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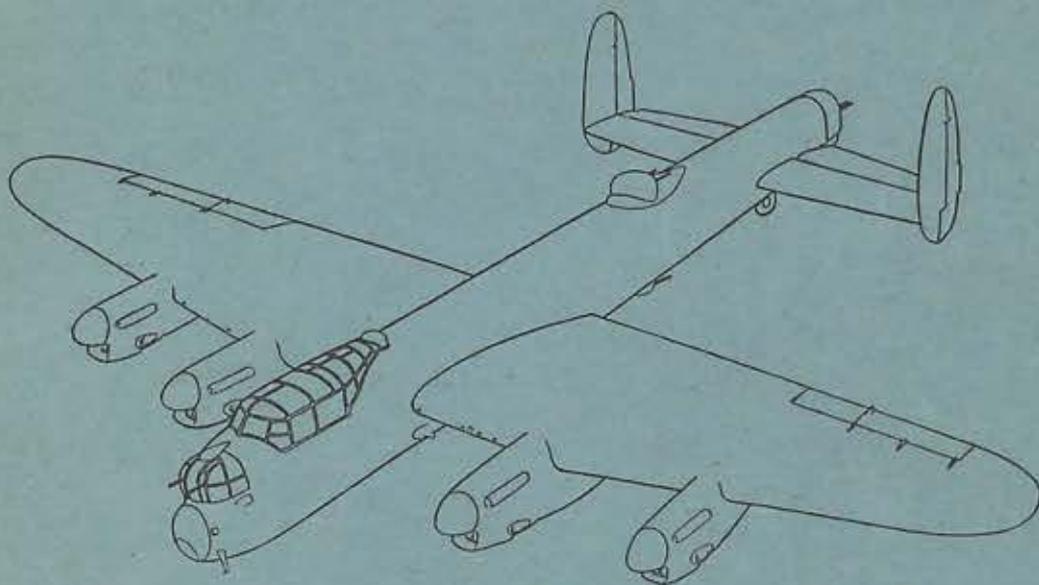
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BOMBER COMMAND

QUARTERLY REVIEW

July—August—September, 1943

No. 6



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HEADQUARTERS
BOMBER COMMAND
ROYAL AIR FORCE

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HAMBURG: DAMAGE RESULTING FROM FOUR MAJOR NIGHT RAIDS (BOMBER COMMAND)
AND TWO DAYLIGHT RAIDS (U.S.B.C.), 24/25 JULY—2/3 AUGUST, 1943

(See pages 2-3)

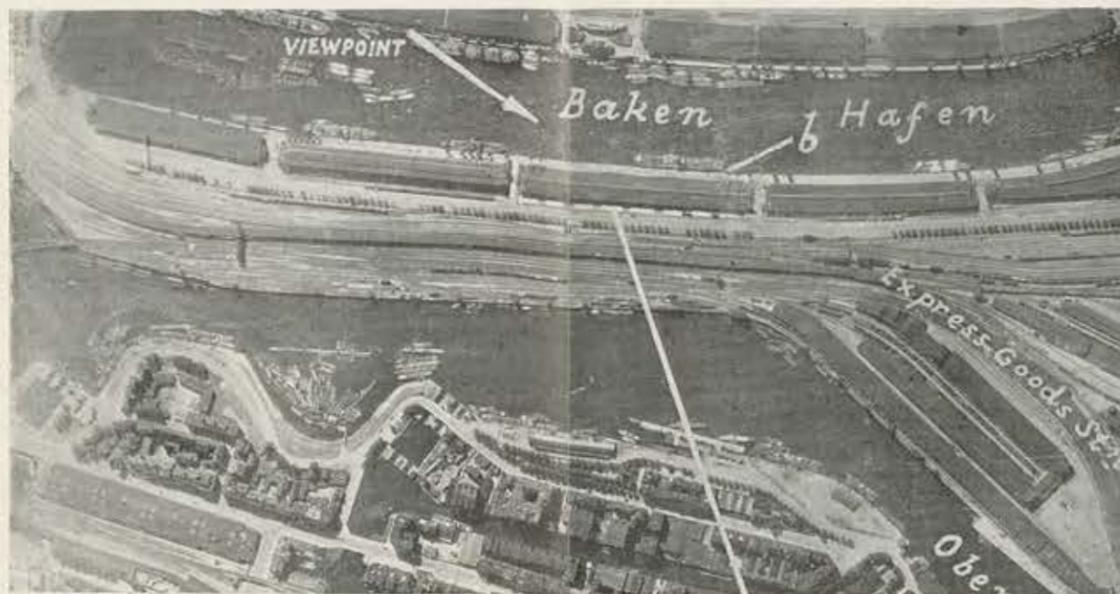


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SCALE OF MILES

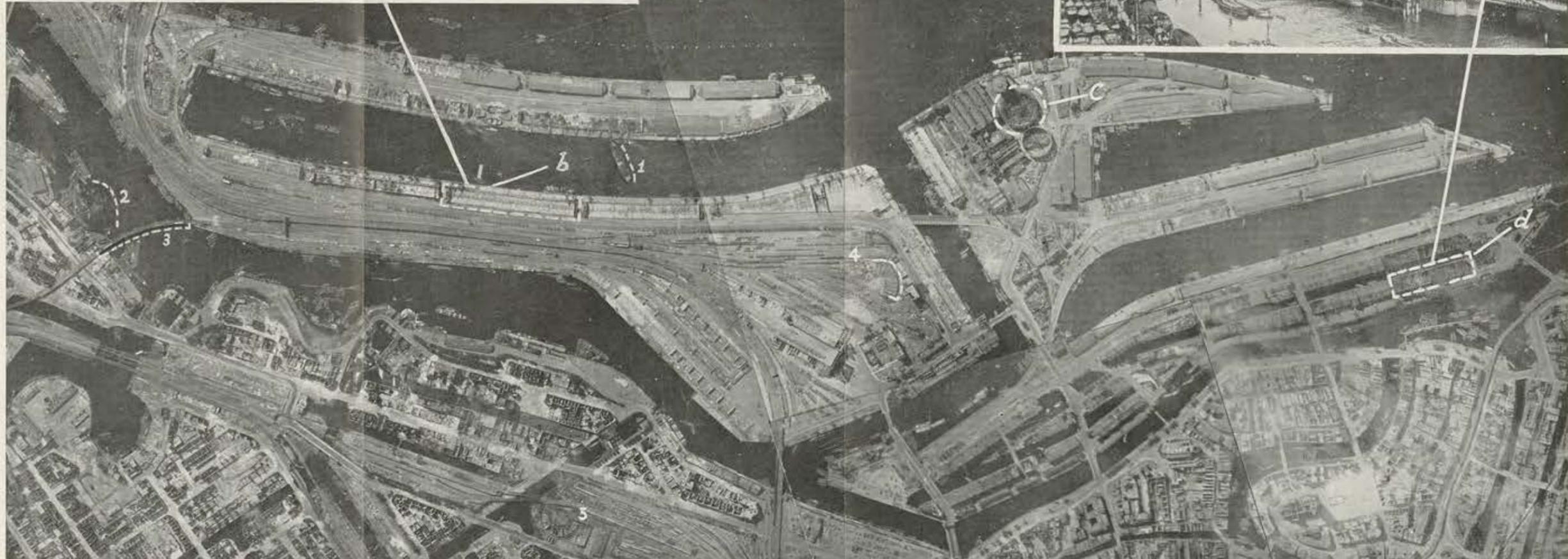
Buildings in areas marked black are destroyed or more than superficially damaged.

TWO MILES OF HAMBURG DOCKS

—(A) Before the raids



—(B) The same in August, 1943 (below)



The normal volume of active shipping present in the port of Hamburg before the raids was about 200,000 tons. Immediately after the raids the volume fell to a mere 15,000 tons. The above reconnaissance photograph indicates some of the reasons for this catastrophic decline.

Practically all the buildings of the Dock Goods Station were demolished, and rolling stock and locomotives wrecked. Nearly two miles of quayside transshipment sheds and their contents were completely gutted in the Baken-hafen alone. (Inset View, left, indicates the size of one of these sheds (b) and shows the so-called "double-cranes" specially constructed at Duisburg for the Hamburg Port Authority.)

In the "Warehouse Town" between Sandtor-hafen and the Central City many very large warehouses were gutted and still burning at the time of reconnaissance. (Compare Inset View, right.) The Main Gasworks was completely inactive, both its large holders being destroyed (c).

- Other points annotated:— (1) A large merchant vessel (350 ft.) sunk in the Baken-hafen. (2) Other sunken craft in Ober-hafen Canal. (3) A burnt-out train which blocked the damaged bridge across the Ober-hafen Canal for at least ten days. (4) Engine round-house wrecked in the Dock Goods Station. (5) Engine-house and 12 trains of passenger coaches wholly or partly burnt out in the approaches to the main station.

BOMBER COMMAND QUARTERLY REVIEW

No. 6

I. REVIEW OF OPERATIONS

July—September, 1943

Introduction

The record intensity of operations achieved in the second quarter of 1943 was surpassed in July and August. Labour troubles which seriously interfered with Lancaster output in August, kept Bomber Command well below establishment in these aircraft in September, and thus reduced the weight of our offensive below the level of the two previous months. In spite of this setback, however, the total effort for the quarter is outstanding in comparison with that of the previous year.

All Targets :—

	Total Night Bombing Sorties.	Total Tonnage of Bombs Dropped.
July-Sept. Quarter, 1942.	8,516	15,677
1943	17,902	51,551

The corresponding figures for German targets only are :—

	Total Night Bombing Sorties.	Total Tonnage of Bombs Dropped.
July-Sept. Quarter, 1942.	8,348	15,438
1943	14,872	44,066

Aircraft of U.S. VIII Bomber Command have participated in small numbers in night attacks during September, to gain experience of night operations.

Thus the prediction of the Commander-in-Chief, made after the first hundred thousand tons of bombs had been delivered on 23/24 May, 1943, that the next hundred thousand would arrive much more speedily than the first had done is being rapidly fulfilled. The total tonnage dropped on Germany up to the end of September, was actually 165,460 tons. The further promise that delivery would be not only more rapid but also more accurate has also been strikingly fulfilled. Many of the towns attacked since it was made, such as Aachen and Remscheid, needed no second

visit, and the elimination of Cologne, Dusseldorf and finally Hamburg itself in a few major attacks has set completely new standards for the speed and thoroughness by which industrial centres can be devastated by highly organised air attack.

Unfortunately, complete success is still far from automatic. Unforeseen variations in wind speed and direction, unexpectedly bad visibility, and ordinary human error in the marking of targets by the employment of navigational aids necessarily interfere at times with the execution of attacks, and nothing like an unbroken record of achievement can be expected. There could, however, be no better evidence of the extent to which successful attacks predominate over failures than the military, political and propaganda measures which the bombing offensive of 1943, has compelled the enemy to take.

It was clearly realised in January, 1943 (see the article on "Bomber Command and the Russian Offensive" in *Bomber Command Quarterly Review*, No. 3, p. 16) that, if the bombing offensive against German Industry and communications were maintained and intensified, the German Army could not hope to maintain its position in Russia. Quite apart from shortages of actual armaments and the acute deficiency of rolling stock which are the direct results of our bombing, and which has forced the Germans to remain on the defensive during the Summer of 1943, the continued piling up of fighter and flak defences in the West has led to a position in which air superiority and even adequate fighter cover at crucial points elsewhere has had to be sacrificed. Thus at the beginning of September, 1943, some 50 per cent. of the day fighters and 85 per cent. of the night fighters available to the Luftwaffe were massed on the Western Front.

As a result of this favourable situation the Soviet Armies have made spectacular advances. They are still too far removed from the frontiers of Germany to be regarded by the inhabitants as constituting a menace comparable to that created by air attack on the Fatherland itself, and it remains to be seen whether bombing on its present scale can so far cripple German arms production and transport as to make even a greatly shortened line untenable. But unquestionably the results already achieved by the bombing offensive demonstrate the extent to which it can directly affect the operations of armies in the field far away from the actual targets attacked. The effect on the home front itself has naturally been even more obvious.

Attempts to stimulate flagging morale by asserting (a) that Bomber Command could not keep it up; (b) that the Luftwaffe and the Secret Weapon would soon provide more than adequate retaliation; (c) that in any case British bombs hit only churches, hospitals and orphan asylums and, therefore, could have no influence on the course of the war, have now been largely abandoned. More direct methods have been adopted in their place. Himmler and the Gestapo are now in charge on the home front, and doubters and "rumour mongers" are no longer exhorted to mend their ways, but are summarily executed or sent to concentration camps. These drastic and unpopular measures would obviously never have been adopted if any alternative except collapse had been discoverable, and they have not been entirely successful as repeated appeals by Press and Gauleiter to all concerned to avoid rumour and gossiping about bomb damage abundantly testify. For the moment, however, the home front is holding, but it is very badly shaken, and although fear as a substitute for morale may see the Fatherland through the chilly and bomb-stricken months which lie immediately ahead, it is clear that the Party regard the prospect as far from rosy.

