THE DEVELOPMENT AND MANUFACTURE, IN QUANTITY, OF THE MYRIAD OF DEVICES THAT IN 1943 AND 1944 ENABLED US, ON A COORDINATED BASIS WITH THE BRITISH AND CANADIANS, TO COPE WITH THE U-BOAT MENACE.

EARLY IN THE WAR, AN A/S INSTRUCTION GROUP WAS ORGANIZED AT BOSTON, AND IN THE NAVY DEPARTMENT, THERE WAS ESTABLISHED A SMALL A/S SECTION TOGETHER WITH A SMALL GROUP OF SCIENTISTS FOR PURPOSES OF ANALYSIS OF OPERATIONS AND EQUIPMENTS. A HEAVY CONSTRUCTION PROGRAM WAS TAKEN IN HAND. BUT UNTIL MID-1943 WHEN THIS PROGRAM STARTED TO PRODUCE OPERATIONAL EQUIPMENT, WE WERE TO SUFFER THE CONSEQUENCES OF OUR PREVIOUS INACTION AND LACK OF FORESIGHT IN THE FORM OF U-BOAT SUCCESSSES THAT WERE NOT FAR SHORT OF BREAKING THE BACK OF OUR ATLANTIC EFFORT.

IT WAS DURING THIS CRITICAL PERIOD THAT ADMIRAL KING, THEN COMINCH, APPEALED TO THE ARMY FOR USE OF SOME OF THE ARMY AIRFORCE AIRCRAFT FOR A/S DUTY UNTIL SUCH TIME AS WE COULD PLACE IN SERVICE SUITABLE NAVAL TYPES. THESE AIRCRAFT WERE OF GREAT VALUE. THEY WOULD HAVE BEEN OF GREATER VALUE HAD THERE NOT ARISEN CERTAIN DISAGREEMENTS AS TO OPERATIONAL MATTERS WHICH I SHALL DISCUSS MORE IN DETAIL LATER.

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IN THE EARLY PART OF 1943 THE U-BOAT SUCCESSES WERE STILL IMPRESSIVE AND CRIPPLING. WHILE THE NAVAL HIGH COMMAND WAS BEING HARANGUED BY AGENCIES BOTH WITHIN AND WITHOUT THE GOVERNMENT TO TAKE CORRECTIVE ACTION, IN SHORT, TO "DO SOMETHING", NO ONE WAS MORE KEENLY AWARE OF THE NEED FOR WELL DIRECTED ACTION, AND OF THE DETAILS OF THE TYPE OF ACTION ACTUALLY REQUIRED, THAN ADMIRAL KING AND HIS ADVISERS. AT ABOUT THIS TIME THE NECESSARY TOOLS, IN THE SHAPE OF SHIPS, AIRCRAFT, AND DEVICES, STARTED TO BECOME AVAILABLE. OTHER SIGNIFICANT CONSIDERATIONS PARTICULARLY THE DESIRABILITY OF MORE CLOSELY INTEGRATING ESSENTIAL SCIENTIFIC ELEMENTS INTO THE OPERATIONAL STRUCTURE, AS WELL AS ACCORDING THE ANTI-U-BOAT EFFORT THE PRIORITY AND POSITION TO WHICH EVENTS HAD AUTOMATICALLY ELEVATED IT, MADE IT APPEAR WISE TO ESTABLISH A SINGLE COMMAND TO EXERCISE COORDINATION OF THE ANTI-U-BOAT CAMPAIGN IN THE ATLANTIC.

AND SO IT CAME ABOUT THAT ON 20 MAY, 1943, THE TENTH FLEET WAS ESTABLISHED. IT WAS ADMIRAL KING'S ORIGINAL INTENTION THAT WHILE THE TENTH FLEET HEADQUARTERS WOULD BE LOCATED IN THE NAVY DEPARTMENT, THE FLEET ITSELF WAS TO HAVE HAD A SEPARATE COMMANDER. THE URGENCY OF THE SITUATION HOWEVER, COUPLED WITH THE NON-AVAILABILITY OF A TENTH FLEET COMMANDER POSSESSING THE QUALIFICATIONS THAT ADMIRAL KING DEEMED ESSENTIAL, IMPELLED HIM TO ASSUME COMMAND OF THE TENTH FLEET HIMSELF AND TO ASSIGN ME THE DUTY OF CHIEF OF STAFF, TENTH FLEET, IN ADDITION TO MY REGULAR DUTY AS ASSISTANT CHIEF OF STAFF A/S TO COMINCH. SINCE THE EXISTENCE OF THE TENTH FLEET WAS NOT PUBLICLY DISCLOSED UNTIL NOVEMBER, 1943, THERE WERE MANY FACETIOUS CRITICS WITHIN THE NAVY WHO HELD THAT ONLY ADMIRAL KING (AND PERHAPS HIS CHIEF OF STAFF) UNDERSTOOD THE ORGANIZATION AND CONVOLUTIONS OF THE TENTH FLEET SET-UP. IN POINT OF FACT, IT WAS A SIMPLE AND DIRECT APPROACH TO THE PROBLEM. A/S BUSINESS IN THE PACIFIC (WHICH THROUGHOUT THE WAR WAS OF RELATIVELY

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MINOR IMPORTANCE) WAS HANDLED IN THE NAME OF COMINCH, AND IN THE ATLANTIC IN THE NAME OF COMMANDER TENTH FLEET, BUT IN EACH CASE BY THE SAME STAFF ELEMENTS. THE MERE FACT OF HAVING A SEPARATE FLEET IN THE ATLANTIC EMPHASIZED THE IMPORTANCE OF THE PROBLEM AND LENT A NOT UNDESIRABLE AIR OF MYSTERY.

