U. S. ARMY-NAVY JOURNAL OF
RECOGNITION

PACIFIC BEACHHEAD

FEBRUARY, 1944
NUMBER 6

DECLASSIFIED RESTRICTED

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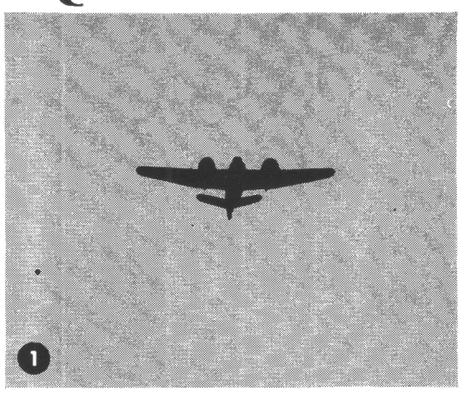
QUIZ NO. 1: THESE ARE SILLOGRAPHS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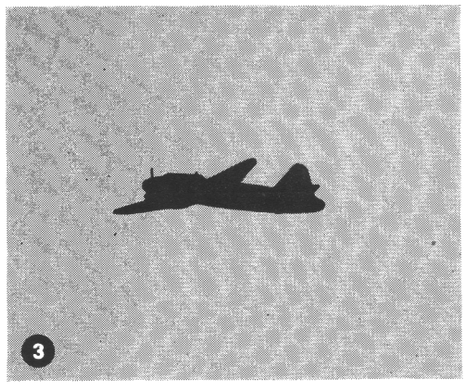
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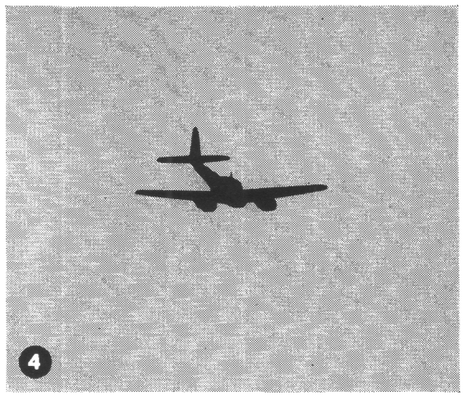
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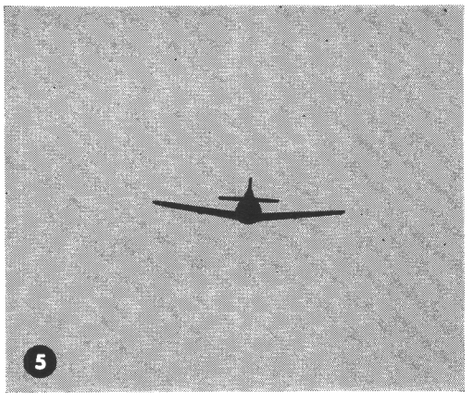
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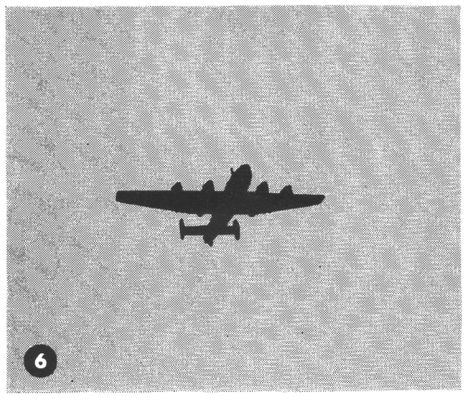
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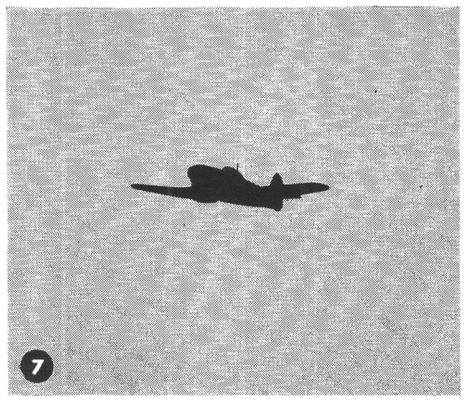
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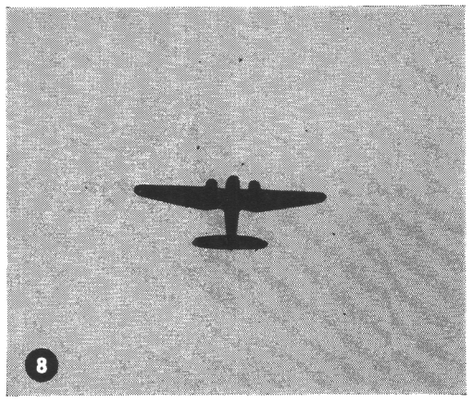
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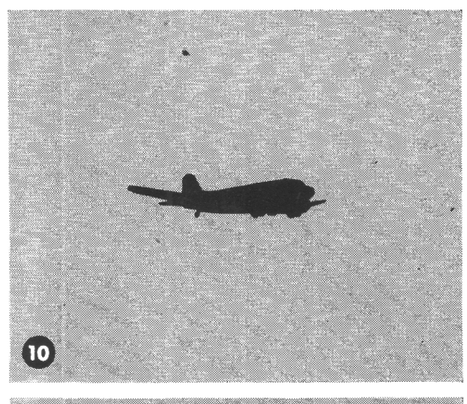
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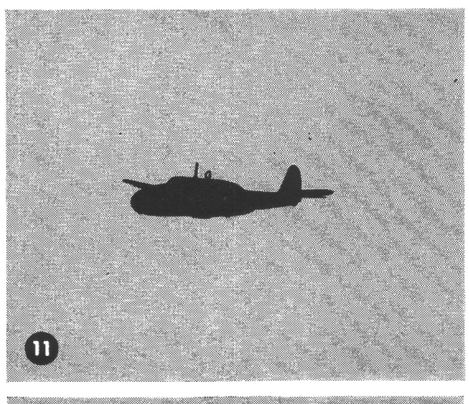
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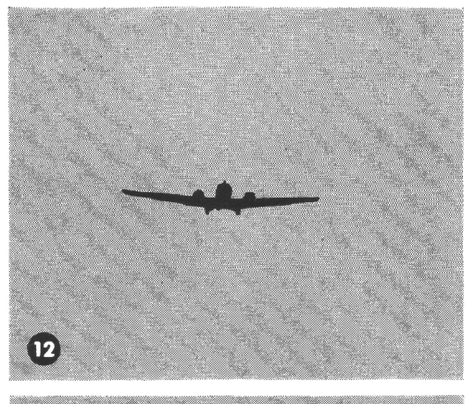
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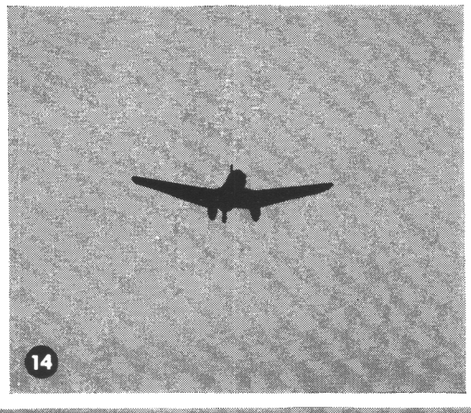
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For answers, see p. 50

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TRAINING AIDS

Since it got underway in September 1943, the *Journal* has tried to present the latest information and best available pictures on various forms of operationally important matériel, both friendly and enemy. With this article, the *Journal* is venturing into a new field—the methods and devices for presenting recognition instruction.

Many synthetic methods of duplicating actual visual conditions have been devised. In most distant views of aircraft, for example, the interesting details of construction disappear and the plane appears to the eye as a dark gray silhouette. The sillographs on the facing page are an attempt to reproduce this condition in print. The detail has been removed; engine nacelles, turrets, and other features are seen only in relief against the gray sky. Since the images are made from flying photographs, they are presented in the same attitudes as they would be to the eye. And they give a large image for printing or magic-lantern projection.

But sillographs have one major weakness. Like all pictures, they are static. The actual spotting of airplanes consists of recognizing a moving, constantly altering shape.

Better than the sillograph, is the shadowgraph presented on the following two pages. This is an excellent recognition training aid. It is simple to construct, easy to operate. The aircraft can be presented realistically and in motion; contrasts and comparisons may be made between types. A number of people can see the screen at once and all see the same view at the same time. By superimposing a ringsight on the screen, the device can be used to teach and test range estimation. And, finally, an almost unlimited variety of views can be shown.

The shadowgraph operates on the same principle as the shadowplays frequently presented in church and school auditoriums. A light source is placed behind a translucent screen (a taut bed sheet or tracing paper will do), and a scale model of the airplane is introduced between the light and screen. The light should be small and concentrated and should be at least eight feet from the screen. The audience should be about the same distance on the other side of the screen. For a sharp silhouette and to reduce distortion, the model should be as close to the screen as possible.

In using the shadowgraph it is important to remember that the model has the same relation to the light as the shadow has to the audience. Thus, when the model is held with its nose pointed at the light, the shadow is the silhouette of the airplane as it would look coming at the viewer. If the light shines on the bottom of the model, the shadow is that of an aircraft seen from below. If it shines on top, the plane is seen from above, irrespective of where the students are sitting.

After the plane is shown from several angles, as a form of review the model can be moved to simulate flight. For an approach view, the model should be brought down on to the screen in a head-on view. Then, by gradually tilting the nose and moving the model upwards and towards the light, the effect of a plane approaching and passing overhead may be reproduced. By lowering the nose the plane can be made to appear to pass beneath the observer. Reversing these conditions, the plane can be made to fly away from the student. From a side view, the plane can be made to bank and sweep across the field of view in varied maneuvers.

Perspective distorts plane shape

One of the most disturbing factors in recognition which the shadowgraph can do much to clear up, is the illusion created by perspective and dihedral. Take for example the Army's chief transport, the C-47. This plane has a wing with marked dihedral, a very pronounced taper on the leading edge, a straight trailing edge. In plan view, this wing is one of the chief recognition points for the airplane. However, when the C-47 is seen from below coming at you, perspective causes the wing to appear swept forward; the leading edge seems almost straight, while the taper seems to be on the trailing edge. Thus the plan form of the wing is just reversed. By using the shadowgraph, the effect of this distortion on a particular plane can be easily demonstrated. By rule, when seen from above, front or rear, a wing with marked dihedral will appear to be swept away from you; when seen from below, the wings will be bent toward you (*see diagram, lower right, page 5*).

With the shadowgraph, two or more planes may be shown at the same time so that differences between similar craft may be pointed out in identical views. This is a great advantage when considering planes which have had limited photographic coverage. Not only can identical views be shown, but models built to the same scale (usually 1:72) can be used and their size compared exactly.

On next two pages the *Journal* presents photographs of the shadowgraph set-up at the AAF Air Intelligence School at Harrisburg, Pa., and schematic diagrams showing the arrangement and use of a typical shadowgraph.

LIGHT SOURCE FOR SHADOWGRAPH used at Harrisburg school is demonstrated by an instructor on the school staff. Baffle plates held by the instructor allow heat to escape from lamp, control the flow of light.

SCALE MODEL OF C-47, 1:72 true size, is held on wand formed of ten-gauge wire. Sharp point of wire fits in hole in model. The instructor can remain hidden behind framework of screen, move model about to simulate flight conditions.

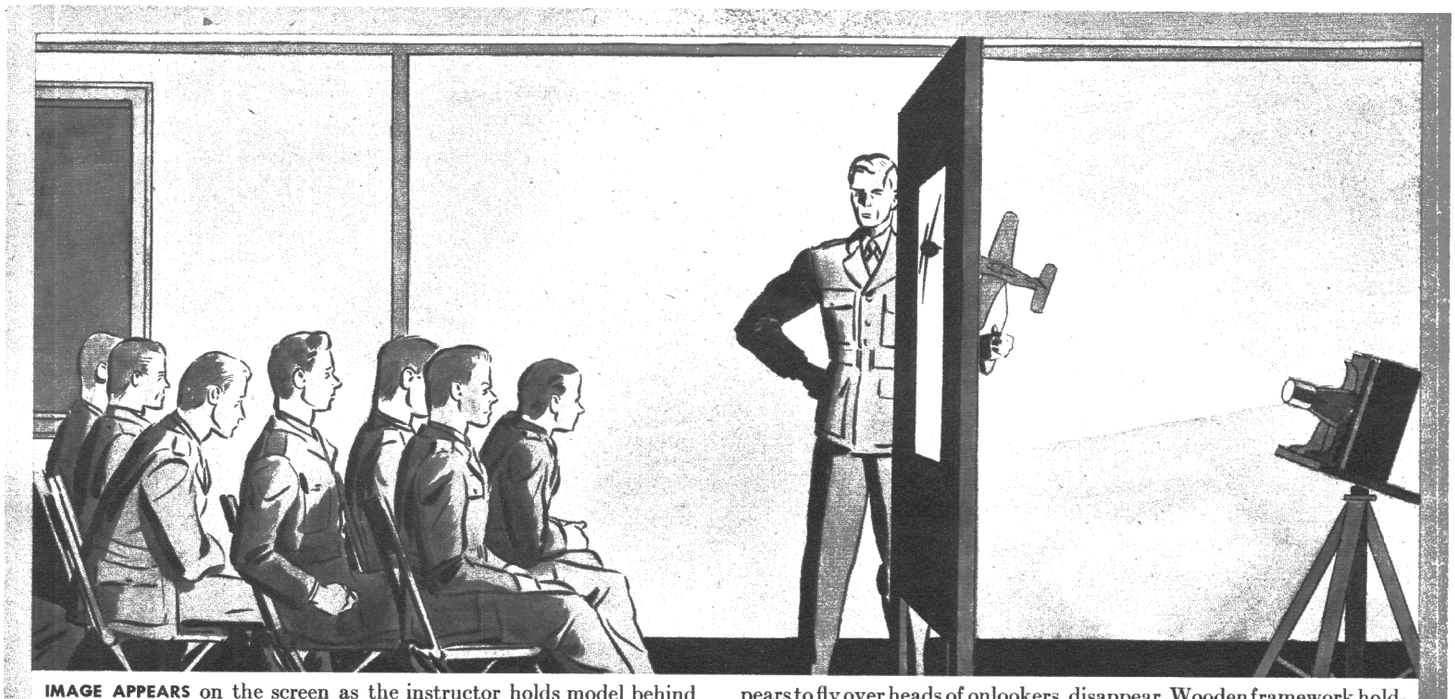
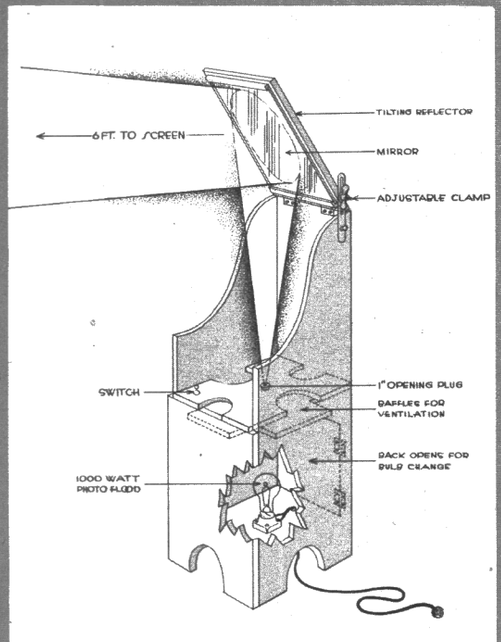
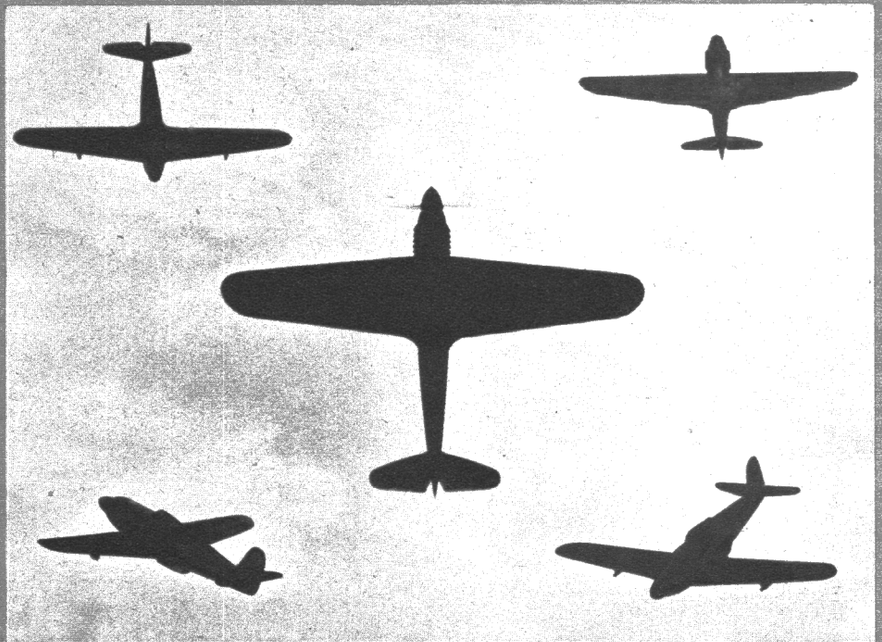


IMAGE APPEARS on the screen as the instructor holds model behind it. Plane appears to be coming toward audience if model is pointed at light source. As the instructor moves the plane toward light, it appears to fly over heads of onlookers, disappear. Wooden framework holding screen prevents audience from seeing which model is selected. Student seated about 30 ft. from screen sees plane at about 700 yd. range.

TYPICAL CLASSROOM ARRANGEMENT for shadowgraph instruction is shown in the picture above. Translucent screen is set up approximately 8 ft. from the source of light, in this case a standard slide projector such as is available for field use. Instructor holds model on thin wire wand very close to screen. The students sit in half dusk of semi-darkened room. For best results they should not be closer to the screen than the source of light.



SPECIAL SHADOWGRAPH LAMP may be constructed to plan shown in sketch. Light is concentrated by small opening, reflected to screen by mirror.



DISTORTION of plane shape by perspective is shown by five views above. Central plan view shows true shape of wing. Upper views show how wing appears to be pulled toward observer when seen from below; lower views how it is pushed away when seen from above.

AIRCRAFT RECOGNITION TRAINING LIST RESTRICTED

THESE LISTS ARE DESIGNED MERELY TO GUIDE RECOGNITION TRAINING IN AIRCRAFT AND ARE NOT TO BE CONSTRUED AS SUPERSEDING ANY PREVIOUSLY ISSUED DIRECTIVE. CLASS A COMPRISES AIRCRAFT THAT ARE OPERATIONALLY MOST IMPORTANT. CLASS B COMPRISES AIRCRAFT THAT ARE OPERATIONALLY IMPORTANT IN SOME AREAS AND/OR ARE NUMERICALLY LESS IMPORTANT THAN CLASS A, AND ALSO AIRCRAFT WHICH, THOUGH NUMERICALLY IMPORTANT, ARE BEING GRADUALLY REPLACED. EMPHASIS SHOULD BE PLACED ON AIRPLANES IN CLASS A.

U. S. NAVY

CLASS A

DESIGNATION	COMMON NAME	TYPE
F4F	WILDCAT	1E-SSF
F6F	HELLCAT	1E-SSF
F4U	CORSAIR	1E-SSF
OS2U	KINGFISHER	1E-S/O
SBD	DAUNTLESS	1E-S/B
SB2C	HELLDIVER	1E-S/B
TBF	AVENGER	1E-T/B
PBY-5 & 5A	CATALINA	2E-P/B
PV	VENTURA	2E-P/B
PBM-3C	MARINER	2E-P/B

CLASS B

SO3C	SEAGULL	1E-S/O
SOC		1E-S/O
SNJ	TEXAN	1E-S/N
J2F	DUCK	1E-J
PB2Y	CORONADO	4E-P/B

U. S. ARMY

CLASS A

P-38	LIGHTNING	2E-SSF, R
P-39	AIRACOBRA	1E-SSF
P-40	WARHAWK	1E-SSF
P-47	THUNDERBOLT	1E-SSF
P-51	MUSTANG	1E-SSF
A-20	HAVOC	2E-LB, 2SF
B-17	FORTRESS	4E-HB
B-24	LIBERATOR	4E-HB
B-25	MITCHELL	2E-MB
B-26	MARAUDER	2E-MB
C-46	COMMANDO	2E-C
C-47	SKYTRAIN	2E-C
C-54	SKYMASTER	4E-C

CLASS B

C-60	LODESTAR	2E-C
A-29	HUDSON	2E-LB
A-30	BALTIMORE	2E-LB
A-31 (A-35)	VENGEANCE	1E-DB
L-4*	PIPER GRASSHOPPER	1E-L
L-5*	SENTINEL	1E-L

*NOTE: THESE TWO AIRCRAFT ARE REPRESENTATIVE OF THE L-TYPE.

BRITISH—R. A. F.

CLASS A

SPITFIRE		1E-SSF
HURRICANE		1E-SSF
TYPHOON		1E-SSF
MOSQUITO		2E-2SF, LB
BEAUFIGHTER		2E-2SF
WELLINGTON		2E-MB, T/B
BLENHEIM		2E-MB
BEAUFORT		2E-T/B, R
LANCASTER		4E-HB
HALIFAX		4E-HB
STIRLING		4E-HB
SUNDERLAND		4E-P/B

CLASS B

WHITLEY		2E-MB
HAMPDEN		2E-MB, T/B
WHIRLWIND	(WELKIN)	2E-SSF
MASTER		1E-N

AMERICAN AIRCRAFT USED BY R. A. F.

DESIGNATION	COMMON NAME	TYPE
P-51	MUSTANG	
A-20	BOSTON	
A-29	HUDSON	
A-30	BALTIMORE	
B-25	MITCHELL	
PV	VENTURA	
B-24	LIBERATOR	
PBY-5	CATALINA	
P-40	KITTYHAWK	
A-31	VENGEANCE	

BRITISH FLEET AIR ARM

CLASS A

SWORDFISH		1E-T/B, R
BARRACUDA		1E-T/B

CLASS B

FULMAR		1E-SSF
ALBACORE		1E-T/B, R
WALRUS		1E-R

OTHER AIRCRAFT USED BY FLEET AIR ARM (ON U. S. AND R. A. F. LISTS)

	SEAFIRE	1E-SSF
	SEA HURRICANE	1E-SSF
F4F	WILDCAT	1E-SSF
TBF	AVENGER	1E-T/B
F6F	HELLCAT	1E-SSF
F4U	CORSAIR	1E-SSF

RUSSIAN

CLASS A

LA-5		1E-SSF
LAGG 3		1E-SSF
IL-2 & IL-3	STORMOVIK	1E-LB
PE-2		2E-DB
SB-3		2E-MB
PE-2B (PE-3)		2E-LB
DB-3F (IL-4)		2E-MB, T/B
TB-7		4E-HB
YAK-4 (BB-22)		2E-LB, R

CLASS B

YAK-1 (I-26)		1E-SSF
MIG-3 (I-18)		1E-SSF
I-16		1E-SSF
SU-2		1E-LB, R
ER-2		2E-MB
AR-2 (improved SB)		2E-DB
DB-3		2E-MB, T/B

AMERICAN AIRCRAFT USED BY RUSSIANS (ON U. S. ARMY AND NAVY LISTS)

P-39	AIRACOBRA	1E-SSF
P-40	WARHAWK	1E-SSF
A-20	HAVOC	2E-LB
B-25	MITCHELL	2E-MB
PBY (GST)	CATALINA	2E-P/B
C-47 (PS-84)	SKYTRAIN	2E-C

GERMAN

CLASS A

DESIGNATION	COMMON NAME	TYPE
ME-109 F & G		1E-B, SSF
ME-110 F & G		2E-B, 2SF
ME-410*		2E-B, 2SF
FW-190A		1E-B, SSF
JU-87D	STUKA	1E-DB
JU-88A, C & S		2E-MB, DB
HE-111H		2E-MB, T/B
JU-188		2E-MB, DB
DO-217E, K & M**		2E-MB, DB
HE-177		2E-HB, R
JU-52		3E-C, GT
JU-290		4E-C, HB, R
ME-323		6E-C

CLASS B

ME-210*		2E-B, 2SF
AR-196		1E-R, FP
BV-138		3E-P/B
BV-222		6E-P/B
HS-129		2E-LB, GA
HE-115		2E-R, FP, T/B
FW-189		2E-LB, R
HS-126		1E-R
FI-156		1E-L
JU-90		4E-C
JU-86P		2E-LB, R
FW-200C	KURIER	4E-HB
DFS-230		G
GO-242 & GO-244		G and 2E-C

*NOTE: RECOGNITIONALLY THE SAME.

**NOTE: DIFFERENCES IN THESE MODELS SHOULD BE NOTED IN INSTRUCTION.

JAPANESE

CLASS A

T-3	TONY	1E-SSF
T-2	TOJO	1E-SSF
T-2	NICK	2E-2SF
T-1, MARK 1, 2	OSCAR	1E-SSF
T-O, MARK 1, 2*	ZEKE	1E-SSF
T-O, MARK 2	HAMP	1E-SSF
T-O or T-2	RUFE	1E-SSF, FP
T-O	PETE	1E-R, FP
T-O	JAKE	1E-FP, DB
T-100, MARK 1, 2	DINAH	2E-R
T-99, MARK 1, 2	VAL	1E-DB
T-97	KATE	1E-T/B
T-1	BETTY	2E-MB, T/B
T-100	HELEN	2E-MB
T-99	LILY	2E-LB
T-97, MARK 1, 2, 3	SALLY	2E-MB, T/B
T-96	NELL	2E-MB, T/B
T-2	EMILY	4E-P/B
T-97	MAVIS	4E-P/B

CLASS B

T-97	NATE	1E-SSF
T-95	DAVE	1E-R, FP
T-99	SONIA	1E-R
T-99	CHERRY	2E-FB
T-MC-20	TOPSY	2E-C
T-DC-2	TESS	2E-C
T-LOCKHEED	THELMA	2E-C

*NOTE: ZEKE 2 HAS A HAMP FUSELAGE AND ENGINE WITH ZEKE WINGS, BOMB RACKS,

ABBREVIATIONS

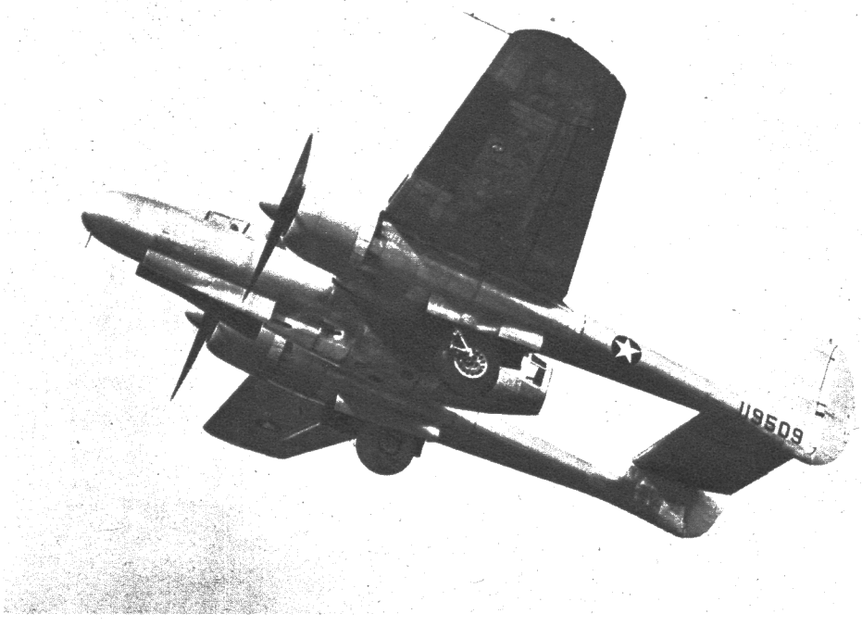
B.....BOMBER
C.....CARGO
F.....FIGHTER
G.....GLIDER
J.....UTILITY
L.....LIAISON
N.....TRAINER
R.....RECONNAISSANCE
DB.....DIVEBOMBER
FP.....FLOATPLANE
GA.....GROUND ATTACK
GT.....GLIDER TUG
HB.....HEAVY BOMBER
LB.....LIGHT BOMBER
MB.....MEDIUM BOMBER
P/B.....PATROL BOMBER
S/B.....SCOUT BOMBER
S/N..SCOUTING, TRAINING
S/O.....SCOUTING OBSERVATION
T/B.....TORPEDO BOMBER
SSF SINGLE-SEAT FIGHTER
2SF...TWO-SEAT FIGHTER
1E.....SINGLE-ENGINE
2E.....TWIN-ENGINE
3E.....THREE-ENGINE
4E.....FOUR-ENGINE
6E.....SIX-ENGINE

ARMY'S NEWEST PURSUIT IS TWIN-ENGINE, TWIN-BOOM JOB WITH TRICYCLE LANDING GEAR, HAS LARGE GLASSED-IN GONDOLA TO HOUSE CREW OF THREE

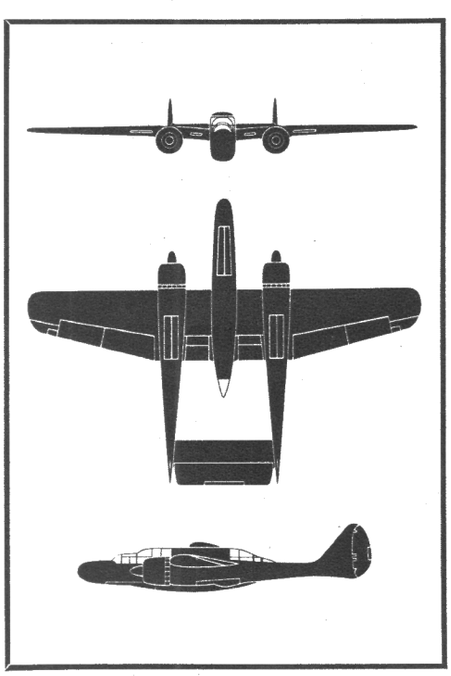
USAAF'S FAST NEW PURSUIT

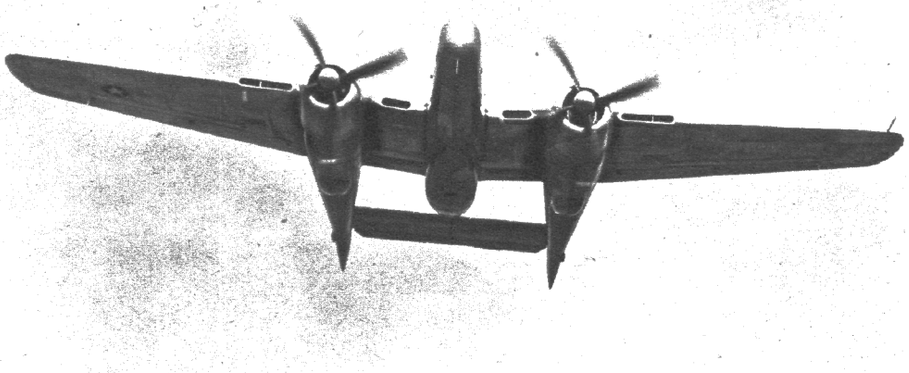
About to go into action with the Army Air Forces is the P-61, a new plane built by Northrop to serve as a night interceptor-fighter. It is in the high-speed class at medium altitudes, and has already acquired the nickname "Black Widow."

RECOGNITION: P-61 is a three-place, high-wing monoplane with a tailboom running aft from each fat radial-engine nacelle. Each boom is smoothly streamlined with slight bulge on under side for landing wheel. The pilot's nacelle is long nosed, is deepest opposite wing. It is pointed aft. Wing has straight leading, tapered trailing edge. Span, 66 ft.; length, 49 ft.