The dominant propaganda line now is that, as an Allied victory will inevitably mean a fate worse than death for all Germans, they may just

as well be killed by bombs as give in. This is another short term expedient forced on Goebbels by the intensity and success of Bomber Command's summer offensive. Indeed, it is already clear that the stories spread by several hundred thousand refugees from Hamburg alone are tending to convince their involuntary hosts in the "safe" areas that no fate could possibly be worse than the endurance of heavy air attacks. The evident truth of this statement gives it a great advantage in the long run over the fear engendered by hypothetical Allied atrocities. The inhabitants of the Ruhr and Rhineland, who have some claim to speak as experts on the relative merits of being occupied and being bombed, have probably few doubts as to which is the less attractive.

The result of the summer bombing offensive is thus that Germany faces imminent disaster both on the home front and in the east. Had our resources permitted an attack on twice the scale of that actually delivered, she would already have been out of the war. As it is, she may be able to hold on for some months yet. But the stage is now reached at which every factory and house destroyed—one might also add, every window broken—makes it noticeably harder for a frightened and overstrained population to carry on. Bombing in a word has all but won the war, and unless the enemy is given a chance to recover, it will finish the job.

(a) Hamburg

The Battle of the Ruhr which provided the main theme of the second quarter of 1943, was prolonged and arduous. It extended, as will appear later, well into the third quarter. By contrast, the almost total destruction of Hamburg took place with appalling suddenness. On 24 July, it was no more seriously damaged than numerous cities in the United Kingdom had been by the Luftwaffe in 1940-41. There was a noticeable area of devastation and numerous isolated incidents, mainly in the docks area. But enormously the greater part of it was unscathed and life went on along more or less normal wartime lines. On 3 August, less than a fortnight later, it was little more than a burnt out shell in which survivors of the disaster existed precariously without gas, electricity and drinking water on emergency supplies of food collected from the surrounding country.

Nothing at all like this had ever happened before since a similar catastrophe overtook Sodom and Gomorrah, the Cities of the Plain. It was indeed so sudden that the magnitude of the disaster which Bomber Command with the aid of the U.S. VIII Bomber Command had inflicted on the enemy was very inadequately recognised in this country. The Press of Germany and the neutral countries, however, did it full justice. So much so that at first it seemed as if Goebbels himself must for some obscure reason be spreading exaggerated stories of the defeat which Germany had suffered. It is now clear, however, both from photographic evidence and accumulated reports from more or less reliable eye-witnesses that even the most vivid imagination would have found it exceedingly difficult to produce anything worse than the actual facts. These are best stated in relation to the figures.

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
24/25 July	791	740	1,376	1,021	2,397	12
27/28 July	787	739	1,141	1,276	2,417	17
29/30 July	777	726	1,124	1,258	2,382	28
2/3 August	740	425	671	775	1,426	30
	3,095	2,630	4,312	4,310	8,622	87

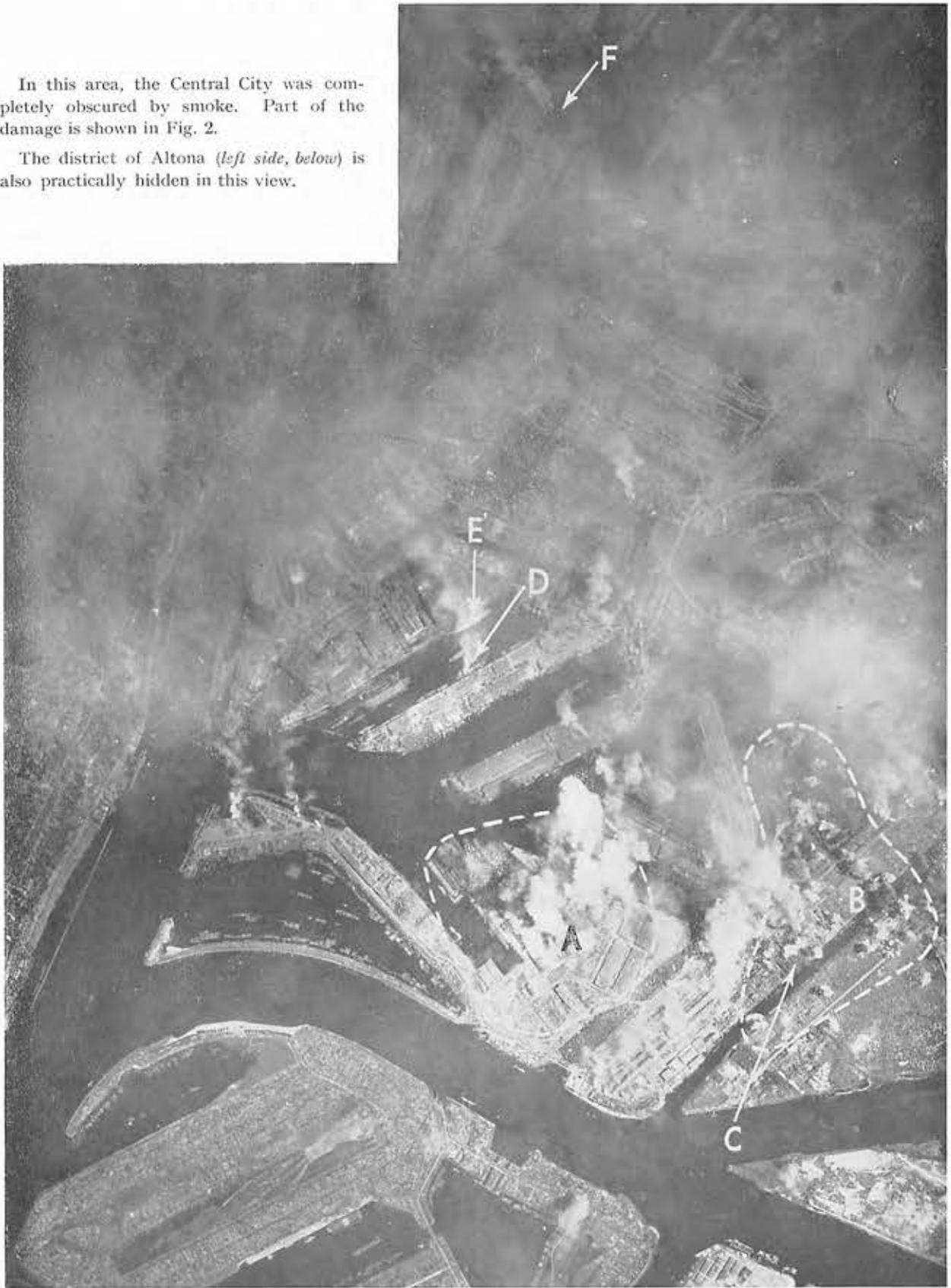
Two daylight attacks were carried out by aircraft of U.S. VIII Bomber Command:—

Date.	Aircraft Despatched.	Aircraft Attacking.	H.E.	Incendiaries.	Total.
25 July	115	68	89.3	50.0	139.3
26 July	120	54	88.9	26.1	115.0
	235	122	178.2	76.1	254.3

FIG. 3
SMOKE PALL OVER HAMBURG (See page 3)

In this area, the Central City was completely obscured by smoke. Part of the damage is shown in Fig. 2.

The district of Altona (left side, below) is also practically hidden in this view.



This photograph, taken during the second U.S.B.C. attack at midday on 26 July, provides a grim picture of the progressive destruction of Germany's second city.

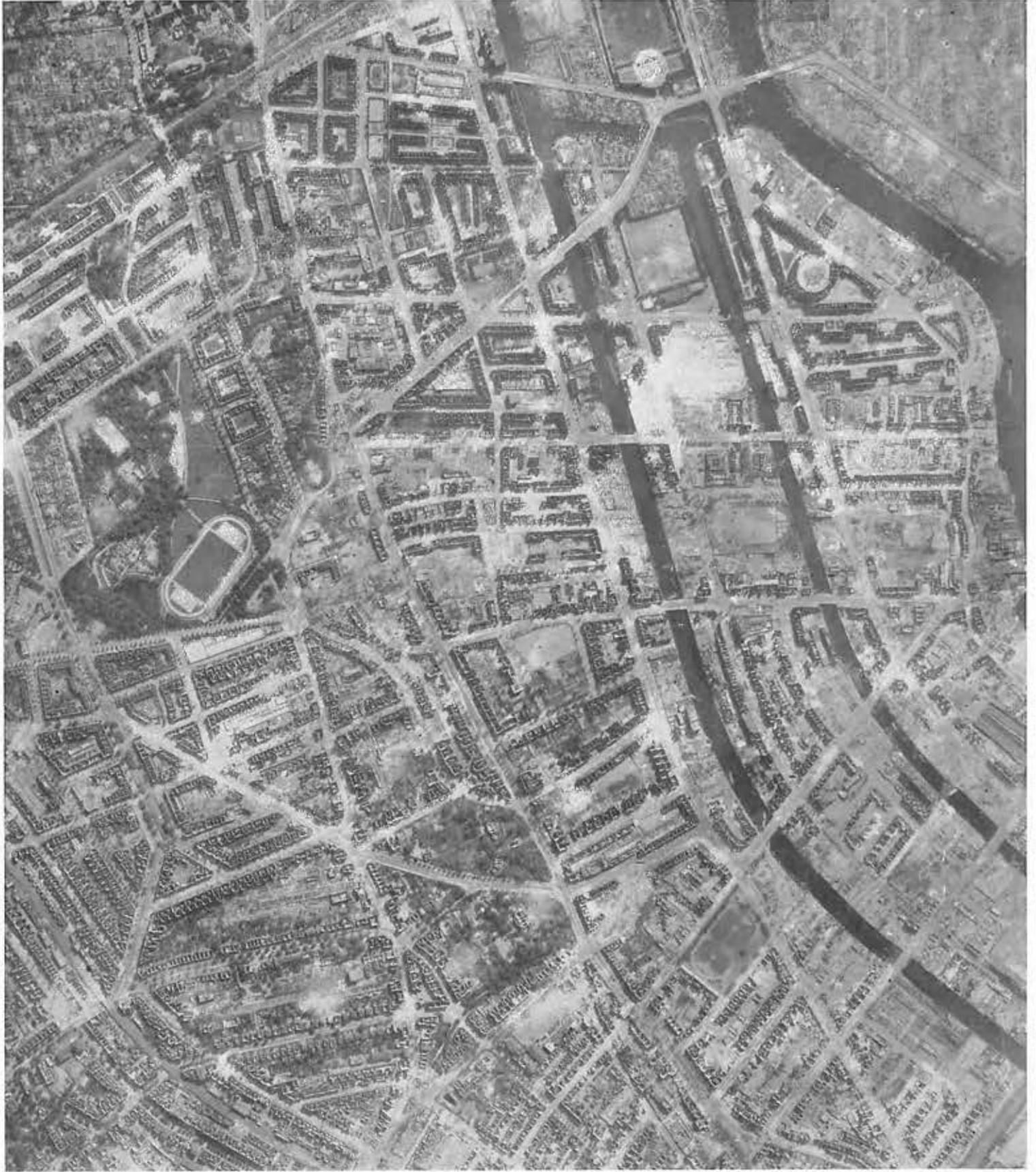
In the upper part of the photograph only the dim outline of the commercial docks and central city area can be discerned beneath the pall of smoke from fires still burning thirty-six hours after the first of the great night raids. Smoke plumes (F) indicate the position of the burnt-out holders of the main gasworks (see Fig. 3, c).

The U.S.B.C. daylight attacks were directed against the primary war industries—the shipbuilding yards making submarines and other naval craft. Much damage was done to workshops of the BLOHM & VOSS Yards, where direct hits were also scored on two floating docks, on the cargo liner *General Artigas* (D, still burning), and on an incomplete liner (E), which capsized over onto the quay.

A heavy concentration of bombs (A) burst on the HOWALDTS-WERKE installations, and the adjoining M.A.N. Diesel-engine workshops were also damaged.

Another group of bomb-bursts (B) fell across important industrial plants in NEUHOF, south of the Howaldt Yards, including three direct hits on Hamburg's largest power-station (C). The other large power-station, at TIEFSTACK, east of the city, was also put out of action during the raids (see Fig. 5).

COMPLETE DEVASTATION IN EASTERN HAMBURG

(See page 3)

This photograph shows a thousand acres of relatively open built-up area in eastern Hamburg, formerly consisting of business and residential property. Almost every building in every street has been demolished or left roofless and gutted. There are more than four thousand acres of this building density in Hamburg, of which 70 per cent. were either destroyed or seriously damaged. In addition, 75 per cent. of the fully built-up area was destroyed. It is estimated that about three-quarters of a million people were rendered homeless by the raids and many thousands more were attempting to live in damaged houses left standing among the acres of ruins.

The area shown above includes the destruction of many small industrial plants, particularly in the vicinity of the canals. Sheds of a large tramway depôt (*right, edge of print*) suffered heavy fire damage, while an extensive whitish area between the canals marks the site of a factory and timber-store literally razed to the ground.

DAMAGE TO PUBLIC SERVICES IN HAMBURG

FIG. 5 (right).—The breakdown of transportation services within the city was ensured by heavy damage to no less than thirteen bus or tram depôts. This typical instance, in the eastern suburbs, shows many gutted trams in the depôt itself and a line of more than thirty others parked in the open street.

