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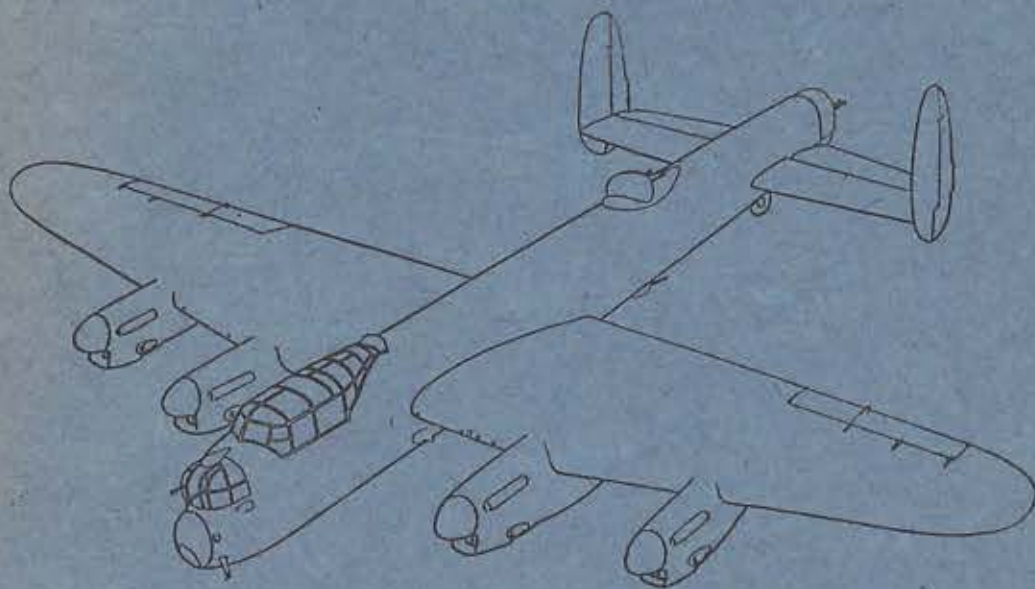
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BOMBER COMMAND QUARTERLY REVIEW

1064 pmh
17/2/81

October—November—December, 1943

No. 7



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HEADQUARTERS
BOMBER COMMAND
ROYAL AIR FORCE

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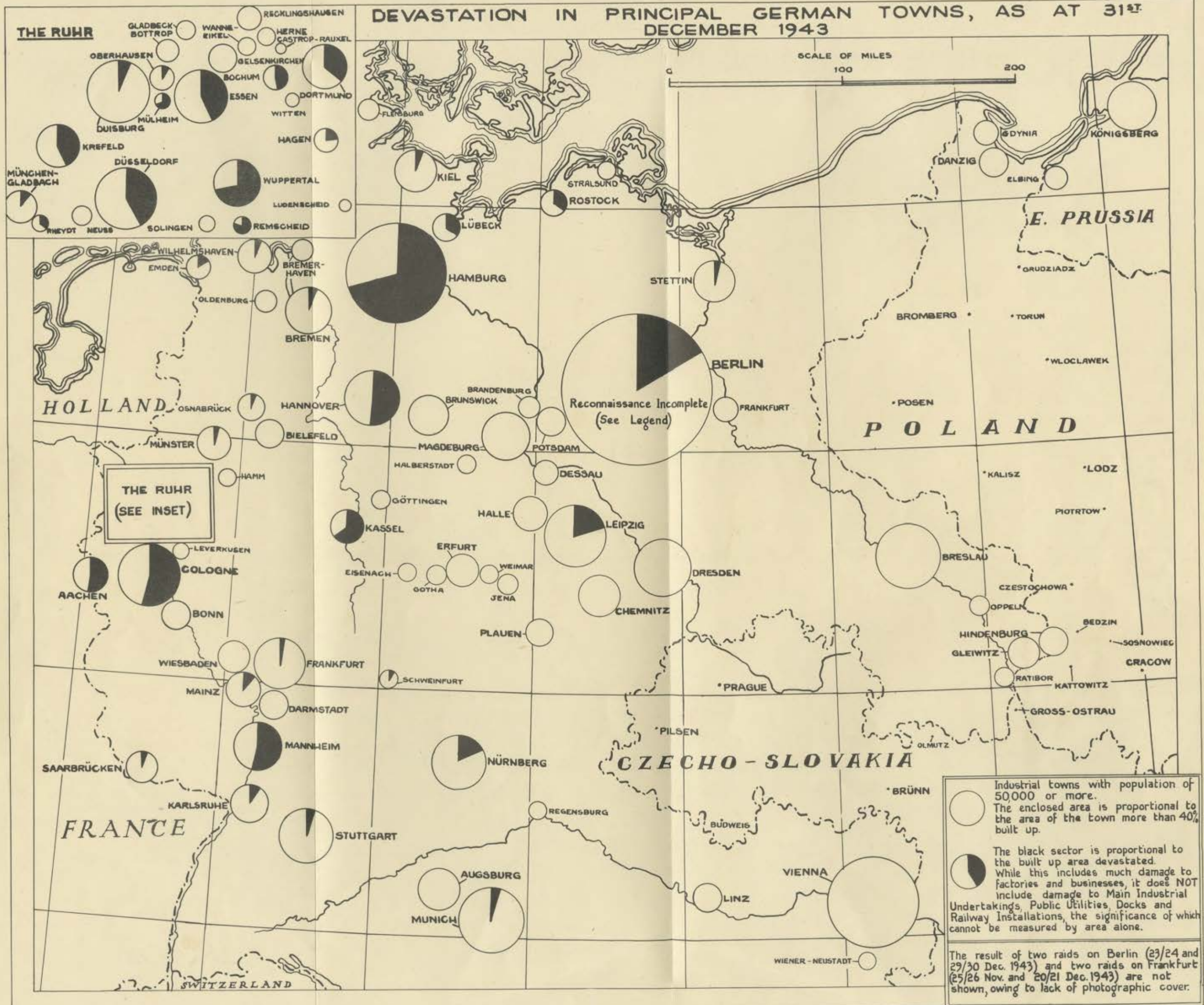
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BOMBER COMMAND QUARTERLY REVIEW

No. 7

I. REVIEW OF OPERATIONS

October—December, 1943

The last quarter of the year covered the most difficult phase of bombing yet carried out. These three winter months presented the first opportunity of operating large forces over the important but distant targets in Central Germany, including Berlin. This was a very different proposition from attacking targets in the Ruhr and Western Germany, heavily defended though these targets were. Two conditions had essentially to be fulfilled if we were to obtain the desired results. First, it was imperative that the bomb load should be concentrated around the selected aiming point, and second, the rate of loss had to be maintained at an economic level. These essentials were achieved in the main by constant improvements in aids and counter-measures coupled with improved navigation by crews and a better understanding of the methods involved in marking the target. Tactical surprise was created by diversionary and "spoof" raids in conjunction with carefully planned routeing so that the enemy was kept guessing as to the real target for the night, with the result that he was seldom able to bring his full defences to bear at the crucial moment. In addition, every endeavour was made to jam his air defence communications system. Whilst the effort achieved was less than that for the third quarter of the year, which covered three summer months, it showed a proportionately greater increase over the corresponding period of 1942 than any other quarter, the tonnage dropped on Germany being no less than $6\frac{1}{2}$ times that of the same quarter in 1942.