THE CHARTER FOR THE TENTH FLEET WAS WRITTEN IN BROAD TERMS. IT PERMITTED OF THE EXERCISE OF OPERATIONAL CONTROL BY COMMANDER TENTH FLEET BUT IT WAS NEVER FOUND TO BE NECESSARY OR DESIRABLE TO EXERCISE SUCH CONTROL WHICH WAS HANDLED THROUGH CINCLANTFLT AND THE SEA FRONTIER COMMANDERS.

ASSIGNED TASKS WERE:

- (a) DESTRUCTION OF ENEMY SUBMARINES.
- (b) PROTECTION OF ALLIED SHIPPING IN THE EASTERN, GULF, AND CARIBBEAN SEA FRONTIERS.
- (c) SUPPORT OF OTHER ANTI-SUBMARINE FORCES OF OUR OWN AND OF THE ALLIED NATIONS OPERATING IN THE ATLANTIC AREAS.
- (d) EXERCISE OF CONTROL OF CONVOYS AND SHIPPING THAT WERE U. S. RESPONSIBILITIES.
- (e) CORRELATION OF U. S. ANTI-SUBMARINE TRAINING AND MATERIEL DEVELOPMENT.

THE ORGANIZATION OF THE TENTH FLEET WAS AS INDICATED IN PLATE ONE.

C&R - 54 OFFICERS 44 CLERICAL

A/S MEASURES - 14 OFFICERS 11 CLERICAL

STATISTICAL - 7 OFFICERS 12 CLERICAL

ASWORG - 72 SCIENTISTS 95 CLERICAL

- - - SLIDE - - - PLATE 1

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AT ITS CREATION ADMIRAL KING ESTABLISHED THE FOLLOWING PRINCIPLES WHICH WERE FOLLOWED WITHOUT MAJOR DEVIATION UNTIL THE END OF THE WAR:

(a) EACH SHIP AND PLANE TO BE PROFICIENT IN THE BASIC TECHNIQUE OF NORMAL OPERATIONS BOTH AS TO PERSONNEL AND MATERIEL,

(b) TRAINING IN USE OF SONAR AND SPECIAL EQUIPMENT TO BE INTENSIVE AND SUSTAINED,

(c) SURFACE ESCORT GROUPS BE TRAINED AS UNITS WITH EMPHASIS ON COORDINATED OPERATIONS BETWEEN SHIPS AND AIRCRAFT AND ON SIMPLE, SURE COMMUNICATIONS,

(d) ALL UNITS (SURFACE AND AIR) BE SUBJECTED TO REGULAR REFRESHER COURSES AT TRAINING CENTERS APPROPRIATELY ORGANIZED, STAFFED AND EQUIPPED,

(e) TRAINING BE CONDUCTED THROUGH THE MEDIUM OF STANDARDIZED INSTRUCTIONS APPROVED BY COMINCH HEADQUARTERS.

(f) INITIAL SURFACE CRAFT A/S TRAINING (UNTIL A SHIP REPORTED FOR DUTY IN A FLEET OR IN A SEA FRONTIER) AND ALL REFRESHER TRAINING (INCLUDING TRAINING CONDUCTED ASHORE WITH SYNTHETIC TRAINING DEVICES) WERE RESPONSIBILITIES OF THE COMMANDER OF THE OPERATIONAL TRAINING COMMAND OF THE APPROPRIATE FLEET. TO THIS END CONTROL AND COORDINATION OF THE METHODS OF INSTRUCTION EMPLOYED AT THE CENTERS LISTED BELOW WERE VESTED IN SUCH COMMANDERS OF OPERATIONAL TRAINING COMMANDS. A/S TRAINING OF ALL AIRCRAFT (FLEET AND SEA FRONTIERS) WAS A RESPONSIBILITY OF THE COMMANDERS OF THE AIR FORCES OF THE ATLANTIC AND PACIFIC FLEETS.

(g) SURFACE CRAFT TRAINING CENTERS, AT EACH OF WHICH TRAINING SUBMARINES AND SYNTHETIC DEVICES WERE AVAILABLE, WERE ESTABLISHED AT CASCO BAY, NEW LONDON, KEY WEST, GUANTANAMO, BERMUDA, TRINIDAD, PANAMA, CASABLANCA, SAN DIEGO, PEARL HARBOR, AND AT A STATION IN THE SOUTH PACIFIC.

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(h) OTHER SURFACE CRAFT TRAINING CENTERS (SYNTHETIC DEVICES, BUT NO SUBMARINES ATTACHED) EXISTED AT BOSTON, NEW YORK, CAPE MAY, HAMPTON ROADS, CHARLESTON, MIAMI, RECIFE, SAN PEDRO, SAN FRANCISCO, AND IN THE PUGET SOUND AREA.