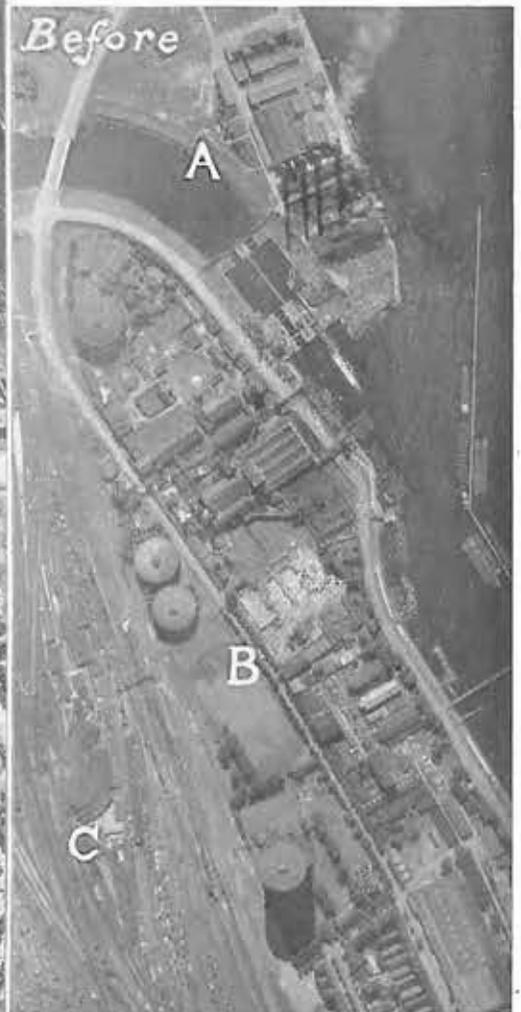
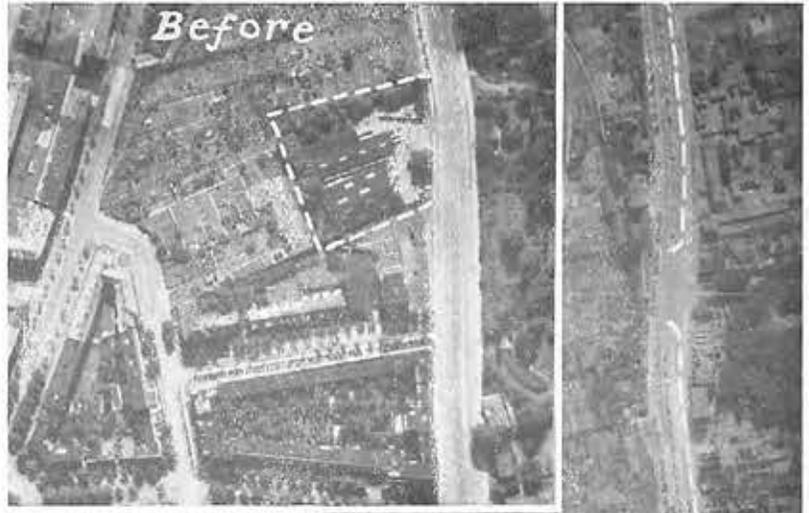


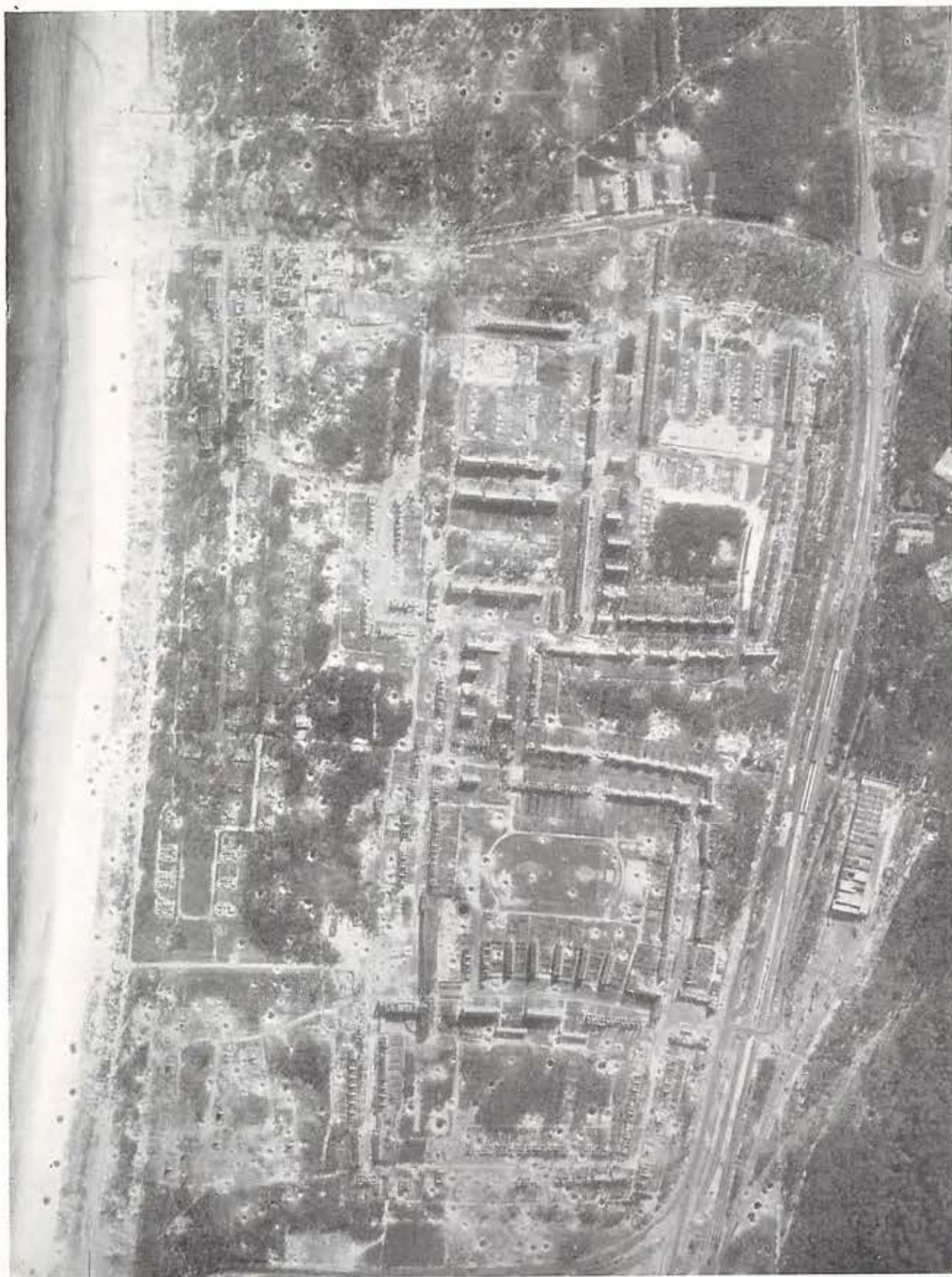
FIG. 6. —Both the large electric power-stations of Hamburg were reduced to inactivity in the course of the raids. The U.S.B.C. Fortresses scored several direct hits on the largest plant at NeuhoF, while that at TIEFSTACK (A, above) was damaged during one of Bomber Command's night raids. At the adjoining plant of the Hamburg Gasworks (B) two of the four dry-type gasholders were destroyed, and a third severely damaged. Many nearby factories and warehouses were completely gutted.

The very large marshalling yards of ROTENBURGSORT (C, above), serving the main Hamburg-Berlin route, were also well plastered with craters and blocked with burnt-out rolling-stock. The engine round-house was destroyed.

FIG. 7

HEAVY DAMAGE TO EXPERIMENTAL RADAR STATION

(See pages 5-6)



On 17/18 August nearly 600 heavy bombers were detailed to attack the research and experimental station at PEENEMÜNDE, a small target of the highest priority situated on the Baltic coast. The force attacked in three waves, each wave aiming at a separate section of the establishment. The Southern Section (living and sleeping quarters) was attacked first with shattering effect, as may be seen from the above photograph. Ninety detached huts and three large barrack-type blocks were destroyed or severely damaged by a veritable carpet of fire and H.E. bombs.

The Senior Officers' Mess and thirty-five other buildings, among them the largest and most important, were completely destroyed or badly damaged in the Northern Section of the establishment, while units of the Factory Workshops received direct hits by H.E. bombs.

The very low casualties incurred in the first two attacks were largely due to the temporary disorganisation of the German fighter defences by a new countermeasure which precluded the vectoring of controlled night fighters and has led to the adoption by the enemy of entirely new defence tactics. The final attack was ruined by unexpected deterioration in weather conditions over the target and caused no damage comparable to that done by the first three.

Eighty-seven aircraft is a high price in itself, but in comparison with the loss sustained by Germany in the almost complete annihilation of her second city, it can only be regarded as minute.

Hamburg was indeed a great city by any standards. It was the second city and greatest maritime centre of Germany with a population of nearly two million and a closely built-up area of 8,380 acres. Except for shipbuilding and especially U-Boat construction, it was a commercial and administrative rather than an industrial centre and was comparable to the Port and City of London. Naturally, quite important industries of various kinds had grown up in and around it, but they were not the primary pre-occupation of the Hamburgers. The "Hafen" with its imposing array of shipbuilding yards, docks, warehouses and administrative buildings was the basis of Hamburg's contribution to German economic life.

Hamburg was last burnt down in 1842. Had weather conditions at the end of May, 1942, been different, it would have been the target of the 1,000 bomber attack launched against Cologne on 30/31 May. In fact, the centenary conflagration was postponed for a year—but when it was finally celebrated in 1943, it was on a much larger scale than would have been within the scope of Bomber Command in the previous year.

Geographically there are six fairly distinct areas in Hamburg :—

- (i) The central city area south and south-east of the Alster (a large artificial lake in the middle of the city). This contains the bourse, the city administrative offices and the main shopping and business centre.
- (ii) Altona, south-west of the Alster. This houses mainly workers directly connected with the port and its subsidiary activities.
- (iii) The actual docks area mainly on the south bank of the Elbe. This included the main submarine building yards.
- (iv) Large private houses round the north end of the Alster (corresponding to the West End residential area round the London parks).

- (v) An inner suburban ring mainly of workers' houses and small industrial undertakings.
- (vi) Dormitory suburbs like Wandsbek about 5 miles from the centre of the city.

The destruction of Hamburg by bombing was thus far the stiffest task yet undertaken in air warfare. Its difficulty was not fully recognised because of the suddenness with which it was successfully completed. It was not until 1 August that smoke from the conflagration started by our attacks on 27/28 and 29/30 July had cleared sufficiently to make photographic reconnaissance practicable. The damage done by these and by the earlier attack on 24/25 July was so enormous that no adequate summary of it in a reasonable space is possible. To indicate the scale of the disaster it is enough to say that the heavily damaged areas covered 6,200 out of the 8,380 acres which comprise Hamburg's closely built-up residential districts—*i.e.*, 74 per cent. All parts of the city and docks were shattered. Casualties were estimated at anything up to 100,000 and the number of homeless and destitute people at about three-quarters of a million.

Assessment of the total damage was not completed until the middle of September. The salient facts, in addition to the overwhelming residential damage, which emerge from this are :—

- (i) All the four main shipbuilding yards and the M.A.N. Diesel engine works were hit. It is reported that U-Boat construction was very badly set back.
- (ii) In the dock area five floating docks were sunk or damaged together with numerous ships in the harbour. On one quay every warehouse for a distance of about a mile was burnt out, and this was only a little worse than what happened generally over the port as a whole.
- (iii) Railway communications of all kinds were completely dislocated by extensive damage to tracks, bridges and buildings.
- (iv) One hundred and fifty industrial plants were destroyed or damaged.
- (v) The important power stations at Neuhoft and Tiefstack were apparently put out of action and remained inactive after the attacks. The two other power stations in the city were seriously damaged and the main gas works in Grasbrook were gutted.

Two months of concentrated effort were required to restore any semblance of normal life to the port. The city as a whole is, of course, beyond hope.