WHEELS FOLD INTO BOOMS as Black Widow takes off. Though similar to the P-38, P-61 has much larger gondola to house bigger crew. Glassed-in rear section provides good visibility for gunner.





P-61'S WING has slight gull effect because of dihedral on the inboard panels. Tailplane is straight with cutouts at end for rudder clearance. Lines of the tailbooms are unbroken in the plan view.

The winner in its battles over Britain, the RAF now sends its fighters winging against Reich

ROYAL AIR FORCE

Greatest air force of the First World War, it has reaffirmed its position in the Second

The Royal Air Force was created on April 1, 1918. Its first communique, issued a few days later, reported that No. 20 Squadron dropped sixteen 20-lb. bombs; No. 1 Squadron thirteen 25-lb. bombs; and No. 206 Squadron seventy-four 25-lb. bombs. In addition, four 40-lb. phosphorous bombs were dropped. In terms of this war's 8,000-lb. blockbusters, this may not seem like a very auspicious start, but within three months the RAF had command of the air over Europe. Against the Germans' 340 planes, Britain could rank 1,390 better machines better manned. By the end of the war, when the rout of the first Luftwaffe was complete, the RAF had 22,647 airplanes, 103 airships, 291,000 officers and men plus 25,000 women in the WRAF. In the short eight months of its wartime life, it had become the world's first great air force.

Many of the men who are leading the RAF to victory in its second great trial gained their first experience with the infant RAF and its immediate predecessors, the Royal Flying Corps and Royal Naval Air Service. Sir Charles Portal, Marshal of the RAF and Chief of Air Staff, flew as an observer in the RFC as early as 1915, once pot-shotted the German ace Immelmann with a rifle. Air Chief Marshal Sir Arthur Tedder, Deputy Allied Commander in Europe, flew with the RFC in 1916, was squadron leader in the RAF by 1919. Air Marshal Sir Arthur Harris commanded the first experimental night-flying detachment in World War I for defense against Zeppelin attacks on London.

Chief of Air Staff from the beginning was Sir Hugh Trenchard, England's Billy Mitchell. Just after the war, he had the great task of transforming the war-created RAF into a vital peacetime military arm, of keeping morale at a high pitch, of establishing a thorough training program and maintaining experimental work on military aircraft. During his tenure Capt. John Alcock and Lieut. Arthur Whitten Brown made the first transatlantic flight, the dirigible R-34 flew to America and back, and other flights were made to India and Australia. Perhaps most important of all, the series of Schneider Cup racers that culminated in the Spitfire got underway. When "Boom" Trenchard retired in 1929 with the rank of Marshal of the Royal Air Force, he remarked truthfully that he had laid the foundations for a castle but if nobody wanted to build anything bigger than a cottage on them, they would still have a jolly good cottage.

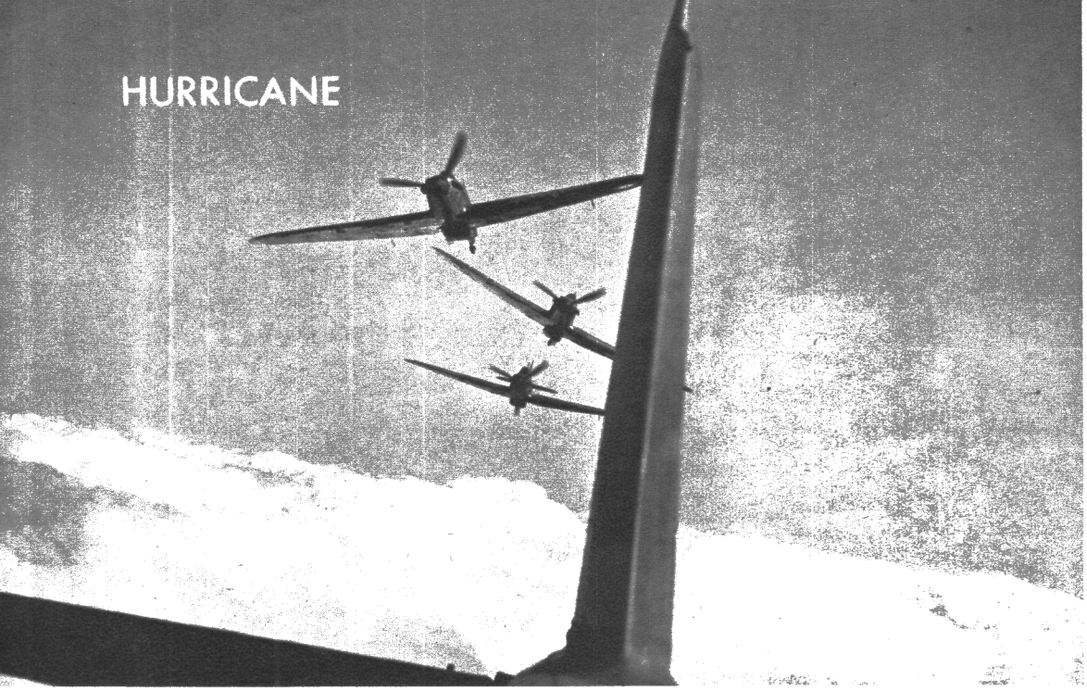
When the Second World War broke out, Trenchard's foundations stood fast. In the months of August and September 1940, when Britain's Spitfires and Hurricanes broke the legend of the Luftwaffe's invincibility, the RAF took its place among the great military organizations of all time. For the next year the war was bitter. Foiled in the daytime, the Germans took to night bombing. But after the first few thunderous assaults, the RAF came back with radar-equipped Beaufighter and Havoc nightfighters. On May 10, 1941, 33 of the raiders failed to return home.

Meanwhile, the RAF's Coastal Command had been insuring the flow of lend-leased supplies to the island kingdom. To the Coastal Command falls the job of patrolling all British waters. Flying far beyond the range of fighter escorts, RAF's patrol bombers must rely on their own limited armament or their pilots' skill. Smaller anti-ship planes, like the torpedo-carrying versions of the Beaufighter and Beaufort, carry on a constant harrying of Axis supply lines in the Mediterranean while England-based craft blast German E-boats and other Channel craft (*see pages 22–25*). It is a tough job which will not end until the peace.

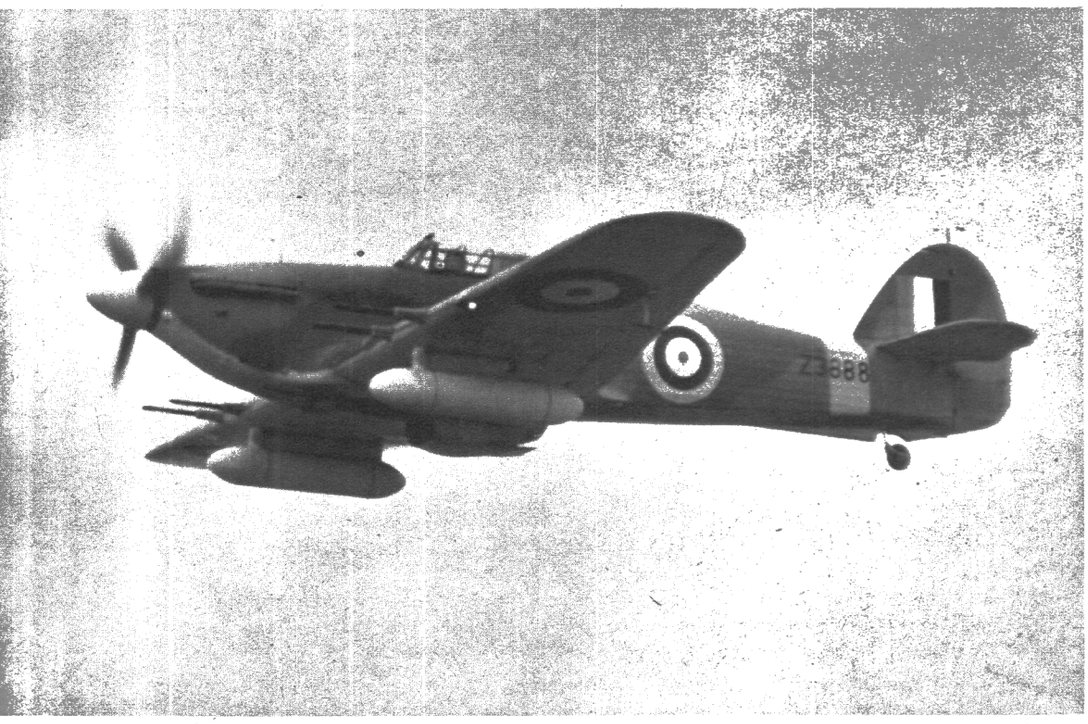
Throughout Allied lands the stations of the Training Command have maintained a steady flow of new, fully prepared men to crew British aircraft. And wherever the British Army has gone, the Mustangs and Typhoons of the Army Cooperation Command have been in there slugging. But the chief glory of the RAF today is the Bomber Command. Nightly ferrying the war to Hitler and his minions, the huge Halifaxes, Stirlings and Lancasters carrying 5½ to 8 tons of bombs apiece have blasted all the Reich's chief ports, pulverized the Ruhr and made a smoking hell of the Nazis' capital. Direct damage to steel works in the Ruhr area alone have caused a loss of 1,250,000 tons of steel and the total loss of steel must be much greater. In three months of 1942, the daily output of coal in the Ruhr fell 20%. In Turin, 70 factories have been damaged including ten of the Fiat factories. In Genoa, acres of docks have been left waste. This constant attack has meant that the enemy has been compelled to keep his finest fighters and pilots away from the Russian front. Little more than one-quarter of the German fighter force has been strung out from the White to the Black Sea, while nearly double that number have been held in Western Europe. In all, the Bomber Command has destroyed or seriously damaged close to 3,000 factories and industrial works in Axis-held Europe.

SIR CHARLES F. A. PORTAL, G. C. B., D. S. O., M. C., Marshal of Royal Air Force.

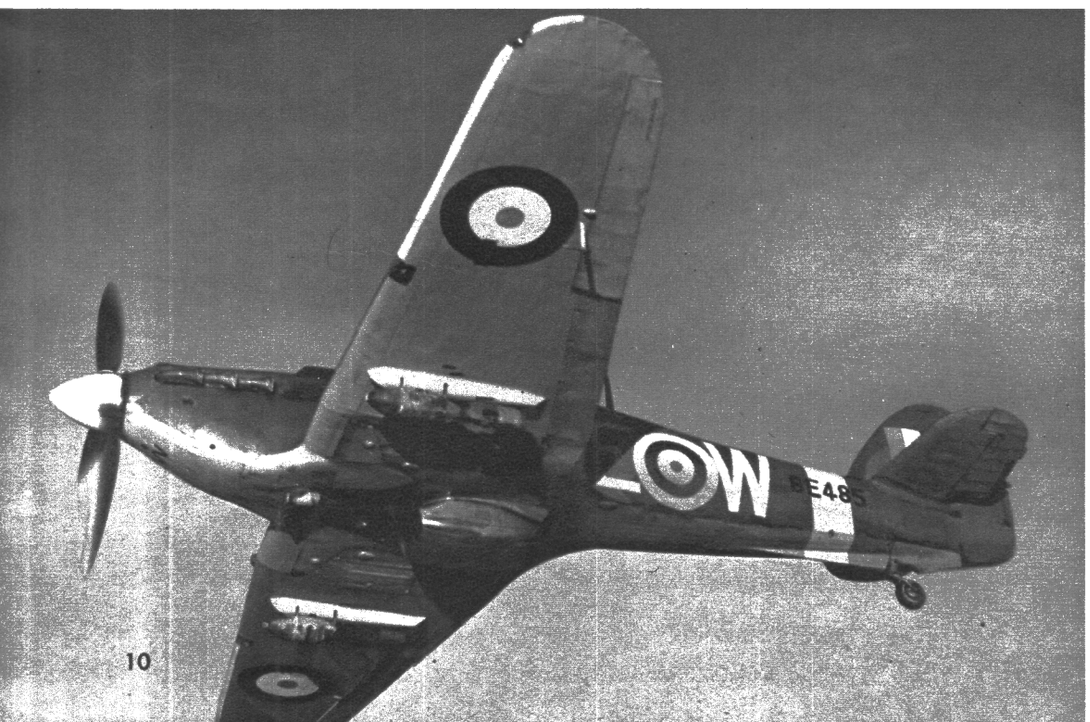
The planes which have carried democracy's banners throughout the European theater since the first gun was fired are pictured on the following pages. Though Americans can be proud of the USAAF as the biggest and strongest assemblage of planes in the world, the airplanes of the Royal Air Force rate close to the top in every category. They have done the war's greatest job.



TALL OVAL FUSELAGE and almost straight wing mark Hurricane in head-on views. High-set tailplane may be visible above the wing. Three-bladed prop cannot be seen by the eye, is not recognition feature.



BOMBS OR FUEL TANKS may be suspended from Hurricane's wing (*above, below*). Thickset fuselage and broad fin and rudder contrast with sharply pointed nose, make plane appear to have tail-heavy sit.



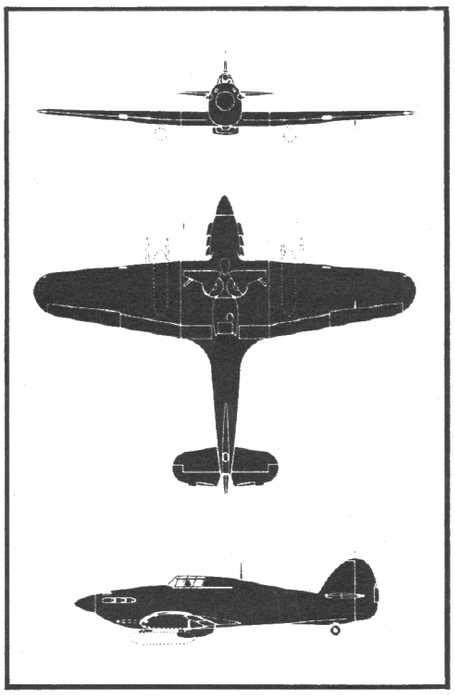
HURRICANE

Have retained superiority

From the chaos of air war which has since been named the Battle of Britain, two great airplanes arose. These were the RAF's famed single-engine fighters, the Hawker Hurricane and the Supermarine Spitfire. Between them they accounted for well over 2,000 enemy craft during the first year of war. The Hurricane was first of the pair to go into production and outnumbered the Spit almost two to one. For this reason it bore the brunt of the early fighting. However, Spitfire's performance was slightly better—it had more speed and climb and operated at higher altitudes—so that in the later days of the battle its percentage of kills per plane was higher.

As the war progressed and the need for specialized aircraft became obvious, the Hurricane took over many jobs which were undreamed of at the time of its original design. To protect hard-pressed convoys, it was catapulted from merchantmen as an expendable interceptor of German bombers. At Narvik, a squadron of Hurricanes flew from the carrier H. M. S. Glorious. In November 1941, others were equipped with bomb racks and used as one of the first fighter-bombers. The Hurricane has also been used as a fighter and ground-attack plane in the African desert and Burmese jungles. Most recently, the Hurricane IID with two 40-mm. cannon in the wing has been used as a tank-buster. Though these adaptations have changed the airplane's appearance in detail, they have not fundamentally altered its personality.

The Spitfire, which still remains one of the greatest fighters in the air, has also undergone a number of alterations (*see Journal, Oct. issue*). As with the Hurri-



& SPITFIRE

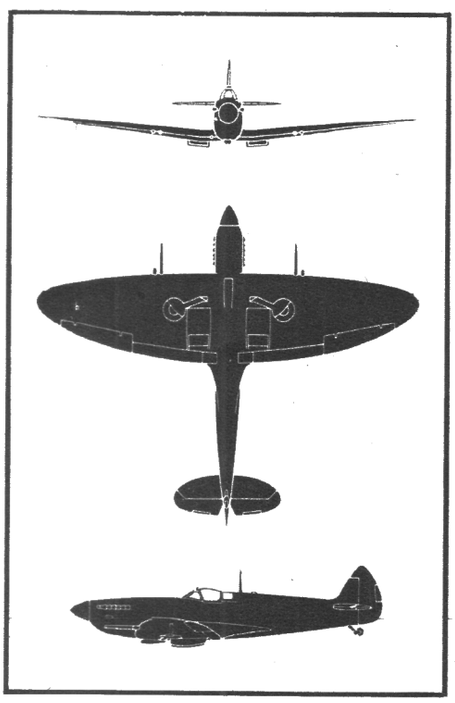
since the Battle of Britain

cane, many of the early changes were in the power plant to boost speed and altitude. From the original two-bladed fixed-pitch propeller, it changed first to a three-bladed variable-pitch prop and then to a three or four-bladed constant-speed propeller. Changes in the airframe to accommodate refinements have materially altered the appearance of the Spit from its prototype. The Marks XII and some Mark V's have had the typical elliptical wing clipped to provide greater speed and maneuverability at low altitudes. This reduces the span by 5 ft.

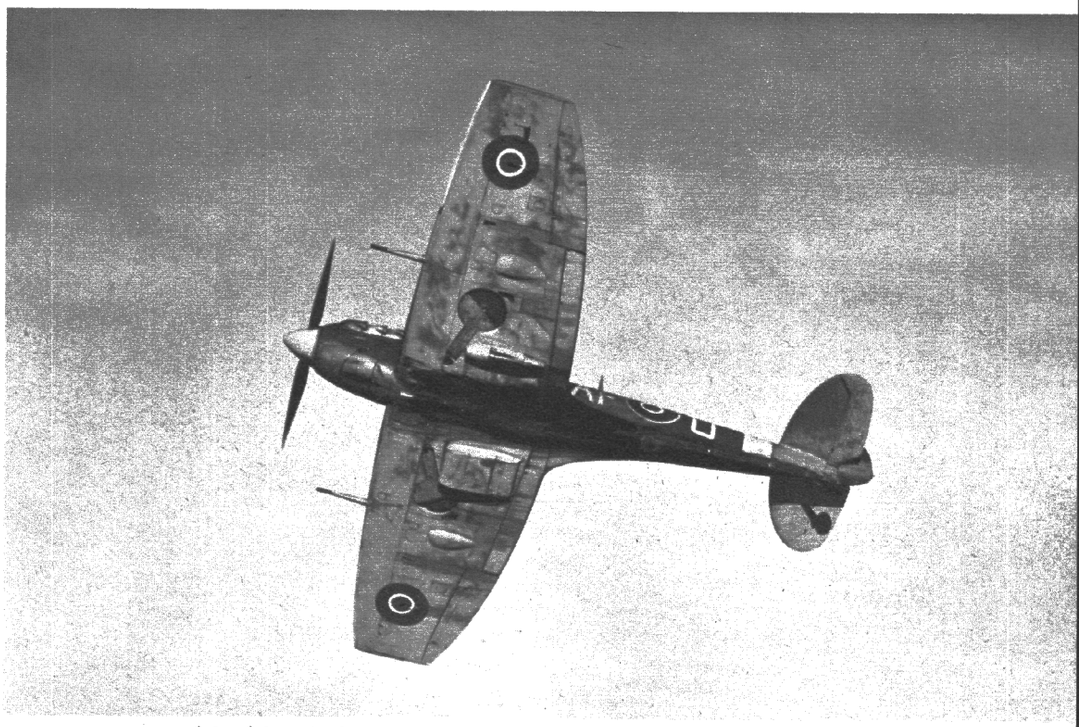
Marks VI and VII, on the other hand, had very pointed wings. The new Mark XII is clip-winged and has a new Rolls-Royce Griffon engine. A large spinner which fairs into the belly-line of the fuselage gives this model a nose-low appearance and a markedly different sit in the air. The Mark IX, most important operational version, has a slightly longer nose and a foot more of overall length and has radiator intakes at the root of each wing. Fin and rudder is more pointed.

RECOGNITION: Hurricane has wing and tailplane which taper evenly to rounded tips. Wing has slight dihedral from a straight inboard section. Nose is pointed. Fuselage has straight lower line, humped upper surface. Fin and rudder is broad and rounded. Span, 40 ft.; length, 31 ft.

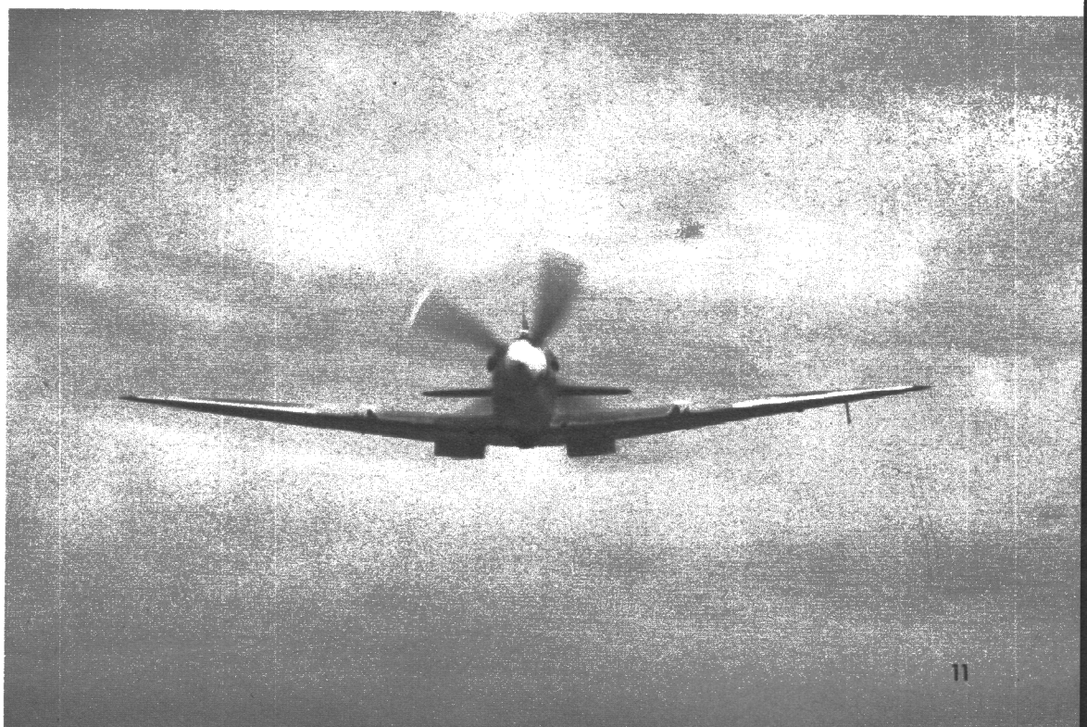
The basic Spitfire, subject to variations above, has distinctive elliptical wing and tailplane. Fuselage belly curves down from high spinner and up to high-set tail. Upper surface of fuselage runs level from cockpit fairing to tail. Fin and rudder is tall, narrow, rounded. Span, 37 ft.; length, 30 ft.

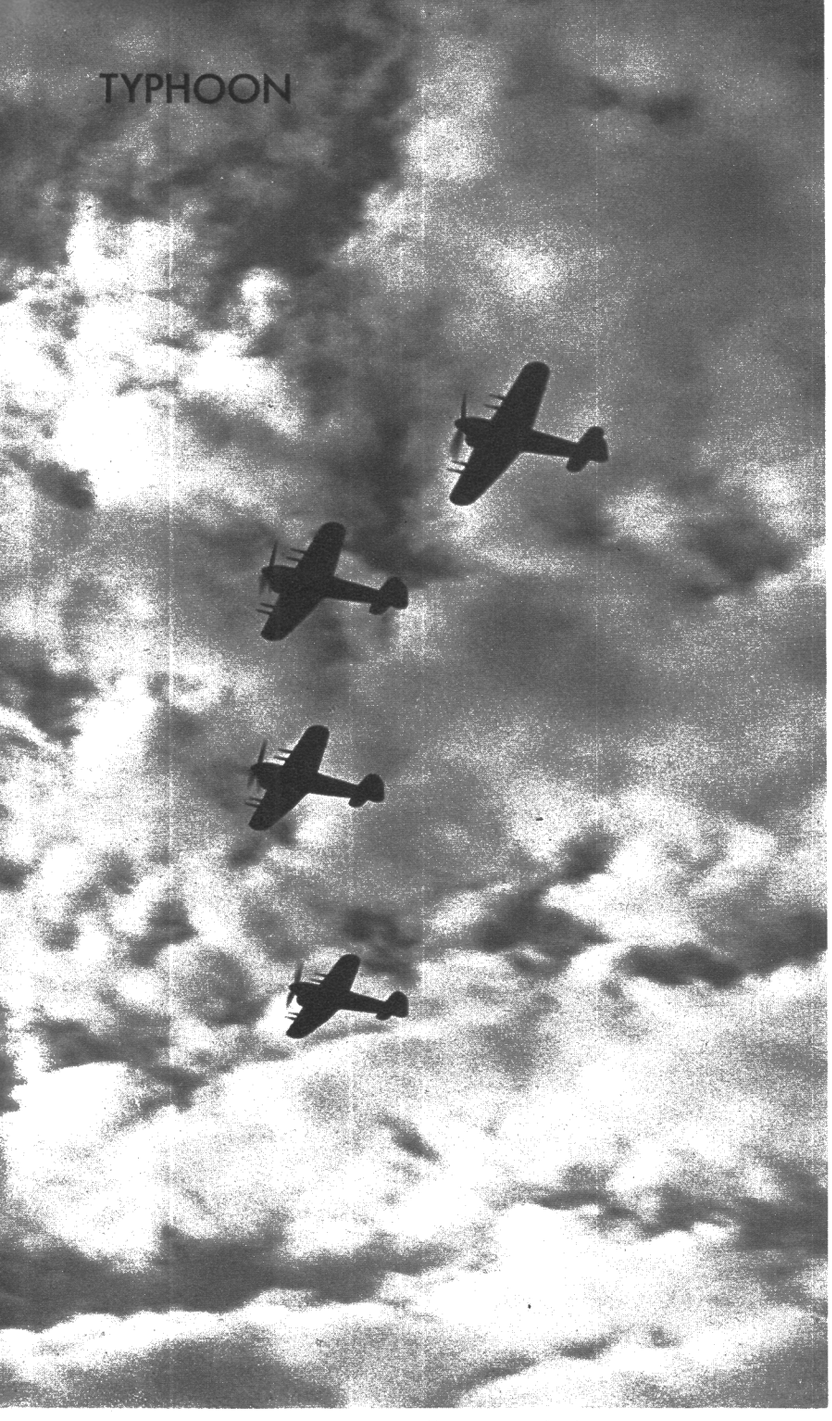


SPITFIRE FOUGHT AT NIGHT in Battle of Britain. Silhouetted Mark IX's (*above*) are now used chiefly for high-altitude fighting. Wing form and straight sit in the air are best clues in such difficult views.



CLIP-WINGED MARK V (*above*) has single radiator intake on starboard wing. Mark IX (*below*) shows two intakes at wing roots. Dihedral is very clear; wing tapers from thick chord at root to thin wingtips.





TYPHOON BOMBING RAIDS are usually connected with Fortress raids on Western Europe, and diversionary sweeps. Typhoon rate of climb is phenomenal.

TYPHOON BOMBER AND BEAUFIGHTER

Constantly harass Axis outskirts of Europe

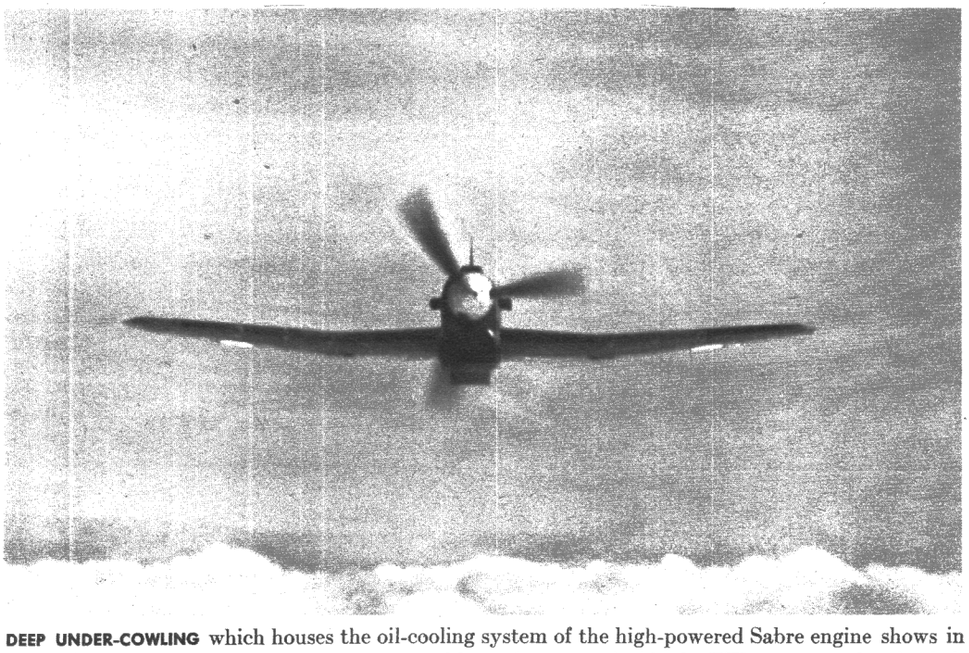
Both the Beaufighter and the Typhoon were designed as fighters, but have scored more outstanding successes in other capacities. The Beaufighter is the more versatile, continuing as day, night, and long-range fighter, while it has added strafing, tank-busting and land-based torpedo-carrying to its occupational list. The Typhoon with a bomb load of 1,000 lb. and mounting four cannon in the wings, is now more commonly seen than the original type with twelve machine guns.

The Typhoon was built around the 2,400-h.p. Napier Sabre engine, and was intended as a bomber-destroyer, which accounts for its big size. The Napier motor gives the Typhoon a speed of more than 400 m.p.h. so that the Typhoon is very difficult to recognize when flying high, and hard to hit during its bombing dives.

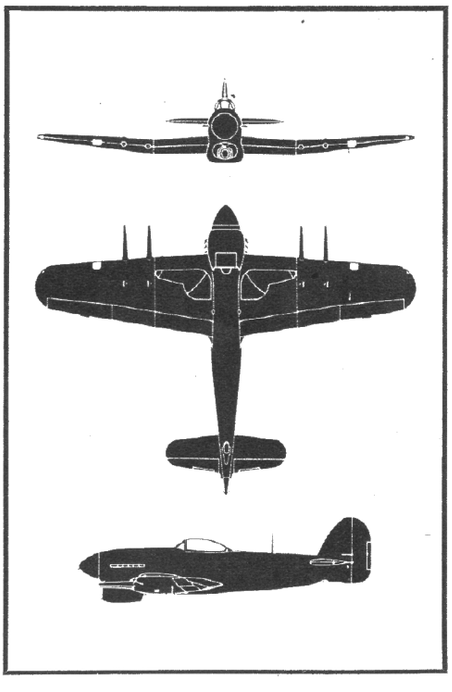
Although the U. S. classification does not exist in the RAF, the Beaufighter is an attack plane, used against all targets. It is the most powerfully armed fighting plane in service, with a 765-lb. weight of fire per minute, coming from four machine guns mounted in the starboard wing, two in the port wing, one in the observer's cockpit, and four 20-mm. cannon in the nose. Descended from the Beaufort, from which it derives its range and structural strength, the Bristol plane is usually seen with two Hercules radial engines, although one model is powered with Merlin inlines.

RECOGNITION: Deep radiator intake under the nose distinguishes the Typhoon. It is a low-wing airplane, with a dihedral on the outer panels only. Wings are equally tapered with rounding edges, the shape being repeated in the tailplane. Fin and rudder is rounded, and extends below fuselage. Span, 41 ft.; length, 32 ft.