(i) WHEN SUFFICIENT A/S SHIPS BECAME AVAILABLE, THERE WAS ESTABLISHED, IN THE NARRAGANSETT BAY-NEW LONDON AREA, A SURFACE ESCORT DEVELOPMENT DIVISION COMPOSED OF APPROPRIATE TYPES OF ESCORT CRAFT WITH A TASK SIMILAR TO THAT ASSIGNED AIRCRAFT ANTI-SUBMARINE WARFARE DEVELOPMENT DETACHMENT, ATLANTIC FLEET -- (Elaborate slightly on latter, pointing out that the two were combined to form ASDevLant -- the forerunner of present OpDevFor).

COMMANDERS RESPONSIBLE FOR ASSIGNMENTS OF UNITS TO A/S DUTY WERE GUIDED BY THESE PRINCIPLES IN THE ALLOCATION OF SUCH UNITS:

(a) WHEN THE SIZE OF SURFACE ESCORT GROUPS BECAME ADEQUATE FOR DEFENSIVE PURPOSES, EXCESS ESCORTS WERE FORMED INTO "SUPPORT GROUPS" TO BE USED EITHER TO AUGMENT ESCORT GROUPS OR TO OPERATE IN AREAS OF SUBMARINE AND/OR CONVOY CONCENTRATIONS AS APPROPRIATE.

(b) THE INTEGRITY OF SURFACE ESCORT GROUPS AS TACTICAL UNITS WAS PRESERVED ALL POSSIBLE, WITH SUFFICIENT SHIPS ASSIGNED EACH GROUP TO ALLOW FOR NORMAL PERIODS OF MATERIEL UPKEEP. A SEPARATE TACTICAL COMMANDER WAS ASSIGNED TO EACH ESCORT GROUP AND SUPPORT GROUP.

(c) CARRIER AIRCRAFT UNITS WERE ORGANIZED, FIRST, TO PROVIDE FOR ADEQUATE ESCORT OF CONVOYS AND, SECONDLY, AS SUPPORT GROUPS.

(d) VLR AND LR AIRCRAFT, WHEN IN EXCESS OF ESCORT OF CONVOY REQUIREMENTS, WERE ORGANIZED AS SEPARATE TASK FORCES OR GROUPS FOR EMPLOYMENT AS SUPPORT GROUPS.

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WHEN SUFFICIENT ESCORTS BECAME AVAILABLE, CVES WITH SCREENS WERE OPERATED IN THREATENED AREAS AS SUPPORT GROUPS.

IT IS TO BE NOTED THAT THE FOREGOING CONTEMPLATED NO MEASURES CALCULATED TO EFFECT AN INSTANTANEOUS CURE. THE BELIEF WAS EXPRESSED, HOWEVER, THAT IMPROVEMENT IN THE SITUATION WOULD RESULT IF ALL OFFICERS IN THE CHAIN OF COMMAND REQUIRED THAT FUNDAMENTALS BE LEARNED AND APPLIED.

BASIC A/S OPERATIONS COME (AND SO FAR AS CAN BE FORESEEN WILL SO CONTINUE) WITHIN THESE CATEGORIES:

(a) DESTRUCTION OF U-BOATS AT THE SOURCE BY BOMBING OF MANUFACTURING PLANTS, SHIPYARDS AND BASES. IN THIS RESPECT THE LAST WAR WAS A CONTINUAL BATTLE FOR PRIORITIES. ADMITTED THAT THERE WERE MANY TARGETS THAT QUALIFIED FOR THE HIGHEST PRIORITY AND ATTENTION, IT IS A FACT THAT NOT UNTIL THE CLOSING MONTHS OF THE WAR DID THE U-BOAT BASES AND BUILDING YARDS RECEIVE THE ATTENTION THEY MERITED. INVESTIGATIONS AFTER THE WAR SUBSTANTIATED THE EFFECTIVENESS OF THE LATE EFFORT. IN 1945 THROUGH MAY, 153 U-BOATS WERE DESTROYED. OF THESE 153, 41 WERE THE RESULT OF AIR RAIDS ON BASES AND BUILDING YARDS. THIS PRINCIPLE WILL BE EVEN MORE IMPORTANT IN THE FUTURE BECAUSE WE WILL BE COPING WITH A MORE EFFECTIVE U-BOAT AND EACH ONE WE CAN BOTTLE-UP OR DESTROY AT THE SOURCE WILL RELIEVE OCEAN A/S FORCES OF MUCH EXTRA EFFORT.

(b) SATURATION BY A/S FORCES (OR MINES) OF AREAS THROUGH WHICH U-BOATS MUST PASS. IN THE LAST WAR THE BAY OF BISCAY WAS A CASE IN POINT, BECAUSE AFTER FRANCE FELL, ALL OF THE MAIN OPERATING BASES WERE SHIFTED TO OR ESTABLISHED ON THE BAY. THESE PRINCIPAL BASES WITH THEIR CONCRETE U-BOAT BUNKERS WERE: LORIENT - 41 U-BOATS; ST NAZAIRE - 26; BREST - 25; LAPALLICE - 16; BORDEAUX - 19; OR A TOTAL OF 127 PROTECTED MOORINGS.