(b) The Ruhr and Rhineland

Ruhr and Rhineland Targets

Date.	Target.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
				H.E.	Incendiaries.		
3/4 July ..	Cologne	653	589	951.7	926.5	1,878.2	30
8/9 July ..	Cologne	288	255	688.0	408.6	1,096.6	7
9/10 July ..	Gelsenkirchen ..	418	383	725.9	615.1	1,341.0	12
13/14 July ..	Aachen	374	352	329.1	545.5	874.6	20
25/26 July ..	Essen	705	627	1,082.8	949.6	2,032.4	26
30/31 July ..	Remscheid	273	243	295.2	483.2	778.4	15
22/23 Aug. ..	Leverkusen	462	427	833.4	895.4	1,728.8	5
30/31 Aug. ..	Munchen Gladbach	660	616	1,034.4	1,319.0	2,353.4	25
29/30 Sept. ..	Bochum	352	312	640.9	698.9	1,339.8	7
		4,185	3,804	6,581.4	6,841.8	13,423.2	147

Although the destruction of Cologne and Köln-Deutz as economic assets to Germany (described in the last number of the *Bomber Command Quarterly Review*) completed the main purpose of the Ruhr and Rhineland offensive, operations were continued during the third quarter of the year with the purpose not only of destroying worth while industrial targets but of preventing the removal of defences to other threatened areas and discouraging attempts at reconstruction and the return of refugee workers from other parts of the Reich. Some of these attacks were outstandingly successful. The most noteworthy was undoubtedly the attack on Essen of 25/26 July. The whole of Krupps works were obscured by fires still burning 12 hours after the attack, and later photographs showed that Krupps had actually suffered as heavily in this one attack as in all previous attacks put together. The total result was that 110 out of 190 workshops in the whole undertaking had received damage. Many of them were of course completely gutted. New damage to other factories in Essen as well as to housing, workers' camps, transport and public utilities was on a similar scale. Indeed, this attack, though immediately overshadowed by the destruction of Hamburg, ranks high in Bomber Command's achievement for the quarter.

The attacks on Aachen and Remschied had a different kind of importance. Following as they did on the annihilation of Wuppertal and Krefeld, they drove home the lesson that a single successful attack can write off an industrial city of considerable size and value in a single night. Recognition of this important fact has had a stimulating effect

on the evacuation of similar towns in Western Germany to the disadvantage of war production and administration.

Both Aachen and Remscheid, however, were quite important in themselves. The former is an important railway centre and housed a large number of small factories, the loss of whose production is a serious matter to Germany in the fifth year of war. The latter was the seat of a special steel industry of great value in the production of crankshafts for aircraft and aero-engines and other essential accessories in arms production.

Very satisfactory though less wholesale destruction was done at München-Gladbach and Rheydt. These adjacent towns were responsible for producing clothes and textiles, of which the shortage in Germany is notoriously acute. At least 30 factories concerned in this and other types of production were destroyed or badly damaged.

Bochum, revisited on 29/30 September, suffered mainly in industrial damage to essential steel-producing plants. Numerous fires were still burning 16 hours after the attack and reconnaissance showed that three plants of the great Vereinigte Stahlwerke in addition to collieries, engineering works and other large industrial undertakings, have received important damage additional to that caused by earlier attacks.

Weather conditions spoilt the attack on Leverkusen (the great chemical works of I.G. Farben) and the blind bombing attack on Gelsenkirchen produced no extensive damage.

(c) Berlin

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
23/24 August	719	625	954·6	826·5	1,772·1	57
31 August/1 September	612	512	771·2	676·7	1,447·9	47
3/4 September	316	295	603·9	395·6	999·4	22
	1,647	1,432	2,329·7	1,898·7	4,219·4	126

The destruction of Berlin without a much heavier weight of attack than Bomber Command alone can produce is an extremely difficult problem. It is the target which above all the Luftwaffe has to defend, and no chances will be taken with it even if this involves leaving lesser places like Stettin and Hanover relatively lightly protected. The penetration of enemy-held territory necessary to reach it is large. Finally, its mere size—18,000 acres of closely built-up area as compared with 8,380 at Hamburg—means that no noticeable impression can be made on it except by a large force.

None of the three attacks made on it during this quarter was an unqualified success, though two of them caused extensive and important damage. The first attack fell well to the south-west of the centre of the city in the area of Charlottenburg and Marienfelde. The second was spoilt by unexpected meteorological conditions and caused damage only in the outlying suburban

area in the south. The third, which, though the smallest in numbers was in some respects the most successful of the three, caused heavy industrial damage in Siemensstadt and the north-west of the built-up area.

The area of damage resulting from these and earlier attacks approaches 500 acres and is thus about three-quarters of what the enemy succeeded in doing to the larger area of Greater London in a series of attacks extending fairly continuously over nine months. This, however, serves only to indicate the size of the whole job. It can be done, but it is not easy.

Probably the most important result of these attacks was their effect on German morale. The first is said to have produced panic evacuation comparable to that experienced in Hamburg. The others added considerably to it. Fire-fighting services again proved inadequate to deal with the results of large scale incendiary attacks.

FRIED. KRUPP A.G. Cast Steel Works ESSEN

0 300 600 yds
Approx

C.I.U. PLAN N° D/299 Scale 1:10,000 Neg. N° 27551r

C.I.U. DAMAGE PLOT (NON STANDARD)
FR. KRUPP A.G. (ESSEN) NO. I.

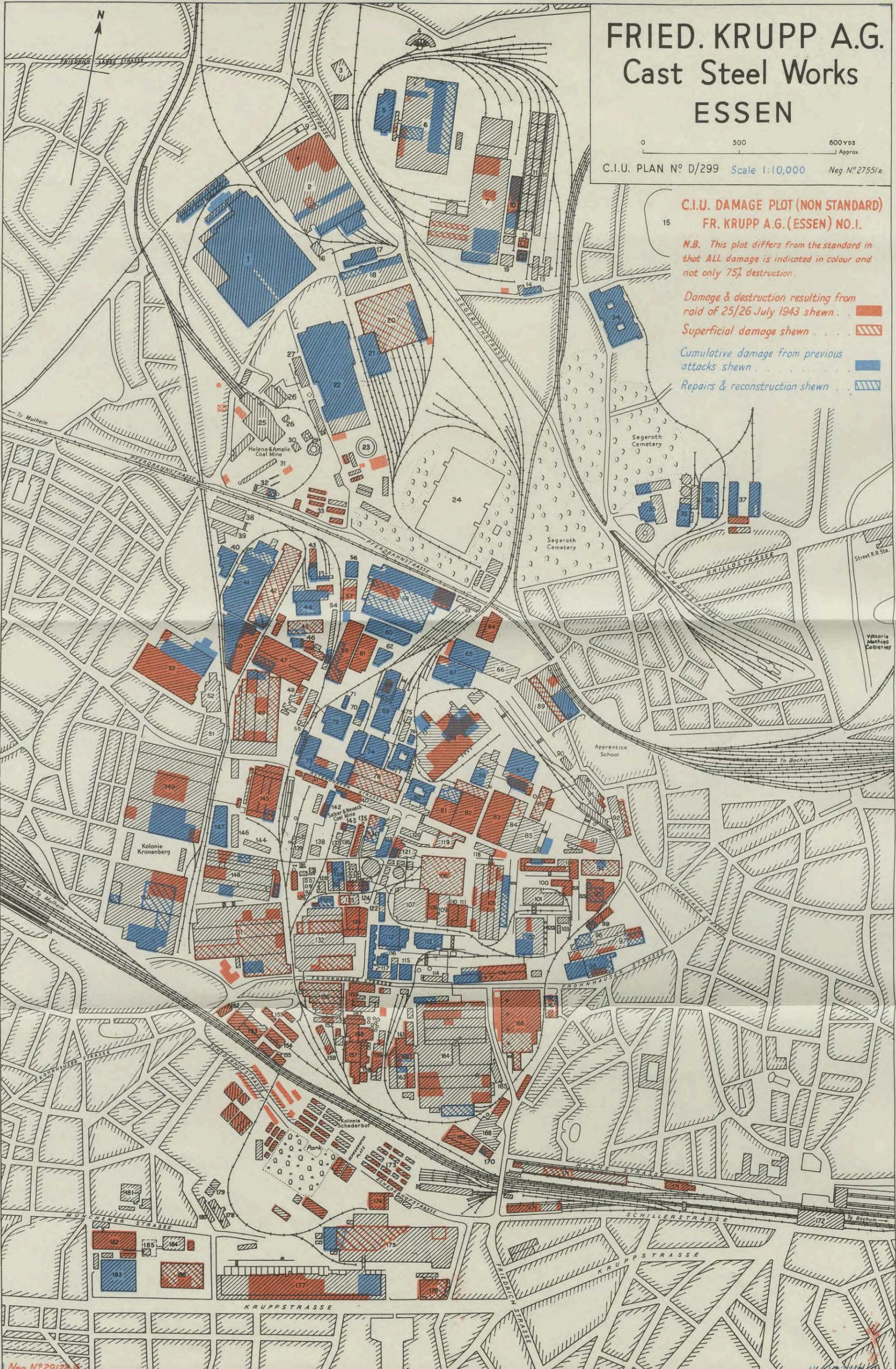
N.B. This plot differs from the standard in that ALL damage is indicated in colour and not only 75% destruction.

Damage & destruction resulting from raid of 25/26 July 1943 shown . . .

Superficial damage shown . . .

Cumulative damage from previous attacks shown . . .

Repairs & reconstruction shown . . .



(d) Other German Targets**Mannheim**

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
9/10 August	457	432	850.9	872.2	1,723.1	9
5/6 September	605	546	772.5	813.1	1,585.6	34
23/24 September	630*	571	956.3	1,017.8	1,974.1	32
	1,692	1,549	2,579.7	2,703.1	5,282.8	75

(* Including five U.S. Fortresses.)

Although Mannheim had experienced 27 previous attacks of varying severity in which over 4,500 tons of bombs had been dropped, many of these had been carried out under bad weather conditions or with relatively small forces and the considerable damage caused had never amounted to devastation on a large scale. The attack on 5/6 September, however, took place under excellent weather conditions and appeared from the start to have been highly successful. Photographs taken two days later showed large fires still burning and it is known that heavy casualties were caused. Material damage amounted to over 300 acres of business and residential property devastated, particularly in the Inner Town, as well as heavy damage to factories, railways and warehouses. But for the fact that aircraft had been loaded that night in preparation for an attack on Berlin and therefore delivered only 1,500 instead of 2,000 tons of bombs, an even greater success would have been achieved.

Although Mannheim is a large manufacturing city, it is also of great importance as a centre for river and railway traffic. Hence the destruction of the main stations at Mannheim and Ludwigshafen, added to considerable damage to warehouses and dock facilities, were important items in the casualty list.

The subsequent attack on 23/24 September, while adding substantially to the areas of housing damage, was mainly concentrated on Ludwigshafen and on the industrial and docks area. The works of I.G. Farben, though by no means destroyed, suffered considerable damage, and destruction in the main docks area at the junction of the Rhine and Neckar was especially severe. Thus Mannheim has at length entered the class of thoroughly blasted German cities and, apart from the I.G. Farben works, which require a separate attack, it needs only occasional attention to prevent serious recovery.

Munich and Nuremburg

Date.	Target.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
				H.E.	Incendiaries.		
10/11 Aug.	Nuremburg	653	611	750.0	921.3	1,671.3	16
27/28 Aug.	Nuremburg	674	621	883.9	889.1	1,773.0	33
6/7 Sept.	Munich	404	365	577.7	467.3	1,045.0	17
		1,731	1,597	2,211.6	2,277.7	4,489.3	66

Although some damage was done to housing and industry by all these attacks, none of them achieved very much. Bombing was scattered, partly as a result of weather conditions over the targets, and the main weight of all of them was

expended on outlying areas and open country. The Munich attack, however, did considerable damage to railway communications to the south of the city.

Peenemünde

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
17/18 August	597	571	1,640.7	296.6	1,937.3	40

The experimental station of Peenemünde, north-west of Stettin on the Baltic coast, was considered a target of sufficient importance to justify a full-scale attack. This station consisted of comparatively small buildings dispersed over a large area. Extreme accuracy of bombing was

therefore essential if valuable results were to be achieved and, to ensure this, the attack was delivered in full moon conditions which gave maximum opportunity to enemy night fighters. Considerable losses were therefore only to be expected. As the route to the target was largely

identical with that used in previous attacks on Berlin, a harassing raid on the capital by Mosquitoes was arranged with a view to deceiving the defences for a time as to the real target.

Weather was clear both *en route* and over Peenemünde. Early arrivals identified the target visually before it was concealed by an effective smoke screen. Markers were punctually and accurately placed on the sections of the station which were known to be of outstanding importance, including the living quarters of the expert scientific personnel responsible for conducting the research work in progress there. Well-concentrated attacks developed and crews' reports gave promise of a most successful assault.

Ground defences at the target were not heavy. As soon, however, as the enemy realised the real object of the attack, night fighters were brought up from covering Berlin and from as far south as the Ruhr to intercept the bombers on their return

route. They were successful in catching the last waves which suffered rather heavy losses. In all, 41 bombers were missing from the night's work.

Photographic cover obtained on the following day was of poor quality owing to the presence of clouds and smoke from fires not yet extinguished. It showed, however, that the destruction caused both in manufacturing buildings and living quarters was very heavy indeed.

In the north part of the station, 27 buildings including the Senior Officers' Mess were completely destroyed. Nine others including the largest and most important in this section were heavily damaged.

The fact that German threats of retaliation against this country by "secret weapons" have become more blood-curdling but less specific as regards dates in the last few weeks is possibly connected with the success of this attack.

Hanover

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
22/23 September	711*	658	1,175.0	1,327.7	2,502.7	26
27/28 September	678*	599	1,012.2	1,298.9	2,311.1	38
	1,389	1,257	2,187.2	2,626.6	4,813.8	64

(* Including five U.S. Fortresses. One reported missing on night of 27/28 September.)