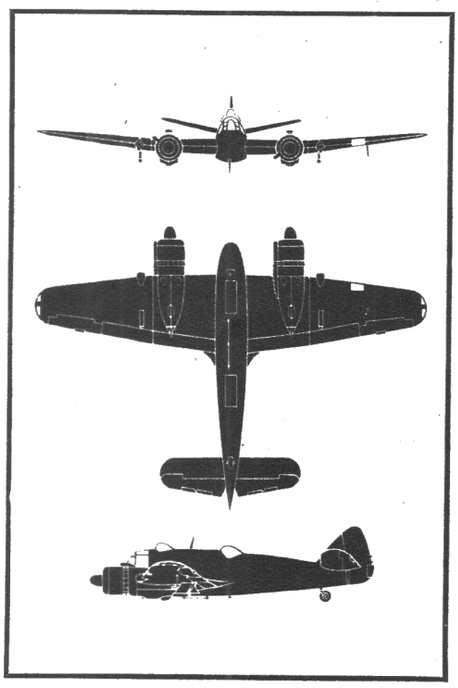
The Beaufighter is a midwing monoplane. The fin and rudder is broad and triangular. Engine nacelles are underslung, extend slightly beyond the stubby nose. The tailplane is broad, rounded, has a sharp dihedral and V cutout. Span, 58 ft.; length, 41 ft.

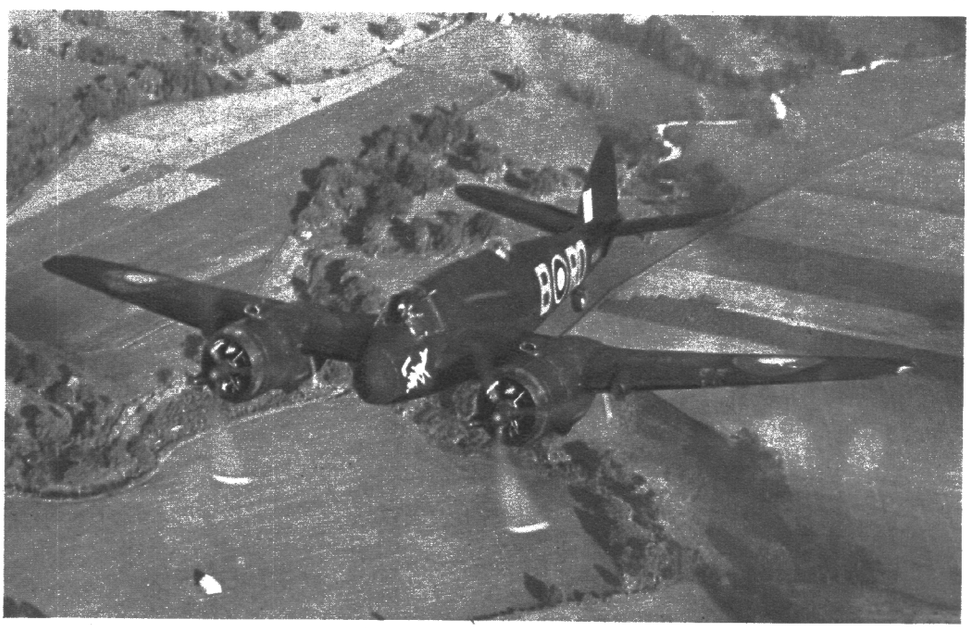


DEEP UNDER-COWLING which houses the oil-cooling system of the high-powered Sabre engine shows in head-on view. The Typhoon is very maneuverable, and can turn inside the FW-190 even when loaded.



REAR VIEW SHOWS dihedral of the Beaufighter's tailplane, a feature added to counteract swing during take-offs and so avoid damage resulting from slips off the runway at night. Torpedoes are carried externally, reducing speed below usual 335 m.p.h., but making changes in the fuselage unnecessary.





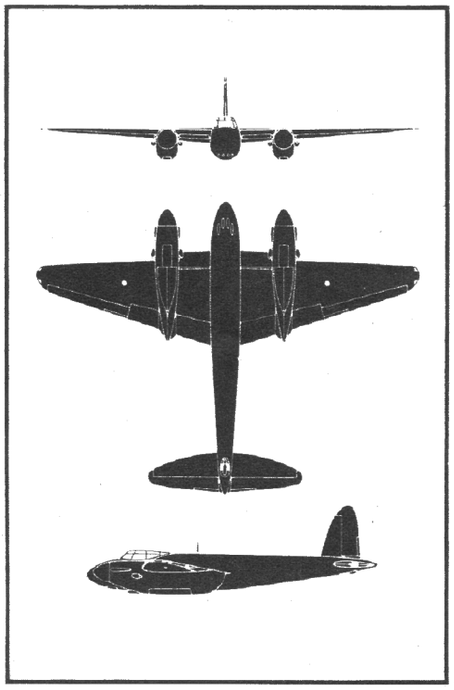
BEAUFIGHTER IS SCOURGE to Axis shipping, also protects Coastal Command bombers on anti-sub patrol. Japs name it "Whispering Death" because of swift, silent approach at low level over the jungle.

MOSQUITO'S GREAT SPEED MAKES DEFENSIVE ARMAMENT UNNECESSARY, GIVES AIRPLANE CLEAN LINES FREE OF GUN TURRETS AND OTHER LARGE PROTUBERANCES

LETHAL MOSQUITO

Fast nightfighter, intruder bomber, reconnaissance plane is world's most versatile aircraft

Since entering operations as an unarmed high-speed bomber late in 1941, the De Havilland Mosquito has performed about every job in the book. With four 20-mm. cannon and four .303 machine guns mounted in a solid nose, the Mosquito is one of the world's best nightfighters and tank-busters. With a glassed-in nose, it has been a superlative light bomber, spot-bombing Party headquarters and Nazi demonstrations when least expected, flying in at roof level to avoid the radar. In a sub-stratosphere version with modified engines, extra wing tanks and low-drag finish, it has been the RAF's best photo-reconnaissance plane. In every use, its twin en-



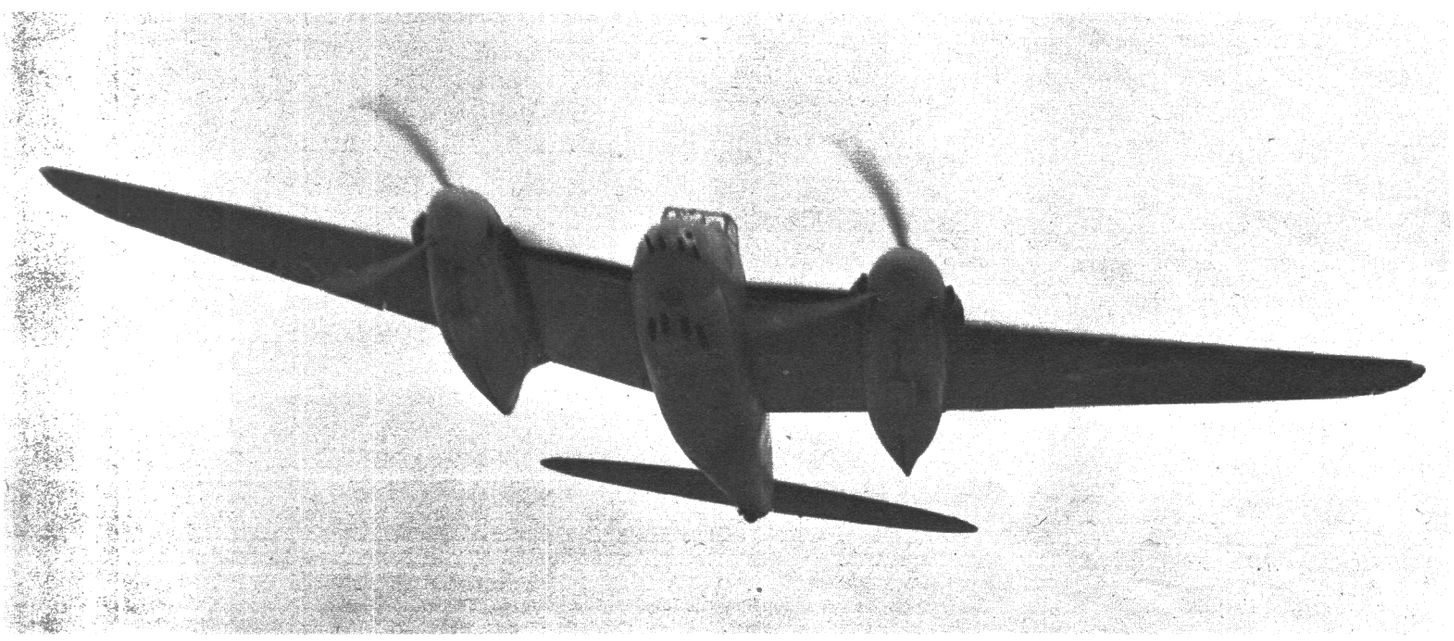
WING RADIATOR INTAKES project between the Mosquito's engine nacelles, break straight leading edge of the wing. Nacelles and nose project evenly. Long elliptical tailplane repeats curved lines of fuselage.

MOSQUITO FIGHTERS FLY FORMATION ON WAY TO CONTINENT. THIS TYPE IS DISTINGUISHED BY SOLID NOSE AND PROJECTIONS OF FOUR .303-CAL. MACHINE GUNS

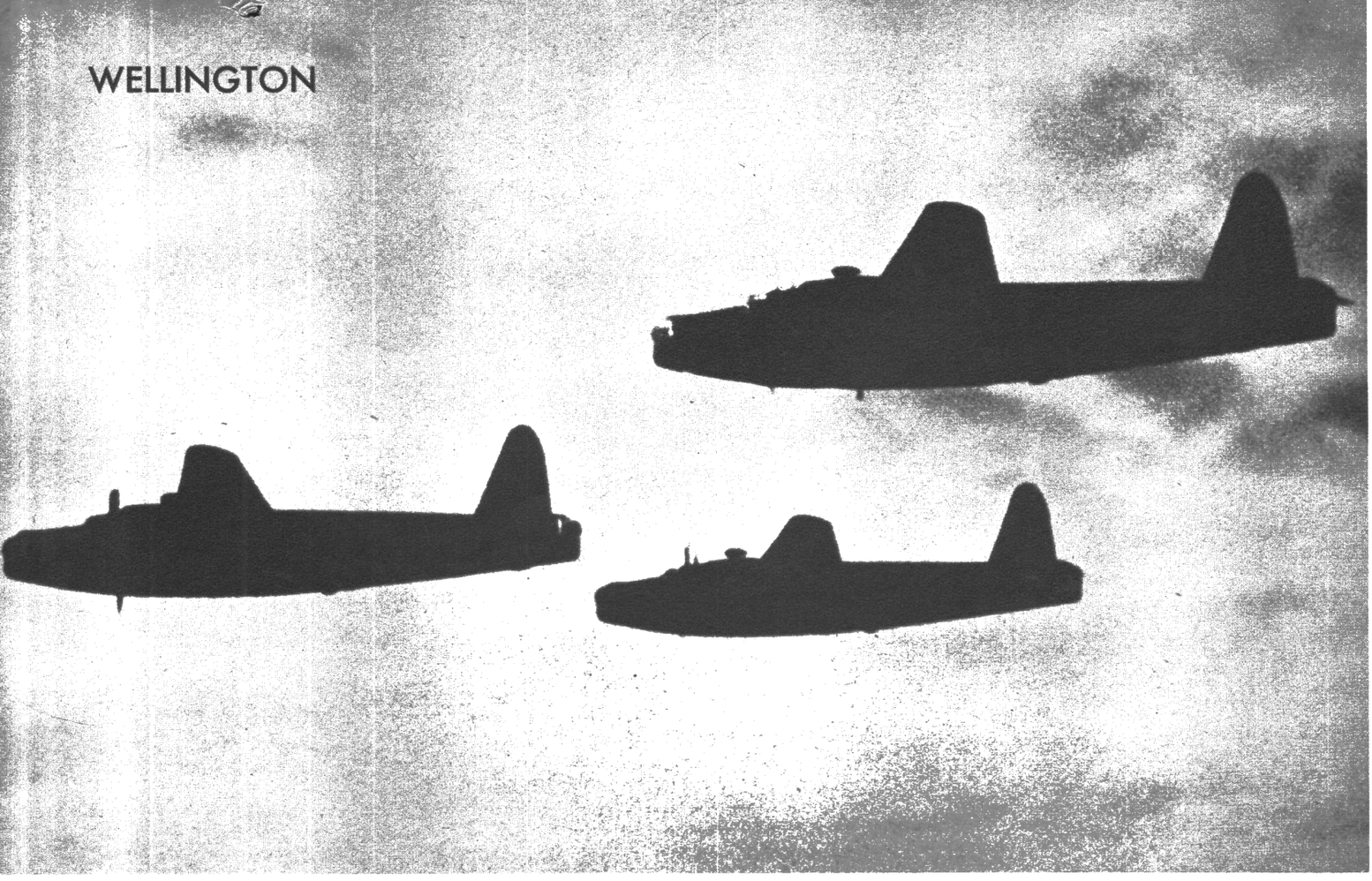
gines have given it a speed of over 400 m.p.h., enabling it to get in its blows before being discovered and to outrun interceptors on the way home.

The all-wood construction of the Mosquito's airframe has been a production godsend. In this war of metals, there has been a less pronounced shortage of wood. Woodworkers in England were an untapped source of skilled labor. Basic components of the Mosquito's production could be distributed among over 400 subcontractors. With these advantages the Mosquito was in operational use only 22 months after its original design. In combat, the wood skin gives a low-drag surface, does not splinter when struck. It can be quickly and easily repaired and will stand up even under the shock of belly landings.

RECOGNITION: The design is aerodynamically clean. The fuselage tapers from a rather pointed nose; only the glazed cockpit breaks the contours. The wing has a straight leading edge, pronounced taper on trailing edge. Tailplane is smooth ellipse; fin and rudder is tall and elliptical. Wing radiators cause leading edge to extend forward between twin nacelles. Nacelles project evenly with nose, slightly beyond trailing edge. Span, 54 ft.; length, 41 ft.



TWO INLINE ENGINE NACELLES are slung under Mosquito's high midwing. The two Rolls-Royce Merlin 21 engines drive airplane through the air at over 400 m.p.h., make the Mosquito the fastest light bomber in the world and one of the fastest aircraft in service. It can outrun most interceptors.



WELLINGTON'S FUSELAGE IS VERY DISTINCTIVE, WITH BLUNT NOSE AND TAIL, STRAIGHT BACK AND CURVED BELLY-LINE. FIN AND RUDDER IS TALL AND TRIANGULAR

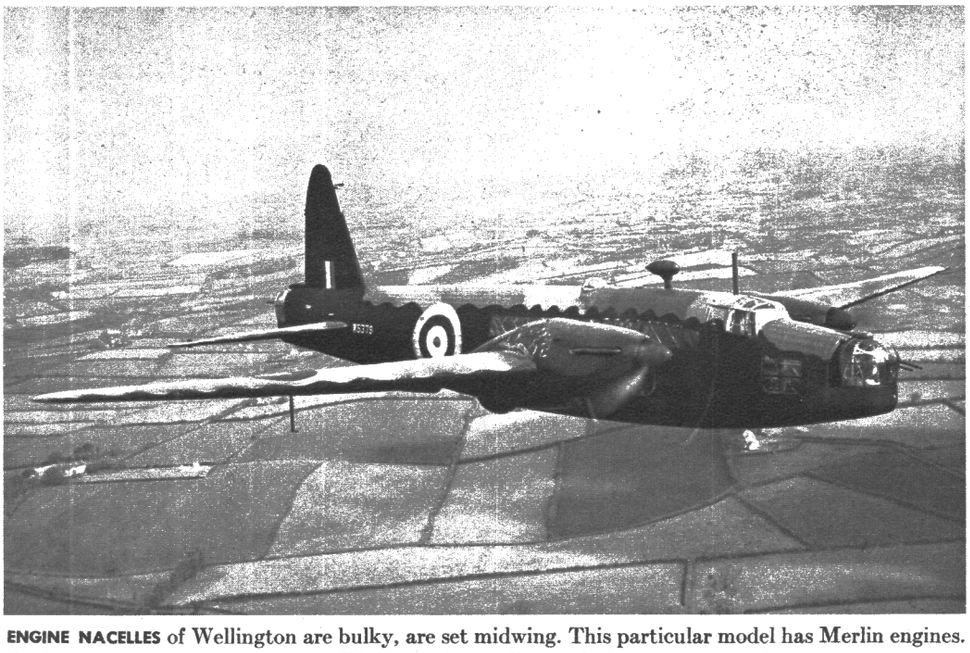
WELLINGTON, SUNDERLAND

Have fought since beginning

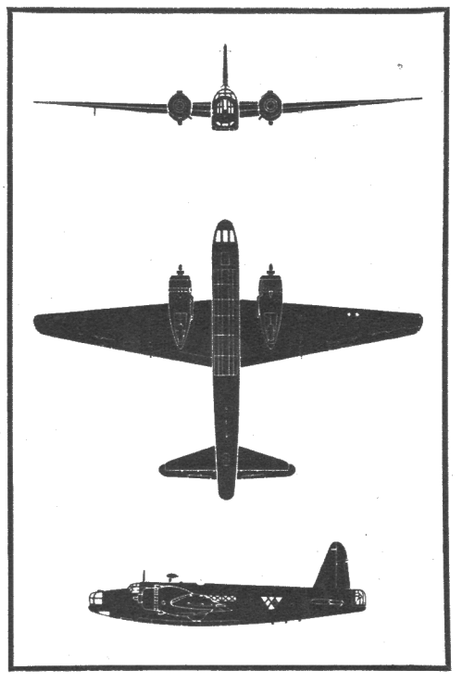
Among the RAF's oldest planes are the Bomber Command's medium, the Wellington, and Coastal Command's flying boat, the Sunderland. Both were in service at the outbreak of war. The Wellington, in fact, made the first bombing raid of the war, an attack on Wilhelmshaven, Sept. 4, 1939. Both are doing a good job today.

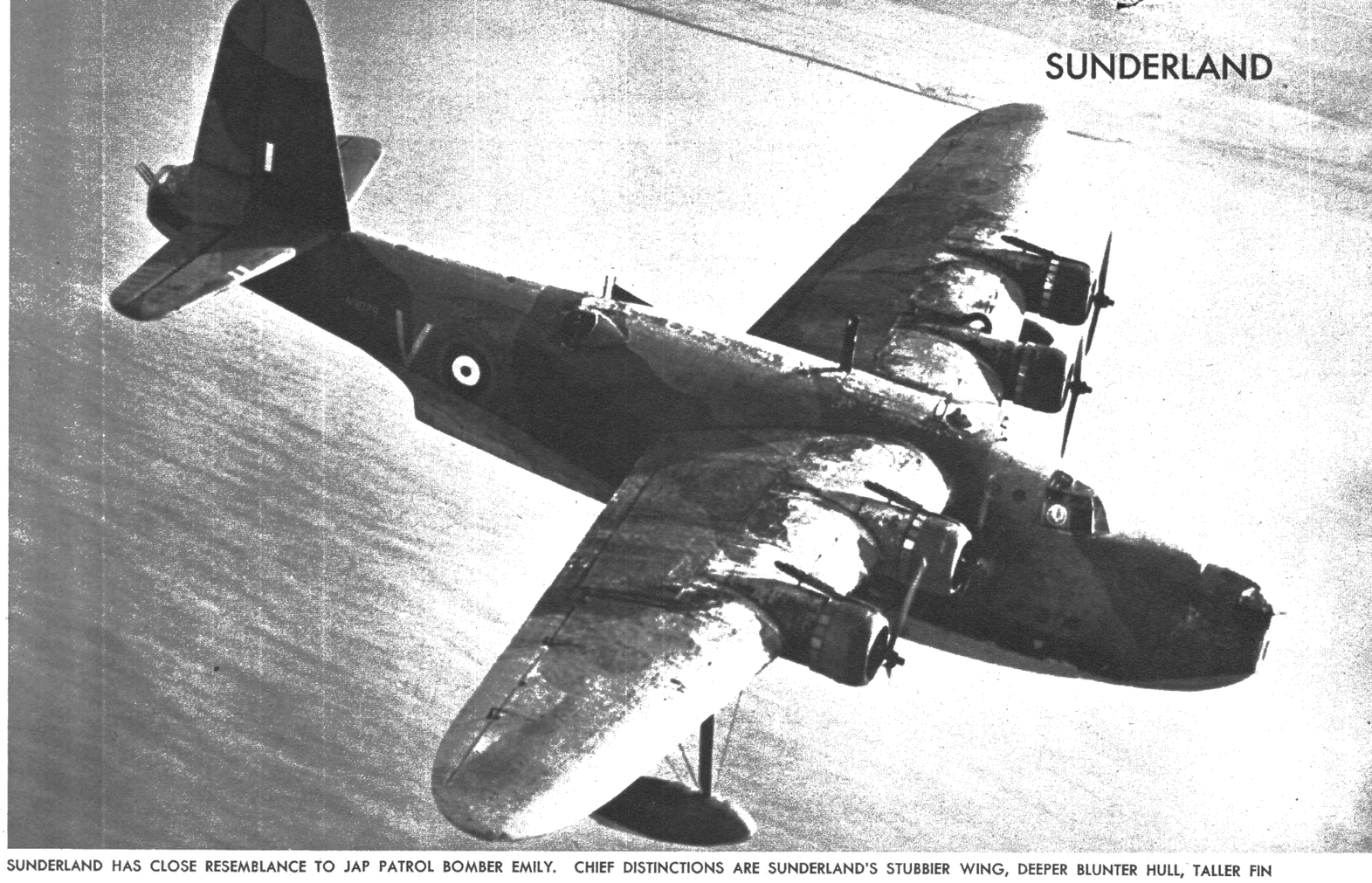
Originally, the Wellington was mainstay of the small RAF bombing force. Performance in Mediterranean has been exceptional. In Sicily it has been a fine ground-support plane, spotting targets with great precision in advance of the troops. Prior to the invasion it helped clear land and water areas, bomb ground objectives, torpedo ships. It has worked both as a mine-layer and minesweeper. In the latter use, known as "Wedding Ring Wimpy," it carried a cumbersome ring about two-thirds the wingspan in diameter which, being charged, set off magnetic mines when the plane flew low over them.

Like most of the older RAF planes the Wellington has gone through a number of variations. Different models have been powered by radial Bristol Pegasus or Her-



ENGINE NACELLES of Wellington are bulky, are set midwing. This particular model has Merlin engines. Basket-weave structure that forms Wellington's peculiar geodetic airframe is visible through windows.





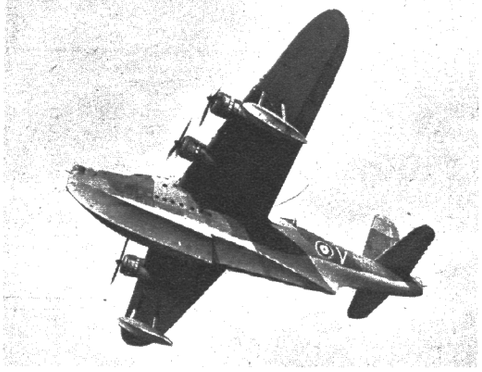
SUNDERLAND HAS CLOSE RESEMBLANCE TO JAP PATROL BOMBER EMILY. CHIEF DISTINCTIONS ARE SUNDERLAND'S STUBBIER WING, DEEPER BLUNTER HULL, TALLER FIN

cules engines, Pratt & Whitney Wasps or inline Rolls-Royce Merlins. One newer version has a solid rather than a turret nose. In this version the fuselage comes to a high point forward.

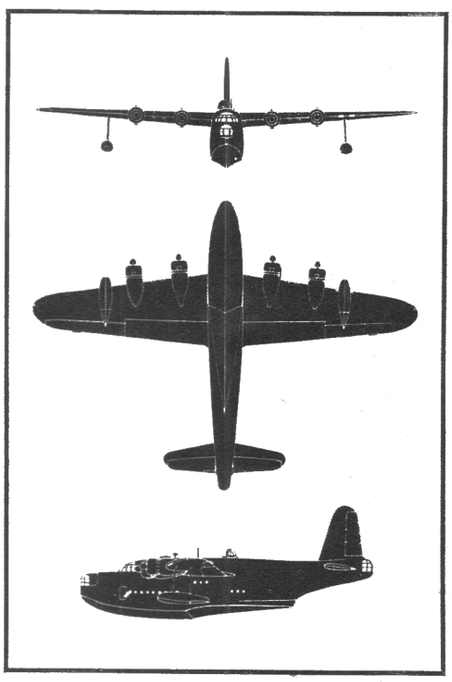
The Sunderland is an outgrowth of the flying boats built by Short Bros. for British Overseas Airways. It is a big plane with great carrying capacity. During the fight for Crete, one Sunderland brought out 80 men in a single trip. When the Kensington Court was sunk in 1940, a Sunderland rescued the entire crew. The Sunderland has two nose guns, four in the tail turret and two amidships or in a dorsal turret.

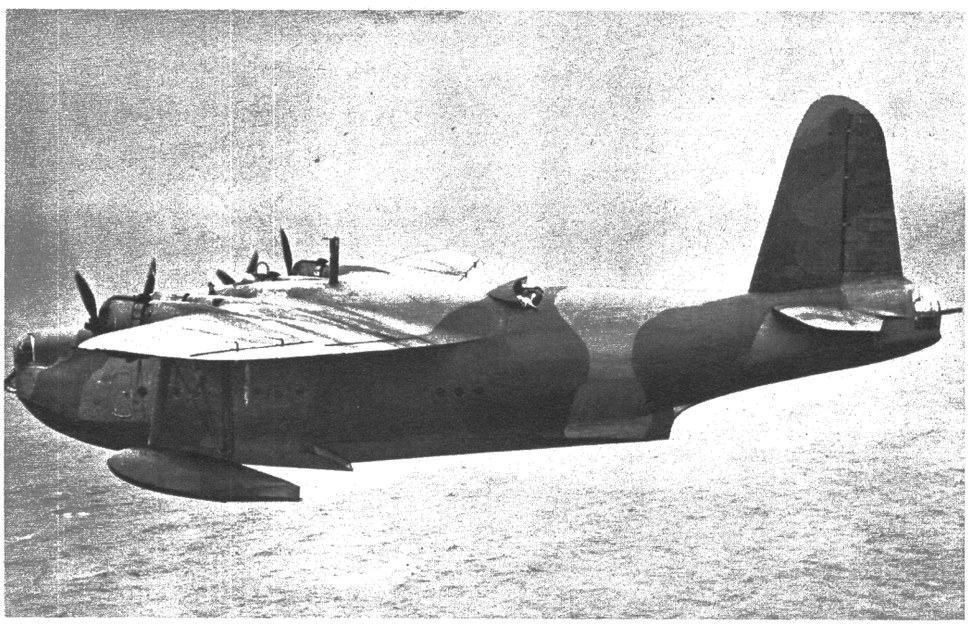
RECOGNITION: Wellington has thick fuselage with blunt nose, blunt tail. Long tapered wing and tailplane. Fat engine nacelles set close to fuselage. Tall fin and rudder set high on fuselage. Span, 86 ft.; length, 61 ft.

Sunderland is deep, broad-hulled flying boat. Four engines are mounted midwing in high double-tapered wing. Fin and rudder is very tall, set high above upswept tail. The nose turret gives the hull a bulldog snout. Span, 112 ft.; length, 85 ft.



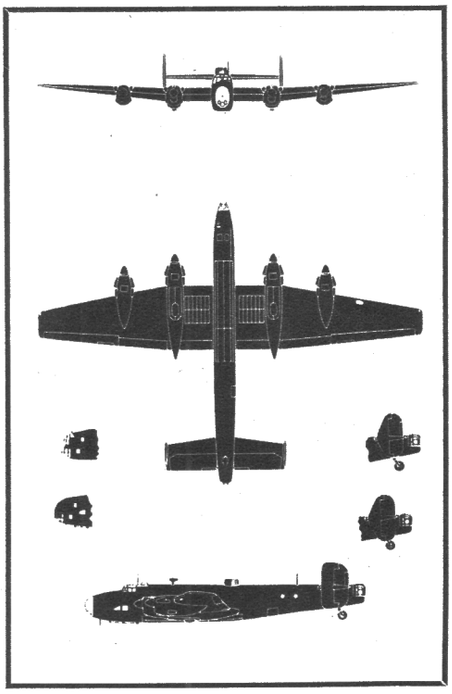
SUNDERLAND'S BROAD WING tapers to rounded tips. Deep flying-boat hull is impressive from below.





GREAT SIZE of British flying boat is shown by crew members watching camera plane from top gunner's position. Despite its bulk, four engines get airplane through the air at speeds over 200 m.p.h.

FIRST VERSION OF HALIFAX II HAD NEW GLASSED-IN NOSE AND SEMI-RETRACTABLE TAIL WHEEL, BUT KEPT ORIGINAL TRIANGULAR FINS AND RUDDERS, RADIO ANTENNA



HALIFAX AND STIRLING

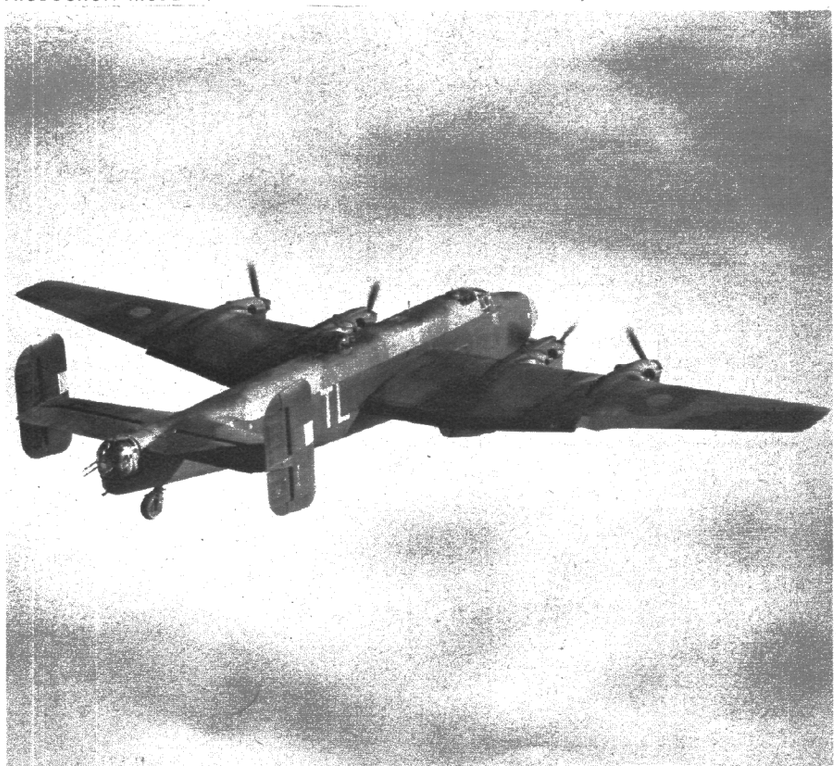
Britain gets revenge as heavies pour weight on Germany

For the first year and a half of air war, Great Britain was on the defensive. Her fine fighting planes battled against almost overwhelming odds and, in the end, battled successfully. During the summer of 1940 the names Spitfire and Hurricane became household words throughout the world. But in the spring of 1941, heavy bombers, the weapons of offense, began to come off British production lines. The Short Stirling made its first sorties the night of Feb. 10, 1941. The Handley-Page Halifax went on its first mission—raids on Kiel and Le Havre—on March 11, 1941. Since that time, these craft and the newer Lancaster have stolen the headlines from their swift fighter defenders.