	Period, 3 months— Oct.—Dec.	
	1942.	1943.
<i>All Targets—</i>		
Night bombing sorties	4,488	12,442
Tons dropped ..	8,242	40,070
<i>Germany only—</i>		
Night bombing sorties	2,938	11,850
Tons dropped ..	5,658	37,965

As the quarter brings us to the end of the year, it is convenient to review shortly the operations for the twelve months as a whole. During the period, a total of 157,434 tons were dropped, of which 136,435 tons were on targets in Germany. This

compares with 45,501 and 37,197 tons respectively for the year 1942, so that in 1943 the monthly rate of drop was about $3\frac{1}{2}$ times that of the previous year. These figures in themselves are striking enough, but give no more than a partial indication of what has really been achieved. It is not feasible to assess on a points system the various items of damage inflicted, but it is possible to get a general comparative picture by examining the devastation caused in built-up areas. For this purpose an assessment has been made from day photographs of damage to areas which are 40 per cent. or more built-up in towns having a population of 50,000 or over. These targets include all the principal towns attacked, which in turn represent 72 per cent. of the urban population and 64 per cent. of the total industrial value of all towns in Germany with a population of 50,000 and upwards.

The figures that result from this examination are very striking, for whereas by the end of 1942 about 2,350 acres had been destroyed or severely damaged, the corresponding figure by the end of 1943 is no less than 23,300 acres, or 27.7 per cent. of the total area attacked. Thus every ton of bombs dropped in the last year caused nearly five times as much devastation as previously. Even these figures are not complete, as it has not yet been possible to make any final assessments of damage resulting from some of the raids in December. Further information on this subject and the method employed in making the assessment is given in a separate article under the title of "An Assessment of Results, 1940-1943."

The above shows very broadly in a cold unimpassioned way something of what Bomber Command has recently been doing and is continuing to do, and, although figures in themselves, however impressive, cannot tell the whole story, they do help in an understanding of what is really happening to the Germans. We are frequently asked what is the real purpose of the Bomber Offensive and to what extent has it so far been achieved. The ultimate goal is no less than to create the requisite conditions for the capitulation of the enemy or, in common language, to finish the war by bombing. This it is hoped to achieve in the main by—

- (i) Reducing sources of production and the means of waging war by destruction of plants, social disruption, and dislocation of essential services and administration to the point where defeat is inevitable.
- (ii) Breaking the morale of the enemy.

Considerable publicity has been given to the great weight of bombs dropped on German cities, and photographs appear of the havoc wrought and articles are written on the damage done to the enemy's war potential by the destruction of factories, workers' dwellings and the means of transport. All these objectives are, however, only a means to an end and not an end in themselves. The aim is to deprive the enemy of the weapons of war and to break his morale. If there is a tendency to concentrate attention on the means and to forget the end, it is no doubt partly due to the difficulty of establishing as a fact with supporting evidence the state to which an enemy country has been driven. There is, nevertheless, a mass of material available from which it is possible to form a valid opinion, unbiased by any wishful thinking, and it is important to consider this for a moment when viewing the operations of the Command as a whole. The evidence for the shortage of war weapons is to be found in the German conduct of the war during 1943. On every front, in every aspect of the war, the enemy has been forced to adopt a none too successful defensive. With regard to morale, in order to produce the required state of mind, it is essential to make it apparent to the enemy that defeat is inevitable and that the sooner it comes the sooner he can get back to a normal life. To assist the enemy in getting his mind attuned to this idea, propaganda is launched and every endeavour made to point out to the enemy the futility of continuing a losing struggle. The immense value of propaganda was appreciated in this country during the last war, and German historians dealing with the causes of their defeat in retrospect have almost unanimously agreed that British propaganda played an important part in hastening the end. It is for this reason that an immense and highly organised German propaganda machine was set up some years prior to 1939 to create the necessary ground work in the minds of the nation by continual repetition of the lie that Germany was never militarily defeated in the last war, but was persuaded to make peace on terms which seemed reasonable, but were never, in fact, adhered to by the Allies. Further, they were told that they were a superior race, the best fighters in the world, and that so long as they were loyal to their leaders and did not listen to the propaganda of the enemy, they could never be defeated. There is no doubt that Goebbels was extremely successful in instilling these thoughts deep into the minds of the German people and that when war came it was only a small minority which did not believe in the invincibility of their armed forces and that, under the leadership of the Fuhrer, victory would be quick and decisive.

The German nation started the war, therefore, not only with the strongest army and air force in the world, but also with their minds attuned in accordance with a definite policy. As time went on, in order to control the minds of the public during the stress and disappointments of war, every endeavour was made, by imposing severe penalties on listening to foreign broadcasts and by means of the Gestapo, to prevent "enemy lies and propaganda" from exerting any influence on the minds of the German people. Despite continuous leaflet raids and other methods of keeping the Germans informed about world affairs, it must be admitted that the Doctor met with a large measure of success, despite the growing number of setbacks on the land fronts and political defeats

suffered. However, to see is to believe, and no amount of propaganda can prevent the real meaning of heavy and sustained air bombardment from sinking into even the propaganda-invested mind of the average German, and this is a very important factor affecting both the armed forces and the general public to an extent far in excess of any other single or, indeed, combination of events.

In considering the morale of the enemy, it will help to cast one's mind back for a moment to the days of the "blitz" on this country. We were then subjected to what was regarded in those days as terrific air bombardment. In the biggest raid on London, about 450 tons of high explosive were dropped and the new term "Coventrate" was evolved out of a raid of some 185 tons of H.E. on Coventry. The weight of incendiary dropped is not known, but is believed to be comparatively small. That we were shaken in this country there can be little doubt, yet what were these raids compared with what Germany is now regularly receiving? A raid of 500 tons on a German city would be regarded as something in the nature of a side show and a devastation of 100 acres, which was all that the Germans accomplished in Coventry, would be deemed a failure, yet that is not the whole story. We had behind us a strong belief founded on history that we would not and could not be beaten. It is true that we stood alone, but we knew that material help on a substantial scale was on its way from America, and no one in his heart had any doubt that the States would be in the war some day. We were passing through a difficult and serious period, but we were gaining time and strength for the day when we would have might as well as right on our side. Air raids came as no surprise to us and we were not misled by our leaders as to what to expect.