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THE BRITISH CONCEIVED THE USEFULNESS OF THIS EFFORT. DUE TO THE LIMITED MEANS AVAILABLE TO US WE WERE NEVER ABLE TO GIVE TO THIS PROJECT ALL OF THE SUPPORT IT DESERVED, BUT IN 1943 DID MAKE AVAILABLE, FIRST, ARMY PLANES AND LATER NAVAL LAND PLANES. AS AN INDICATION OF ITS EFFECTIVENESS, OF 186 U-BOATS SUNK OR PROBABLY SUNK IN THE ATLANTIC IN 1943, 42 OF THESE WERE IN THE BISCAY AREA. ASIDE FROM ACTUAL SINKINGS OF U-BOATS THIS OFFENSIVE MADE PASSAGE OF THE BAY OF BISCAY SO PRECARIOUS AS TO GREATLY INCREASE THE TRANSIT TIME, WHICH WAS OF MATERIAL ASSISTANCE IN THEREBY AUTOMATICALLY REDUCING, BY THE TRANSIT PERIOD, THE TIME THAT THE U-BOAT COULD DEVOTE TO EFFECTIVE PATROL, AS WELL AS SUBJECTING THE PERSONNEL TO STEADY HARASSMENT.

(c) OPERATIONS AT SEA - SUCH OPERATIONS FALL INTO THREE GENERAL CATEGORIES:

(1) ESCORT OF CONVOY - SINCE THE OBJECT OF ALL U-BOAT EFFORT IS TO SINK SHIPS AND THAT OF THE ANTI-U-BOAT EFFORT TO PREVENT SUCH SINKINGS BY DESTRUCTION OF THE U-BOAT BEFORE ATTACK OR FRUSTRATION OF ATTACK, IT FOLLOWS THAT THE PROTECTION OF CONVOYS IS A FIRST CHARGE AGAINST ANY ANTI-U-BOAT EFFORT. IF CONVOYS ARE PROTECTED THE U-BOAT EFFORT HAS FAILED REGARDLESS OF ITS POTENTIAL THREAT. THIS WAS A CASE IN WHICH ARMY AIRCRAFT ASSIGNED TO OUR OPERATIONAL CONTROL WERE IN DISAGREEMENT. ESCORT OF CONVOYS IS PROSAIC, EVEN DULL AND FREQUENTLY DIRTY WORK. IT IS MUCH MORE SATISFYING TO LOCATE U-BOATS AND SINK THEM. THE PROBLEM IS NOT (NOR EVER WILL BE) THAT SIMPLE. PROTECTION OF CONVOYS, BY ONE MEANS OR ANOTHER, WILL CONTINUE TO BE A FIRST CALL ON ANTI-U-BOAT FORCES.

IT MAY WELL BE THAT A PARTIAL REASON FOR THIS ATTITUDE ON THE PART OF THE THEN ARMY AIR FORCE WAS THAT WHILE EVERYONE ASSUMED THAT ASW WAS A NAVY FUNCTION, IT WAS NOT SO SPECIFICALLY SET DOWN ON PAPER AND SINCE INITIALLY OUR EFFORTS HAD NOT BEEN TOO EFFECTIVE, THERE WAS AN UNDERSTANDABLE TENDENCY AND AN IMPATIENCE

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ON THE PART OF ARMY AIR TO TAKE OVER. THIS SITUATION HAS BEEN CLARIFIED BY RECENT DIRECTIVES MAKING ASW A RESPONSIBILITY OF THE NAVY.

(2) PATROL OF SHIPPING LANES - THIS OPERATION, PARTICULARLY WHEN CONDUCTED BY AIRCRAFT, MAY BE CONSIDERED SOMEWHAT IN THE CLASS OF NEGATIVE EFFORT BUT EVEN THOUGH CONTACTS ARE NOT ESTABLISHED, SUCH PATROLS FREQUENTLY CAUSE U-BOATS TO DIVE (EVEN THOUGH NOT DETECTED) FOR UNCERTAIN PERIODS AND THUS TO SACRIFICE FOR THOSE PERIODS MOBILITY AS WELL AS COMMUNICATIONS.

(3) HUNTER-KILLER OPERATIONS IN PROFITABLE AREAS - ONCE REASONABLE PROTECTION HAS BEEN AFFORDED SHIPPING, SUCH OPERATIONS BECOME THE MOST PROFITABLE OF ALL. THEY CAN ONLY BE PROFITABLE, OF COURSE, WHEN BASED ON GOOD INFORMATION. SUCH INFORMATION, INCLUDED UNDER THE GENERAL HEAD OF INTELLIGENCE, MAY COME FROM A RADIO DIRECTION FINDER NETWORK (WE POSSESSED ONE COVERING THE AREA FROM GREENLAND TO THE SOUTH ATLANTIC, WHICH WAS BOTH FAST AND ACCURATE) OR FROM OTHER INTELLIGENCE SOURCES. IT CANNOT BE TOO STRONGLY EMPHASIZED THAT SUCH INFORMATION WAS THE KEY TO OUR SUCCESS IN THE LAST WAR AND WILL BE AGAIN. THERE IS NO SUBSTITUTE. IT MUST BE USED OPERATIONALLY HOWEVER, WITH THE GREATEST DISCRIMINATION AND IN NO SET PATTERN, ELSE SOURCES SOON BECOME KNOWN TO THE ENEMY. THE REFINEMENTS OF OUR RDF NET EXTENDED TO THE POINT WHERE WE COULD IDENTIFY MANY INDIVIDUAL U-BOATS BY NUMBER, DUE TO CHARACTERISTICS OF THE RADIO SET AND ALSO, A CONSIDERABLE NUMBER OF INDIVIDUAL OPERATORS AS A RESULT OF PERSONAL PECULIARITIES OF KEYING. MUCH OF THE VALUE OF THE RDF NET MAY BE LOST IN THE NEXT WAR WITH THE DEVELOPMENT OF A PULSE METHOD OF TRANSMISSION THAT MAY BE SO SHORT AS TO PREVENT A FIX BEING OBTAINED BY A NET.