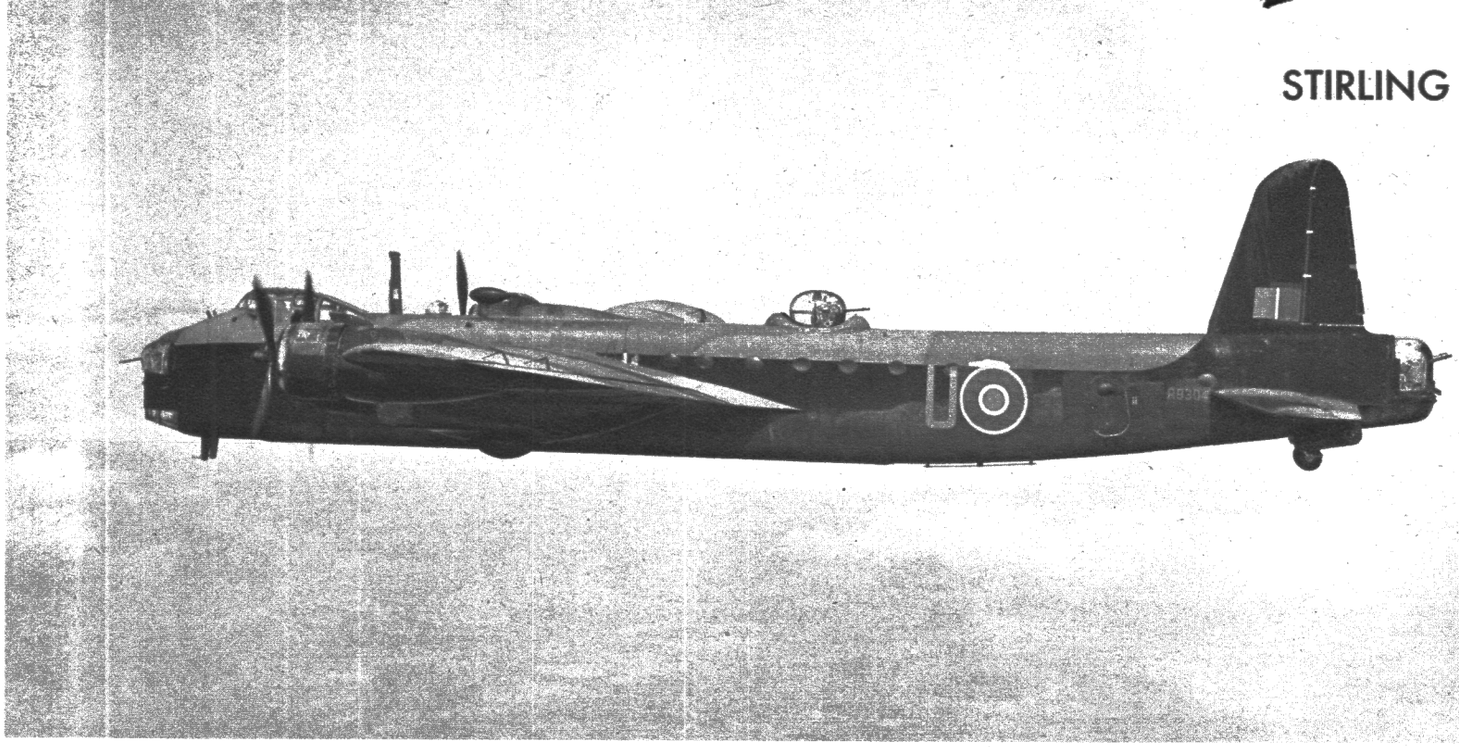
The Halifax has gone through a number of variations since it first appeared. Some changes in nose and tail are included in the silhouettes at the left. The original "Halibag" was of full monocoque construction, powered by four Merlin 10 engines. Its wingspread was limited to less than 100 ft. by the available hangars. Trailing-edge flaps extended from wing root to the ailerons to permit take-offs from small fields under

HALIFAX I HAS NOSE, TAIL AND DORSAL TURRETS, TRIANGULAR FINS

PRODUCTION MODEL OF HALIFAX II IS IDENTIFIED BY ROUNDED, RECTANGULAR TWIN TAILS



STIRLING



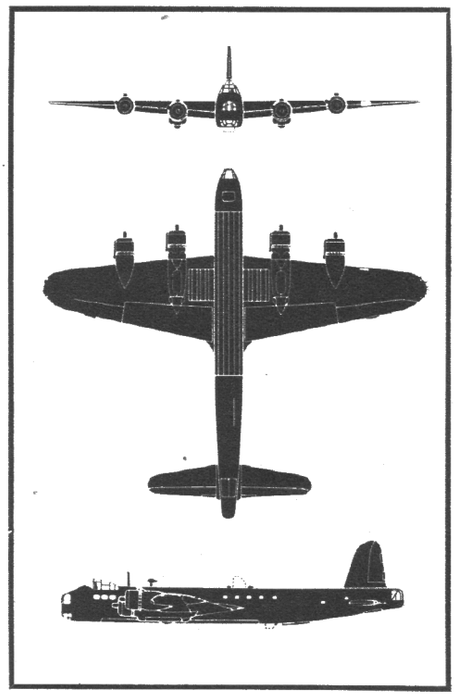
LONG BULKY FUSELAGE OF SHORT STIRLING MADE IT FIRST FLYING "BOXCAR." ANGULAR SNOUT AND TALL, HIGH-SET FIN AND RUDDER DISTINGUISH IT IN SIDE VIEW

heavy load. The original nose had a bulbous turret at the top, a prominent chin for the bombardier's position below. The twin fins came to a point at the tailplane while the rudders were broad and rounded. The Halifax II has a smooth glassed-in nose and more rectangular fins and rudders. Defensive armament is concentrated in four-gun turrets in the tail and on top of the fuselage. An intermediate stage had the new nose and the old tail assembly (*see left*). In its newest form, the performance of the Halifax compares with that of the Lancaster.

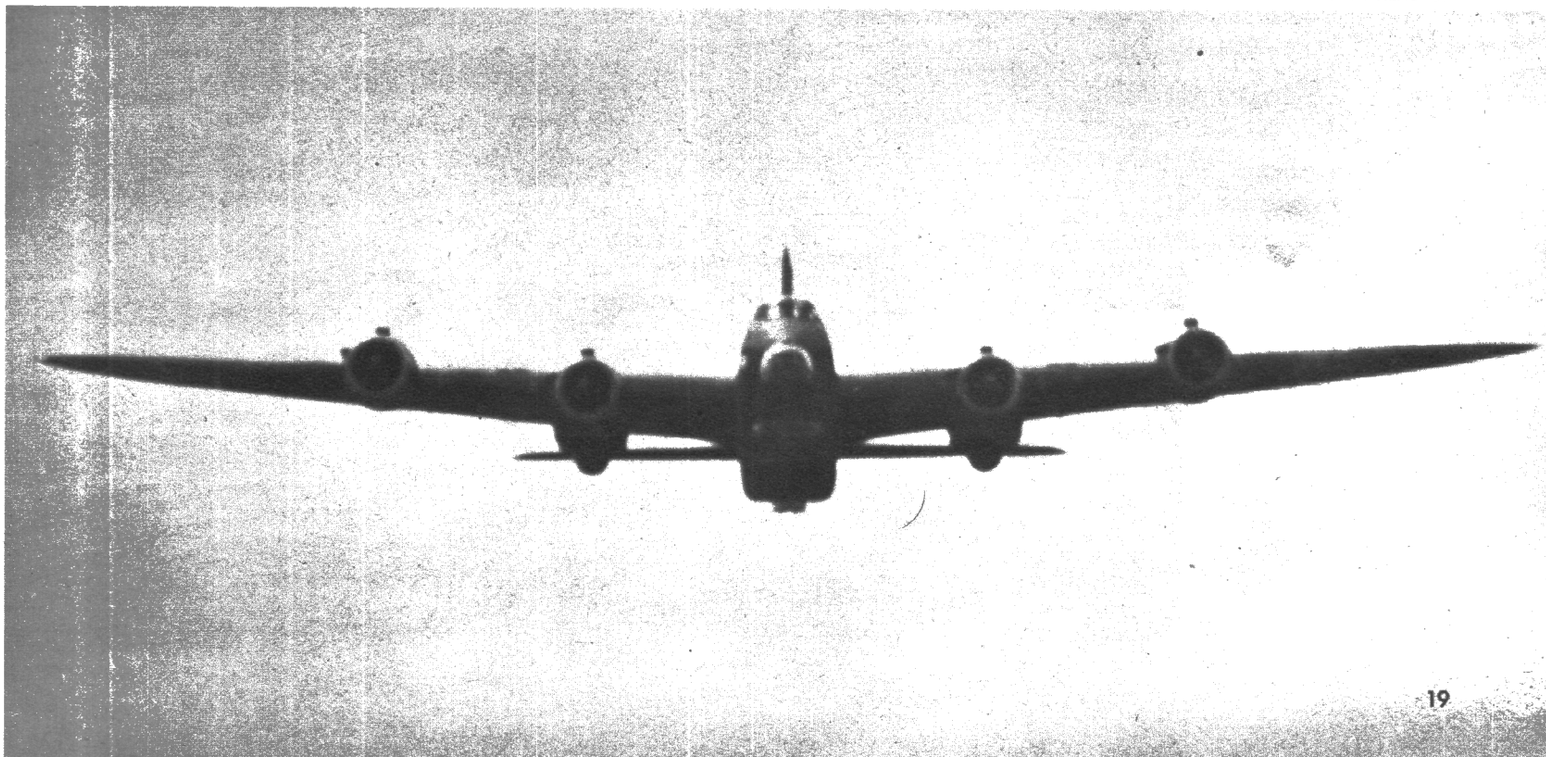
The Stirling, which is now being superseded by the Halifax and Lancaster, was once the biggest weight-lifter in the RAF's line-up, carrying a bomb load of over eight tons. Like the Halifax, its wingspan was limited by the available hangar space. Because of this and its great weight, the Stirling lands at high speed and cannot climb until its landing gear is retracted. The plane carries more armor than any other craft in the air, even its leading edge is armored.

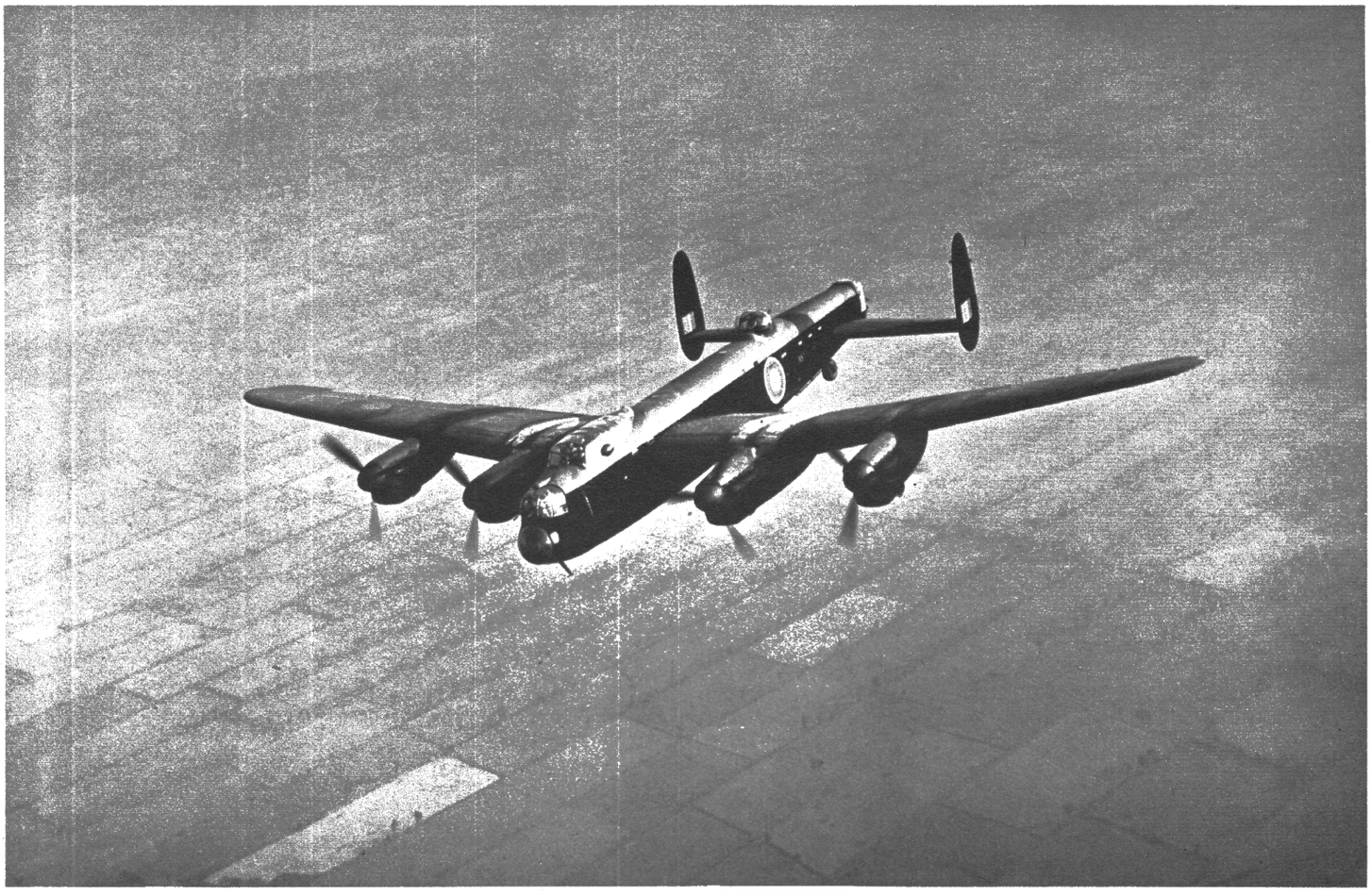
RECOGNITION: Despite nose and tail changes, the Halifax has a distinct character. The fuselage is long and deep-bodied, rounded fore and aft. Midwing has straight panel inboard, then tapers evenly to square tips. All nacelles are underslung, inner ones may extend beyond trailing edge. Tailplane has slight taper on leading edge. Span, 99 ft.; length, 71 ft.

The Stirling has very long fuselage with almost straight lines top and bottom. Cockpit forms noticeable hump forward of leading edge. Wing tapers evenly from thick root chord to very thin tips, with a pronounced dihedral angle. Inboard radial engine nacelles are long and underslung; outboard nacelles short, midwing. Single fin and rudder is mounted high on the fuselage forward of gunner's position. Tailplane is long and tapering. Span, 99 ft.; length, 87 ft.



STIRLING'S THICK WING, TAPERING TO VERY THIN TIPS, AND MIXED MOUNTING OF ENGINES, TWO HIGH, TWO LOW, MAKE PLANE UNLIKE ANY OTHER SEEN HEAD-ON





LIKE ALL BRITISH HEAVIES, "LANK" HAS LONG INBOARD NACELLES, BOXCAR FUSELAGE. MOST PROMINENT DISTINCTION IS GUITAR-PICK FIN AND RUDDER

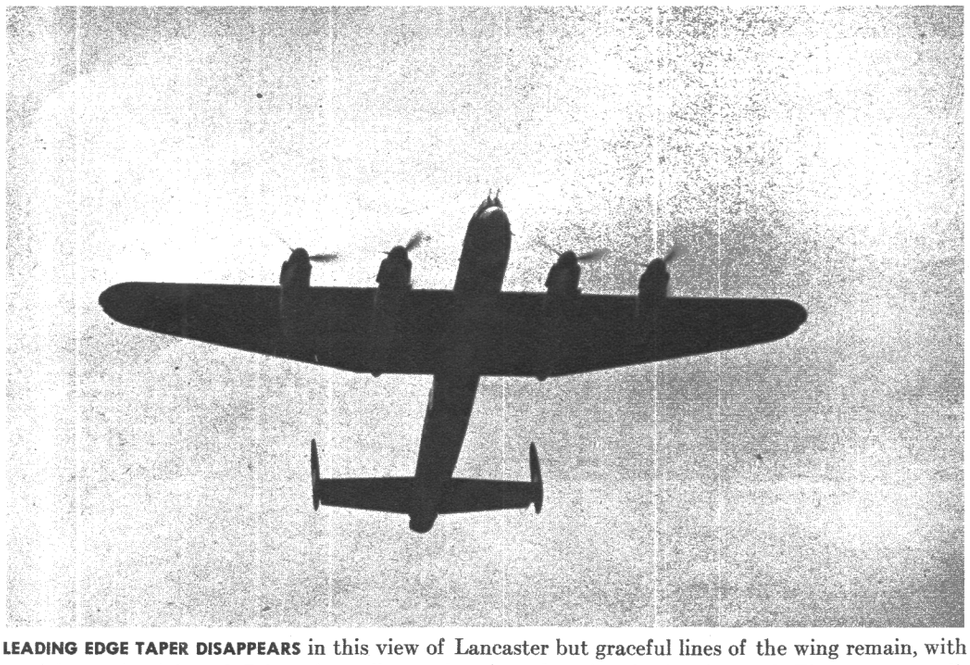
LANCASTER

RAF's fastest big bomber, it is mainstay of Bomber Command

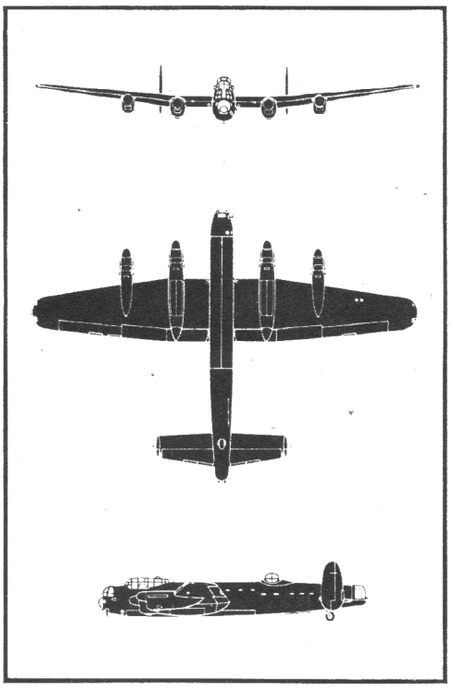
Since April 1942, when the Lancasters went out on their first daylight sweep, a roof-level attack on the Diesel plant at Augsburg, they have grown into the greatest strategic weapon in the European air war.

With a maximum speed of over 300 m.p.h., a maximum range of 3,000 miles, and able to carry an 8-ton load, the Lancaster has a generally high performance. It dives at 360 m.p.h. and, when fully loaded, can climb at a rate of 1,000 ft. per minute.

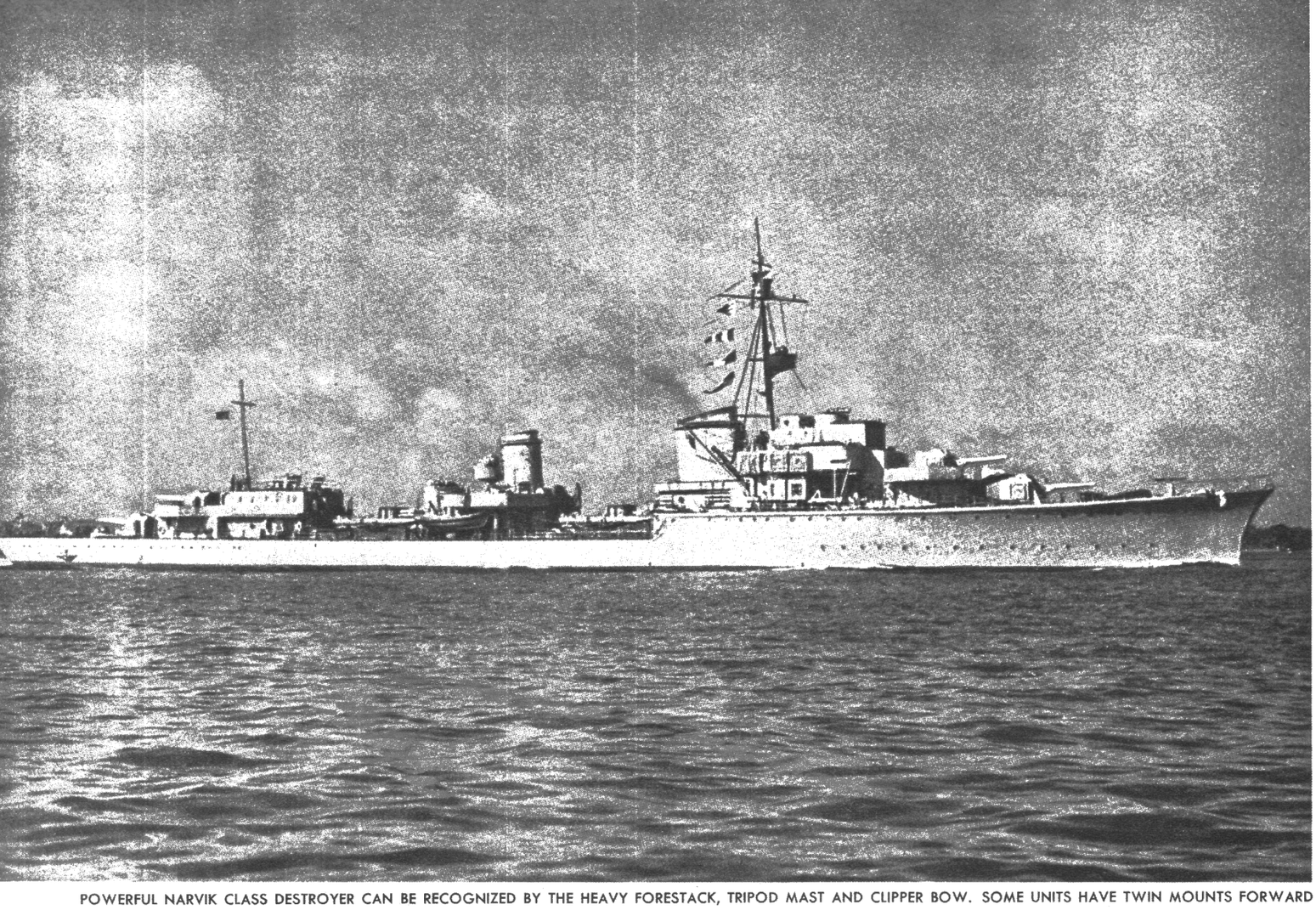
RECOGNITION: Long boxy fuselage has prominent turrets on nose and tail, bulbous top turret and inconspicuous remotely controlled belly turret. The wing has straight section to inboard nacelles, tapers outboard to round tips. Dihedral starts from inboard engines. Tailplane is long and narrow; fins and rudders form long ovals. "Lank" usually has four Merlin inline engines, but may have four Bristol Hercules radials. Span, 102 ft.; length, 69½ ft.



LEADING EDGE TAPER DISAPPEARS in this view of Lancaster but graceful lines of the wing remain, with straight section inboard. Inboard nacelles are longer and project farther forward. Fins are very tall.



Above fire and flak of Hamburg
broad-winged Lancaster looses
tons of bombs on U-boat yards



POWERFUL NARVIK CLASS DESTROYER CAN BE RECOGNIZED BY THE HEAVY FORESTACK, TRIPOD MAST AND CLIPPER BOW. SOME UNITS HAVE TWIN MOUNTS FORWARD

CHANNEL CRAFT

With heavier classes crippled, German Fleet's sting depends on smaller types

Two sharp displays of naval action coming within a few days of each other brought out clearly the situation of German sea might. The Scharnhorst, a fast but undergunned battleship of 26,000 tons, was sunk off North Cape, leaving the Nazi Navy without a single battleship in fighting trim. Three days later eleven Narvik and Elbing Class destroyers were sighted west of the Bay of Biscay, evidently seeking to contact an important blockade runner. Aircraft of RAF's Coastal Command had already accounted for the merchantman, and a U. S. Navy Liberator sighted the destroyer squadron in time to call in the British cruisers Glasgow and Enterprise. Expert British gunnery sank three of the German destroyers and damaged several others.

But these losses are no indication that the coastal sniping between German and Anglo-American sea and air forces will subside. As long as Nazi convoys slink from port to port in the English Channel and North Sea, planes of the RAF and ships of the Royal Navy's coastal forces will be out to attack them.

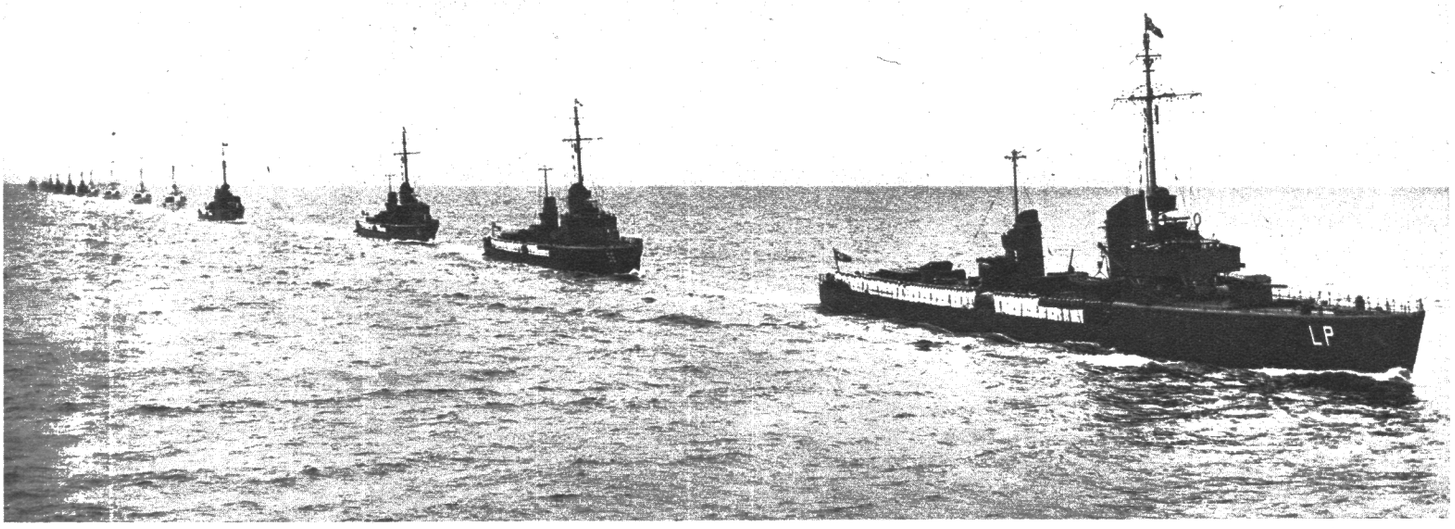
Most powerful destroyers of the German Fleet are the Narvik Class. Their four 5.9-in. guns enable them to engage light cruisers, have caused the Germans to call them convoy destroyers. They were laid down in 1939 and were first seen off Narvik. Newer than the Narviks but less heavily armed are the flushdeck Elbings (*see grid, pages 26–27*). They were laid down in 1942, got provisional class name when they were first identified off the East Prussian coast near Elbing. Except for the Karl Galster, lone survivor of the Roeder Class virtually wiped out at Narvik, the remaining German-built DD's belong to the Maasz Class laid down in 1935. Displacing 1,625 tons, and 381 ft. long, they are less formidable than the Narviks which measure 410 ft. in length, displace 1,870 tons.

Although destroyers have largely replaced torpedo boats in other navies, the Germans in the 1920's built the Möwe and Wolf Classes (*see opposite*). Since the Narvik, Roeder, Maasz, Wolf and Möwe Classes are somewhat similar in appearance, they appear on the training list as one group. Another class of torpedo boat, T-1's, were completed between 1938–40.

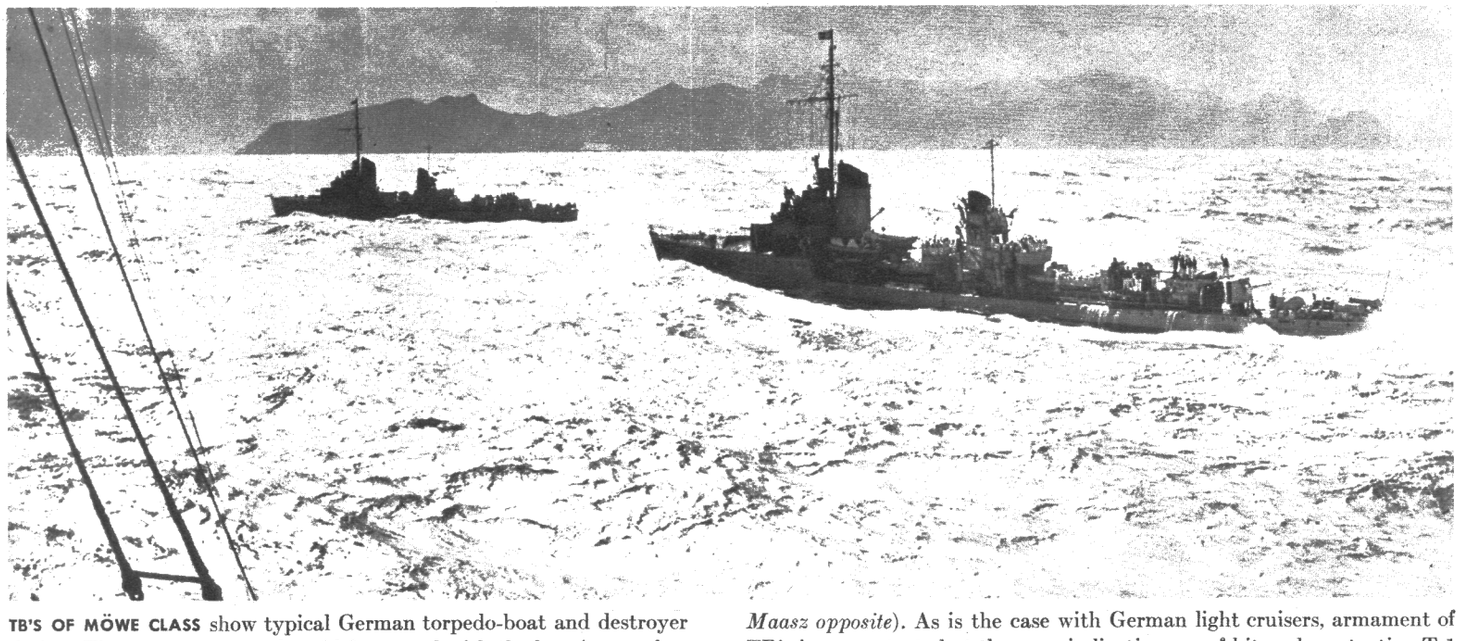
The balance of German minor combatant types and auxiliaries follow the conventional pattern of PT boats (S-boats), various types of minesweeping, minelaying craft, patrol boats, trawlers. The more important types are pictured on pages 24–25, while the German Navy as a whole, including seizures, is shown to scale on the grid which follows.

MAASZ was typical prewar Nazi destroyer. Note how widely-spaced stacks, with heavier one forward, break in deckline correspond with similar features on the Narvik Class DD shown above. Maasz's bow differs, however.