The Germans, on the other hand, had been led to believe that their cities were immune from air attack, and their only consolation now lies in a blind hope that the "retaliation" which they are promised against this country will open a new phase of total war, and that its effect will be such that their own sufferings will pale into insignificance.

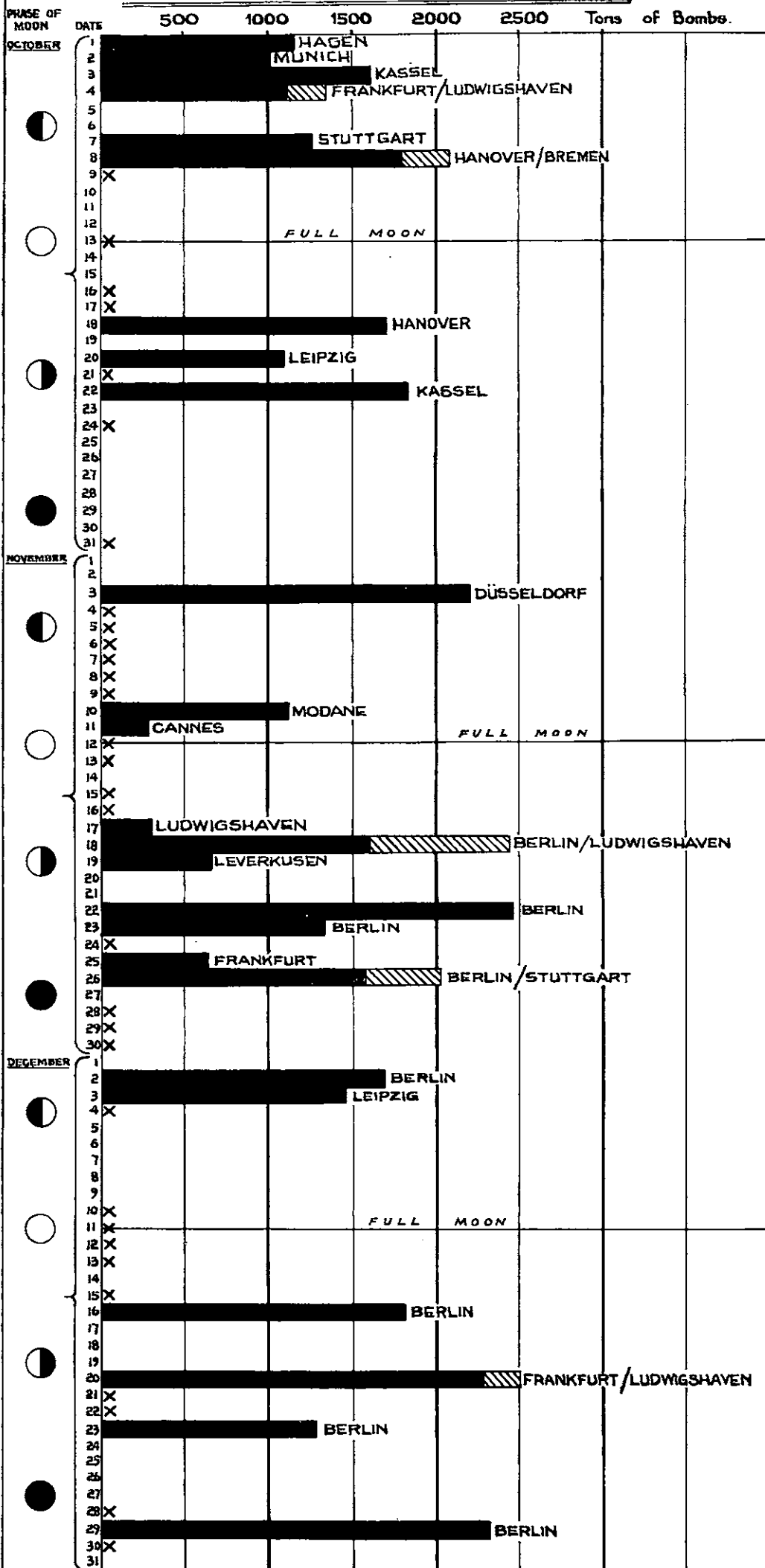
The German people have been misled many times, but it is not easy for them to make their voice heard and so they accept this new promise with hope, but we may be sure also with doubt. There seems for the moment no alternative open to them, but, should the long waited "retaliation" fail to materialise, the repercussions may be sharp and decisive.

There is no doubt that the expulsion of the Axis forces from Africa, the occupation of Sicily, the fall of Mussolini, and the retreats on the Eastern Front since the disaster of Stalingrad, have all played their part in affecting the morale of the enemy. The effect of these setbacks must, however, be seen in their proper perspective in relation to the bombing of German cities. Reports come in almost daily illustrating the dread that is uppermost in the mind of the ordinary German and the following quotation in the *Gazette de Lausanne* of 27 October, from a report from a correspondent who had occasion to make a journey through Germany, is typical:—

"If we are to be objective, we must recognise that the military events we have just mentioned were only a secondary reason for this psychological depression. The main reason was the

PRINCIPAL BOMBING OPERATIONS

X = SMALL SCALE RAIDS ONLY



continued offensive of the Allied air forces. One can never lay too much emphasis on the disastrous effects on German morale produced by the night raids of the R.A.F. and U.S.A.A.F. It is not only a question of Hamburg annihilated, Essen reduced to a heap of smoking ruins, of Cologne, Düsseldorf and Rostock devastated, but of every town and village, even those situated in distant districts, where the danger from the air is feared because it has been experienced every night for the past year. There are very few Germans who can go to sleep unafraid and who do not have their suitcases containing their most necessary belongings beside their beds.

"Enough has been said about the disastrous effects of the great raids: they were at the bottom of the Italian capitulation. In Germany

they are feared even more because, in the event of destruction, or even mere damage, it is impossible to replace the smallest article of clothing, furniture, utensils or food, and it is impossible to find lodgings."

That report was made two months ago, prior to the great onslaught on Berlin, and whilst no one can say when the breaking point will be reached, there is no doubt that we are nearing the final stages.

* * *

The sequence of the principal raids during the quarter is shown in the form of a chart with asterisks indicating other nights when small-scale attacks took place. The following is a short description of the chief targets attacked and results achieved.