The weight of both these attacks fell outside the main city area. The first destroyed the outer southern suburbs including several important factories, while the second fell just too far north to be effective. It may safely be assumed that the

morale of the inhabitants, after two such near misses, had sunk to a low ebb even before Hanover received the knock-out blow, which followed within a fortnight. The results of that attack will be described in the next issue of this *Review*.

(e) Minor Raids and Harassing Attacks

Throughout the quarter small raids and harassing attacks have been carried out to distract the enemy defences and maintain pressure on morale over a wide area. These attacks have not been on a large enough scale to do substantial damage and shortage of Mosquito aircraft has severely limited operations by this type. They have, however, been of great value.

An attack on 15/16 September by a small force of specially-equipped Lancasters on the Dortmund-Ems Canal was unsuccessful owing to thick haze over the target. Mosquito blind-bombing attacks on the Brauweiler Power Station, north of Cologne, are shown by photographs to have scored a number of hits. The precise importance of the damage done, however, is not capable of being assessed from photographic evidence alone.

(f) Targets in Italy

Date.	Target.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
				H.E.	Incendiaries.		
12/13 July ..	Turin	295	277	493.4	296.5	789.9	13
15/16 July ..	Switching and transformer stations.	24	23	70.2	0.5	70.7	2
16/17 July ..	Switching and transformer stations.	18	17	47.3	4.6	51.9	1
24/25 July ..	Leghorn	33	33	79.0	4.3	83.3	—
7/8 Aug. ..	Milan	73	72	128.6	68.8	197.4	2
	Genoa	73	72	92.2	74.1	166.3	—
	Turin	74	74	109.6	82.4	192.0	—
12/13 Aug. ..	Milan	504	481	659.5	572.8	1,232.3	4
	Turin	152	144	121.1	118.8	239.9	2
14/15 Aug. ..	Milan	109	106	211.5	107.3	318.8	1
15/16 Aug. ..	Milan	199	193	377.0	214.2	591.2	7
16/17 Aug. ..	Turin	154	137	116.8	127.5	244.3	4
		1,708	1,629	2,506.2	1,671.8	4,178.0	36

In view of subsequent events, the last stages in the bombing of Italian cities have now little but antiquarian interest. They were, however, extremely successful both in causing material damage and in finally removing what little will to continue the war still remained in Northern Italy. The first attack on Turin involved a round trip of nearly 2,000 miles since the short hours of darkness necessitated a return to this country via the Bay of Biscay and the S.W. Approaches.

Material damage in Turin, though considerable, did not justify the hysterical accounts of it circulated by the Italian Press and Radio. In all, about 40 acres of built-up area were devastated. This small result was, as on previous occasions,

largely due to the absence of trees in Italy and the consequent lack of wood in Italian houses, which have always proved incombustible. Serious damage, however, was done to railway repair shops and to one of the Fiat works.

Milan came out of it considerably worse than Turin. No less than 350 acres of fully built-up area and a further 80 in the more lightly populated zone were devastated. All forms of transport broke down and mass evacuation was carried out largely on foot.

Many fires appear to have burnt unextinguished for days and the works of Alfa Romeo, Isotta Fraschini and Pirelli were all damaged. Damage in Genoa was also considerable in view of the small scale of the attack made on it.

(g) Targets in France

Date.	Target.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing
				H.E.	Incendiaries.		
15/16 July ..	Montbéliard (Peugeot Works).	165	157	366.1	24.6	390.7	5
30/31 Aug. ..	Special targets (installations at Forêt d'Eperlecques).	45	34	63.6	2.4	66.0	2
31 Aug./1 Sep.	Special targets (installations at Forêt d'Hesdin).	41	36	65.3	3.3	68.6	—
8/9 Sept. ..	Boulogne	257	234	664.0	5.9	669.9	—
15/16 Sept. ..	Montluçon	376*	351	483.9	532.0	1015.9	3
16/17 Sept. ..	Modane	340*	295	551.9	73.6	625.6	3
		1,224	1,107	2,194.8	641.8	2,836.7	13

(* Including five U.S. Fortresses.)

The attack on the Peugeot Works at Montbéliard was less successful than might reasonably have been expected. Conditions were favourable and a heavy concentration round the aiming point was achieved. Photographic cover, however, showed that only seven buildings in the works were actually hit, though other damage invisible in vertical photographs was probably considerable. The Dunlop Works at Montluçon, on the other hand, was very severely hit indeed. Twelve out of 26 major buildings were destroyed, including a store for finished products, a test house and a raw rubber store. Ten other buildings, including a store for compounding ingredients, a building for the production of solid tyres and a technical office and laboratory were all very badly damaged. Five storage sheds near the factory were also destroyed.

The Montluçon Dunlop factory was one of the most important tyre-producing plants in German-occupied territory and is believed to have produced 14 per cent. of Axis automobile tyres, as well as tyres for aircraft. The gap left in German war production by its elimination is therefore serious. According to a report in a French newspaper the attack was very fortunately timed, as it took place a day or two before 700,000 tyres, representing

some months production, were due to be transported to Germany. The entire stock of 700,000 is said to have been destroyed by fire.

The attack on Modane was designed to block the French end of the Mont Cenis Tunnel and thus hinder the passage of supplies to the German armies in Italy. Bombing was accurate and photographs showed a great concentration of craters running from the east end of the International Station and completely filling the loop formed by the railway doubling back to the entrance of the tunnel. Hits were scored on the railway embankments partly cutting the tracks in places. It is possible that damage was done to overhead electric transmission lines.

The Italians are reported to have dynamited the tunnel at the other end.

An attempt made on the same night by a small force of Lancasters to destroy the Anthéor Viaduct on the coast line from France to Italy was unsuccessful, though a bomb missed it only by a few feet.

Other raids on France were made in connection with an Army exercise in September.

(h) Mine-laying

The mine-laying effort of Bomber Command has been maintained during the quarter July-September, 1943; in all a total of 3,218 mines was laid. It is interesting to note that since the inauguration of these operations in April, 1940, the number of mines laid in enemy waters by aircraft of the Command exceeds 22,000. This has been achieved in the course of something over 10,000 mine-laying sorties.

The maintenance of the scale of effort at a high level continues to cause grave concern to German naval authorities, who now fully realise the disastrous effects of mine-laying by air on their vital lines of sea communications. Strenuous attempts are made to counter the offensive by stepping up the conversion of valuable and ill-spared merchant tonnage into sweepers, and by strengthening anti-aircraft defences in the localities concerned. The supply of man-power and material necessary for such countermeasures must prove most embarrassing as it can only be obtained at the expense of other pressing war commitments.

Mine-laying off the French west coast U-Boat bases is now almost a routine. Information from reliable sources shows that the crews of U-Boats regard the mining of these waters with fear, and that the offensive has contributed a

considerable share towards the general and rapid deterioration of their morale.

During September longer hours of darkness made possible a resumption of mine-laying in the Kattegat and Baltic. The enemy is particularly vulnerable in these waters. His main lines of communication run through them and it is in the Baltic that his Fleet and U-Boats train and exercise. With the recent loss of rail transport facilities through Sweden his vulnerability has increased.

It is known that during the quarter under review a number of merchant vessels, naval patrol vessels and minesweepers have been sunk or damaged by mines laid from aircraft of Bomber Command. There is every possibility that many other ships of different categories have suffered similar fates.

The effort for the quarter compared to those of the two previous quarters is:—

	<i>Number of Sorties.</i>	<i>Number of Mines laid.</i>
1943.		
1st January- 31st March.	1,641	3,574
1st April- 30 June.	1,485	4,191
1st July- 30th September.	1,212	3,218



Around the Industrie-hafen (above) a large number of small factories were burnt out. Other points of interest include:—

- A. Canal Pumping Station devastated.
- B. Through a gap in the smoke can be seen part of the heavily-damaged MOTORENWERKE-MANNHEIM factory, important producers of U-Boat engines.
- C. Considerable damage to a shipyard engaged in construction of river barges and tank-landing craft.
- D. The main station at LUDWIGSHAFEN and many buildings on the adjoining docks were extensively damaged.
- E. The southern part of I.G. Farbenindustrie. Many buildings of this huge plant were destroyed in August and September, among them some important processing shops.

The greater part of the old town of MANNHEIM (lower left) is now uninhabitable.

MANNHEIM-LUDWIGSHAFEN is one of the main transportation-centres in Germany, and its harbour constitutes the second largest inland port on the European Continent.

Raids in August and September caused severe damage to dock and railway installations. After at least one of these attacks, railway traffic across the Rhine was completely suspended.

The low-level oblique view (inset, above) shows the Central Goods Depot and neighbouring docks as they were before the War. Vertical reconnaissance photographs taken 18 hours after the raid on 23/24 September showed nearly 50 warehouses and transhipment sheds either destroyed or still on fire.

A TARGET MARKER BURSTS OVER BERLIN



FIG. 9.—In the opening stage of the raid of 23/24 August, Lancaster, "R" of 405 (Pathfinder) Squadron took this excellent photograph, which shows its salvo of target-marking bombs bursting over the south-central part of BERLIN. The salvo fell between the Tempelhof Airfield, the Schöneberg Gasworks, and the siding of the Potsdam and Anhalt railway termini. The tracks of two searchlights are also recorded on the print.



FIG. 10.—Industrial plants in Mariendorf (S. Berlin) suffered heavy damage in September. The ASKANIA precision instruments works, which produce most of the aviation instruments used by the Luftwaffe, had many more buildings destroyed (A). Those buildings damaged in the March raids had previously been rebuilt.

One of Berlin's largest gasworks (B) had its two large wet-type holders destroyed (arrows). The pumping and control house, and the by-products plant were also heavily damaged.

A nearby light-engineering works (C), a timber store and part of a hutted camp (D) were gutted.

BERLIN: ELECTRICAL WORKS OF HIGH PRIORITY



FIG. 11.—The huge works of SIEMENS & HALSKE, N.W. Berlin, the most important manufacturers in Germany of all kinds of electrical equipment, were very extensively damaged during the raid of 3/4 September.

All the buildings of the Electro-Chemical Plant (B) and the Accessories Plant (C) were either completely destroyed or severely damaged. On the opposite side of the canal inlet dividing the works, the large Electric Motor Plant (A) was also damaged extensively and the adjoining Power Station (E) was inactive at the time of reconnaissance. The large building (D), which produces all types of telephone apparatus, also shows damage in several wings.

DAMAGED BOMBERS WHICH RETURNED SAFELY

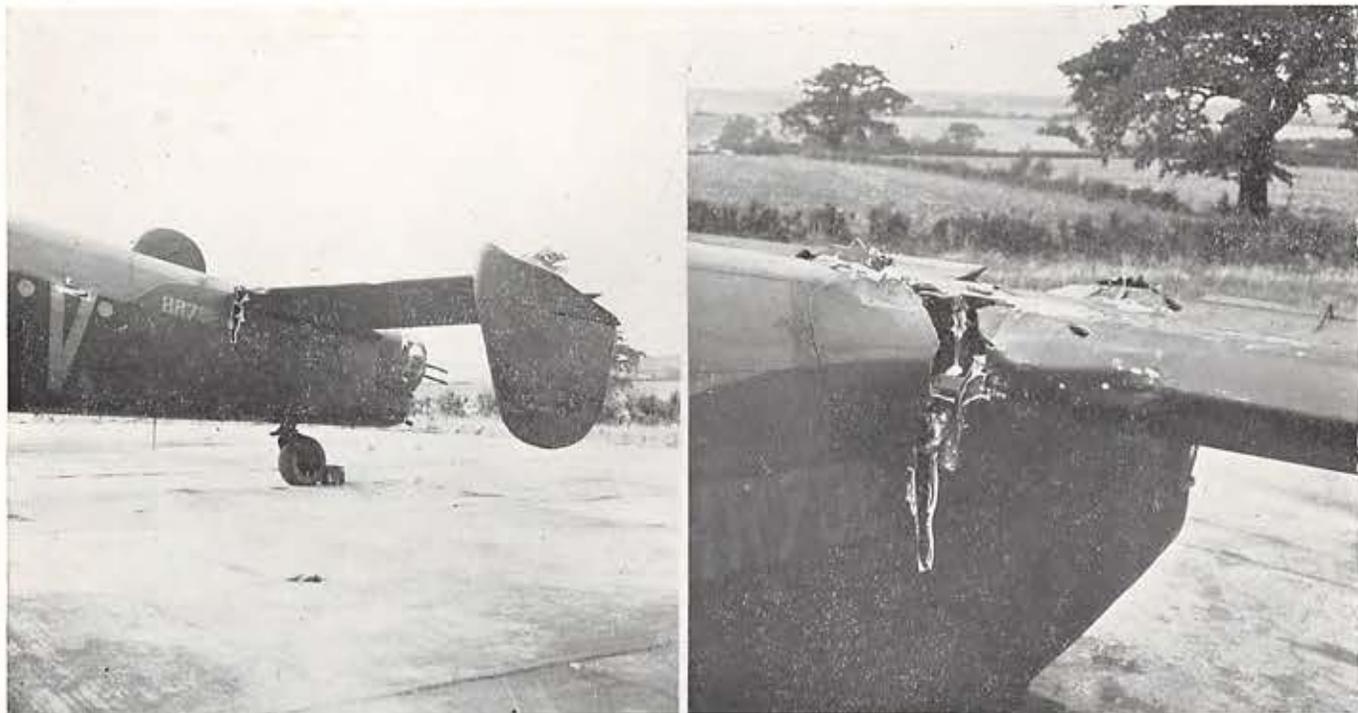


FIG. 12.—Two views of the damage sustained by Halifax "V" of 51 Squadron, which collided with a Lancaster while returning to its base on 30/31 August. Both aircraft landed without injury to either of the crews concerned, although the Lancaster over-ran the airfield boundary in avoiding a taxiing aircraft.