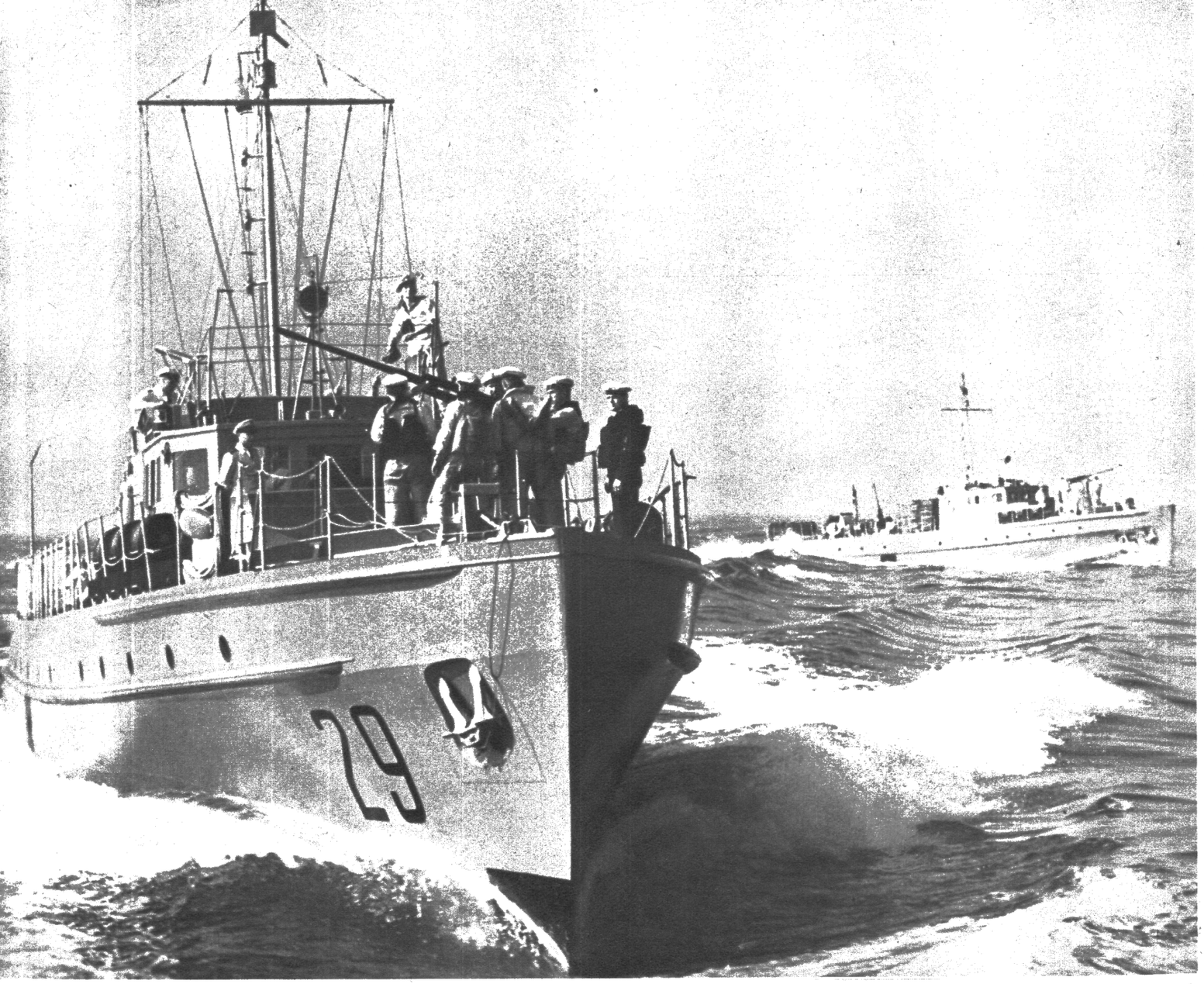
WOLF CLASS TORPEDO BOATS Jaguar and Tiger cross the T of old battleships Hessen and Schleswig-Holstein during Baltic maneuvers. Built as destroyers under limitations of the Versailles Treaty, these 800-ton ships are seaworthy enough for high seas duty with the Fleet. Their speed is 34 knots; armament includes three 4.1-in. guns, six 21-in. torpedo tubes in triple mounts. All of the Wolf Class ships are named for animals of prey.



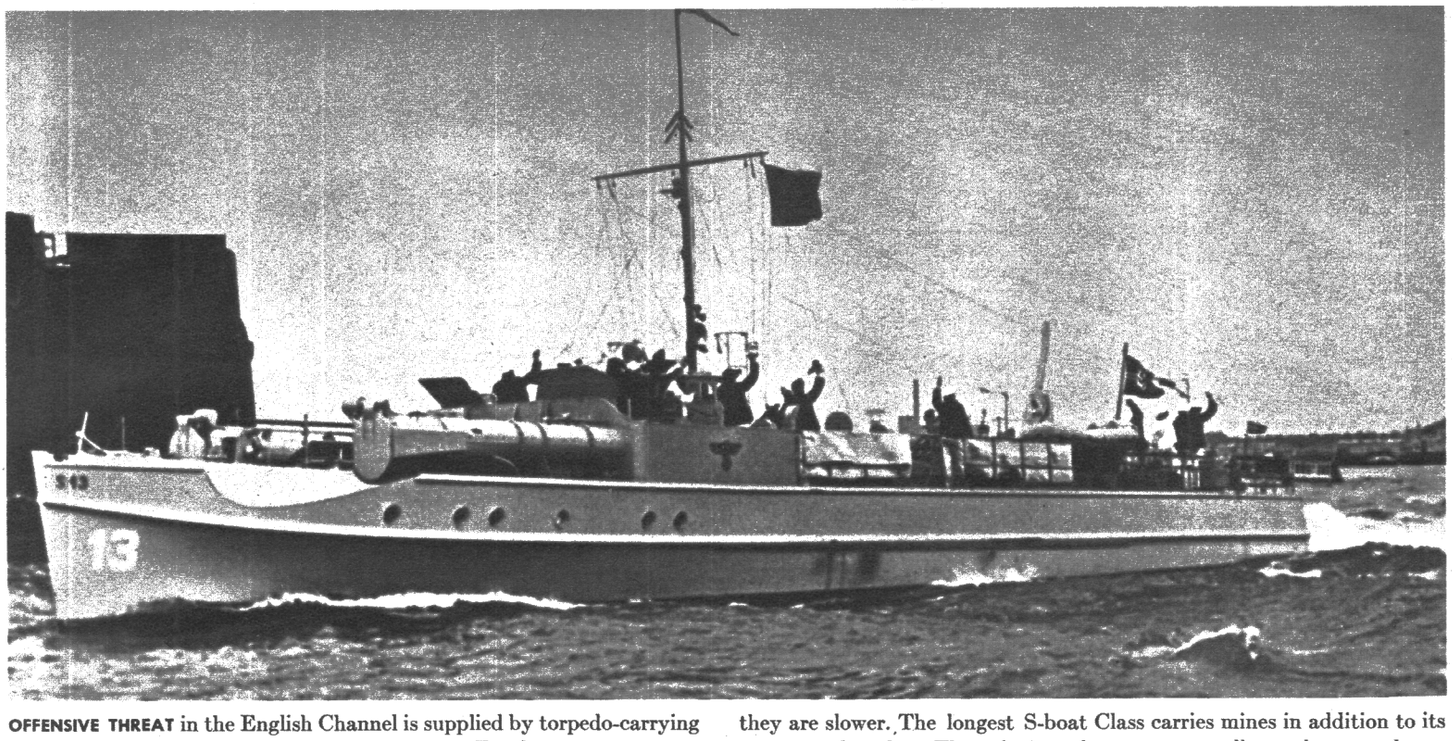
MÖWE CLASS TB SEEADLER (Sea Eagle) follows Leopard of Wolf Class in reviews at Kiel. Laid down in 1925, two years earlier than Wolf Class ships, the Möwes are slightly shorter (288 ft. vs. 304 ft.), displace same tonnage. Möwe means gull, and all ships in this class are named for birds. Distinguishing Möwe and Wolf ships from each other is difficult; Möwe's stack is set close to the bridge, both have raked rather than clipper bows.



TB'S OF MÖWE CLASS show typical German torpedo-boat and destroyer design. They carry two stacks widely spaced with the heavier one forward. Break in deckline comes abreast of the forestack (*see Narvik and Maasz opposite*). As is the case with German light cruisers, armament of TB's is concentrated at the rear, indicating use of hit-and-run tactics. T-1 Class (*see grid*) is smaller, faster, less heavily armed than Wolf and Möwe.

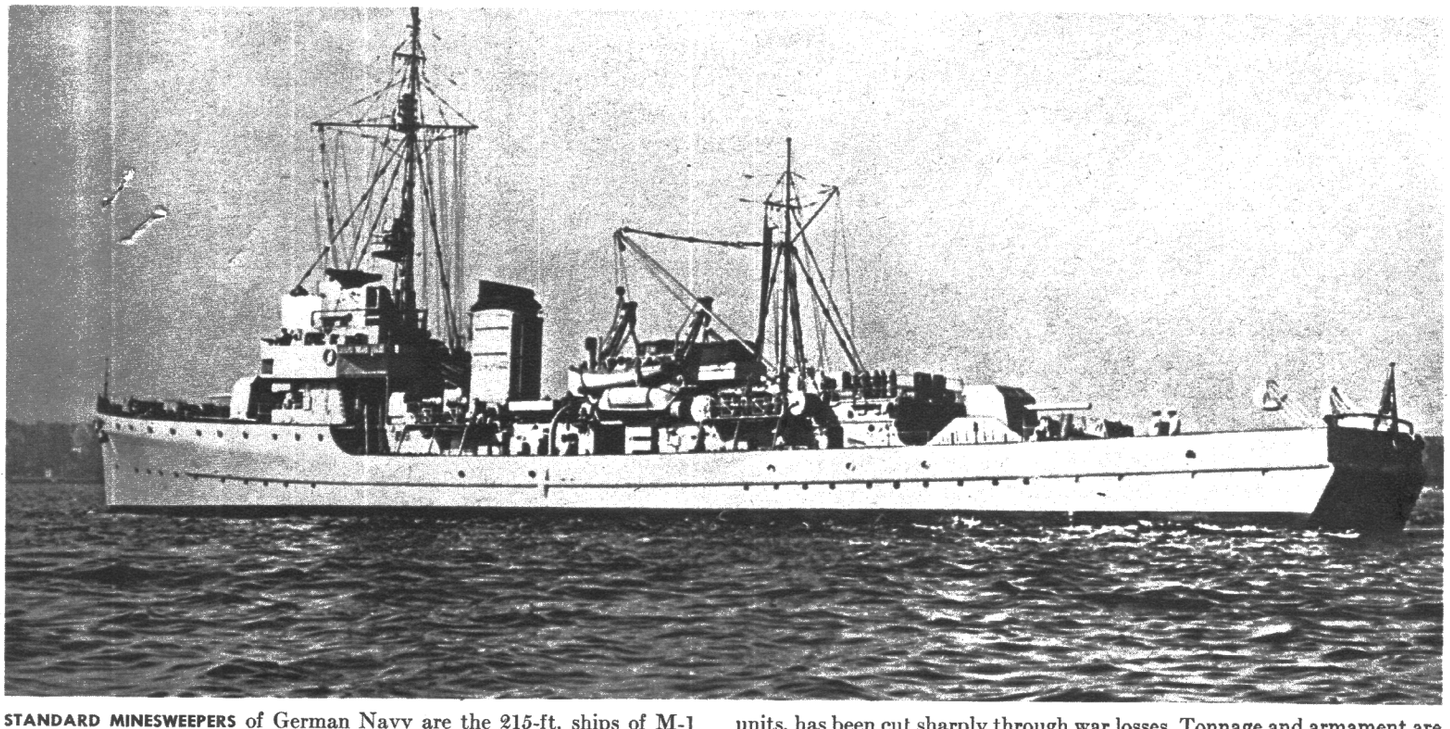


R-BOATS ARE USED in the German Navy as minesweepers, minelayers and patrol craft. In the U. S. Navy their classification would be coastal minesweeper (AMc). Length of R-boats varies from 85 to 121 ft.; speed is 17 to 18 knots; armament consists of single AA guns fore and aft. Flushdeck craft, with no visible stacks, they sometimes appear with small center island (*above*), also with additional superstructure extending far aft of bridge.



OFFENSIVE THREAT in the English Channel is supplied by torpedo-carrying S-boats which frequently attack British forces. The known types have lengths of 92, 106, and 115 ft. They are bigger than U. S. PT's, though they are slower. The longest S-boat Class carries mines in addition to its two torpedo tubes. The tubes can be seen externally on the type shown above; on other S types they are built into the top of the hull near bow.

MINELAYING GUNBOATS, units of F-1 Class, have seen but little service to date. Their armament consists of single 4.1-in. guns fore and aft, also four 1.460-in. AA guns. Except for flushdeck Königin Luise (F-3), ships of F-1 Class have two breaks in deckline, one just fore, the other just aft of forestack. Length of the F-1's is approximately 250 ft., displacement 600 tons. Widely-spaced stacks and high freeboard forward aid identification.



STANDARD MINESWEEPERS of German Navy are the 215-ft. ships of M-1 Class. Escorting convoys and subs in Bay of Biscay, they seek to counteract minelaying campaign of RAF's Coastal Command. Class included 40 units, has been cut sharply through war losses. Tonnage and armament are approximately same as F-1's. Outstanding recognition features are barge-like stern, high boat davits amidships (*here shown lowered*), and single stack.

GERMAN NAVAL VESSELS PRINCIPAL COMBAT

The 38 classes of fighting ships which make up the substance of the German Navy are portrayed to scale in the silhouettes on this spread. Ships which have never been completed, or which are being rebuilt after heavy damage, are shown in black. Just how these will look when and if they appear is uncertain.

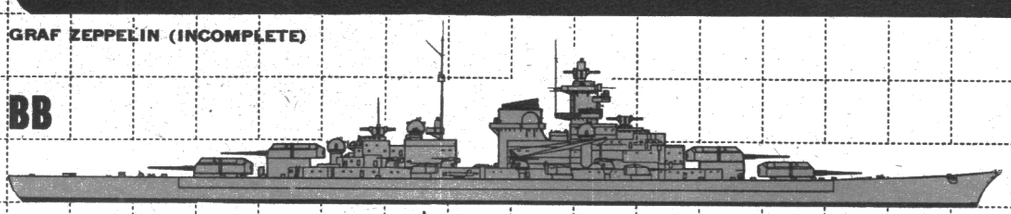
Offensive strength of the German Fleet has been dissipated by individual defeats at the hands of Allied vessels and planes but certain large ships and numerous small ones remain as threats to Allied movements in northern waters.

SCALE: EACH SQUARE EQUALS 50 FT.

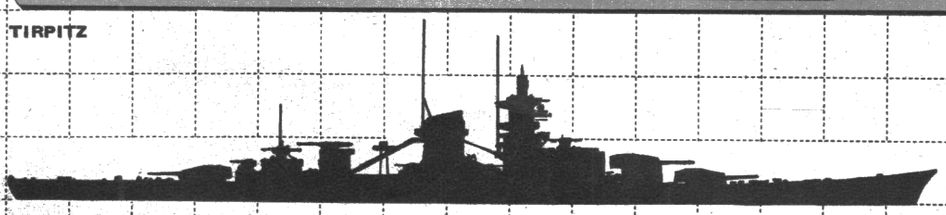
CV

GRAF ZEPPELIN (INCOMPLETE)

BB



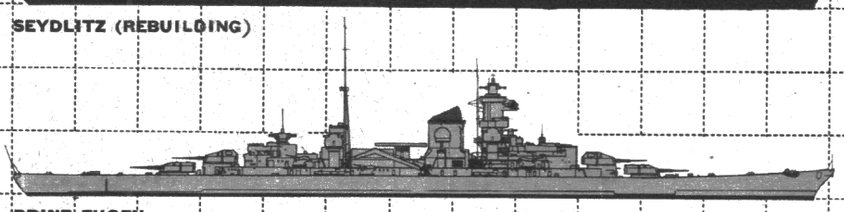
TIRPITZ



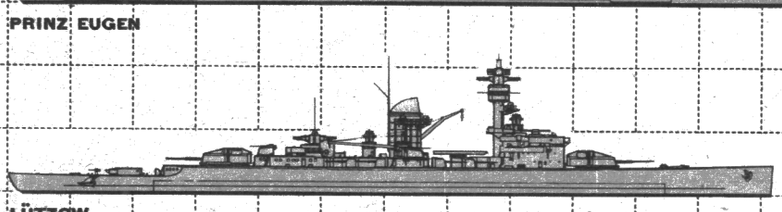
GNEISENAU (REBUILDING)

CA

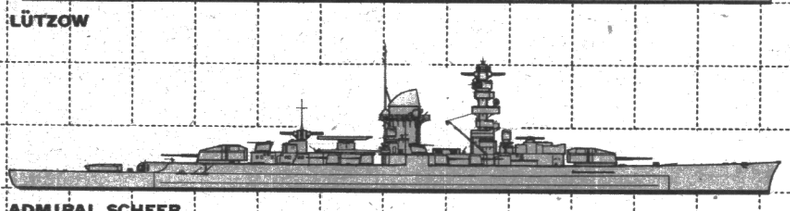
SEYDLITZ (REBUILDING)



PRINZ EUGEN

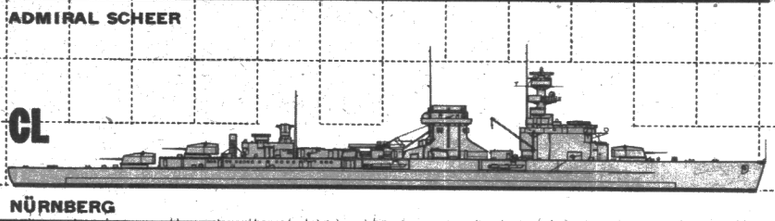


LÜTZOW

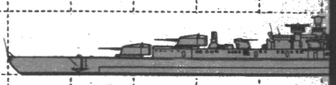


ADMIRAL SCHEER

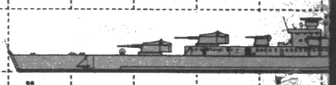
CL



NÜRNBERG



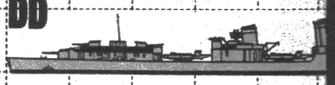
LEIPZIG



KÖLN

EMDEN

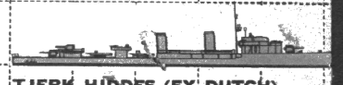
DD



NARVIK

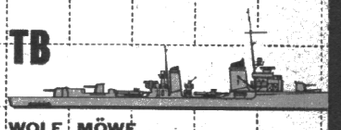
MAASZ

ELBING

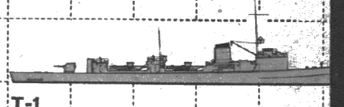


TJERK HIDDES (EX-DUTCH)

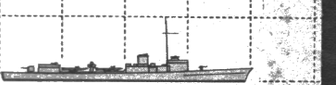
TB



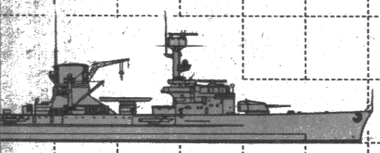
WOLF, MÖWE

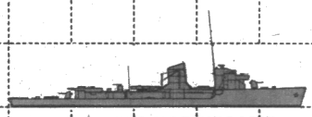


T-1



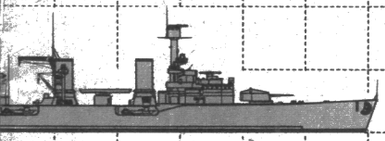
RIEHERSTIEG



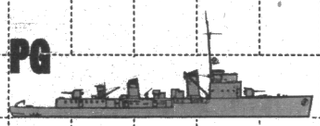


SLEIPNER (EX-NORWEGIAN)

R CLASS



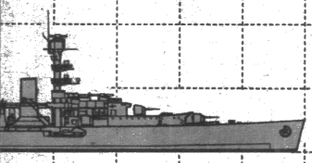
PG

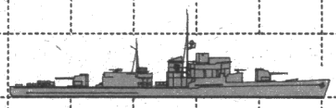


F-1

PT

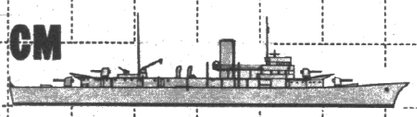
S CLASS



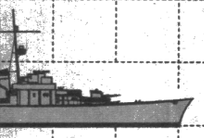


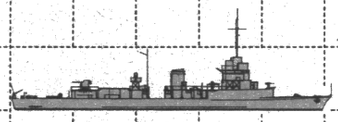
GUNBOAT (EX-DUTCH)

CM



ALBATROS (EX-NORWEGIAN)

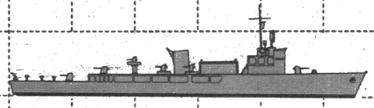




ELAN (EX-FRENCH)

SS

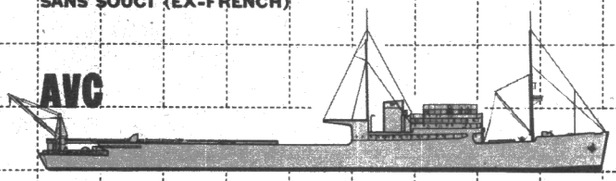
1600-TON



SANS SOUCI (EX-FRENCH)

1200-TON

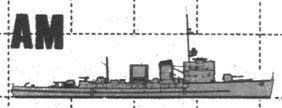
AVC



FRIESENLAND

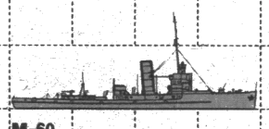
740-TON

AM



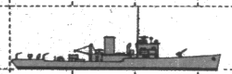
M-1

600-TON



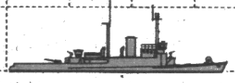
M-60

517-TON



OTRA (EX-NORWEGIAN)

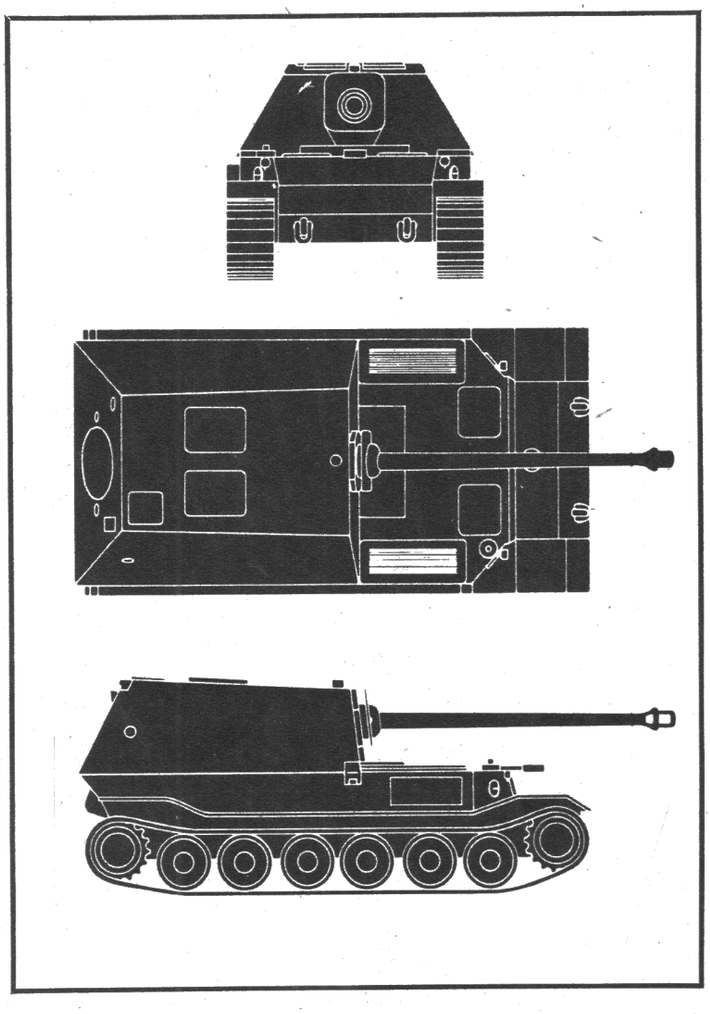
250-TON



WILLEM VAN EWICK (EX-DUTCH)

1200-TON SUPPLY TYPE

LACK OF RETURN ROLLERS TO TAKE UP SLACK IN TRACK GIVES MOTIVE GEAR OF FERDINAND A DILAPIDATED LOOK. CHASSIS BOW IS LONG BUT GUN BARREL LONGER



FERDINAND &

More pictures of self-propelled "88" and PzKw

The Germans have been hurling their heaviest armored equipment against the Russians. Recently silhouettes and more pictures of the two newest Nazi armored threats encountered on the Russian front, Ferdinand and the Panther (*see Journal Nov. and Dec.*), have been made available to the *Journal*, are shown on these two pages.

Ferdinand is a tremendous 70-ton self-propelled mount which carries an 88-mm. gun on a chassis built to offer maximum resistance to enemy firepower. The thickness of Ferdinand's armor plate is as much as 8 in. on the front, intended to make the mount serve as a battering ram to clear the way for lighter armored vehicles of the Nazi anti-tank battalions. There are usually 44 of these self-propelled "88's" in one heavy battalion and each one carries a crew of six. Although the mighty firepower and armor of Ferdinand make it a dangerous opponent, it has been proved to be quite vulnerable. Unwieldy and underpowered for its great size, it can travel only 12 m.p.h. on a highway and 6 to 9 m.p.h. on rough ground; to fire, it must come to a full stop. When Ferdinand is attacked by more than one opponent at a time, its fixed weapon is a great handicap. Russians concentrate their artillery attacks on Ferdinand's mobile parts which break down readily under the great weight of the chassis; also on the gun installation and on the gas tanks in the center of the hull. Grenades and Molotov cocktails hurled through a large shell-case ejection opening in the rear of the mount will blast the twin electric motors located directly inside.

A new heavy tank in the German arsenal, the 45-ton PzKw

HUGE BOW OF PANTHER SLOPES UP TO IMPOSING HEIGHT. TURRET HAS ROUNDED FORWARD WALL RESEMBLING RUSSIAN T-34. ARMOR PLATE PROTECTS SUSPENSION

THE PANTHER

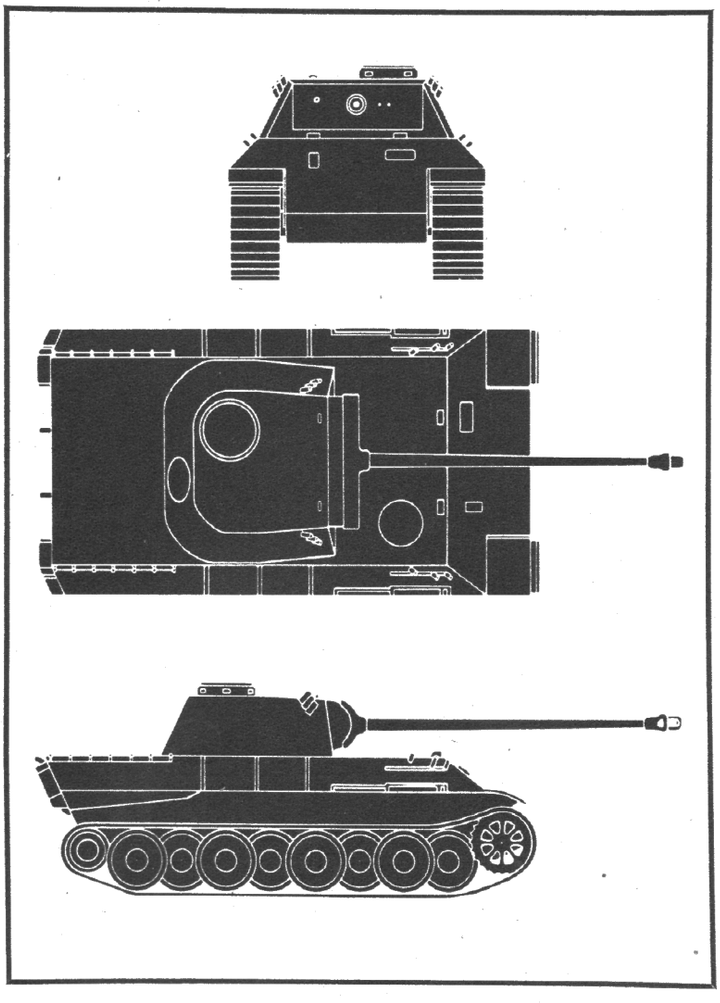
Mark V reveal details of new Nazi weapons

Mark V serves to bridge the gap between the 22-ton Mark IV and the 60-ton Mark VI, Tiger. This tank, which is called the Panther, appears to be a first-class vehicle, fast, well-armored and hard-hitting. It has the advantage of being swifter and more maneuverable than the Tiger but at the same time is easier to knock out because of lighter armor protection. Its long-barreled 75-mm. gun with double-baffle muzzle brake is a new weapon which has a high velocity, considerable armor penetration, and direct sights up to a distance of 1,640 yd.

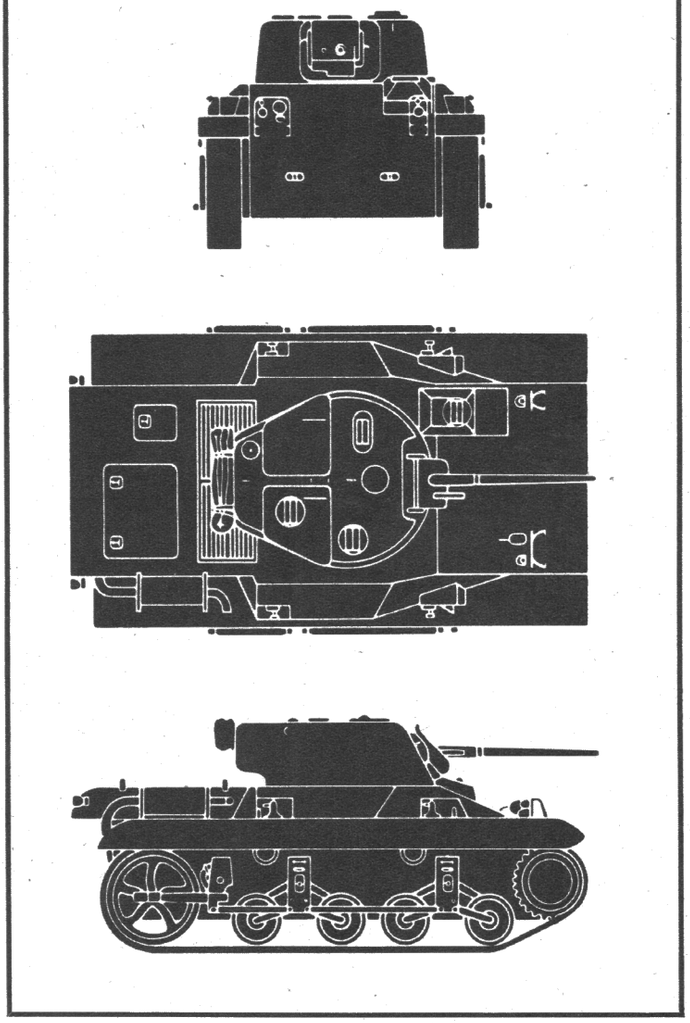
Like the Tiger, the Panther can be converted for deep stream fording. It has a speed of 31 m.p.h. and carries a crew of five. Its heaviest armor plate, on the front of the turret and the cannon shield, is about 3.94 in. thick. The top and bottom of the tank are lightly armored and are especially vulnerable to grenade fire.

RECOGNITION: The huge coffinlike gunshield of Ferdinand, set well to rear, has sloping sides and top. Hull is rectangular and straight-sided. Six large evenly-spaced bogie wheels support a track approximately 2½ ft. wide.

The Panther is built close to the ground with a low center of gravity. Its turret sides flow in sloping line into the sides of the hull. The turret is slab-sided and set slightly to the rear of center with a cupola at the back. The 75-mm. gun barrel is extremely long. From the side, the Panther's hull is sharply undercut behind. Eight overlapping bogie wheels on each side with driving sprocket in front are typical of German-designed suspension systems.



ARMY'S FIRST AIRBORNE TANK



Airplanes in this war have carried all kinds of supplies, have ferried men and jeeps and field guns to the front lines. During the Papuan campaign alone the Army Air Forces Troop Carrier Command transported 12,000,000 lb. of equipment in less than 2½ months over the storm-swept ranges of the Owen-Stanley Mountains between Port Moresby and Buna Mission. One Flying Fortress ferried across a four-gun battery of 105-mm. howitzers.

Now, for the first time, the U. S. is prepared to transport armored vehicles by air. The Russians who were first to experiment with parachute-borne artillery have scarcely ever employed these tactics seriously. Even the Germans in their well-organized airborne invasions only occasionally have flown tanks to battle. But the U. S. Army's new T9E1, world's smallest four-man tank, has been specially designed to be airborne. It is a fast, light and maneuverable tank with many features in its construction which mark a departure from previous American design. Its 37-mm. gun has an angular rather than a circular mantlet. Hull sides are sloping rather than vertical and are covered with hooks and other gadgets. The usual tandem bogie wheels, in two pairs, have horizontal rods to keep them in place during transit.