(a) Berlin

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
18/19 November	444	402	708	796	1,594	9
22/23 November	764	670	1,133	1,332	2,465	26
23/24 November	382	332	710	625	1,335	20
26/27 November	450	407	859	717	1,576	28
2/3 December	458	401	882	804	1,686	40
16/17 December	492	450	947	868	1,815	25
23/24 December	379	338	710	578	1,288	15
29/30 December	712	656	1,099	1,216	2,315	20
	4,081	3,646	7,138	6,936	14,074	183

A study of German propaganda shows that the fight for Stalingrad was an epic victory and that the events that followed in the East went in favour of the Germans thanks to their brilliantly conceived and executed system of elastic defence. It is not, of course, possible for the Hun to make use of elasticity in the defence of his capital against air attack except perhaps on those occasions when, in mad confusion, he orders his fighters to protect some other target on nights when a heavy weight of bombs is discharged on Berlin. However, victory he does claim on grounds that are even more absurd and equally untruthful, such as gross exaggeration of the number of heavy bombers destroyed by his defences. That he regards this battle as the climax of the war is clear from all his pronouncements, and the success so far achieved by Bomber Command can be measured in no small degree by an examination of statements made by German officials both in the press and elsewhere. We have, however, considerable evidence from day photographs of the great material damage to date, and we know from reliable intelligence sources something of the tremendous effect this has had on the population.

The battle for Berlin started in earnest in November, 1943, since when it has continued unabated. It is bound to be a long and arduous fight, yet there are already indications that victory in one of the greatest battles of all time either on land, sea or air, is going to be won, and won at a very reasonable cost in relation to achievement. In view of the importance of the target and the greatly strengthened German defences, it would not have been unreasonable to expect an increasing rate of loss as the battle progressed,

but, in fact, the loss measured in terms of percentage of aircraft missing to those despatched since the beginning of November is less than three-quarters the rate that obtained prior to November.

No day cover has been obtained since the 21st December so that it is only possible to give an incomplete picture of the devastation to date, but it is indicative of the vast amount of damage that must by now have been caused to all classes of property.

The greatest havoc extends over an area of nearly 8 square miles, stretching from the east side of the central district of Berlin to Charlottenburg in the north-west and Wilmersdorf in the south-west, where a number of complete island blocks have been gutted. The principal districts affected are Tiergarten (residential, including most embassies and legations), Mitte (industrial, residential, government and commercial offices), Wedding (industrial and workers' living quarters), Charlottenburg (chiefly residential, but industrial towards the north), Schoensberg (residential and industrial) and Wilmersdorf (mainly residential, but some industrial plant). Damage throughout the City is so vast that it is not practical to enumerate it here in detail, and yet it is difficult to summarise without omitting a large number of items of considerable importance. The following indicates the extent and the type of damage inflicted:—

Industrial

There is damage to 98 named industrial concerns, including Siemens Kabelwerke, Siemens and Halske A.G. and Rheinmetall-Borsig A.G., all of which are targets of the highest priority.

A considerable number of factories engaged in manufacturing aero-engines and aircraft components have been damaged, including B.M.W., Argus, Dornier and Heinkel, all priority firms, whilst included amongst factories producing electrical and wireless equipment are Bergmann Elektrizitäts A.G. and Dr. Cassiner. Other industries damaged cover a wide range of products including vehicles of all types, engines, components, armaments, machine tools, precision tools, electrical equipment, chemicals, dyes, plastics, fabrics and goods stuffs. In addition to the 98 named and identified firms, damage has been caused to considerably more than 100 other industrial concerns.

Commercial

Over 100 commercial undertakings have received damage, of which 40 can be identified, including M/T depôts, garages, building contractors, timber merchants, printers, food wholesalers and warehousemen of all kinds.

Transportation

Railway services most seriously affected are in the central area. The Lehrter and Potsdamer passenger stations are gutted, and almost the entire group of railway buildings and warehouses at the Lehrter Goods Station, which is the terminus for the Berlin-Hamburg line, has been demolished. Railway carriage sheds and warehouses in the Anhalter and Potsdamer sidings are gutted and there is also serious damage to the Stettiner and Wriezener Stations and to Spreuefer Goods Station.

Public Utilities

Damage has been caused to 39 public utilities, including four gas works and two gas storage depôts. Seven water works and pumping

stations, five tramway depôts and the main postal depôts in the central area are also damaged.

State, Ministerial and Public Buildings

Well over 100 of this type of building have been destroyed or damaged, including a number of legations and embassies and the great War Office, of which the part used as the secret service headquarters of the three armed forces has been gutted. Other buildings deserving mention are the Ministry of Food and Agriculture, the Ministry of Justice, the Foreign Office, the Treasury, the Ministry of Transport, buildings known to be the headquarters of the Gestapo, and the private residence of Himmler. Buildings which it is believed housed the Ministry of Armaments and Munitions are gutted and a considerable part of the Home Office is burnt out. Other buildings of note receiving damage are the Army Records Office, the Ministry of Education and the Kroll Opera House, where Reichstag meetings were held.

Military and Huttled Camps

The military academy and artillery school have both been badly hit and six barracks and several military stores damaged. In 25 huttled camps, 236 huts out of 483 have been destroyed.

General

The above gives a quick appreciation of the type of damage inflicted without becoming involved in a long list of names. Altogether the incomplete photographic cover shows devastation to 2,757 acres, or about 20 per cent. of the fully built-up zones, and, if damage in zones 40-70 per cent. built-up is included, the total is 3,227 acres.

(b) Hanover

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
8/9 October ¹	496	457	926	856	1,782	26
18/19 October	360	349	950	747	1,697	17
	856	806	1,876	1,603	3,479	43

The raid on 8/9 October which followed two heavy attacks in the previous 18 days was by far the most effective of all attacks on this city, the main weight of bombs falling fair and square on the business, residential and public buildings in the central area around the main railway station and to a slightly lesser extent in the industrial area of Linden to the south-west of the town centre. This particular raid was, in fact, a classic example of what can be achieved in a really successful concentrated attack compared with a number of raids meeting with only moderate success. In all, Hanover has received about 9,500 tons, yet this one raid did incomparably more damage than all the others combined.

Altogether about 100,000 people in Hanover have now been bombed out, or nearly one-quarter of the entire population, and buildings of the main station and the offices of the Railway Directorate have been partly destroyed. There is little left of the Wool Combing Factory at Dohren, whilst six buildings of the main branch of Hannoversche Maschinenbau, at Linden, have been destroyed and others damaged. In all, 1,320 out of a total of 2,619 acres of built-up areas and about 160 factories have now been destroyed or damaged. Hanover is no longer of much use to the German war potential.



FIG. 2.—Target Indicators burst above the cloud.



FIG. 3.—The same Indicators (*arrow*) falling through cloud.
Note glow of fires.