THREE EXAMPLES OF THE OPERATIONAL USE OF SUCH INFORMATION, SELECTED FROM MANY, ARE OF SUFFICIENT INTEREST TO REPORT IN SOME DETAIL:

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(1) THE INTERCHANGE BETWEEN GERMANY AND JAPAN, BY SUBMARINE, OF CRITICAL MATERIALS AND SCIENTIFIC PERSONNEL WAS AN ESTABLISHED AND PROFITABLE PRACTICE. OCCASIONALLY WE WOULD GET AN RDF ON ONE OF THESE SHIPS AND HAD REASONABLE SUCCESS IN THEIR DESTRUCTION. IN THE SPRING OF 1944, INFORMATION CAME TO US THAT A CARGO TYPE SUBMARINE WAS PROCEEDING TO GERMANY LOADED NOT ONLY WITH RUBBER AND OTHER CRITICAL ITEMS BUT ALSO WITH A LARGE GROUP OF THE BEST JAPANESE SCIENTISTS EMBARKED. A FIX BY RDF WAS ESTABLISHED ON THIS SUBMARINE SOUTH OF THE CAPE OF GOOD HOPE AND BY GOOD FORTUNE SHE OPENED UP ON RADIO FREQUENTLY ENOUGH TO ALLOW US TO TRACK HER WITH ACCEPTABLE ACCURACY. BECAUSE IT WAS OUR ESTIMATE THAT THE LOSS OF THIS SHIP AND HER IRREPLACEABLE PEOPLE WOULD PLACE A PERMANENT DAMPER ON FURTHER EFFORTS, WE MARSHALLED ALL AVAILABLE FORCES - AND SUBSEQUENT EVENTS PROVED THE WISDOM OF THIS ACTION. AT THIS TIME THERE WERE THREE CVE GROUPS (A GROUP CONSISTED OF ONE ESCORT CARRIER PLUS FOUR TO EIGHT ESCORTS) CONDUCTING OFFENSIVE AND SUPPORT OPERATIONS IN THE NORTH ATLANTIC. WE SIANTED ALL THREE GROUPS, WITH PROPER SPACING BETWEEN, TO COVER THE MOST PROBABLE TRACK OF THE JAP SUBMARINE. IN JUNE, THE MOST NORTHERLY AND LAST GROUP MADE AIRCRAFT CONTACT AND SANK THE SUBMARINE AT NIGHT WITH AIRCRAFT WEAPONS. HUGE BLOCKS OF RUBBER AND ARTICLES FROM INSIDE THE SUBMARINE WERE RECOVERED. THIS PROVED TO BE THE LAST ATTEMPT AT SUCH BLOCKADE RUNNING OPERATIONS. THIS OPERATION WAS CONDUCTED BY THE CVE HOGUE AND HER ESCORTS. THE SUBMARINE WAS LATER IDENTIFIED AS I-52, A 2800-TON TRANSPORT TYPE U-BOAT.

(2) IN EARLY JUNE 1944, THE CVE GAUDALCANAL WITH HER ESCORTS WAS CONDUCTING AN OFFENSIVE PATROL IN THE VICINITY OF THE CAPE VERDE ISLANDS. AIRCRAFT RADAR AND SONO BUOY CONTACT ON A U-BOAT WAS ESTABLISHED ABOUT FIFTY MILES FROM THE SHIP. INTENSIVE OPERATIONS WERE COMMENCED AT ONCE. ON 4 JUNE AFTER A SERIES OF DEPTHCHARGE ATTACKS BY THE DES THE SUBMARINE (U-505) SURFACED IN WHAT APPEARED