The total weight of the vehicle is only 7.9 tons; height is 5 ft. 9 in. Its armor plate averages less than an inch in thickness. Maximum speed is 40 m.p.h. and the tank has a cruising range of 135 miles.

RECOGNITION: From above, cast turret of the T9E1 forms a curve at front, then gradually tapers to a straight edge in rear. Sides of hull form an almost perfect rectangle except for the rear where a rounded extension overhangs the tracks. From the side the gun turret is undercut behind, slopes into the bow in front.

A COMPACT VEHICLE, the smallest four-man tank in the world should provide new striking power to our airborne troops. From the head-on view, the T9E1 has a deep curving belly and a distinctly low squat silhouette which affords very slight ground clearance. Its 37-mm. gun reaches the complete length of the front section, has an angular mantlet. All possible deadweight has been eliminated in the T9E1's suspension system.

DIVEBOMBER

This fine, exciting picture of an SBD taken a split second after the 500-lb. bomb was released from rack was taken by a U. S. Navy photographer. Because there has been a great demand for such pictures, the *Journal* will hereafter try to publish in each issue a Plane of the Month.

QUIZ NO. 2: ARMORED COMBATANTS

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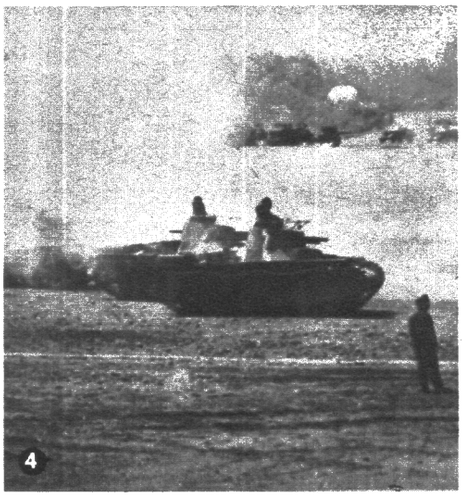
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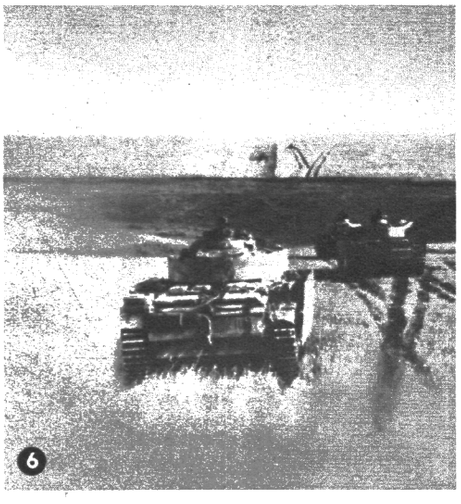
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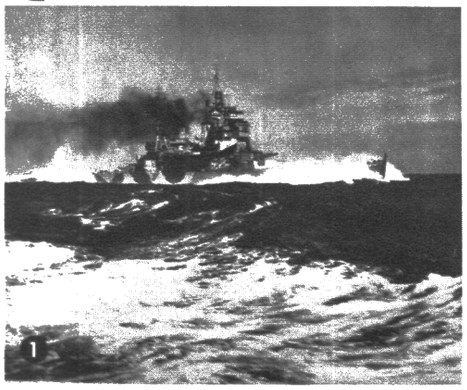
(For key to numbers, see p. 50)

QUIZ NO. 3: IT TAKES ALL KINDS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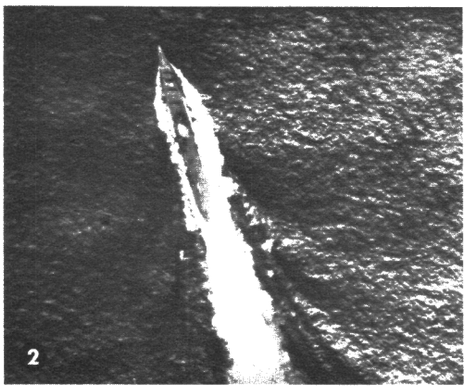
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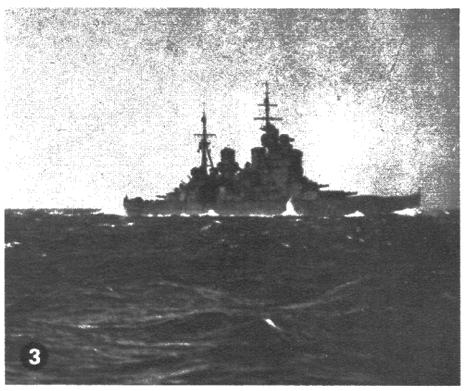
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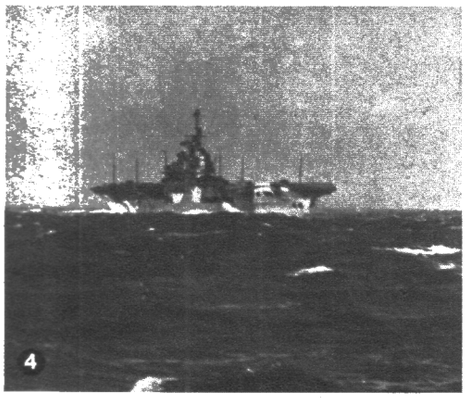
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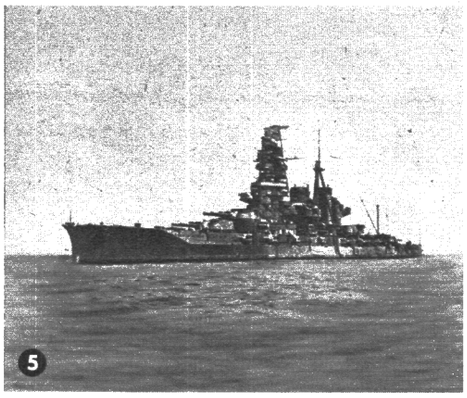
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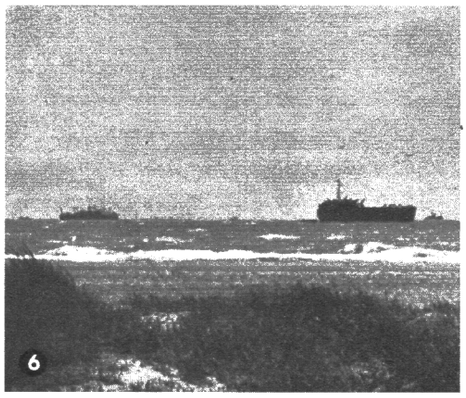
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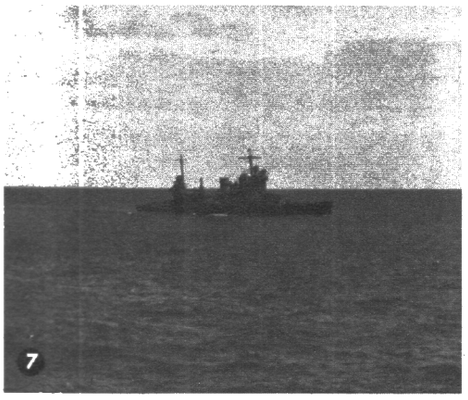
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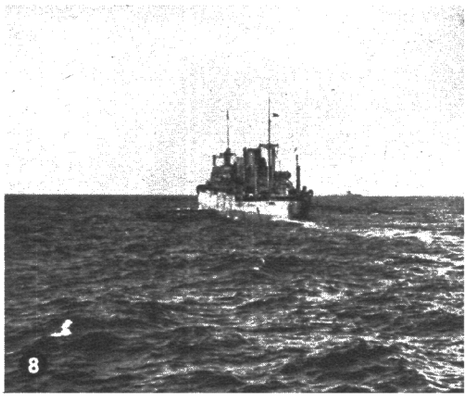
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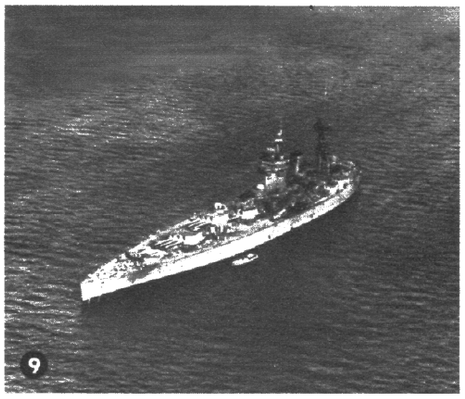
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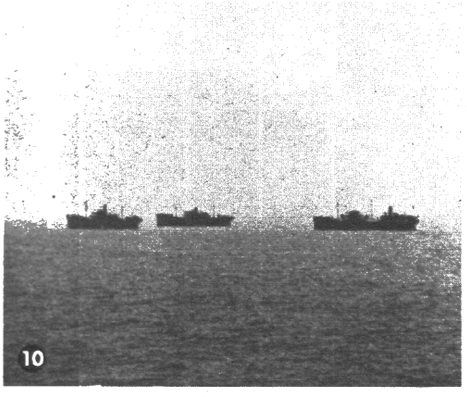
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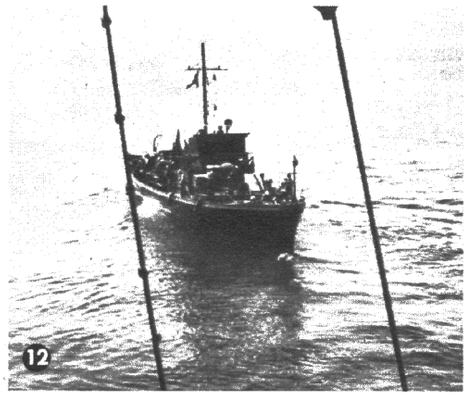
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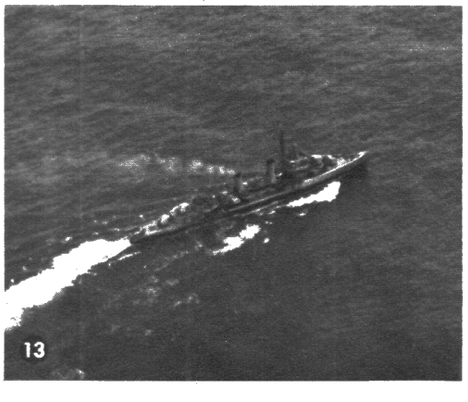
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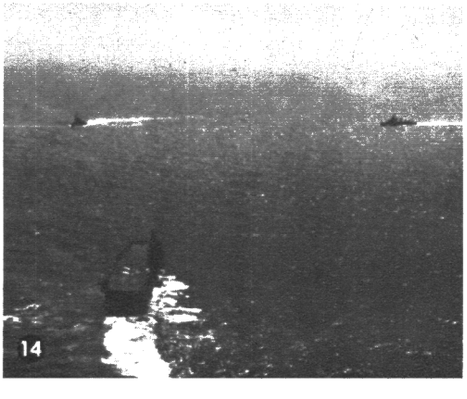
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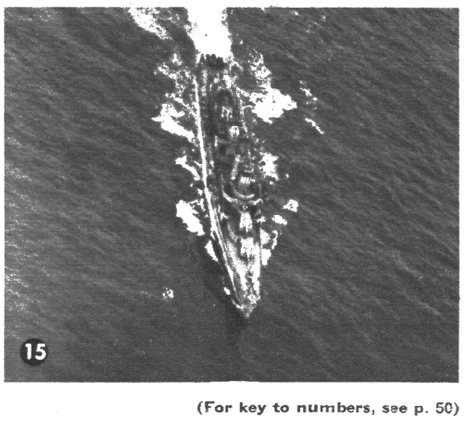
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(For key to numbers, see p. 50)

NOEL SICKLES' DRAWING OF INVASION SCENE SHOWS COMPLEXITY OF OPERATION, VARIETY OF EQUIPMENT USED. LST'S AT LEFT CARRY LCV'S. M-4 TANK IN LEFT FORE-

LANDING CRAFT

Driven off the continent of Europe and pushed deep into the South Pacific, the Allies in 1942 had to revive an outmoded form of warfare—landing operations. Invasion by sea, even in earliest days of an expanding and warring world, was as commonplace as war itself. However, the developments which changed war from simple infantry and cavalry fighting to an involved mechanical holocaust stacked the cards very heavily in favor of the defense.

Three factors were responsible for the assumption that defensive power held the whip hand. The first was the increasing strength of coast artillery, considered more accurate at long range than naval gunfire. The second was the question of supply; since heavy guns and tanks could not be landed without dock facilities, infantry which might force a beach could be hacked to pieces by the defender's mechanized might. The third was land-based airpower.

Between World Wars I and II, military thinkers were convinced that because of the above factors, sea-borne attackers did not stand a chance against big-league opposition. But in World War II the Germans smashed Polish resistance on the Hela Peninsula from the sea, conquered Norway and Crete by sea and air. The Japanese made repeated landings in the course of their drive down the Malay Peninsula and took the Philippines, the Netherlands East Indies and a multitude of South Pacific islands by overwater invasion. It can be argued that most of these invasions did not come off according to the book. Coast defenses were feeble, land-based airpower was quickly crushed, treachery gave the invaders seaports intact (Bergen, Trondheim, Stavanger) enabling them, in some instances, to walk down gangplanks.

But regardless of whether Axis success in amphibious operations has proved or disproved anything, the Allied counteroffensive is based on storming the beaches. Abandoning the slow, vulnerable ship-to-shore methods of the past, the U. S. and Great Britain have developed nearly 15 types of landing craft: ships, barges, amphibious vehicles. They range in size from the ocean-going LST (Landing Ship, Tank) and LCI (Landing Craft, Infantry) to amphibian jeeps and rubber rafts. Where a short year ago patrol and escort craft had first priority in naval construction, landing vessels now have priority over all wartime construction.

Except for the recapture of Cos, Leros and Samos in the Aegean Sea, landing operations have, since the summer of 1942, become an Allied monopoly. But even before that, Combined Operations was executing swift stabs at German-held shore positions from the Lofoten Islands off the northern coast of Norway to St. Nazaire in western France. For the most part, these raids were not on a large scale, and the smaller landing craft sufficed to put the Commandos ashore.

Climax to the Commando raids from the standpoint of size was the assault on Dieppe on Aug. 19, 1942. Involving 200 ships, 10,000 men and 40-ton Churchill tanks brought in by LCT's (Landing

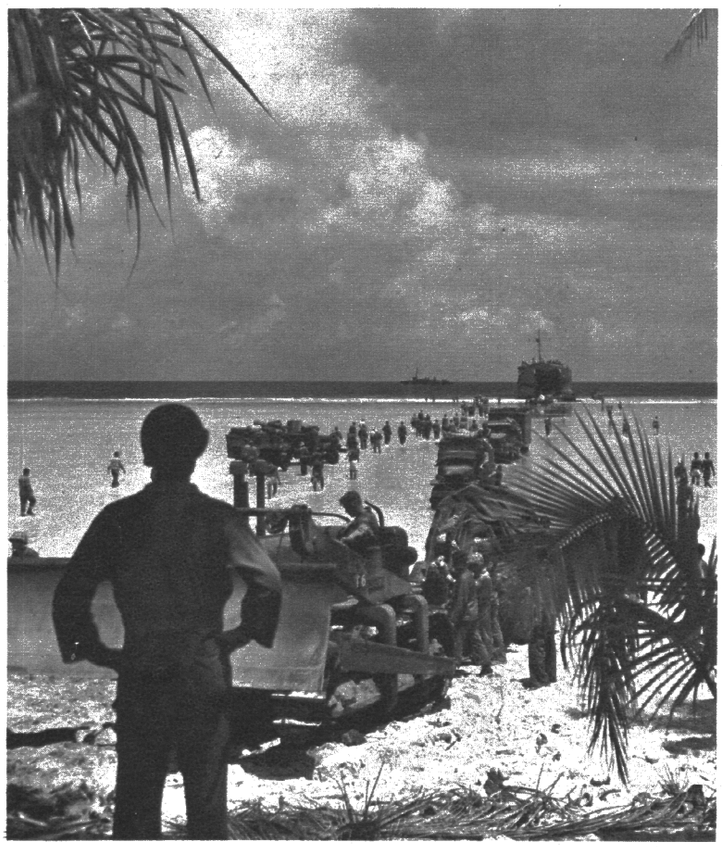
GROUND IS ABOUT TO BE JOINED BY SECOND M-4 EMERGING FROM LST WHICH HAS SECTIONAL FLOATS LASHED TO SIDE. IN RIGHT FOREGROUND ARE "DUCK" AND LCVP

NEW TYPES LEAD ASSAULTS ON BEACHES HELD BY ENEMY

Craft, Tank), this landing was a severe enough laboratory test to satisfy the fussiest critic. The casualties were very heavy for the attackers, but the point that troops and tanks could be put ashore against the most rugged opposition was demonstrated.

Earlier in August U. S. Marines swarmed ashore on Guadalcanal to open the Allied attack in the Pacific. In this operation, as well as most of those in the South Pacific and the Aleutians, there was little or no Japanese resistance at the beaches, savage opposition farther inland. But at Tarawa late in November 1943, there was no chance of finding a weakly held strip of shore and the going was hellishly tough, geographically and militarily, from the start.

In November 1942, a huge United Nations convoy steamed into North African waters to seize control of Morocco and Algeria from the sea. Resistance was severe only in isolated spots, and in the military sense we got away with the easy type of invasion which marked German and Japanese conquests. However, in the summer of 1943 the Allies undertook two further invasions in the Mediterranean theater, Sicily and Italy. This time the beaches had to be stormed against experienced and well-armed defenders, had to be held while the heaviest equipment was being landed for big armies. It was here that the big landing boats, LST's and LCI's were introduced and proved their worth. How amphibious warfare in the West developed from Narvik to Salerno is shown on pages 36–39; pictures of the major types of U. S. landing craft on pages 40–47.



PROCESSION OF TRUCKS rolls ashore from LST as U.S. Marines occupy Nanumea in Ellice Islands near the Gilberts. A converted destroyer, possibly a high-speed transport (APD) or seaplane tender (AVD), is on patrol offshore.

COMRADES HELP COMMANDO WOUNDED IN VAAGSOE-MAALOY RAID TOWARD A BRITISH LCA (ASSAULT). THIS CRAFT OFFERS PROTECTION FROM MACHINE-GUN FIRE

NORWAY AND THE CHANNEL

Three purposes have been served by the countless Commando attacks against German objectives on Norwegian and French shores. Specific targets may be destroyed; defenses are tested and experience gained in amphibious warfare. The best example of a target destroyed was the demolition of the radar station at Bruneval in France. Best example of the other two was Dieppe.

As early as June 1940, scarcely more than a month after the Wehrmacht attacked in the West, raiding parties stabbed at the Nazi-held coast to study defenses, take prisoners. First sea attack in which destruction was the main object took place on March 4, 1941, in the Lofoten Islands, far up the Norwegian Coast. Just before the end of 1941 a second major raid was undertaken in the North, this time against factories and shipping at Vaagsoe and Maaloy (*above*).

Shifting attention to France, Combined Operations then attacked Bruneval in February 1942. A month later, H. M. S. Campbeltown was rammed in and blown up at St. Nazaire to wreck the only Atlantic drydock capable of handling the battleship Tirpitz. Dieppe, in August 1942, was the biggest raid of all, served as an experiment in landing tanks, knocking out gun positions.

DIEPPE CONVOY demonstrated importance of patrol and escort craft in landing operations. Pictured here are minor combatant types of the Royal Navy.

BRITISH LANDING CRAFT HEAD FOR NARVIK UNDER COVER OF HEAVY FIRE FROM ALLIED WARSHIPS. BARGES WERE EARLY TYPE, BUILT FOR USE OFF ROCKY COASTS

LANDING CRAFT (LCP'S) race for Dieppe shore under cover of smokescreen laid down by the Royal Navy. Attack marked first use of British LCT's.

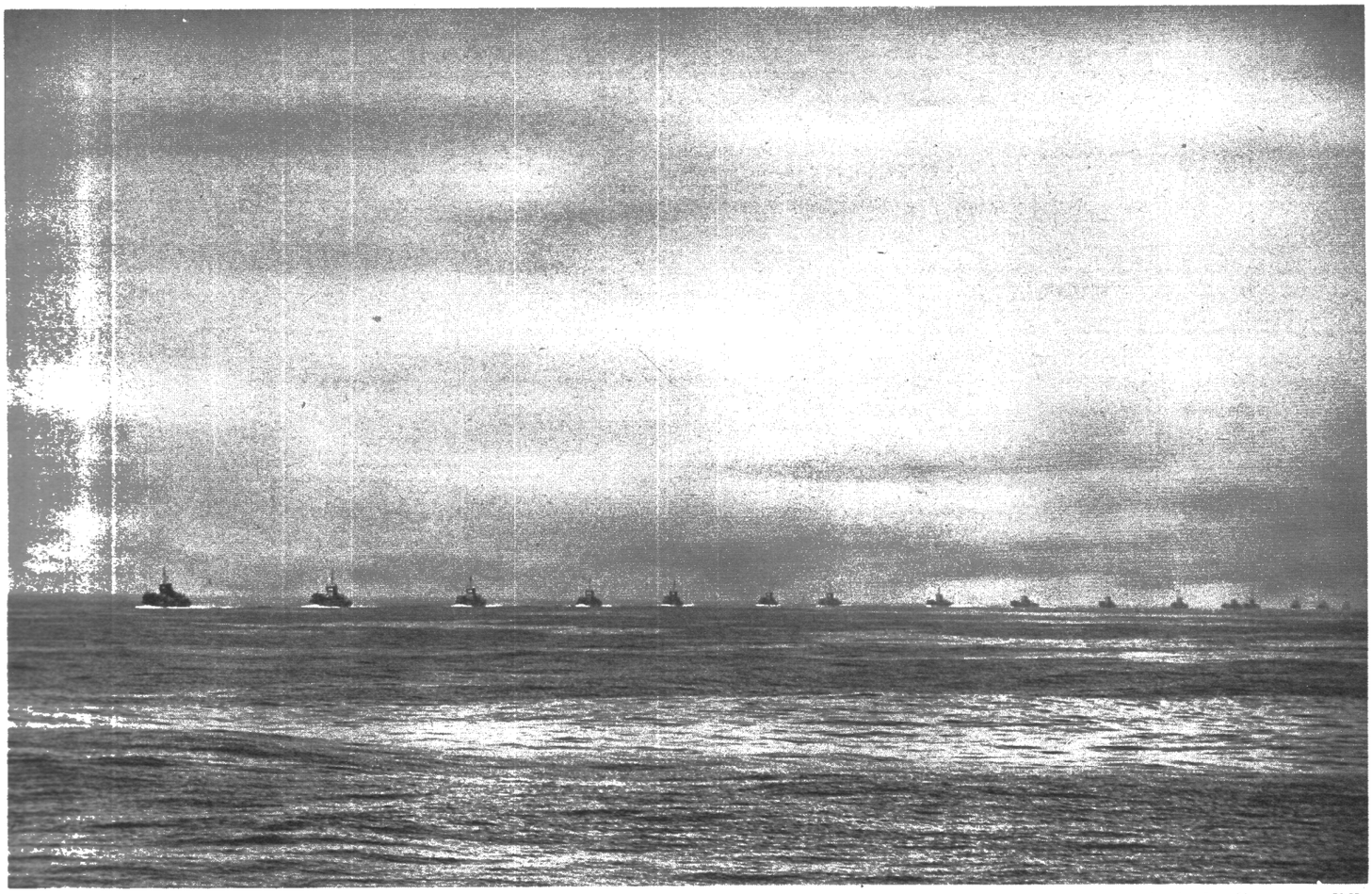
COMMANDOS RE-EMBARK IN LCA'S after a successful reconnaissance raid near Boulogne in June 1942. The boats on the beach are French fishing vessels.

AMERICAN LANDING AT SURCOUF IN NORTH AFRICA SHOWS USE OF SMALL CRAFT, ABSENCE OF HEAVY EQUIPMENT. SCENE INDICATES LACK OF SERIOUS RESISTANCE

THE MEDITERRANEAN

The three great amphibious operations in the Mediterranean were the assaults on French Africa, Sicily and finally the Italian mainland. Departures from earlier landings in that they opened full-scale campaigns, they introduced supply problems which did not have to be considered in the lightning-like Commando raids in the West. Algiers and Casablanca in Africa and Augusta in Sicily fell to the Allies very quickly, giving them good harbors for unloading. Salerno, however, was a different matter, since a great deal of heavy fighting took place before that city or the port at Naples were of any value to the invading forces. Here conditions were tough enough to satisfy military experts that a fair test of invasion strength was being made. The enemy was firmly entrenched and ready for the landing where it took place; they had airfields nearby from which they could hammer at the convoy. But carrier-based Seafires held them off while coordinated amphibian assault waves bulled their way through to take and hold the beach.

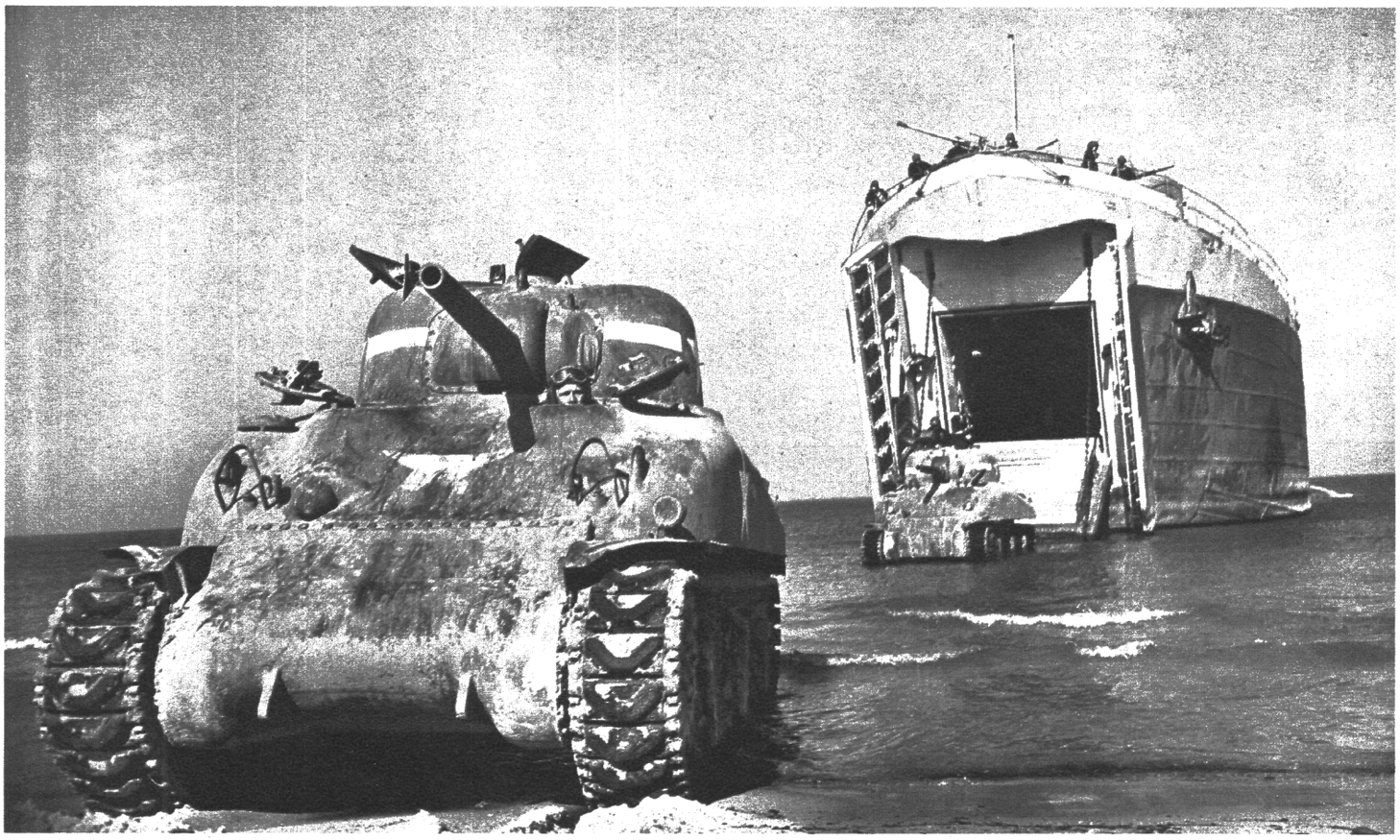
SUPPLY TRUCKS SHUTTLE TO & FRO LOADING HUGE ARMADA OF LST'S AT A NORTH AFRICAN PORT. SHIPS WERE PART OF CONVOY WHICH OPENED SALERNO ATTACK



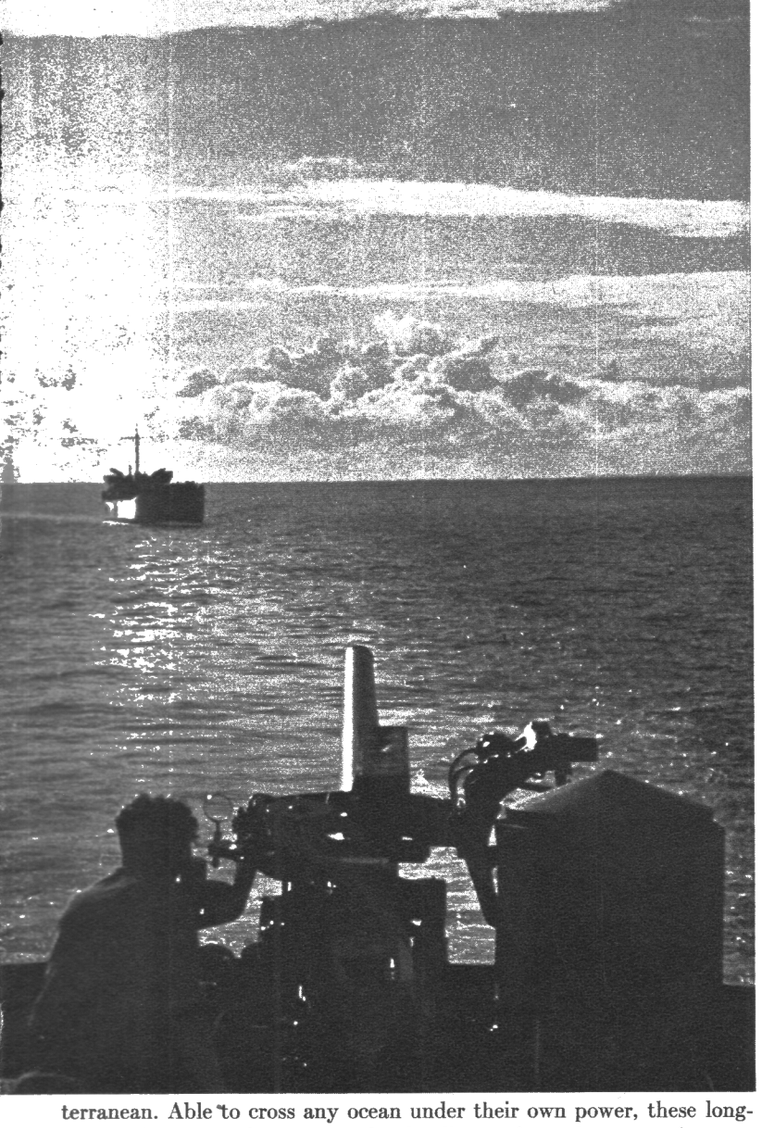
SICILY-BOUND LCI'S carry U. S. Seventh Army to Gela where the most bitter beachhead opposition of the entire campaign was encountered. Fire from DD's finally turned the tide against Nazi tanks which threatened to drive U. S. forces into the sea. Heavy weather made the landing more difficult than was anticipated but added to the surprise element since the Italian defenders thought the sea so rough that invasion would be postponed.