LEIPZIG: AS THE RECONNAISSANCE

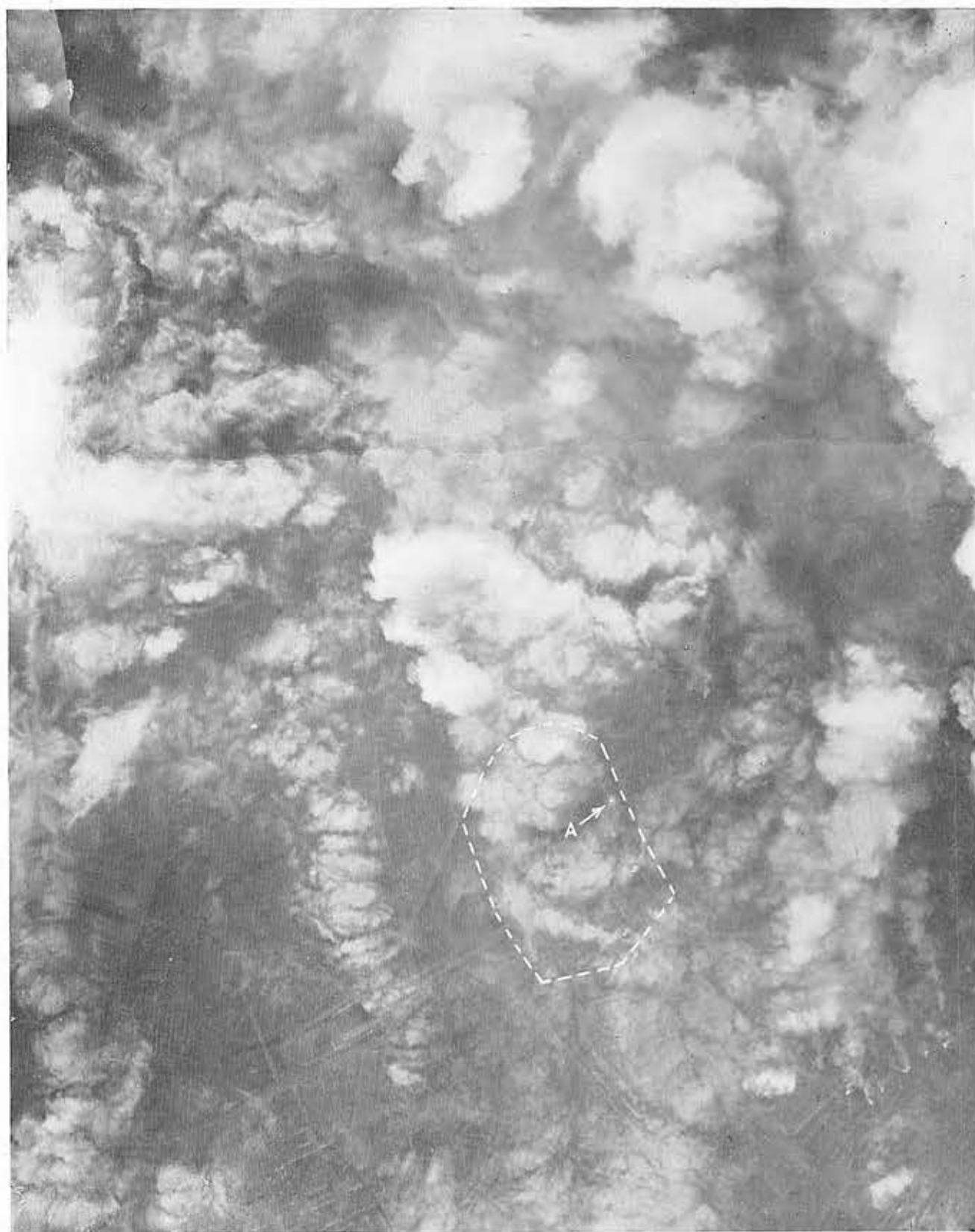
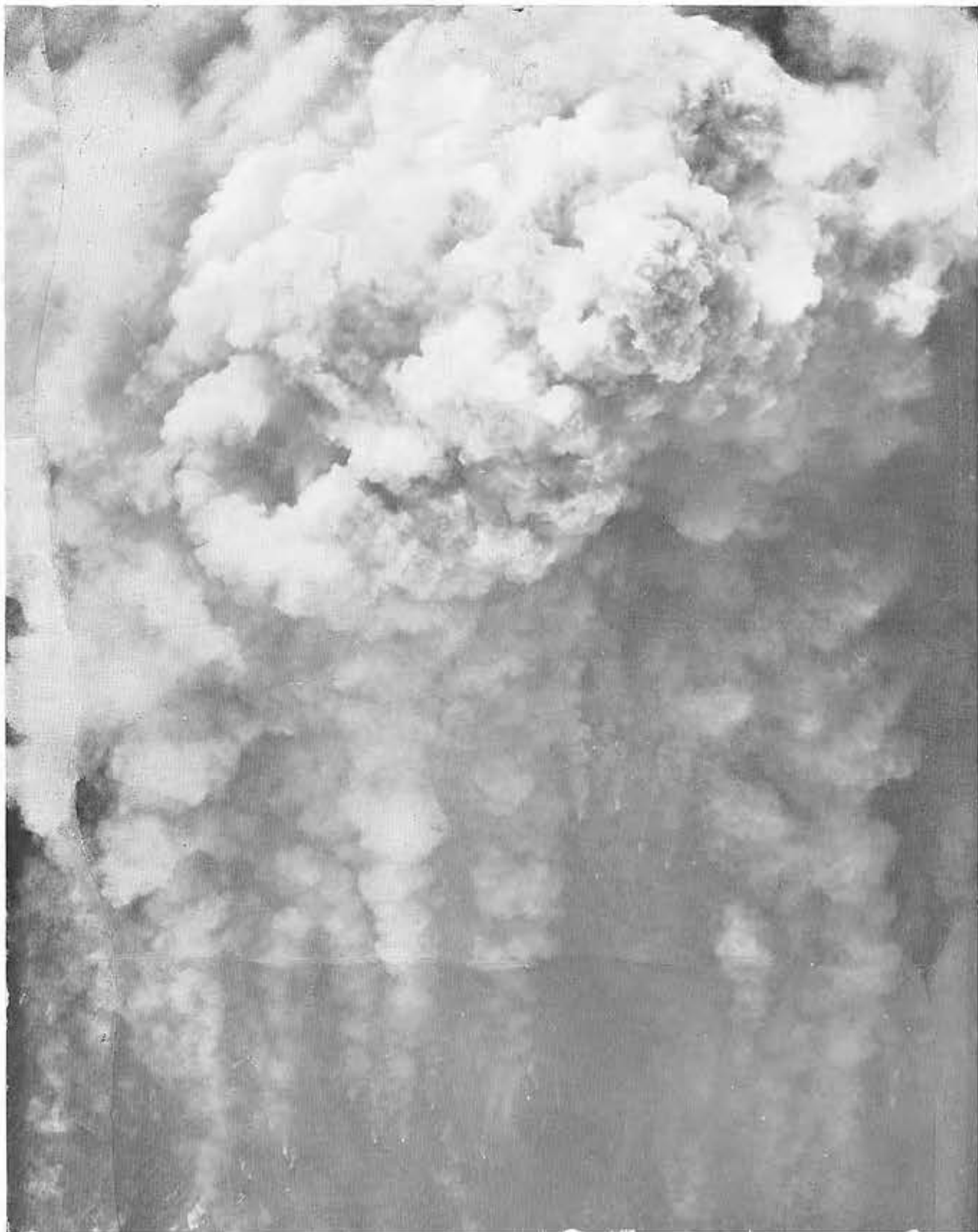


FIG. 4.—On 4th December, about 10 hours after the cloud-smoke and heat rising thousands of feet over the centre industrial city of
Some idea of the scale of the conflagration may be gained by the permanent buildings of the Leipzig World's Fair,

PILOT SAW IT THE DAY AFTER THE RAID



cover raid, reconnaissance showed great clouds formed by of Leipzig, obscuring more than three-quarters of this 700,000 inhabitants.

from comparing the outlined 100-acre site (A) covered with Fig. 5, which shows the same area on a larger scale.