(See article on page 9.)



FIG. 13.—This Lancaster of 50 Squadron impacted an unidentified object while over MANNHEIM, on 23/24 September. Although half the tail unit was torn off, the pilot managed to regain control and flew the bomber safely back to base—a distance of some 450 miles. None of the crew were injured.

II. FLYING INCIDENTS

(a) An Operational Flight to Africa

The first "Shuttle Raid" was carried out by a force of 60 Lancasters of No. 5 Group which attacked the Radar (ex-Zeppelin) works on Lake Constance before landing in North Africa, and bombed the Italian naval base of Spezia on the return journey to this country three nights later. No aircraft was missing from either of these very successful operations. They were by no means uneventful, however, as may be seen from the following narrative of the outward journey, prepared by the Group Flak Liaison Officer who accompanied the Leader crew detailed to control the attack.

"We took off at 2139 hours on 20 June, 1943, in a Lancaster, Mark III, and proceeded to Selsey Bill, from which we set course. Approaching the French coast at 19,000 ft., we encountered heavy cloud and electric storms up to about 24,000 ft. We therefore decided to come down below the front and lost height from 19,000 to 5,000 ft. in 3½ minutes, to avoid icing, but were still in thin cloud. During the dive we saw no enemy activity until we were suddenly engaged by the defences of Caen or the outer defences of Le Havre—owing to technical difficulties with navigation instruments we were then uncertain of our exact position. Four 4-gun heavy flak positions engaged us for about 4 minutes. During this time we altered course by about 30° every 8 seconds, alternately losing and gaining 1,000 ft. in height. The flak bursts were mainly 300–500 ft. behind and about the same distance above us. It was noticed that the rate of fire of the guns was extremely high. No searchlights were exposed, no doubt owing to the thin cloud. We flew on below cloud at 2,500–3,000 ft. across France and encountered no further opposition. Orleans was clearly identified *en route*.

"When some three-quarters of an hour's flying time from Lake Constance, it was found necessary to feather our port-inner engine, which was emitting showers of sparks, so we continued on three engines until we sighted the Lake. By that time we had increased height to 6,000 ft. As the port-inner engine is essential for the operation of the Mark XIV bomb sight, it was unfeathered to allow the propeller to windmill, but shortly afterwards the engine caught fire. We were unable to feather it or extinguish the fire, which grew in intensity. The Captain then jettisoned his bombs, told the Deputy Leader to take over and gave the order to prepare to abandon aircraft, first diving across the Lake into Switzerland, and subsequently turning the aircraft towards Germany. We were about to bale out, expecting the port petrol-tanks to explode, when the engine seized and the fire went out. Although the shaft had broken, the propeller continued to rotate at approximately 4,000 revs. per minute. By this time we had descended to 4,000 ft. but were able to maintain height and soon began to gain a little.

"We stayed over Lake Constance for thirteen minutes and had an excellent view of the attack. There were approximately 16–20 heavy flak guns, 18–20 light flak guns (most crews thought there were nearer 30–40) and 25 searchlights within a radius of 6–8 miles of the target. Two searchlights were exposed at Konstanz, and several aircraft were coned, but not for any length of time. Heavy guns were firing both predictor-control seen and unseen. As the defences were heavier than expected, the Deputy Leader gave the order for all aircraft to increase height by 5,000 ft., so that attack was actually delivered from 10,000–15,000 ft.

"Leaving the target area, we commenced to fly over the Alps. By skirting the peaks, we eventually crossed over, gradually gaining height to 14,000 ft. before reaching the Italian coast between Spezia and Genoa.

"The 600-mile flight over the Mediterranean was slow, as we had to fly at 140 m.p.h. to prevent over-heating. It was also somewhat alarming as we would have been unable to ditch satisfactorily since the front escape-hatch had been jettisoned, and the port-inner propeller was liable to fly off at any moment. Eventually we sighted the Algerian coast and landed safely at Maison Blanche at 0752 hours, after a flight of 10 hours 13 minutes."

(b) A Halifax collides with a Lancaster

(See Fig. 12)

Halifax "V," of 51 Squadron, was returning to base after the raid on München-Gladbach (30/31 August) and had crossed the English coast without any untoward experiences. There was no moon that night; it was hazy and extremely dark. The last few minutes of the sortie are here described in the words of the pilot.

"We were doing a gradual descent, on a course of 340° at 180 I.A.S., and were down to 4,000 ft. when we saw something on the port bow, closing head on very fast. I shoved the nose down, but then it hit us and the aircraft swung round to a course of 280°. There was violent vibration coming from the port wing, apparently from the port-outer engine, so I feathered it and the vibration died to a certain extent. I thought it would be uneconomical to fly at 180 I.A.S. on three engines, so decided to reduce speed. While I was pulling back the stick, the rudder suddenly locked to the right, the starboard wing dropped, and we were spiralling to starboard in a rudder stall. With the aircraft out of control we were on the point of abandoning it but, gaining more speed, I turned into the stall and in that way managed to get out of it. At the time of the collision, the I.F.F. detonated, and the "Gee" set caught fire, filling the cabin with fumes. The top of the rear turret was pushed in, temporarily.

stunning the rear-gunner. The wireless-operator reported several large gashes in the port fuselage. When the engineer went back to investigate and looked out of the astrodome he was astonished to see that the port fin was missing. (See Figs. 11 and 12.) Meanwhile we had lost 400 ft. in the descent. On experimenting, I found that the aircraft would not fly at less than 180 I.A.S. without full aileron and rudder trim—and that was at 2,300 revs. on the three engines, and throttling back on the port-inner. Below we could make out the lights of an airfield, so we called "Darkie" over the R/T and were given permission for an immediate landing. Previous to the accident the engineer had discovered that the flap accumulator was adrift and leaking oil, so that the flaps were out of action and, in addition, the undercarriage gauge read zero.

"Coming down to land, I ordered the crew to crash stations. I did a low approach at 180 I.A.S. with full throttle on the starboard engines and revolutions at 2,650, and cut the engines over the boundary. As we touched down, the bomb-aimer, who was beside me, reported that the speed had fallen to about 160 I.A.S. The starboard wing dropped, and the plane swerved to the right. I pulled the wing up, but we had swung off the runway and there were the lights of the Watch Office dead ahead. At the risk of smashing the undercarriage I gave a burst on the starboard engines, and got parallel to the runway again. By using the brakes we just pulled up 100 yards short of the hedge on the airfield boundary."

Later it was discovered that the vibration in the port wing was due to 2 ft. missing from two blades of the port-outer propeller, and 1 ft. from a blade on the port-inner. The port fin and rudder were neatly severed at the level of the tailplane, and there were two or three gashes in the side of the fuselage.

The Halifax had collided with a Lancaster of 1654 Conversion Unit engaged on a training flight. The latter was on circuit of its base when the collision occurred. There was a terrific thump on the port wing and the aircraft went into an uncontrollable dive. The pilot managed to regain control at about 2,000 ft. but, having to extinguish a fire in the port-outer engine (the propeller was lost on impact), he had no time to trim his aircraft for three-engine flying. He decided to make straight for the flare-path as they happened to be right over the "funnel" at this juncture.

On receipt of permission to crash land, the port-inner engine caught fire. This also was extinguished, the propeller feathered, and the crew ordered to their crash stations as it was now too low to bale out. Another Lancaster just returned from the night's operation was taxiing dead ahead as the pilot approached down the "funnel." To avoid collision with this aircraft the pilot gave his two remaining engines a burst of throttle, which carried him neatly over the taxiing aircraft although it involved running into some trees on the boundary of the airfield. This skilful performance on the part of the Conversion Unit pilot and crew saved the operational aircraft from destruction and, despite the difficult landing, not one of the crew was injured.

(c) Returning from Berlin

A Lancaster of 106 Squadron had a difficult trip on 3/4 September. The target was Berlin. Immediately after bombing, while the bomb-doors were still open, a Me. 110 attacked without warning from directly astern. There was one definite hit by a cannon shell, and the rear gunner reported he was severely wounded. Although the pilot carried out the appropriate combat manoeuvres during this and subsequent attacks, three further shell-hits were experienced. All the turrets were damaged, the fuselage hit at the fore end of the bomb-bays and near the I.F.F. position, and the bomb-aimer fatally wounded. Nevertheless the mid-upper gunner continued to reply effectively to the attacks, and his claim to have destroyed the fighter was corroborated by the wireless-operator in the astro-hatch.

As the intercom was severed during the combat the pilot was only aware that the attacks had suddenly ceased. The remainder of the story is given in his own words:—

"I had my course all ready set on the D.R. compass and flew on it for some way. In actual fact, this course was probably 060°, as I did not realise that my D.R. compass was out of action. We were then at about 10,000 ft., so I started to climb, and tried to find out the state of the crew. The bomb-aimer was either dead or dying. The mid-upper gunner had passed out, owing to damaged oxygen-supply, and I was under the impression that he was dead. I knew that the rear-gunner was badly injured. There was no intercom, emergency intercom, or call lights and, as we were by that time flying at over 20,000 ft., it was difficult to make contact by word of mouth. After about half-an-hour, when I had time to check my D.R. compass against the P.4, I found that the former was out of action and remained stationary on changing course. Then, steering by P.4 compass and Sperry gyro, we presently made a landfall, probably on the south-east coast of Sweden. At the time we did not recognise it, and subsequently mistook Lake Vättern for the Kättegat—we were then up to 27,000 ft., having no means of defence other than height. Our course was 255° until we obtained a fix 70 miles west of Denmark and changed course to 260°. We then knew we had to ditch but hoped to get within 80 miles of the English coast. All this time the wireless operator was trying to get fixes. The flight-engineer was acting as my runner and helping the navigator with the wounded. The former had previously said he was all right but we found out later that he, too, was wounded. I discovered that my straps had been shot away, and the flight-engineer managed to fix me up some makeshift ones made from oxygen extension tubes, the sight of which caused me much needless misgiving. At 0450 hours he went aft, after I had given him three minutes' warning of ditching. That was five hours after leaving Berlin.

Ditching the aircraft presented no troubles, although only 10° of flap could be obtained. It was, however, very difficult to get out the rear-gunner who was partially paralysed, but eventually the wireless-operator, flight-engineer and myself managed to get him clear and into the dinghy. I went back and got the pigeon, wireless and all other equipment which might be of use. I considered it wise to leave the aircraft as soon as possible and we floated down wind and stayed,

by means of the dinghy rope, about 80 yards away. Our position was then 54° 30' N., 04° 30' E.—a long way from the English coast. As soon as it was light, and a rather predatory looking bird which was circling us had left the area, I launched the pigeon successfully. The rear-gunner went into a coma and died at about 0600 hours.

At about 0900 hours I was keeping watch while the crew were asleep and saw two specks on the horizon, which came straight towards us at about 500 ft. They resolved into Hudsons, dropped smoke-floats, and circled us. Emergency rations were dropped from about 1,000 ft., with perfect timing. About 1100 hours an airborne lifeboat was dropped, with equal success. We got in and then, for the first time, noticed that the flight-engineer was wounded. We towed the dinghy with the rear-gunner's body in it behind the lifeboat, the Hudsons were circling all the time and dropping smoke-floats. At 1600 hours two Naval M.L's appeared and we were taken aboard, a signal was sent out, and the flight engineer's wounds attended to. After a rough passage we docked at 0545 hours. The A.S.R. efforts were performed throughout with splendid efficiency and excellent timing."

(d) A Pyrotechnic Novelty

On the same night a Lancaster of 49 Squadron had a peculiar experience over Berlin. The bomber was in the centre of the target at 20,000 ft. when, without warning, something burst against or immediately under the nose. A large red ball of fire appeared instantaneously and seemed to envelop the aircraft from wing tip to wing tip. The mid-upper gunner judged that the centre of the conflagration must have passed to one side of the fuselage just behind the wing. He watched it going up to a considerable height above the aircraft, "going round and round, with many sparks in the middle of the red ball." Rocket-like projectiles shot out in all directions, and the spark-trails from each of these were visible for 20 or 30 yards before dying out.

Evidently this great firework revealed the Lancaster to the enemy on the ground, as searchlights on each side came on to it at once. In spite of this the crew were not troubled by flak or fighters. The "Catherine Wheel" went out quite suddenly while the mid-upper gunner was watching it. Turning his attention to the aircraft he observed four holes in the port wing and two more in the fuselage, each roughly 6 ins. in diameter. The bomb-aimer reported two or three similar holes in the floor of his compartment, but none in the roof. No one was injured, and the control and handling of the aircraft were completely unaffected.