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TO BE A SINKING CONDITION AND ALL HANDS ABANDONED. THE TASK UNIT COMMANDER HAD ACTUALLY PREPARED FOR AND REHEARSED THE CAPTURE OF A U-BOAT. THE FIRST ELEMENT OF HIS BOARDING PARTY Poured DOWN THE CONNING TOWER HATCH, FOUND IN THE BILGES A BONNET THAT HAD BEEN REMOVED FROM A 6-INCH SEA VALVE THAT WAS FLOODING THE SHIP, AND REPLACED IT. AS THE RESULT OF HEROIC AND INGENIOUS PERFORMANCES BY THE PERSONNEL OF THIS TASK GROUP, U-505 WAS FINALLY DELIVERED TO BERMUDA. BERMUDA WAS SELECTED AS THE PLACE LEAST LIKELY TO RESULT IN COMPROMISE OF THE INFORMATION THAT WE HAD CAPTURED THE U-BOAT. SOME OF US FROM THE TENTH FLEET FLEW DOWN AND WENT THROUGH HER IN DETAIL. SHE YIELDED A GOLD MINE OF INVALUABLE INFORMATION INCLUDING TWO ACOUSTIC TORPEDOES THAT WE IMMEDIATELY TRANSPORTED BY AIR TO OUR TESTING STATION IN CHESAPEAKE BAY AND WERE THUS ENABLED TO DRAW AUTHENTIC CONCLUSIONS AS TO THE COUNTERMEASURES TO THIS TORPEDO, MANY OF WHICH, UP TO THIS TIME, HAD BEEN BASED ON AN ESTIMATED PERFORMANCE OF THE VARIOUS COMPLICATED CIRCUITS IN THE TORPEDO.

(3) ANALYSIS OF U-BOATS ESTIMATED TO BE OPERATING IN MID-1943 INDICATED THE FOLLOWING APPROXIMATE NUMBERS:

30	-	250-TONNERS
200	-	500-TONNERS
60	-	740-TONNERS
10	-	1200-TONNERS
14	-	1600-TONNERS

IT WAS IMMEDIATELY APPARENT THAT ONE OF THE GREAT WEAKNESSES OF THE U-BOAT FLEET WAS THE LACK OF LONG RANGE SHIPS AND THAT, DEPRIVED OF REFUELERS, THE RADIUS OF THE OVER-ALL U-BOAT EFFORT WOULD BE MATERIALLY REDUCED. ACCORDINGLY, COMTENTH FLEET ISSUED A POLICY DIRECTIVE EMPHASIZING THAT NUMBER-ONE-PRIORITY OF TREATMENT WAS TO BE ACCORDED REFUELERS AND CONTINUALLY APPLIED THIS PRINCIPLE IN THE OPERATION OF CVE SUPPORT GROUPS WITH THE RESULT THAT ALL KNOWN REFUELERS WERE SUNK BY JUNE 1944.

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IN JUNE OF 1944 THERE ~~UNITED STATES PACIFIC FLEET~~ ^{UNITED STATES PACIFIC FLEET} ANTI-SUBMARINE BULLETIN - A MONTHLY PUBLICATION THAT CONTINUED FOR TWO YEARS AND THAT WAS INVALUABLE IN PROVIDING TIMELY INFORMATION AS TO PROGRESS AND DEVELOPMENTS. A READING OF THIS BULLETIN NOW MAKES FAR MORE CLEAR THAN WAS APPARENT AT THE TIME THE TERRIFIC PACE OF SCIENTIFIC DEVELOPMENT IN THE FIELDS OF RADAR, SONAR, WEAPONS AND COUNTER-WEAPONS THAT PLAYED SUCH AN IMPORTANT PART IN OUR ULTIMATE SUCCESS.

- - - - - (SLIDES 2, 3, 4 and 5) - - - - -

PLATE TWO PRESENTS IN RATHER A STRIKING MANNER VITAL STATISTICS AS TO U-BOATS IN BOTH WORLD WARS.

PLATE THREE SHOWS THE OVER-ALL PICTURE OF THE RACE BETWEEN U-BOATS TO SINK SHIPS AND THE ALLIED CONSTRUCTION PROGRAM.

PLATE FOUR SHOWS THE CAUSES OF SINKING OF U-BOATS.

IN PLATE FIVE I HAVE ATTEMPTED TO PRESENT A COMPOSITE PICTURE OF SHIP SINKINGS VERSUS U-BOATS SUNK (KNOWN IN THE TRADE AS THE EXCHANGE RATE) TOGETHER WITH THE PRINCIPAL EVENTS AND DEVELOPMENTS, IN THE SHAPE OF CAUSE AND EFFECT, THAT HAD SIGNIFICANT INFLUENCE ON TRENDS.

ANY SUCCESS PICTURE SUCH AS THIS IS PLEASING, BUT HAD THE WAR CONTINUED A FEW MONTHS MORE, AND HAD THE GERMANS BEEN ABLE TO BRING INTO PRODUCTION THEIR TYPE-21 FAST SUBMARINE AND FURTHER REFINEMENTS THEREOF, WE WOULD HAVE HAD PRESENTED TO US ALMOST AN ENTIRELY NEW PROBLEM OF DETECTION AND ATTACK WHICH WOULD HAVE REQUIRED MUCH MORE EFFORT AND INGENUITY THAN WERE NECESSARY IN SOLVING THE PROBLEM OF THE U-BOAT IN WORLD WAR II. THIS NEW PROBLEM OF THE FAST STREAMLINE SUBMARINE, EQUIPPED WITH SCHNORKEL, WE ARE WORKING ON AT HIGHEST PRIORITY TODAY, AND IT IS FAR FROM SOLVED.