JUNKERS AIRCRAFT WORKS AT LEIPZIG HEAVILY DAMAGED

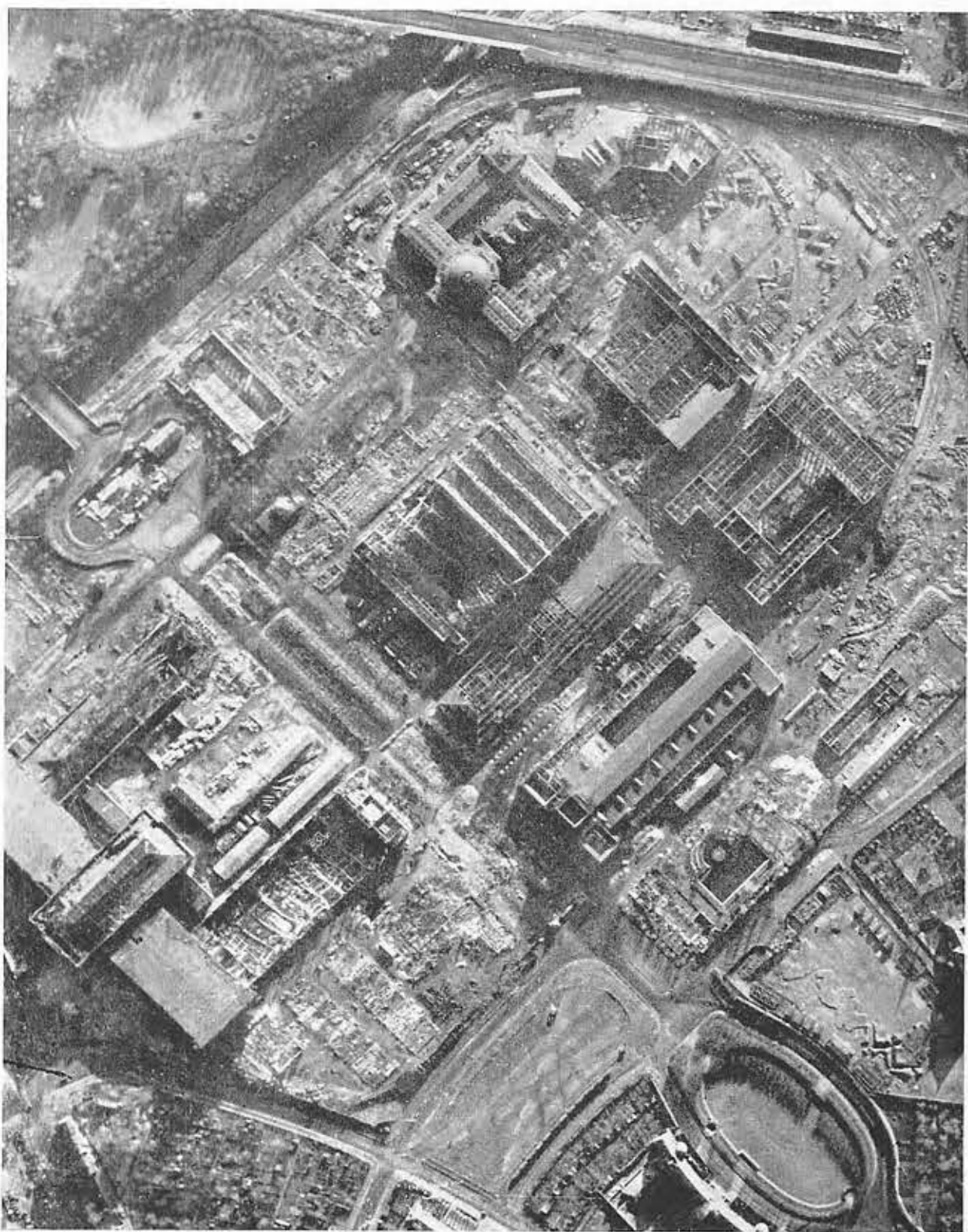


FIG. 5.—Twenty-six buildings of the Leipzig World's Fair, now converted as engineering workshops of the Junkers Aircraft Company, were seriously damaged by fire and high explosive during the raid of 3/4 December, 1943. Several buildings were completely razed to the ground, while in others the contents were gutted, leaving only the roofless walls standing. Of the seventeen large buildings on the site not one remains intact; and the largest hall, which boasted an unsupported roof-span of 320 feet, is completely shattered.

Aircraft fuselages can be seen in the open outside some of the ruins (*e.g.*, top, right of picture).

(c) Leipzig

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
20/21 October	358	285	555	530	1,085	16
3/4 December	527	451	716	735	1,451	24
	885	736	1,271	1,265	2,536	40

Leipzig, one of the chief commercial and manufacturing cities in Germany, was first attacked during the last quarter of 1943. The second of the two raids was the more successful, in spite of the target being covered by cloud at the time, and tremendous damage was caused. In general, the damage covered a wide strip running right across the city from north to south, spreading east and west from the centre of the city into the most densely built-up districts on either side. Most of the area south-west of the main station, where lies the old town, the centre of Leipzig's civic life, crowded with offices, restaurants and public buildings, is now laid waste.

Industrial damage is particularly severe, especially in the north in and around the enormous railway yards spreading out from the main station, and in the south, where the huge buildings designed to house the Leipzig World Fair had been con-

verted to the aircraft industry engaged on the repair of Junkers aero-engines and probably also in the sub-assembly of Junkers fuselages. In view of the German's known shortage of textile goods, another particularly useful target which was severely damaged was the Leipziger Wollkammerei, the third largest wool combing works in Germany. Very considerable damage was also inflicted on transportation.

Leipzig was predominantly a city of tenements with a population density in the fully built-up zone of about 160 to the acre. Three hundred and seventy-five of these acres have been completely devastated. During the raid in December, fires were completely out of control due in part to units of the fire brigade having been called to Berlin, and this no doubt assisted in creating the enormous havoc wrought. Leipzig has joined the list of those towns which require no more than one heavy successful attack in the future.