AERIAL VIEW OF SICILIAN SHORE shows an assortment of landing craft scattered along the beach. Owing to barge-like appearance, only length can aid observer in distinguishing craft from each other. Those to the right and left of center are LCV's while the larger one at the center is an LCM. When barges are close to Allied beaches, recognition is not difficult. They are, however, likely to be seen in rough water under combat conditions.

GROUP OF LST'S steam through Pacific waters on the way to Lae in New Guinea. The backbone of modern invasion armadas, these 5,500-ton ships carry all sorts of war matériel, are the most versatile of all landing craft, serving as both hospital and repair ships on occasion. They were originally sketched in November 1941, with acceptance trial for first completed unit coming 11 months later. Sicily marked their first combat use in the Medi-



SIZE OF LST can be judged from M-4 tanks rolling up on beach. Length of these ships is 327 ft. For unloading, gates are swung outward, ramp is then lowered for tanks or other mechanized equipment. Elevator service from deck to hold enables trucks to be lowered for disembarkation. Extra ramps can be carried on sides of LST in case bow of vessel cannot come in close enough to permit the vehicles to go ashore through shallow-water.

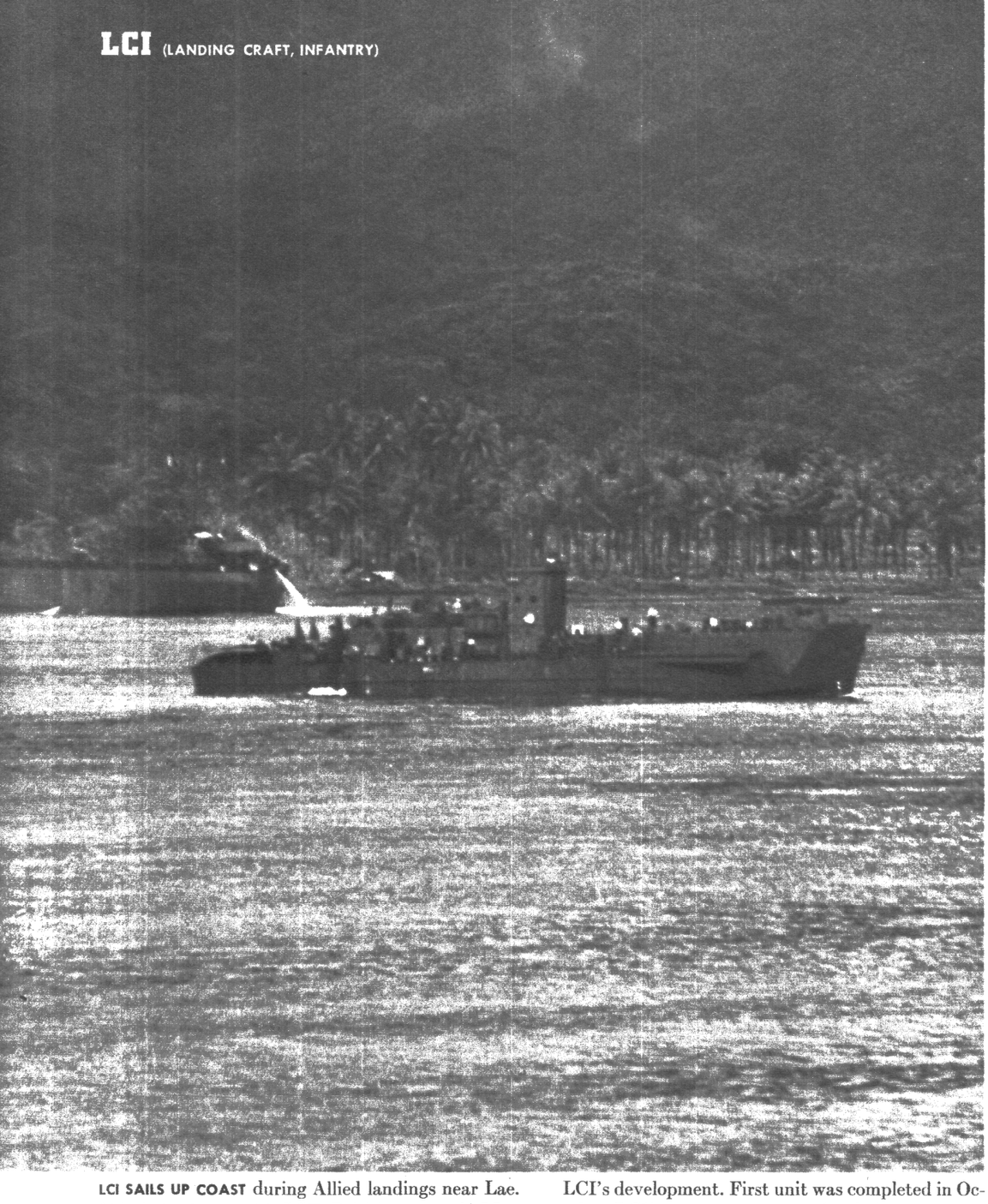


terranean. Able to cross any ocean under their own power, these long-range ships are used to carry other landing craft to the scene of operations, frequently carry trucks and bulldozers as well on their wide decks.

ENGINES AFT, HIGH FREEBOARD FORWARD and flush deck help identify LST's. Hull is straight-sided, tapers abruptly at bow and stern. Ship has short pole mast, no visible stack. Engines aft permit cargo space forward for landing.

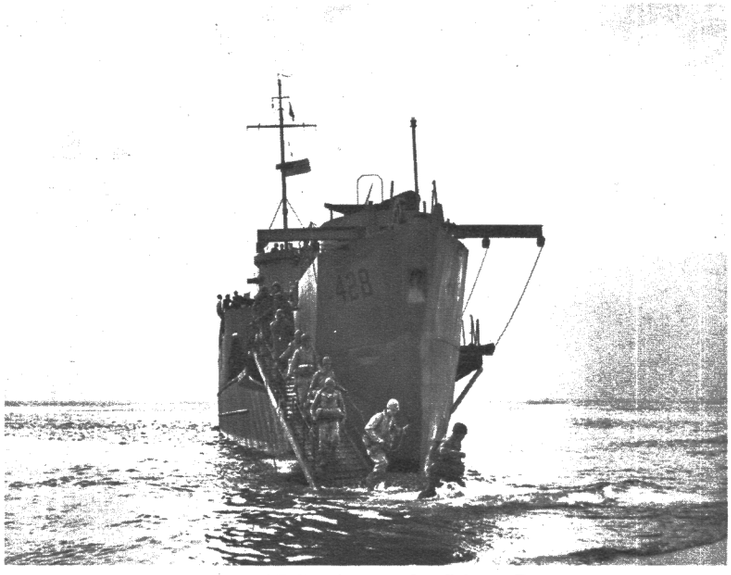
DECKLOADS MAKE RECOGNITION of LST's a major problem since cargoes carried topside vary considerably. This LST has LCT and LCM. Vents on deck forward of load are helpful for identification, particularly from the air. Except for the 450-ft. LSD's (Landing Ship, Dock), LST is the biggest of all the invasion craft. LST's versatility makes it possible for the Navy to free more specialized ships for service in other vital operations.

LCI (LANDING CRAFT, INFANTRY)

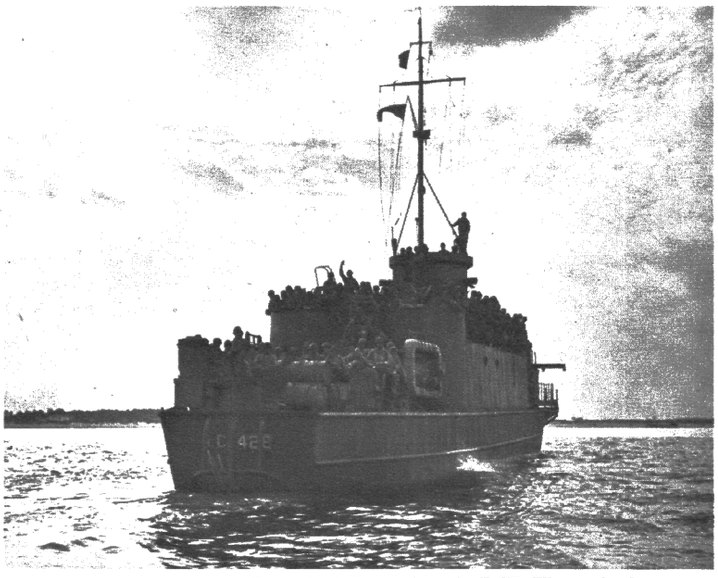


LCI SAILS UP COAST during Allied landings near Lae. Ship in background is LST. British request in May 1942 for larger type of infantry landing craft led to LCI's development. First unit was completed in October. LCI's can cross ocean under their own power, but only carry troops just before landing operations.

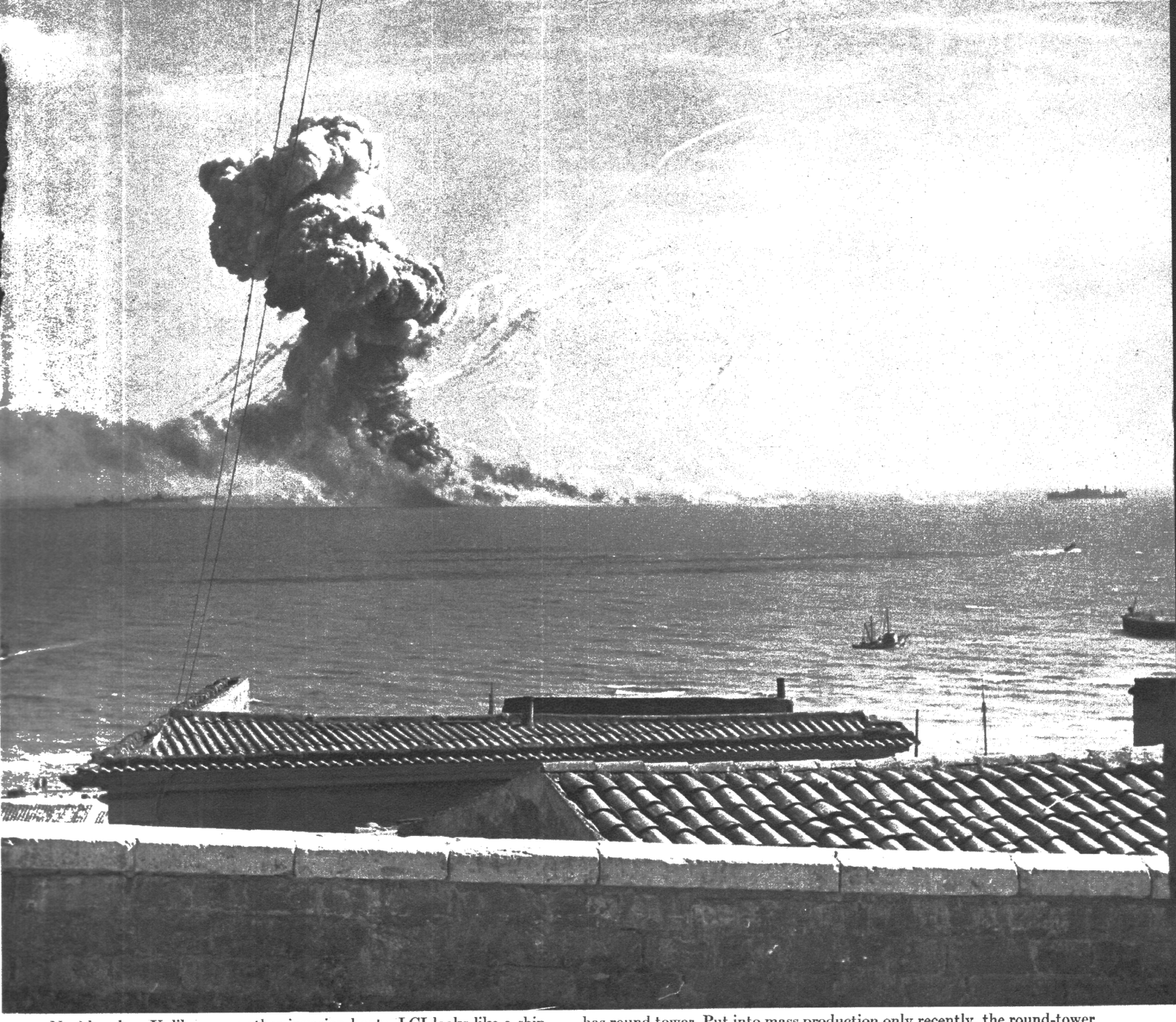
LCVP'S COME ASHORE ahead of LCI at Gela in Sicily. Ammunition ship in the background explodes following hit by



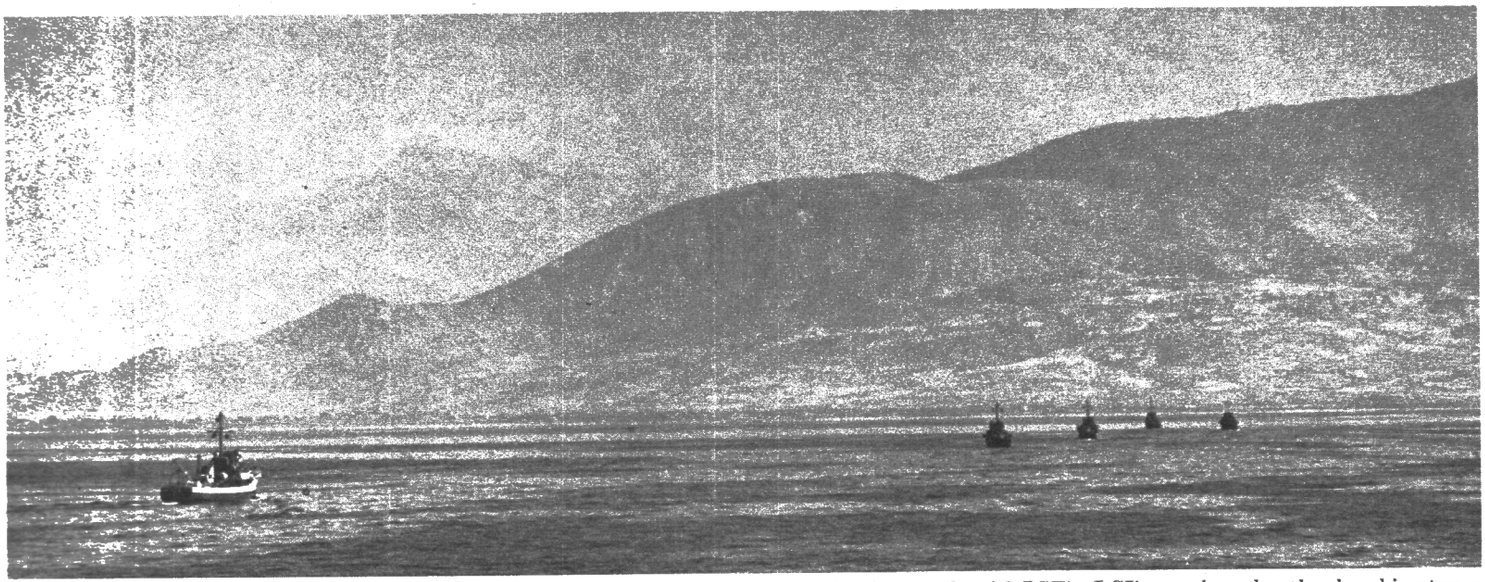
SOLDIERS RUSH DOWN RAMP of LCI a few yards offshore. Ramps are carried outside forward bulwarks, provide excellent recognition feature for low-flying planes. LCI may carry more than 150 men, accommodates them in the hull.



STICK MAST ABAFT BRIDGE, flush deck help identify LCI. The unit shown here is newer class, differs from old type (*above, left*) in superstructure and AAMG position. Depth charges at stern provide anti-sub defense.



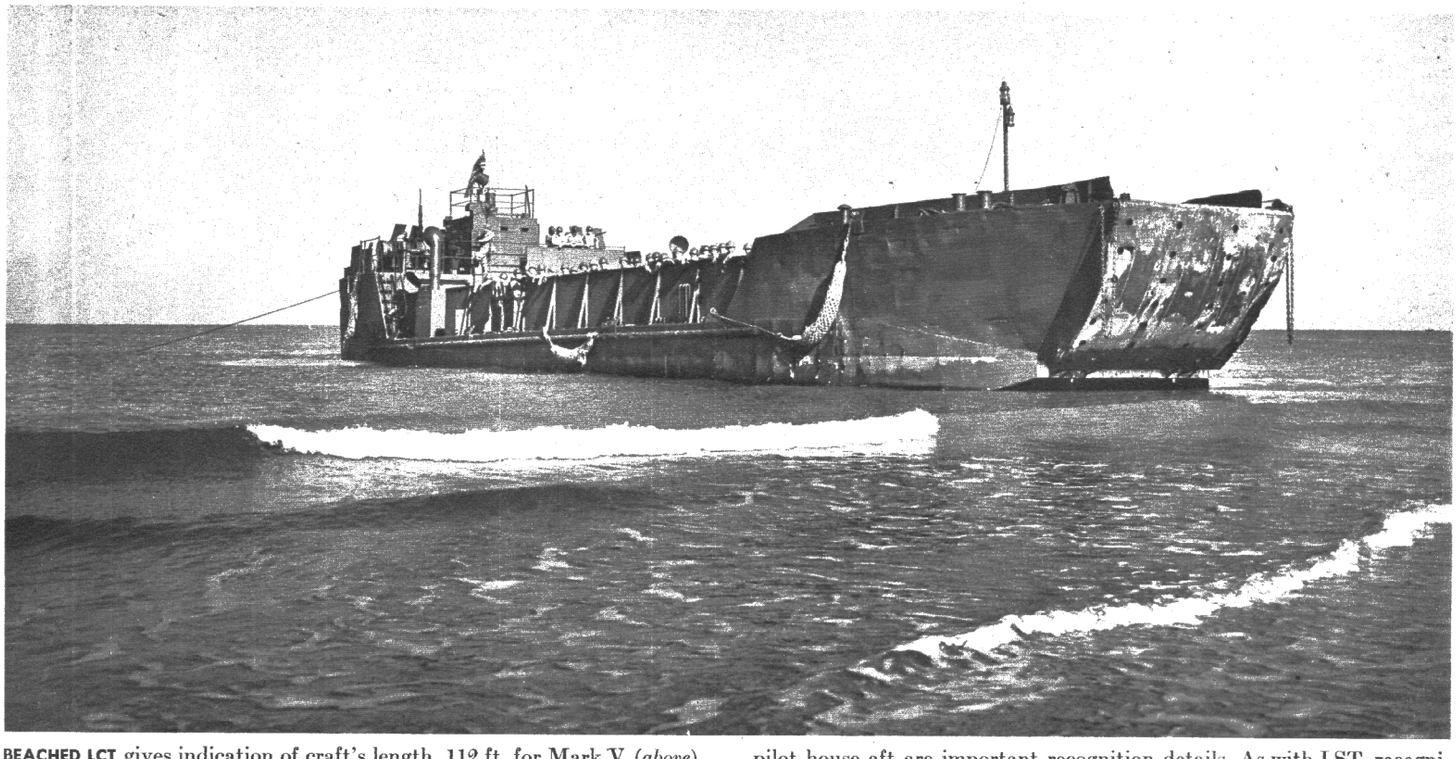
Nazi bomber. Unlike many other invasion boats, LCI looks like a ship, not a barge. Just over 155 ft. long, it has bridge amidships, no visible stack. Block tower characterizes earlier version (*left*), while newer model has round tower. Put into mass production only recently, the round-tower model is being supplied to Great Britain via lend-lease on a large scale. Appearance of LCI, as well as wake, has led to its being confused with subs.



LCI'S HEAD FOR SHORE in Salerno attack. Their low hulls may cause confusion with DD's or minor combatant types when seen from this angle, but LCI's should be distinguishable by relatively bulky outline. Developed simultaneously with LST's, LCI's are the only other beaching types likely to be encountered on the high seas. They are not usually seen at the beaches during preliminary stages of assault when smaller craft are used.

LCT (LANDING CRAFT, TANK)

LCT'S, SHOWN HERE AT KISKA, are largest of the landing craft to have ramp for bow. Logical development of an early type LCM, they were first built in May 1942, were designed to bring in tanks behind first wave of assault troops. LCT's are frequently carried in three sections on cargo ships, transports or as assembled units on LST's. With sides cut away, LCT's can be lined across bow of LST when conditions prevent use of portable ramps.



BEACHED LCT gives indication of craft's length, 112 ft. for Mark V (*above*) and 105 ft. for Mark VI which differs slightly, having longer, higher off-center superstructure at stern, shorter center section. Squared-off bow, pilot house aft are important recognition details. As with LST, recognition of LCT is made more difficult owing to differing loads: tanks, trucks, personnel. Shape and wake classify LCT's and most smaller craft as barges.

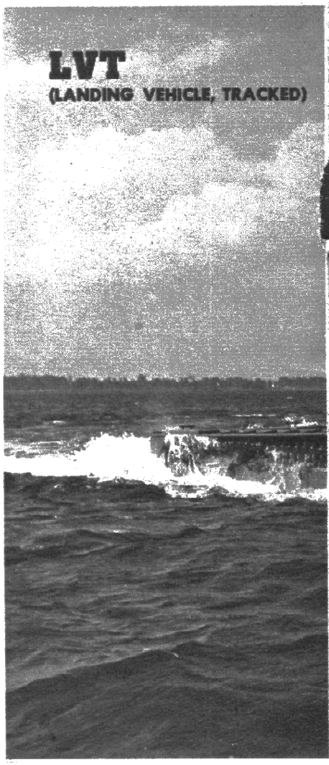
LCM AND LCVP race for shore near Salerno. LCM with anti-aircraft machine guns is in right foreground, can be identified by high grilled bow ramp. This type is 50 ft. long. LCV's (Landing Craft, Vehicles) double up as vehicle and personnel carriers, are called LCVP when used in the latter capacity. About 36 ft. in length, they have also been built with a small pilot house at the stern. The ramp and the sides of the LCV are armored.

VARIED LANDING CRAFT MANEUVER in Chesapeake Bay just before departure for North Africa. Grilled bow of LCM is distinguishable at the right. Craft in the foreground are 36-ft. LCP's (Landing Craft, Personnel) and LCPR's (Landing Craft, Personnel, with Ramp). LCP has a rounded bow, looks less like barge than other invasion boats (*see next page*). Towing rubber landing rafts (LCR's) is important function of LCP's and LCPR's.

LCP (LANDING CRAFT, PERSONNEL)

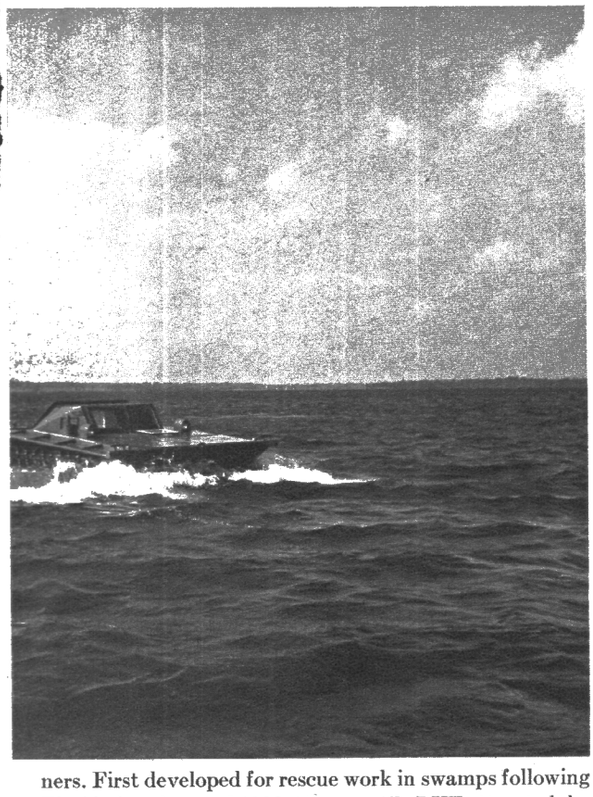
SHIP UNLOADING TROOPS IN LCP'S

CLOSE-UP FIRE SUPPORT for landings is given by heavily armed LCS (Landing Craft, Support).

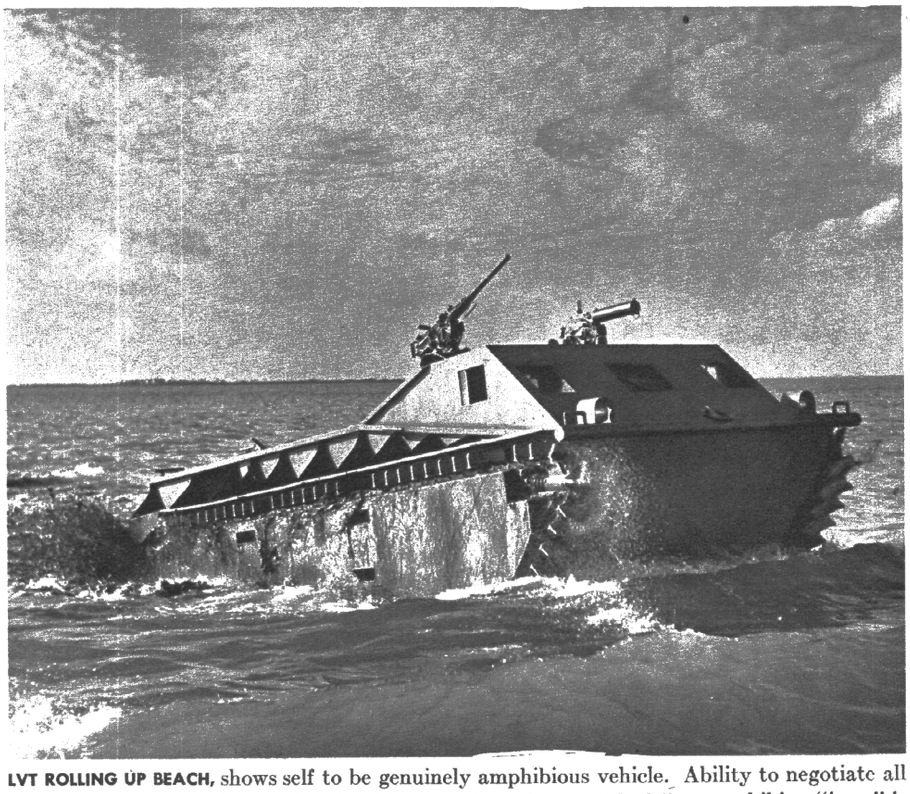


RIDING LOW IN THE WATER, LVT (Landing Vehicle, Tracked) offers a poor target to shoregun-

This armored, rocket-firing boat is likely to be seen in the first wave, rendering the beaches untenable for the enemy before LCP's go ashore with the infantry. Unlike other landing craft, LCS's do not transport personnel or equipment, carry crew just large enough to man the boat controls and weapons. Armor plate can be put up to shield the crew completely from enemy small-arms fire, gives LCS the appearance of low blockhouse on a speedboat.

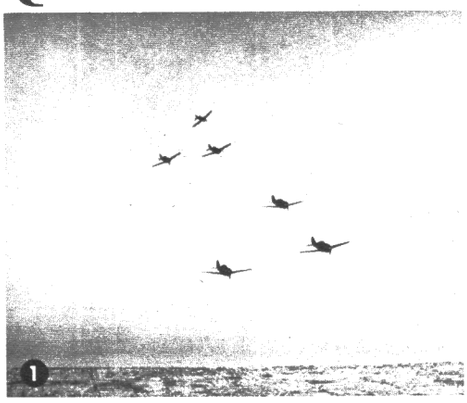


ners. First developed for rescue work in swamps following Florida hurricane of 1933, the versatile LVT attracted the attention of U. S. Marine Corps and was adopted by them.



LVT ROLLING UP BEACH, shows self to be genuinely amphibious vehicle. Ability to negotiate all sorts of terrain, including coral reefs which would rip tires on "duck" or amphibian "jeep," is the greatest asset of LVT or Alligator. Armored version, LVT(A), has turret with 37-mm. gun.