Unfortunately, shortage of fuel obliged the Captain to ditch the Lancaster some 15 miles from the English coast. Thus it was not possible to ascertain the precise nature of the "rocket projectiles" and the holes they had made. Although the description makes it evident that this strange device differs in some respects from the "Scarecrow Flares" reported many times before, it seems to resemble them in so far as they also are spectacular rather than dangerous. As the "Catherine Wheel" can burst right against

the nose of a Lancaster without causing more than superficial damage there would seem to be little to worry about.

(e) A Lancaster over Mannheim

There was no moon and visibility was poor on the night of 5/6 September, when Lancaster "Y" of 115 Squadron was outward bound for Mannheim.

Our aircraft made the run-up to the target at a height of 19,000 ft. The bomb-aimer was in the bombing position when a Ju.88 dived from head-on and raked the starboard side of the fuselage with cannon and machine-gun fire, wounding both the second pilot and the engineer. The fighter was not seen until it broke away to the starboard beam above, when the mid-upper and rear gunners both fired a 2-sec. burst, but without any obvious result. As the Lancaster continued to dive out of control, owing to damage caused during the attack, the Captain ordered the crew to bale out. The navigator and wireless-operator went out through the rear door, but the rear-gunner had difficulty in opening his turret door and the mid-upper gunner asked the pilot to hold on until he could help him out. Suddenly the rear-gunner sighted the Ju.88 diving to attack on the port quarter fine at 200 yards range and about 500 ft. above the Lancaster. He returned to his guns and fired a 4-sec. burst just as the enemy opened up. As it was not possible to manoeuvre the aircraft, the starboard tail-plane was hit. The rear-gunner's fire scored strikes on the nose of the fighter, which broke off the attack at about 100 yards range and, in attempting to climb to port, exposed the underside of its fuselage to a further 4-sec. burst. This burst, also fired by the rear-gunner, raked the enemy's fuselage from nose to tail and a fire which broke out in the starboard wing-root spread rapidly along the fuselage until the whole fighter was enveloped in flames. Then the Ju.88 rolled over on its back and was last seen by both the rear and mid-upper gunners going down obviously out of control and emitting large quantities of smoke. This aircraft is claimed as destroyed.

During the combat the Lancaster lost height rapidly in an uncontrollable dive. By the time the fighter went down in flames our Captain had partially regained control of his aircraft and, at 14,000 ft., cancelled his previous order to bale out. Eventually complete control was regained and bombs were safely jettisoned.

The mid-upper gunner, whose turret had been put out of action during the first attack, took the place of the wireless-operator and was successful in contacting this country by W/T, while the bomb-aimer did the navigation. The Lancaster made a good landing at an airfield on the south coast. On examination after landing it appeared that the dinghy had been released from the starboard wing during the initial head-on attack and had wrapped itself round the elevator causing the aircraft to dive out of control. During the fighter's attack from the port quarter, when the starboard tailplane was hit, it is believed that the dinghy was shot away from the elevator, thus making it possible for the pilot to regain control.

III. MISCELLANEOUS ITEMS OF OPERATIONAL INTEREST

(a) A New Countermeasure against the Enemy Defences

To overcome the difficulty the defences have in locating bombers at night, radio methods have been developed whereby any metal object can be detected and its position ascertained. Since the early days of the war the location methods used by the enemy have become steadily more effective and, but for new tactics developed on our part, bomber losses would certainly have been heavy. While our losses remained low in comparison with those suffered by the Luftwaffe over this country, it nevertheless became increasingly important to impair the usefulness of the radio aids employed by the enemy.

These aids are mainly of four types:—

(1) "*Freya*," formerly used in the main for early warnings of the approach of bomber raids, and as a standby for controlling fighters.

(2) "*Giant Würzburgs*," a very accurate device, used for locating aircraft and for vectoring fighters on to bombers.

(3) "*Small Würzburgs*," used in conjunction with anti-aircraft fire.

(4) *Airborne Equipment* used in fighters.

Both small and giant Würzburgs operate on a radio frequency of 53 cms., the airborne equipment on a frequency of 61 cms., and the Freyas on 225 cms.

In order to frustrate the Germans' use of these aids a new countermeasure has been developed and was first employed during the quarter under review. Briefly, this consists of bundles of metallised strips of paper which are thrown from our aircraft at regular intervals.

How the Countermeasure works

Radio methods enable us to locate the position of an object in the sky by the reflections obtained from the object when a transmitted ray is pointed at it. The quantity of reflected radiation is not, however, purely proportional to the area of the object. A strip of metal in length half the wavelength of the transmitted radiation gives a reflection very much bigger than would be expected purely on the basis of its area. This is the principle of the new device. The strips must not touch or they cannot be regarded electrically as separate strips, nor must they be too far apart, as they do not simulate the reflections of aircraft on the indicator equipment unless there are a number of them close together. As the strips disperse they gradually cease to resemble aircraft echoes, so that there is a certain time limit to their confusing effects.

Bundles of the metallised strips are dropped at such intervals that there are many more false echoes than aircraft echoes in any given portion of space. In that area where the density of echoes is not so great as to completely block out the indicator devices of the enemy, the Hun operators must spend their time trying to pick out the aircraft echo from the mass of others. When he

has at length done so, it will probably get mixed with fraudulent echoes while he tries to follow its movement.

We are now using quantities of strips of two lengths, 25 cms. and 30 cms. The former is useful mainly for jamming the "*Würzburgs*" and the latter for airborne apparatus, but each size has some effect on both types of enemy equipment. The "*Freya*" is being jammed by other methods.

The Introduction of the Countermeasure

On 24/25 July, when the new countermeasure was first employed during the 790-bomber raid on Hamburg, it proved an immediate and unqualified success. Only 1.5 per cent. of sorties were lost, as against an expected loss-rate of about 6 per cent. based on previous raids against this well-defended target. While it was obvious that the confusion of the defences would be greatest on the first operation, losses on three subsequent attacks on Hamburg—including one made in conditions of severe icing—were no more than half the previously expected rate.

Swedish refugees returning home from Hamburg described "a new device used by R.A.F. pilots to defeat the searchlights." One ingenious person explained that when the searchlight rays struck the silvery surfaces of the "masses of sheets of paper" the light was deflected from the aircraft. "The movements of the planes were thus hidden behind a carpet of blinding reflections!"

A fortnight later, the Italians, probably considering that all was lost anyhow, cast security to the winds and declared bluntly in their newspapers that in the raid on Turin the R.A.F. dropped a special device "giving out electromagnetic waves which disturbed their radio detectors."

Intercepted enemy R/T traffic provided more reliable evidence of the confusion caused to the enemy's ground control of fighters. On the first operation against Hamburg, for instance, a German controller was overheard to complain that "Reception is very bad" and half an hour later, "It is impossible—too many hostiles." Another in the Jever area reported "Many hostiles coming from the West" and, after a pause, "I cannot control you . . . try without your ground control."

"Everything has gone wrong" was one exasperated comment overheard when our aircraft went to Essen the next night. When a fighter enquired whether the "hostiles" were coming from South or North his control replied with elaborate caution: "Please wait—I will explain everything when you are on the ground." (His troubles were clearly appreciated over here, at least, if not by the fighter pilot.) "It's a sorry mess!" he added presently. "Still more hostiles are expected—I will explain everything

when you come down"; and one of his colleagues put the whole matter in a nutshell: "I cannot follow any of the hostiles, for they are very cunning."

Subsequent Developments

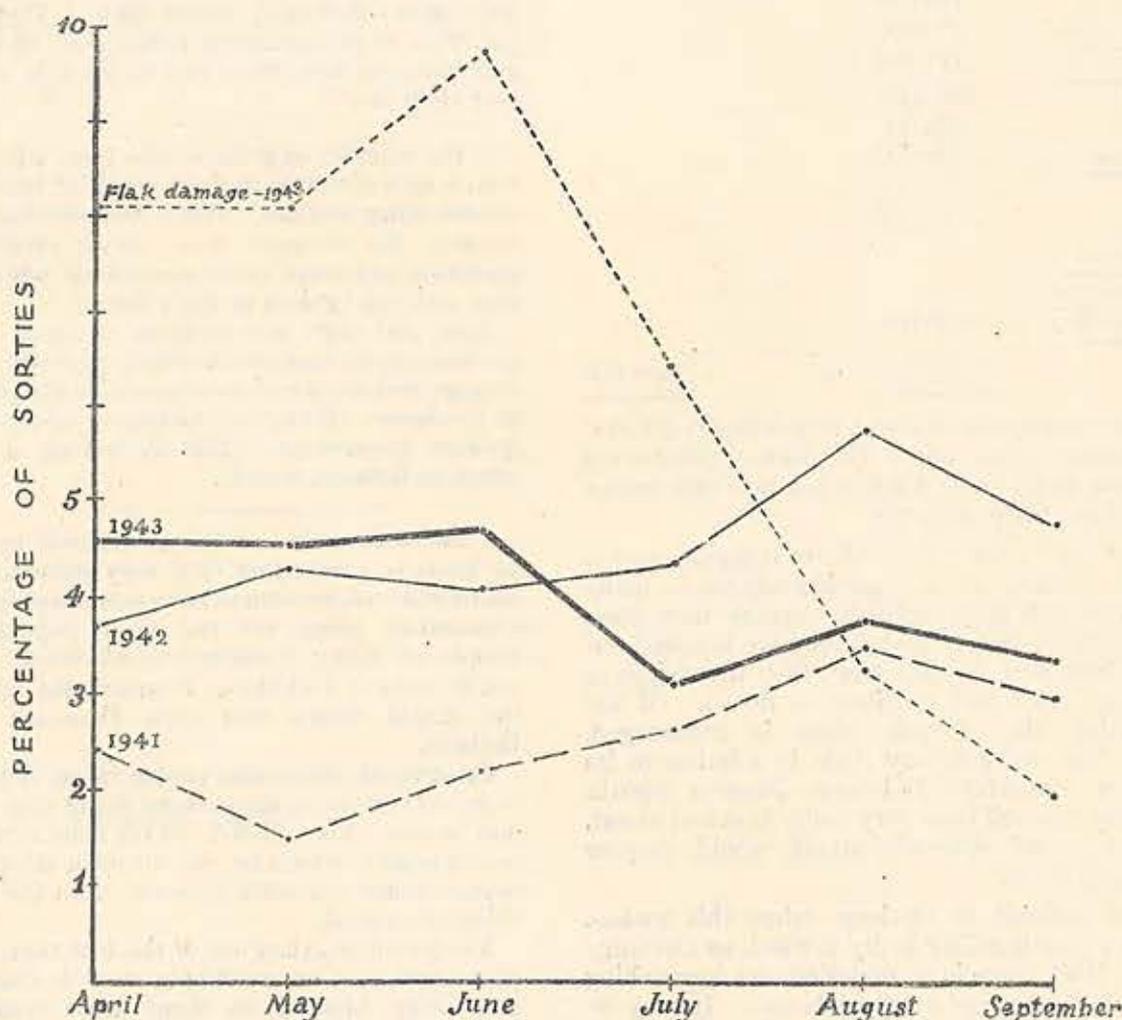
There can be little doubt that the collapse of the enemy's accustomed system of defence contributed to the panic which swept the Reich following the destruction of the greater part of Hamburg, and led to the hasty decline in the population of Berlin. From the Germans' point of view it is absolutely vital that our bombers should be strongly opposed and, having no other means of opposition at their command, they have now reverted to the use of free-lance fighters, assisted by such visual aids as flares and searchlights. For the time being at least, the controlled fighter is relatively innocuous, and flak plays a much less effective part in the defence of the Fatherland than hitherto.

In return for a lavish expenditure of effort—and not without losses on their side—the enemy's free-lance fighters have saved the situation from developing into a débâcle. Indeed, the proportion of bombers reporting fighter *attacks* has not fallen much below the earlier level. But the *lethality* of the attacks has definitely fallen and it is evident that the fighters are now less able to manoeuvre unseen into the position most suitable for a lethal attack. Moreover, the present system of

directing the fighter "pack" towards the bomber stream is open to serious error and in planning our operations we have not failed to take advantage of this weakness.

So much for the effects of the new counter-measure from the enemy's viewpoint. We have every reason to be satisfied with its achievements. The diagram below shows very clearly its beneficial influence on bomber losses. In spite of many improvements, both technical and tactical, adopted by the Command since the Fall of France the growing weight and effectiveness of the Hun's opposition had caused our overall losses to rise steadily from about 2 per cent. to nearly 5 per cent.

During the two months since the introduction of the new device the loss-rate has swung back decisively to something very near the 1941 level. This remarkable improvement took place at the time of year when past experience showed we might expect, not a fall, but a further increase in the loss-rate. What is even more important, the favourable trend noticed in July, has been well maintained up to the end of the quarter. Thus it may be said that the new countermeasure, coupled with appropriate tactics, has saved something like 200 bombers and their crews within a period of just over two months. The phenomenal decline in the efficiency of the Flak, as shown by the graph, is also worthy of attention.