(d) Kassel

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
3/4 October	540	501	685	931	1,616	24
22/23 October	569	486	826	998	1,824	43
	1,109	987	1,511	1,929	3,440	67

This town, with a population of some 216,000, was highly industrialised with few residential suburbs, and most of the workers lived in the town itself. Its traditional industry was locomotive building, the three great Henschel factories producing approximately one-third of the total German output, added to nowadays by large quantities of tanks, A.F.V.s and lorries, so that on this ground alone it could be counted as a target of the greatest importance. In addition, however, it had a substantial aircraft industry producing aero-engines and various components as well as being engaged in the assembly of aircraft including F.W.190s.

The raids on this town may be considered as among the most successful attacks yet carried out. The total built-up area is 960 acres, of which some 615 acres have been devastated including almost the whole of the 300 fully built-up acres in the central area where lived the industrial workers of the town. All three Henschel factories were damaged, the main factory suffering the most with the majority of its smaller buildings completely destroyed and the larger workshops damaged. Important workshops of the other two factories were also damaged. The aircraft works in the main appear to have escaped serious damage, but their functioning will, of course, have been affected by the great destruction throughout the town and in particular to the workers' dwellings.

(e) Other Targets**Dusseldorf**

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
3/4 November	551	527	926	1,267	2,193	16

Germany's third largest inland port, with a population of 530,000, includes the Rheinmetall-Borsig works, producers of heavy machine tools, as important as, but less well known than, the Krupps Works at Essen. Considering the large scale devastation caused in previous attacks, this raid was particularly successful, no less than 28 per cent. of the business and residential property that had escaped damage previously being affected. Twenty-one identified factories were damaged and many factories and offices

which the enemy had considered of sufficient importance to repair were again hit. One building of the Rheinmetall-Borsig works was destroyed and very considerable damage was caused to many important works engaged in the armament industry, including Schiess-Defries, leading producers of heavy machine tools and Deutsche Rohrenwerke, makers of steel tubes. Devastation in this city is now on such a vast scale that it can no longer be regarded as a first priority target for further heavy attacks.

Mannheim/Ludwigshaven

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
4/5 October	66	57	127	108	235	—
17/18 November	83	75	308	—	308	1
18/19 November	395	325	376	476	852	23
20/21 December	54	62	132	91	223	—
	598	519	943	675	1,618	24

Mannheim had already been very severely handled and these raids were more in the nature of anti-recovery raids than all-out attacks, the largest of them on the 18/19 November being made in conjunction with a heavy attack on Berlin, which had the desired effect of confusing and

splitting the enemy defences. Previous heavy devastation makes it difficult to assess accurately fresh damage, which was, however, appreciable, including the destruction or damage of about 20 buildings in the I.G. Farbenindustrie and further damage to Daimler Benz A.G.

Frankfurt

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
4/5 October	406	357	475	630	1,105	10
25/26 November	262	237	332	314	646	12
20/21 December	650	576	1,078	1,203	2,281	40
	1,318	1,170	1,885	2,147	4,032	62

Considerable damage was caused in the October raid, mostly to the east of the town and to the suburban buildings of Offenbach and Oberrad, and particularly to the East Harbour, where the majority of the buildings on the quayside were destroyed or heavily damaged.

The two subsequent raids were less successful, but altogether some 37 factories suffered damage, in addition to which food and other stores and railway property suffered extensively and severe damage was done to the Courts of Justice and the Customs House. There was also considerable damage to business and residential property.

Stuttgart

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
7/8 October	342	314	696	561	1,257	4
26/27 November	178	162	229	217	446	6
	520	476	925	778	1,703	10

Whilst useful damage has been inflicted on Stuttgart, there are no extensive areas of devastation and no attack to date can be regarded as fully successful. Some damage to business and residential property has, however, been caused in the centre of the city and western outskirts and damage of varying amount has been done to some

40 industrial and commercial concerns. The Guild-hall and Government offices have been damaged or gutted and the city hall razed to the ground, but altogether only some 100 acres have been devastated, which is about what the Germans achieved in Coventry..

Hagen

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
1/2 October	251	240	557	593	1,150	1

Hagen has some 200,000 inhabitants, and prior to the above attack was the largest undamaged town in the Ruhr. It was the main centre for the production of U-Boat accumulators and also contained other important industrial plants. Damage inflicted was severe, particularly in the south and centre of the town, and included the Accumulatoren Fabrik A.G., the largest factory of its kind in Germany. Altogether at least

39 factories were affected, including two steel works and 11 factories engaged on specialised steel or iron work. Much damage was also caused to business and residential property and several public and municipal buildings. Considerable damage occurred to railway property, and a 400-ft. bridge across the railway junction immediately north of the main station was destroyed.

Munich

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
2/3 October	294	273	598	417	1,015	8

The damage resulting from this attack was scattered and no areas of devastation were caused in business or residential areas. Groups of buildings were, however, gutted or destroyed mostly by fire. Considerable damage was done to I.G. Farbenindustrie Camerawerk (instrument makers) and other works making motor cycles and gears were

practically entirely destroyed. Munich is important as a military centre, and many of the permanent barracks were badly damaged in addition to the many hutted camps in which some 65 hutments were destroyed. Whilst much useful damage was caused, this attack cannot be regarded as outstanding.

Modane

Date.	Aircraft Despatched.	Aircraft Attacking.	Bomb Tonnage.		Total.	Aircraft Missing.
			H.E.	Incendiaries.		
10/11 November	313	301	997	144	1,121	—

This attack, involving 1½ million engine miles without a failure, produced one of the highest degrees of concentration yet achieved. The international station was completely destroyed and there were innumerable incidents on the

marshalling yards to the west. No endeavour appears to have been made to repair the damage, though it is reported that one line may now have been opened.

(f) Minor Raids and Harassing Attacks

Apart from the main raids, well over 100 other attacks were made on a variety of targets often in conjunction with a main attack. Altogether Mosquitoes carried out more than 1,000 sorties, and whilst it is not possible to summarise the results achieved they were undoubtedly of considerable value in assisting the main effort and served to divert and confuse the enemy's defences.

Useful attacks were also made against Bremen (300 tons), Cologne (240 tons), construction works in N. France (350 tons), and Cannes (280 tons).

In addition, 143 million leaflets were dropped by the Command, of which more than one-half were carried by Wellingtons and Whitleys from O.T.U.s.

(g) Mine-laying

Seasonal bad weather has prevented the mine-laying offensive during the quarter from reaching the high totals achieved in each of the three preceding quarters of the year. However, the period under review is noteworthy in that it completes a year's effort which in every respect greatly exceeds the previous records of 1942. The most outstanding record was made during the spring, when, within 48 hours, 1,051 mines were laid by 386 aircraft.