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THE PRINCIPAL ELEMENTS IN WORLD WAR II THAT ENABLED US TO COPE WITH THE

U-BOAT WERE INHERENT LIMITATIONS OF THE U-BOAT HERSELF; I.E., IT COULD NOT ESCAPE RADAR ON THE SURFACE; SUBMERGED, IT WAS SLOW WITH SHORT RADIUS. THESE LAST TWO SHORTCOMINGS MADE IT SUSCEPTIBLE TO HOLD DOWN TACTICS TO EXHAUSTION BY SURFACE CRAFT USING CONVENTIONAL SONAR, OR AIRCRAFT USING SONO-BUOYS, OR A COMBINATION OF THE TWO. ADDITIONALLY, THE U-BOAT POSSESSED NO STRONG PROVEN COUNTER-WEAPON WITH WHICH TO ATTACK HER PURSUERS.

AS OF TODAY, ALL OF THE ABOVE IS IN PROCESS OF CHANGE. THE ABILITY OF AIR OR SURFACE CRAFT TO DETECT U-BOATS ON THE SURFACE WITH RADAR HAS BEEN GREATLY REDUCED BY THE ADVENT OF SCHNORKEL, (A BREATHING TUBE FOR THE MAIN DIESELS WHICH GIVES PRACTICALLY NO RADAR REFLECTION). AS TO SUBMERGED QUALITIES, THERE ARE IN EXISTENCE, OR CAN BE PRODUCED, SUBMARINES CAPABLE OF BURSTS OF SPEED OF FROM 20 TO 25 KNOTS. WITH BATTERY PROPULSION THEIR RADIUS IS NECESSARILY LIMITED BUT NOT FAR OFF IS THE WALTER, OR A CLOSED-CYCLE TYPE OF DIESEL, THAT WILL INSURE MAXIMUM SUBMERGED SPEED FOR FROM 10 TO 12 HOURS. THIS WILL SERIOUSLY REDUCE THE EFFECTIVENESS OF EXISTING AND PROJECTED SONAR AND ATTACK WEAPONS. THERE ARE ALSO AVAILABLE COUNTER-MEASURE WEAPONS WHEREBY A SUBMARINE MAY TAKE THE OFFENSIVE AGAINST HER PURSUERS.

THUS IT IS APPARENT THAT THE THREE MAJOR LIMITATIONS INHERENT IN SUBMARINES OF WORLD WAR II ARE IN THE PROCESS OF BEING OVERCOME.

- - - - - (PLATE 6) - - - - -

THIS SITUATION SEEMS TO PRESENT INSURMOUNTABLE OBSTACLES. YET I BELIEVE THERE IS TOO MUCH ACCEPTANCE OF SUCH AN ATTITUDE TODAY, AND THAT WE WOULD BE AS UNWISE TO OVER-ESTIMATE THE POTENTIALITIES OF THE U-BOAT OF TOMORROW AS WE WOULD BE SHORT-SIGHTED TO UNDER-ESTIMATE THEM. I THEREFORE SUGGEST THAT IT IS LOGICAL TO DIVIDE

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THE PROBLEM INTO TWO PHASES: PHASE ONE, COMPRISING THE NEAR FUTURE AND BECOMING PROGRESSIVELY MORE DIFFICULT IN 5 TO 10 YEARS, AND PHASE TWO, BEGINNING WITH THE TERMINATION OF PHASE ONE; AT WHICH TIME WE MUST BE ABLE TO COPE WITH THE SUBMARINE THAT CAN REMAIN SUBMERGED PRACTICALLY INDEFINITELY, CAN CRUISE SUBMERGED AT HIGH SPEEDS FOR LONG PERIODS, CAN OFTEN DETECT HER PURSUERS BEFORE SHE HERSELF IS DETECTED AND CAN THUS LAUNCH AN ATTACK ON THE HUNTERS BEFORE THEY THEMSELVES MAKE CONTACT.

PHASE ONE - NOW AND FOR THE NEXT FEW YEARS. ALL COMBATANT SUBMARINES MUST BE ASSUMED TO HAVE SCHNORKEL. THIS WILL MAKE SURFACE DETECTION INFINITELY MORE DIFFICULT THAN IN THE PAST. HOWEVER, THERE WILL BE MANY INSTANCES WHEN SCHNORKEL IS INOPERATIVE OR TOO MUCH EXPOSED, THAT WILL MAKE RADAR DETECTION POSSIBLE. RADAR RESEARCH LOOKING TOWARDS FURTHER REFINEMENTS IS IN PROGRESS. AS TO SUBMERGED DETECTION, THE ADVENT OF LARGE NUMBERS OF SUBMARINES WITH HIGH SUBMERGED SPEED AND GREAT RADIUS IS NOT AN IMMEDIATE PROBABILITY. WHILE PRESENT SONAR LEAVES MUCH TO BE DESIRED, DECIDED ADVANCES ARE BEING MADE AND IT IS A REASONABLE ASSUMPTION THAT DURING PHASE ONE THESE ADVANCES WILL KEEP PACE WITH SUBMARINE DEVELOPMENT.

WE CANNOT ASSUME ANY SHARP LINE OF DEMARCATION BETWEEN PHASE ONE AND PHASE TWO. AS THE TECHNICAL IMPROVEMENTS NECESSARY TO BRING PHASE TWO INTO BEING, COME INTO PRODUCTION, WE WILL FIND OURSELVES IN PHASE TWO WITHOUT WARNING.