QUIZ NO. 4: WARPLANES IN E.T.O.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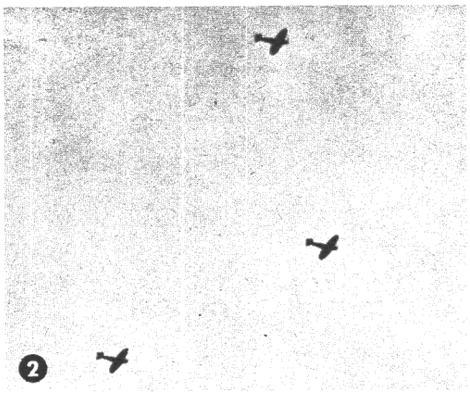
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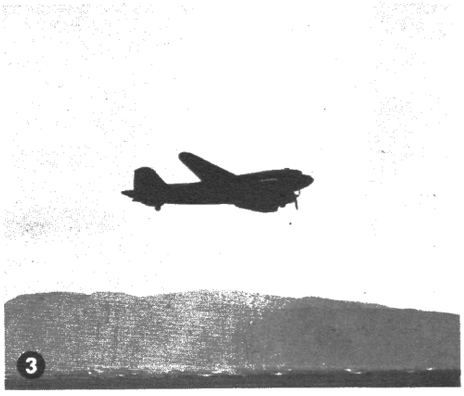
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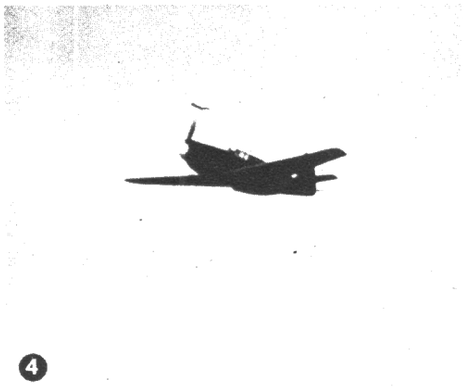
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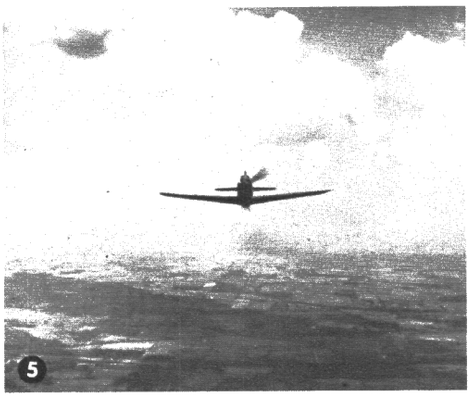
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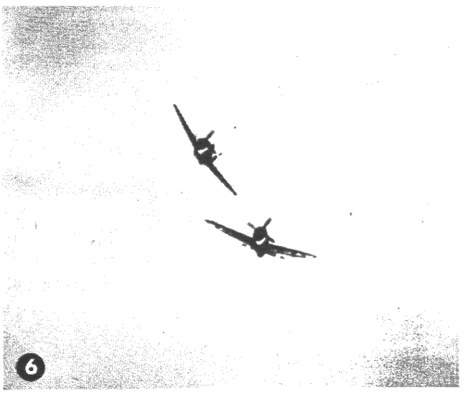
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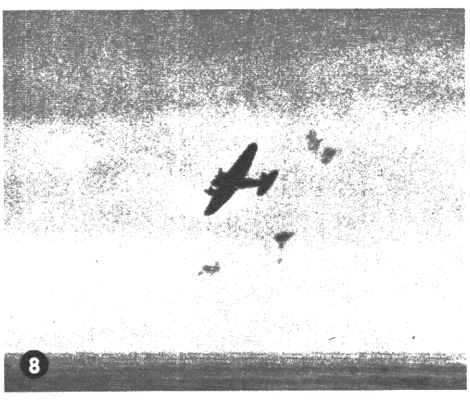
7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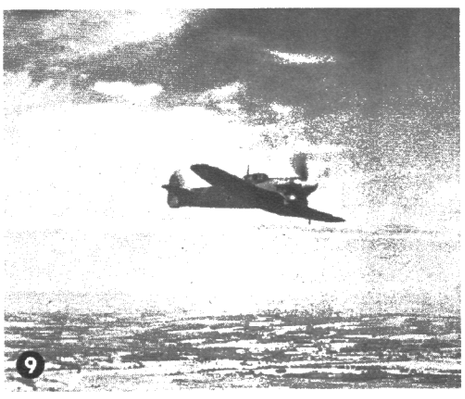
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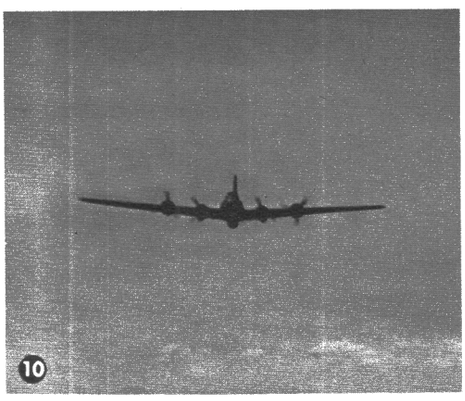
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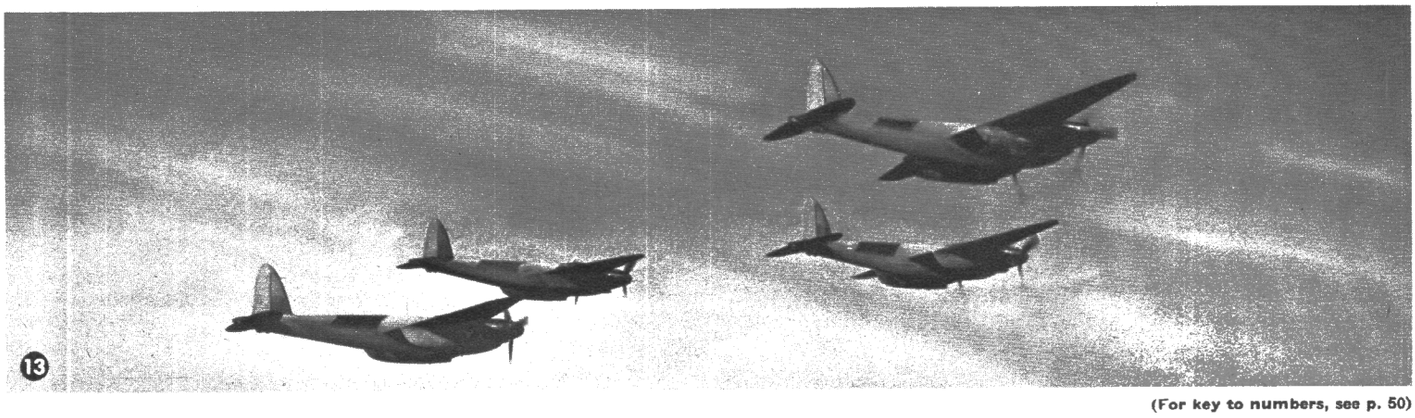
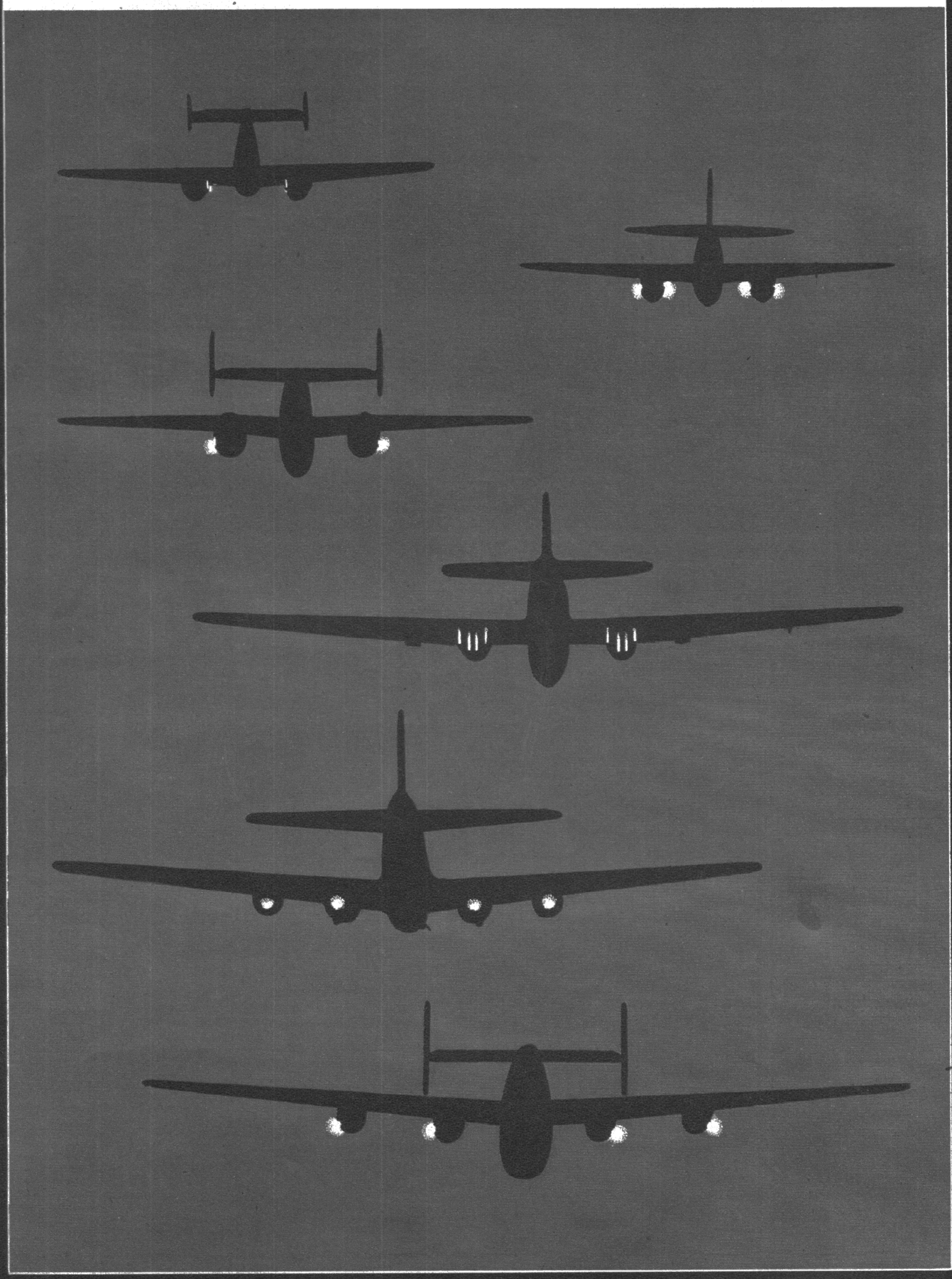

13

(For key to numbers, see p. 50)

EXHAUST PATTERNS

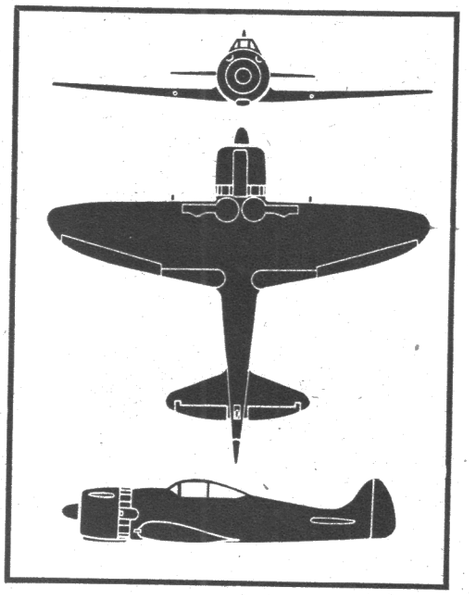
Shown here are results of an RAF study of exhaust flame patterns from 10° below astern. Trickiest of these six views is the owlish-looking Mosquito (No. 2) whose engines cast a bright flame on both sides. Odd pattern cast by He-177 (No. 4) shows four long light streaks formed by each engine, while the Me-110 (1) reveals engine exhaust only on the inside of each engine. B-25 (3) does the exact reverse and like the B-24 (6) throws its flame pattern only to the outside. The B-17 (5) is alone in this group in having exhaust position directly behind engines. Intended as an aid to recognition, it is important to note that these patterns reveal only the position of exhaust flames, not their intensity.



NEWS & MISCELLANY

NEW SILHOUETTE

A provisional silhouette of Japanese single-engine Tojo is given below. Tojo is a single radial-engine, low-wing monoplane. Wings resemble those of P-47 in plan view, have moder-



ate dihedral. Broad wing, heavy engine, and short fuselage, give Tojo a stubby, compact appearance. The landing gear retracts inward. Tail plane is set unusually far forward of fin and rudder, providing an excellent recognition feature.

The smallest Jap fighter thus far encountered, Tojo mounts the most powerful engine yet found in any Jap SSF. Not quite so maneuverable as Zeke, it is faster, climbs and dives better. No protection is provided for pilot, fuel, or engine, and, when hit, Tojo explodes as spectacularly as did his predecessors. Armament consists of two synchronized 7.7-mm. MG in the fuselage and 1x12.7-mm. MG in each wing. Tojo is unique among Jap fighters in that it has a four-piece wing. This is a heavier construction than the usual Jap one-piece wing but should make Tojo easier to maintain.

NEWS

The Ju-188 is a new type, fast medium bomber that was developed from the Ju-88B, which apparently was an intermediary model between the standard Ju-88A and Ju-188. The redesigned wings with increased span and completely new tail unit, compared with the Ju-88A, suggest an attempt to produce an aircraft with improved flying qualities, take-off and ceiling, particularly with heavy loads carried externally. This bomber is a twin-engine, low-wing monoplane. The tail unit is of a new design, the fin and rudder being both higher and wider than that of the Ju-88A and very square in general shape. Nose is redesigned for greater visibility and to accommodate increased armament.

●

Italian aircraft are in use at present by both the Germans and the Allies. Following is a list of Italian planes (for abbreviations see p. 6):

Mc-200	1E-SSF
Mc-202	1E-SSF
Mc-205	1E-SSF
Re-2001	1E-SSF
Re-2005	1E-SSF
Cant-Z 1007 bis	3E-HB, (T/B)
SM-79	3E-T/B(HB)
SM-82	3E-HB,(C)
SM-84	3E-HB,(T/B)
Cant-Z 506 B	3E-F/B,(LB,R)
Cr-42	1E-SSF
G-50	1E-SSF
G-55	1E-SSF
Re-2000	1E-SSF
Ro-37 bis	1E-LB,R
Ca-311 & Ca-312 bis	2E-LB,R(T/B)
Rs-14	2E-F/B
P-108	4E-HB(T/B,C)
Br-20M	2E-MB,(T/B)
Cant-Z 501B	1E-F/B,(LB,R)

●

Notice: The bottom of page 7 in the January issue of the *Journal* was removed by the U. S. Navy prior to distribution for security reasons.

TRAINING AIDS

War Department Training Circular 131, Dec. 14, 1943 has been published outlining all the War Department training aids available for aircraft, naval vessel and armored vehicle, recognition training. Consult it for information on how to obtain these aids and the basis of issue to the Ground and Service Forces.

CORRECTION

Slide number 883 bears the title "U. S. Army Transport, C-46—Lodestar 6/30/43." The title should be corrected to read "U. S. Army Transport Glider Tug, C-46—Commando 6/30/43."

RECOGNITION COVERAGE IN NAVAL TRAINING COMMANDS

Primary Training

FLIGHT PREPARATORY SCHOOLS:	
U.S. NAVY PLANES	CLASS A
U.S. ARMY PLANES	CLASS A
BRITISH RAF PLANES	CLASS A
BRITISH FLEET AIR ARM	CLASS A
U.S. WARSHIPS	CLASSES A&B
PRE-FLIGHT SCHOOLS:	
JAPANESE PLANES	CLASS A
BRITISH WARSHIPS	CLASSES A&B
FRENCH WARSHIPS	CLASSES A&B
MERCHANT VESSEL TYPES	
PRIMARY TRAINING STATIONS	
GERMAN PLANES	CLASS A
JAPANESE WARSHIPS	CLASSES A&B
GERMAN WARSHIPS	CLASS A
LANDING CRAFT—U.S., JAPANESE & GERMAN	

Intermediate Training

Review of units introduced in Primary Training utilizing distant views of planes and warships. Introduction of planes and warships added to training lists while cadets are in Intermediate Training.

Operational Training

OPERATIONAL TRAINING UNITS:

Selected review of units introduced in Primary and Intermediate Training; review of enemy planes to include performance and characteristics data.

NAVAL AIR GUNNERS SCHOOL:

Japanese, German and British fighter and attack bomber planes, and U. S. and Japanese warships as listed in Aviation Free Gunnery Central Standardization Committee Syllabus for Naval Air Gunners Schools and Aviation Free Gunnery Units.

Technical Training

U.S. NAVY PLANES:	CLASS A
U.S. ARMY PLANES:	CLASS A

(Transports Excluded)

NOTE: Selected review in Operating Squadron covers planes and ships according to geographical areas and missions of personnel.

QUIZ ANSWERS

QUIZ No. 1

1. Beaufighter
2. Mosquito
3. Betty
4. Me-210
5. FW-190
6. Halifax
7. Typhoon
8. He-111
9. B-17
10. C-47
11. Lily
12. Ju-52
13. Ju-88
14. Ju-87D
15. Me-109F

Quiz No. 2

1. Soviet T-34
2. German six-wheeled armored car
3. German PzKw VI, Tiger
4. Jap Medium Tank, 2597
5. Jap Light Armored Car, 2597
6. German PzKw III
7. German PzKw III (short "75")
8. British Bishop
9. German one-ton Armored Half Track
10. U. S. 105 mm. Howitzer Motor Carriage M-7
11. U. S. Medium Tank M-4
12. Soviet T-70 Light Tank

QUIZ No. 3

1. Br. BB King George V Class
2. Jap CA Tone Class
3. Br. BB King George V Class
4. Br. CV Illustrious Class
5. Jap BB Kongo Class
6. U. S. Pass.-Cargo, LST, LCI
7. U. S. CA New Orleans Class
8. U. S. Modern Combination Passenger-Cargo
9. Br. BB Nelson Class (Rodney)
10. World War I—2 Freighters & Oiler
11. U. S. CVE Sangamon Class
12. U. S. 110-ft. SC
13. U. S. DD Livermore Class
14. U. S. CV Ranger—U. S. DD Livermore Class
15. U. S. DD Fletcher Class

QUIZ No. 4

1. Warhawk P-40
2. Spitfire
3. Skytrain C-47
4. Mustang P-51
5. Airacobra P-39
6. Thunderbolt P-47
7. Boston A-20
8. He-111
9. Typhoon
10. Fortress
11. Sunderland
12. FW-200 C "Kurier"
13. Mosquito

CREDITS

The pictures used in the Journal, unless otherwise specified (*see below*) came from the Allied Armed Services.

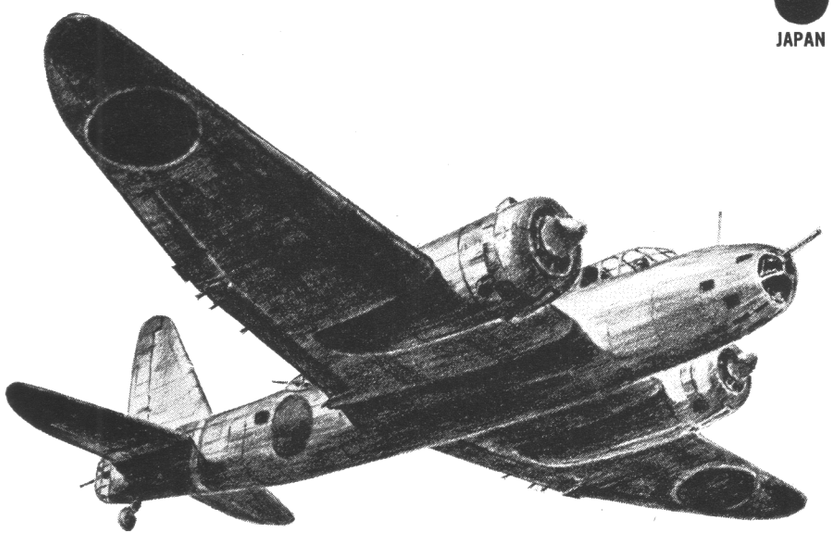
Cover—William C. Shrout
4—Bot., Matthew Greene
5—Bot. left, Fernando Martinez
9—Hans Wild
11—Top, Graphic
14—Top, "The Aeroplane"
15—Bot., A.P.
20—Top, John Phillips
21—A.P.
22—Bot., A.P.
23—Top, W.W., cen., A.P.
24—Bot., Acme
33—Second row right, Bob Landry; third row center, Walter B. Lane; fourth row left, William C. Shrout; fourth row right, Myron H. Davis
37—Top, A.P.; bot. right, Int.
39—Top, J. R. Eyerman
40-41—Top, Myron H. Davis; bot., Sam Shere
42—Top, Myron H. Davis; bot. left and right, Sam Shere
43—Top, Bob Landry; bot., J. R. Eyerman
44—Bot., Sam Shere
45—Top, J. R. Eyerman
46—Dmitri Kessel
47—Bot. left, Ed Clark; bot. right, Dmitri Kessel
48—First row, Ralph Morse, William Vandivert, Eliot Elisofon
Second row left, North American Aviation Inc.; right, Frank Scherschel
Third row, Ralph Morse, Frank Scherschel, Acme
Fourth row center, William Vandivert

Abbreviations: A.P. Associated Press; W.W., Wide World; Int., International

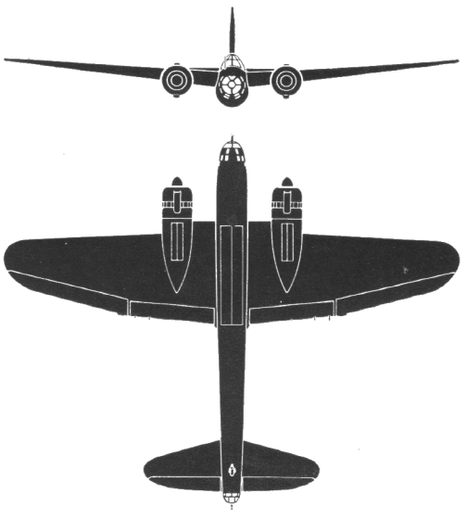
MEDIUM BOMBER

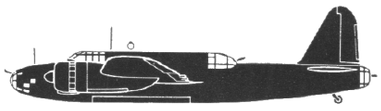
JAPAN

"HELEN," T-100 M/B



PROVISIONAL SKETCH





PROVISIONAL SILHOUETTE

DISTINGUISHING FEATURES: Twin-engine mid-wing monoplane. Leading edge inboard of the engines is farther forward than outer section, like the Mosquito. Trailing edge of the wing has a broken taper ending in a broad rounded tip. Radial engines are underslung. Fuselage decreases in size only slightly toward tail section, terminating in gun position. Span is about 68 ft.

INTEREST: Though this plane has been known to be in production for some time, it is now appearing in operation over India, Australia, and Southwest Pacific areas. The remains of a few crashed Helen's have been examined, and recently this plane has been photographed from the air. Results to date have been insufficient for a satisfactory calculation of its performance.

SPAN: approx. 68 ft.
LENGTH: approx. 54 ft.
APPROX. MAX. SPEED: 270—80 m.p.h.
SERVICE CEILING: 35,000 ft. (Max.) estimated, 30,000 ft. (Normal)

JAN. 1, 1944
FROM DATA CURRENTLY AVAILABLE

WAR DEPARTMENT FM 30-30
NAVY DEPARTMENT BUAER 3

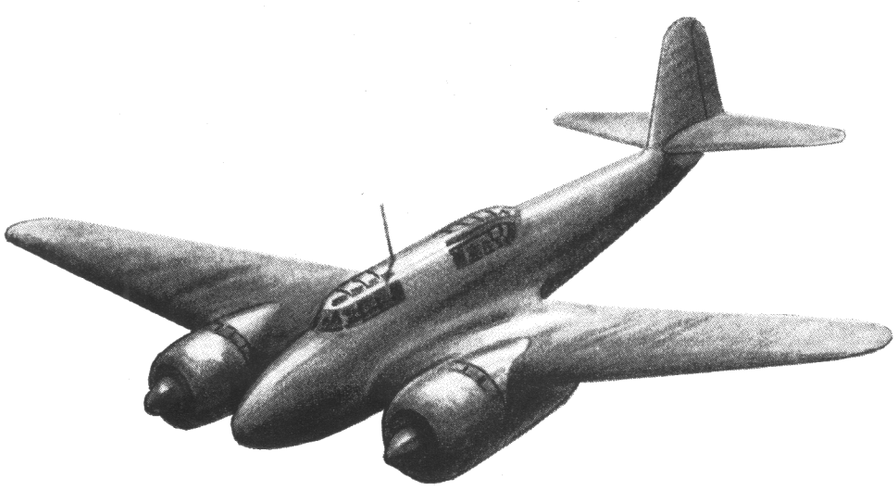
RESTRICTED

NOTE: This page is to be cut along dotted lines (*above* and *below*), added to the proper nation's section in the Recognition Pictorial Manual. The dots indicate perforations.

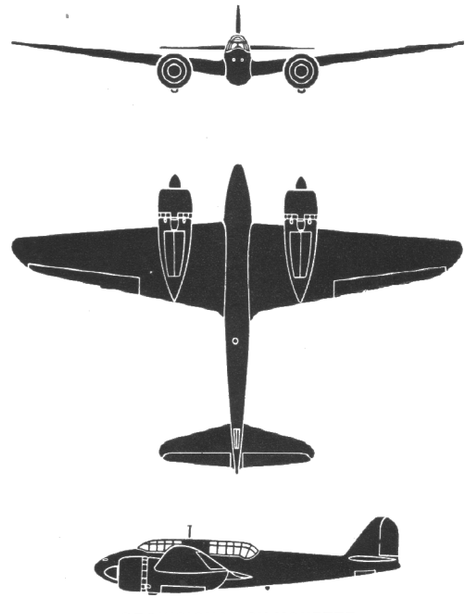
FIGHTER

JAPAN

"NICK," Type 2



PROVISIONAL SKETCH



PROVISIONAL SILHOUETTE

DISTINGUISHING FEATURES: Twin-engine low mid-wing monoplane. Engines are underslung with a deep nacelle continuing back under the wing to the trailing edge. The fuselage is unusually slender and streamlined from pointed nose to tail. The wing, engines, greenhouse, and tail closely resemble those of Lily.

INTEREST: This airplane has been reported operating in the Southwest Pacific area for the last few months. Very little was known about it until some recent photographic data was secured by our attacking aircraft. Nick is now recognized as an operational plane and will probably be seen in increasing numbers.

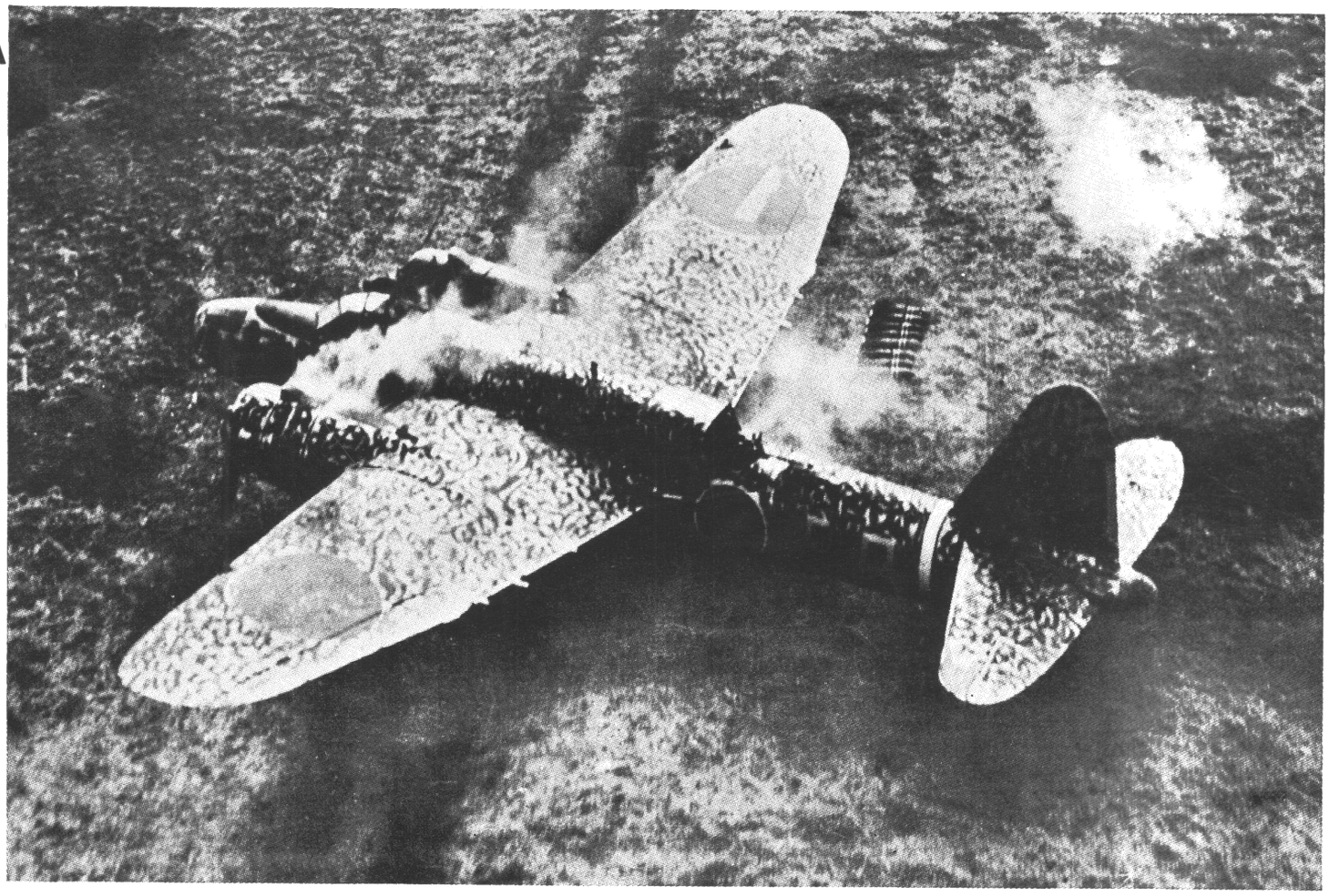
SPAN: 50 ft. approx.
LENGTH: 34 ft. approx.
APPROX. MAX. SPEED: 350 m.p.h. at 17,600 ft.
SERVICE CEILING: 35,400 ft. (Normal wt.)

JAN. 1, 1944
FROM DATA CURRENTLY AVAILABLE

WAR DEPARTMENT FM 30-30
NAVY DEPARTMENT BUAER 3

RESTRICTED

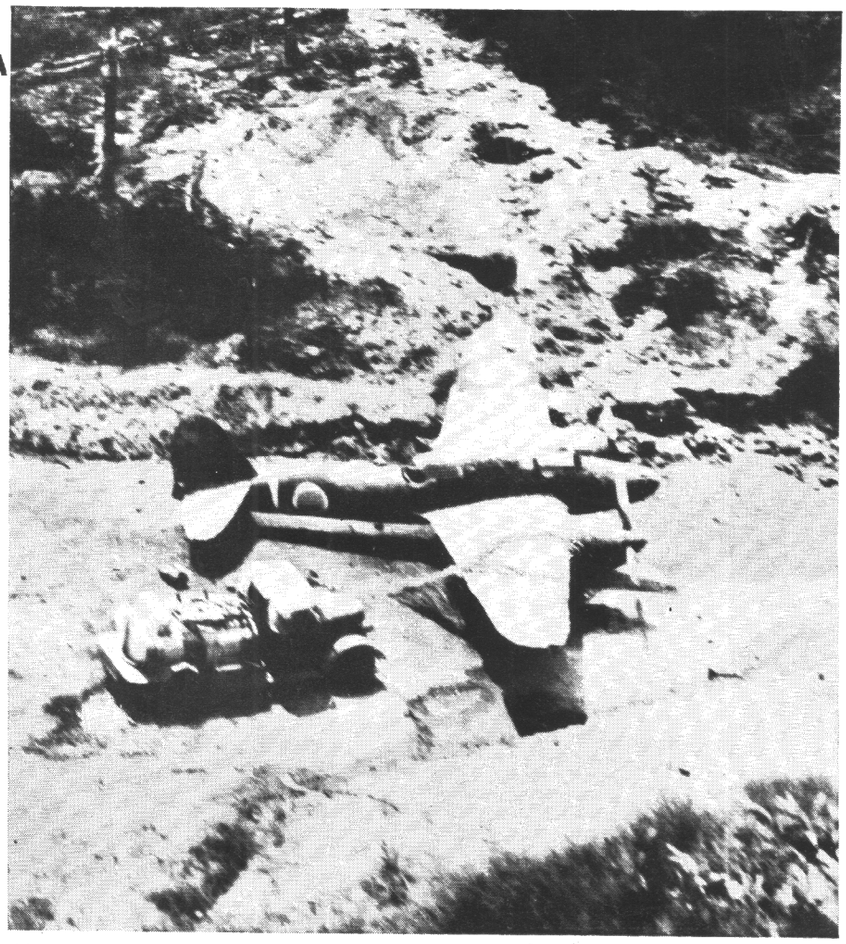
A



HELEN, one of latest operational Japanese twin-engine airplanes, has wingspan and armament of a medium bomber, but performance details are undetermined. Helen is distinguished by broken line of wing's trailing edge; leading edge projection between nacelles.

NICK was recently photographed in an Army Air Forces raid on Wewak (see *Journal*, Nov. issue). While a fighter version of Dinah has been reported for some time, Nick is the only Japanese twin-engine fighter so far definitely established as being operational.

A



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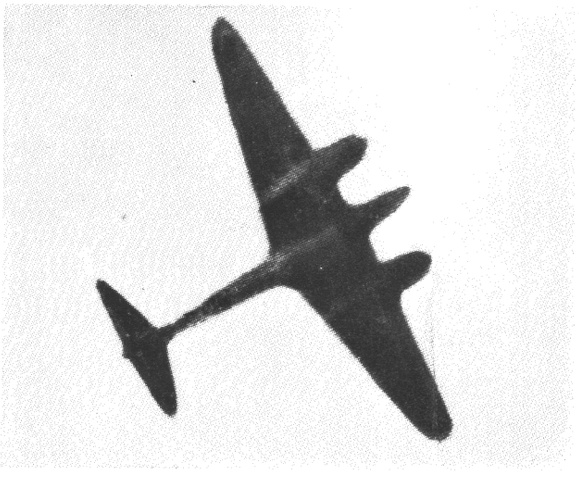
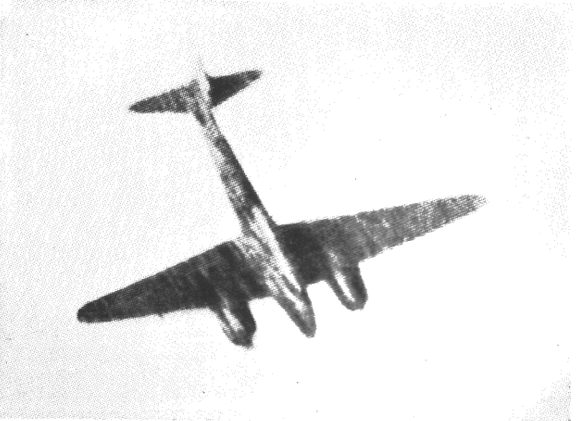
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