Graph comparing Bomber Command Losses during the summer months of 1941, 1942 and 1943. The marked improvement which followed the introduction of the new Countermeasure in July, 1943, is well illustrated in this diagram.

(b) Six Months of Combined Bombing and German Reactions to it

The decisive phase of the war opened with the first attack against Essen on 5/6 March, 1943. The campaign has so far gone very much in our favour, and there is now every reason for believing that if it is prosecuted without remission, even for a few more months, it will bring about the complete collapse of the enemy. This is perfectly clear to anyone who takes the trouble to study the information available on the subject.

The fundamental fact which makes this possible is the geography of Germany. North and west of the line Stettin-Leipzig-Stuttgart is the immense majority of the heavily populated industrial centres. Taking for this purpose cities with populations of 200,000 and over, the following list shows the distribution between the area which has so far been the prime objective of the Bomber Offensive and the remainder of Germany.

<i>North West.</i>		<i>Remainder.</i>	
Berlin ..	4,400,000	Munich ..	820,000
Hamburg ..	1,800,000	Dresden ..	640,000
Cologne ..	906,000	Breslau ..	625,000
Leipzig ..	720,000	Nuremburg	450,000
Essen ..	667,000		
Frankfurt ..	570,000		
Dortmund ..	550,000		
Dusseldorf ..	530,000		
Hanover ..	450,000		
Stuttgart ..	450,000		
Duisburg ..	440,000		
Mannheim ..	430,000		
Wuppertal ..	411,000		
Bremen ..	383,000		
Stettin ..	380,000		
Bochum ..	320,000		
Kiel ..	235,000		
Kassel ..	216,000		
Munchen- Gladbach/ Rheydt ..	200,000		
	<u>14,058,000</u>		<u>2,535,000</u>

The distribution of towns with 100,000-200,000 population gives much the same distribution between areas—and Austria has no town except Vienna in either category.

Now, up to date, of the nineteen major cities of N.W. Germany, eleven (underlined) are so badly damaged that they probably consume more than they produce and, provided they are knocked out again from time to time when they show signs of recovery, they will continue to do so. Of the remaining nine, Leipzig alone is undamaged. Berlin has suffered very little in relation to its size, but Frankfurt, Duisburg, Bremen, Stettin and Kiel have all been very badly knocked about. One successful full-scale attack would dispose of any of them.

It is difficult to envisage what this means. When a city is rather badly bruised, as Coventry was in 1940, there is no real difficulty in patching it up and going on much as before. It may be badly hit, like Stettin, and still recuperate if given plentiful assistance from elsewhere. But the ten large cities mentioned are really maimed—and cripples are a handicap and not a help, especially in wartime.

Photographic evidence is a poor guide to the effect of these frightful disasters on the actual volume of German war production, and is naturally no guide whatever to the effect of them on morale throughout Germany. The best testimony to the former, already mentioned in this *Review*, is the wholesale retreat of the German armies in Russia and the Mediterranean. The latter is more difficult to gauge since the population is much too well controlled by the Gestapo for any overt action to end the terror to be a practicable proposition, and apathy and hopelessness have no positive results except in so far as they affect production. There are, however, useful indications to be gained both from the Press and ground reports, especially in connection with the millions of refugees who have been evacuated both in preparation for and as a result of air attacks. Three samples will be sufficient to show what is happening:—

“What affects morale more than the actual bombing is the throwing of people out of their homes. They are moved from place to place, are forced to live in strange surroundings and are regarded as unwelcome intruders by those amongst whom they have to live. Having lost all their possessions, they have come to constitute a sort of new proletariat; and it is a steadily increasing element. Amongst more fortunate people there is even a tendency to call these unfortunates ‘Communists.’

At all events, so far as can be seen, there is nothing revolutionary about them. They are just in a desperate and hopeless state of mind and have no alternative but to stick it out as best they can.”

“The number of persons who have left their homes as a direct or indirect result of bombing is now many millions. When the bombing first started, the refugees were given privileged positions and were to be considered wherever they went as ‘guests of the Führer.’

Now that there are millions of them, they are making themselves an unholy pest wherever they go and are about as welcome as the plague in the homes throughout Germany where they quarter themselves. This is having a real effect on German morale.”

“The evacuation of towns affected by the air raids is proceeding in a very disorganised manner and there seem to have been no prepared evacuation plans for the civil population. People are being evacuated to wherever space can be found: to Poland, Pommerania, Silesia, the Baltic States and even Denmark and Holland.

On certain occasions, people were detailed to board certain trains without being told their destination. The ‘Führer’ of the train received sealed orders, which he was to open when the train reached a certain distance from the area being evacuated.

Much trouble arises out of the fact that most of the evacuees, on arriving at their destination and being billeted on some local resident, consider themselves to be some sort of State pensioners. This is extremely unpleasant for both parties and there are consequently very many cases where the evacuees try legally or otherwise to return to the town from which

they have been evacuated, preferring the danger of bombing to the daily discomfort and quarrels in strange surroundings.

Large numbers of evacuees from Hamburg were sent to Danzig, thus creating a crisis in living accommodation. Relatively few refugees from Hamburg have been sent to the Baltic States. Many have been sent to Poland very much against their wishes, as Poland has the reputation of being the most unpleasant and dangerous country for German settlers. Relations between Poles and Germans are extremely bad and the Poles seem to be becoming more and more daring in their dealings with the local Germans. The murder of German settlers is becoming more and more frequent and the murderer is not always punished as the local German authorities are often terrorised by Polish underground organisations."

Whether any population could stand this kind of thing on a vast scale through a normal Continental winter is highly questionable, in spite of the worst efforts of the Himmler organisation of terrorism on a large scale.

It is quite obvious to anyone who watches German propaganda both for internal and external consumption that the Nazi authorities regard it as rather more than questionable, and they have therefore only one purpose, apart from the rather hopeless task of cajoling and bludgeoning the Germans into enduring it, namely, to persuade the British and Americans to stop it. This, naturally, is quite well done and is not altogether ineffective. The following are the chief lines used:—

- (1) It is strategically unwise of the English and Americans to bomb Germany. They would do much better to use their bombers to destroy guns and pill boxes on the French coast and thereby prepare for the Second Front.
- (2) It is economically useless to do so because German industry has all been moved to Silesia, Austria, and indeed anywhere except where one would normally expect to find it—*i.e.*, in the great industrial cities.

(3) It is aesthetically deplorable because, in spite of the irritating refusal of Cologne Cathedral to be destroyed, a lot of churches have been hit and works of art, unlike the heavy industry, have not been removed to safe areas.

(4) It is morally bad both because the German army is defending Europe against Bolshevism and because only the very young, the aged and infirm are ever injured in American and British terror attacks.

(5) It is highly dangerous, especially for the English, because one day the Führer will decide to retaliate, and then they will be sorry for it.

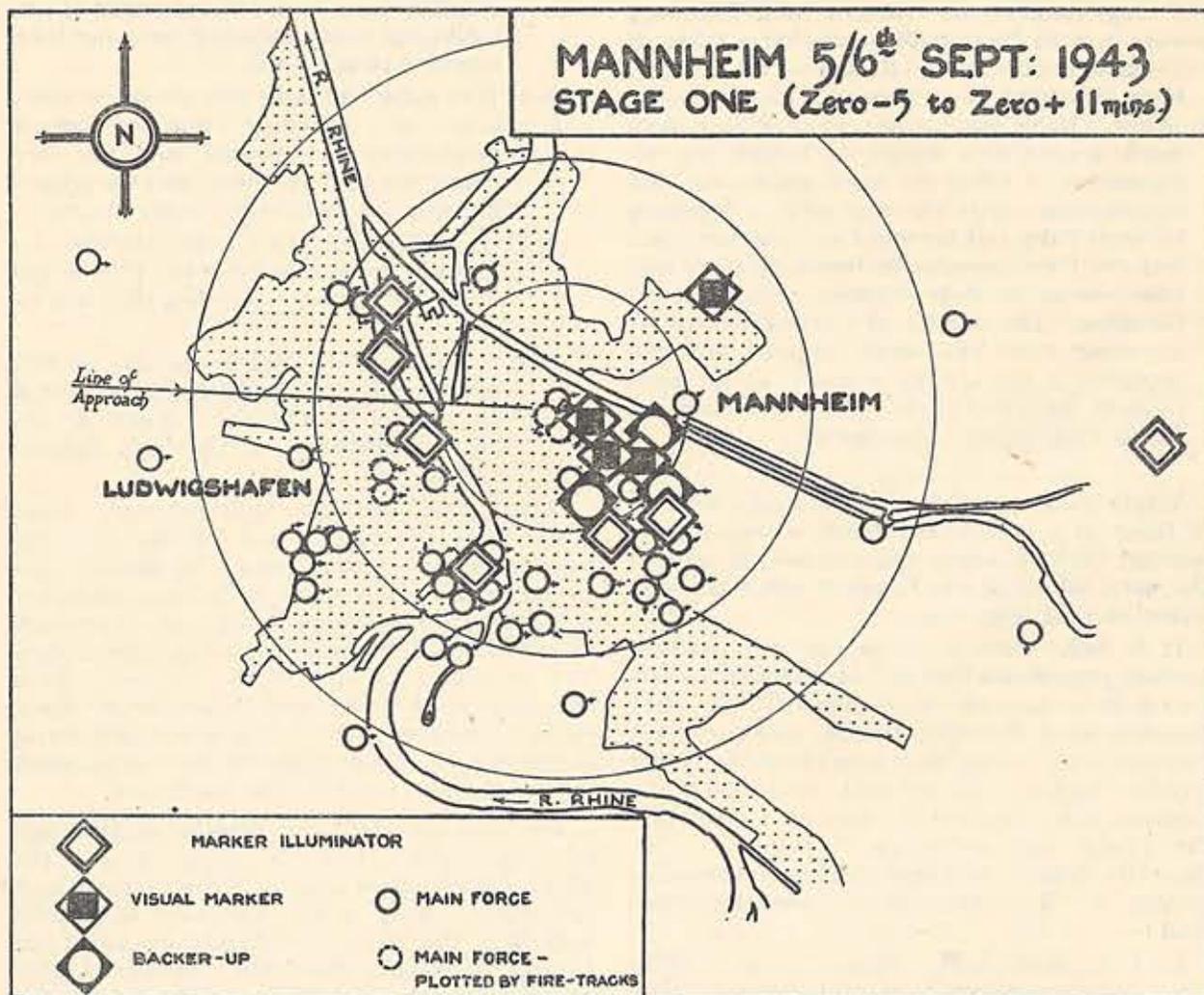
(6) It is impossible to achieve decisive success by this method, because the losses suffered are absolutely prohibitive thanks to the belated efficiency of Goering's defence system.

Stated thus without embellishment, these propositions are all false and together they are nonsensical and contradictory. In suitably disguised forms, however, all of them are faithfully reproduced by the unsuspecting friends of Germany on both sides of the Atlantic, and in so far as they lead to any weakening of the offensive which Germany most fears, they have served their purpose. Sentimentalists, unreasoning advocates of the Second Front, and vendors of panacea targets should remember this simple fact.

The position after six months of intensive bombing is this. Half the major cities in the highly industrialised area of Germany have been devastated. Most of the remainder have been badly hit. But Berlin is relatively unscathed and Leipzig, Magdeburg, Halle and a number of other quite important cities in the north-western area are undamaged. In view, however, of the material and moral results of what has already been achieved, there is no prospect whatever that Germany could carry on with the very limited resources in her southern and south-eastern territories alone. What we have to do to win the war, though still a great deal, is now no longer vague and unmanageable, but specific and straightforward. The sooner it is done, the better. Opportunities do not last for ever.

(c) Target-Marking at Mannheim

(See page 5)



The raid on Mannheim on 5/6 September was a good example of the work of the Pathfinder Force. The opening stage of the attack is illustrated by the above plot of night photographs taken with bombing, in which the Pathfinder aircraft are distinguished by three types of diamond-shaped symbols.

After finding the target, *Marker Illuminators* dropped sticks of flares in the light of which *Visual Markers* were able to see clearly all the details of the town and mark the exact aiming point with coloured marker-bombs. (For tactical reasons the aiming-point selected for this raid was situated in the east of the city.)

Backers-up then aimed more marker-bombs at those already dropped, so that in a few minutes a great concentration of markers were burning around the aiming-point. This formed an unmistakable

bull's-eye for the main bomber force and, within 10 minutes, a carpet of incendiaries was laid over nearly the whole of Mannheim and the southern half of Ludwigshafen. Subsequent reconnaissance revealed over a thousand acres of residential and industrial damage.

Whilst the new target-marking methods are on the whole an undoubted success, the results of particular raids may still be jeopardised by individual marker-bombs being misplaced—especially if they fall short of the target. This has led occasionally to the diversion of a large part of the bombing effort, and the tremendous responsibility resting on the Pathfinder crews cannot be over-emphasised.

The concentration achieved on the Mannheim and many other good raids was greatly helped by close adherence to the bombing-times laid down in the plan of attack.