TO SUMMARIZE, HERE WE HAVE THE SUBMARINE THAT RARELY NEEDS TO SURFACE AND THAT HAS HIGH SUBMERGED SPEED FOR LONG PERIODS - THE ALMOST IMPOSSIBLE PROBLEM.

THERE SHOULD BE NO SLOWING DOWN IN OUR RADAR RESEARCH. THEORETICALLY THE TRUE SUBMARINE NEVER SURFACES. ACTUALLY, CASUALTIES OCCUR AND CASES OF MAL-OPERATION WILL PROVIDE NUMEROUS RADAR CONTACTS. A SINGLE SUCH CONTACT WITH PROPER TRAPPING

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METHODS AND THE LETHAL WEAPONS THAT WILL BE AVAILABLE SHOULD GIVE REASONABLE ASSURANCE OF A KILL.

WHILE THE SITUATION IS NOT TOO CHEERFUL NOW, EFFORTS MUST BE CONTINUED TO GREATLY INCREASE RANGE OF PRESENT SONAR OR TO DEVELOP A SUPERIOR METHOD OF UNDERWATER DETECTION. I WILL NOT HERE GO INTO THE DETAILS OF SONAR PROGRAMS, BUT SUFFICE IT TO SAY THAT THEY COVER THE ENTIRE FIELD INCLUDING EXAMINATION OF MANY NOVEL IDEAS, MANY OF WHICH AT FIRST GLANCE, APPEAR TO BE EVEN MORE THAN NOVEL. NO CHANCES CAN BE TAKEN HOWEVER, OF FAILURE TO EXPLORE ALL REASONABLE IDEAS, ANY ONE OF WHICH MAY POSSESS THE GERM OF A NEW AND VASTLY IMPROVED SYSTEM.

WHEN THE TIME COMES, WE WILL HAVE NEED FOR HUNDREDS OF SEA-GOING ANTI-SUBMARINE SHIPS BOTH SURFACE AND SUBMARINE, INASMUCH AS THE LATTER TYPE OFFERS GREAT PROMISE IN THE WAY OF IMPROVED PASSIVE SONAR PERFORMANCE. THERE WILL BE NO TIME TO BUILD THE NUMBERS WE REQUIRE. WE DO NOW POSSESS HOWEVER, THE HUNDREDS OF DESTROYERS AND THE HUNDREDS OF SUBMARINES THAT A CAREFULLY DEVELOPED CONVERSION PROGRAM WILL ENABLE US, IN THE SHORTEST TIME, TO CONVERT TO COMPETENT A/S SHIPS WITH LATEST GEAR OF ALL TYPES INSTALLED. SMALL NUMBERS OF THESE WE SHOULD CONVERT AND PLACE IN SERVICE NOW -- AND KEEP THEM TO-DATE WITH NEW EQUIPMENT. THESE WILL BE LESS PERFECT THAN TYPES NOW ON THE DRAWING BOARD BUT THEY WILL PROVIDE AN IMMEDIATE ACCEPTABLE ANSWER. ANY PRESENT THINKING THAT ASSUMES WE WILL HAVE TIME TO BUILD, IN NUMBERS, NEW TYPES OF A/S SURFACE SHIPS AND NEW TYPES OF A/S SUBMARINES, IS, IN MY VIEW, FAULTY AND DANGEROUS. IN TWO WARS, GOD AND GOOD ALLIES HAVE GRANTED US TIME. IT IS TRITE TO SAY THAT THIS WILL NOT HAPPEN AGAIN.

I ALSO STRONGLY FEEL THAT IN SPITE OF A PHILOSOPHY OF THE PRESENT DAY THAT ENTIRELY NEW THINKING AND NEW WAYS AND MEANS ARE REQUIRED IN APPROACH TO NEW PROBLEMS, WE WILL BE WELL ADVISED NOT TO BE STAMPEDED INTO ACCEPTANCE OF THE VIEW

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THAT ALL NOW CONFRONTING US REQUIRES A NEW APPROACH AND RADICAL DEPARTURE FROM
PROVEN PRINCIPLES.

THE CONVICTION OF EXCELLENCE BY THE HUMAN MIND WHICH CAN ONLY RESULT FROM
FINE TRAINING, FINE DISCIPLINE, AND HENCE, SUPERIOR ACCOMPLISHMENT IS STILL
BEYOND THE SCOPE OF ANY KNOWN OR CONTEMPLATED PUSH-BUTTONS. THIS FACTOR AIDED
BY THE SUPERIOR TECHNOLOGY AND PRODUCTIVE CAPACITY OF OUR COUNTRY CLOSELY
INTEGRATED INTO OUR MILITARY FRAMEWORK, WILL AGAIN, IF WE ARE FOREVER FOREHANDED,
PROVIDE THE MARGIN OF VICTORY.

THOSE WHO CONTROL POLICY MUST REMAIN ALIVE TO THE FACTS (AS THEY NOW ARE)
THAT THERE CAN BE NO COMPLACENT ACCEPTANCE THAT WEAPONS AND TECHNIQUES OF TODAY
WILL NECESSARILY BE EFFECTIVE TOMORROW AND, MOST PARTICULARLY, POLICY MUST, BY
UNREMITTING PRESSURE, DRIVE TOWARD THE GOAL OF BEING READY ON D-DAY, AND NOT
ON D PLUS 365.