In spite of the bad weather, no less than 358 sorties have been made to the French U-Boat bases and 816 mines have been laid off Brest, Lorient, St. Nazaire, La Pallice and the Gironde. In addition, mines have been laid in the Baltic, where the approaches to Naval bases, U-Boat exercising grounds and the main swept channels have received attention.

Increased defences in the vicinity of the mine-laying areas, together with the very large mine-sweeping effort that is being made, signify the importance which the enemy attaches to combating this menace in his waters. It is of interest to note that since the beginning of the mine-laying offensive in the spring of 1940, nearly 12,000 mine-laying sorties have been flown and over 25,000 mines laid in enemy waters.

The effort for the quarter compared with those of the previous quarters in the year is:—

1943	Number of Sorties.	Number of Mines.
1st January–31st March ..	1,641	3,574
1st April–30th June ..	1,485	4,191
1st July–30th September ..	1,212	3,218
1st October–31st December	975	2,852
Totals for 1943 ..	5,313	13,835

INDUSTRIAL DAMAGE IN FRANKFURT DOCKS



FIG. 6.—The attack of 4/5 October, 1943, fell particularly upon the area of the East Harbour of Frankfurt-am-Main, shown in the above photograph. The majority of the quayside factories and warehouses were destroyed or heavily damaged, including an important factory producing rangefinders (A).

HANOVER: INDUSTRIAL DAMAGE

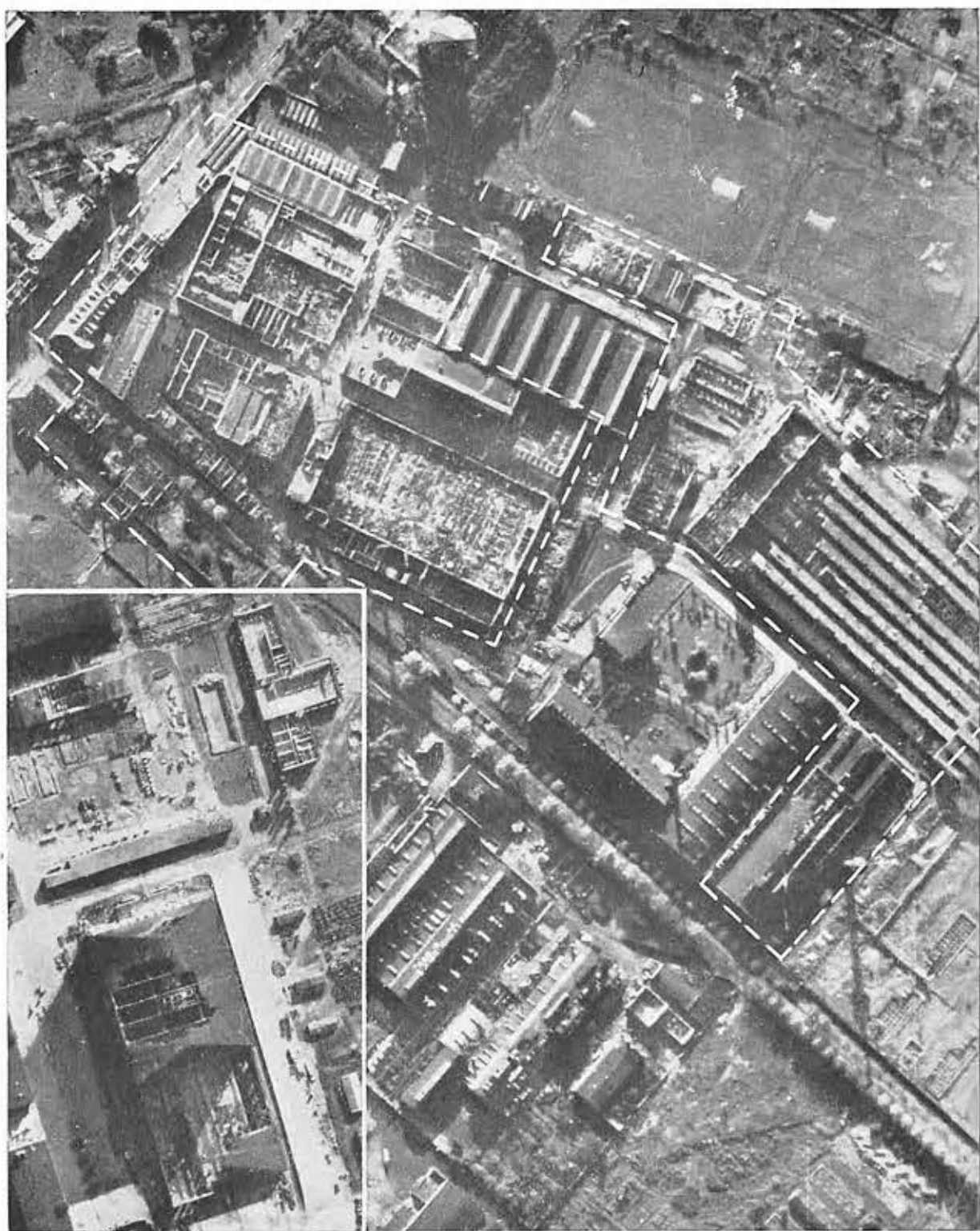


FIG. 7.—The two attacks at the end of September and that on 18/19 October fell most heavily upon the industrial outskirts of Hanover, while the highly successful attack of 8/9 October devastated the city itself. (See Fig. 8.)

The above photograph shows extensive damage in the recently developed industrial complex along the Mittelland Canal, north of the city. These particular factories produced electrical equipment, cables, lathes and machine tools.

Inset: The new branch of "Hanomag," the very important Hanover armaments firm which produces everything from tanks to aircraft components. Two-thirds of the main workshop here was destroyed, as well as nine other buildings of the same factory.

HANOVER: THE CITY CENTRE



FIG. 8.—The raid by just under 500 bombers on 8/9 October laid waste some 2,500 gross acres of the built-up area of Hanover. This photograph, taken three days later, covers part of the central city area and shows that hardly a building has remained intact. Whole streets of buildings have been demolished (centre, right) to prevent fires from spreading, and the large open space of the Waterloo-Platz has been turned into a dumping ground for rubble. About 160 factories have now been destroyed in this important engineering and industrial centre.

DEVASTATED KASSEL



FIG. 9.—On 22/23 October about 1,500 tons of bombs (over 90 per cent. of the tonnage dropped) fell within that part of the administrative area of Kassel containing buildings. In the fully built-up central area (A) few buildings remained standing and none were left intact. Even in the less congested area west of the old town about half the buildings were destroyed. Industrial damage in this and the previous raid (3/4 October) was very extensive (see Fig. 11).

B = The gutted Law Courts. C = Damaged office block of the Main Railway Station.

Note Königs-Platz in centre—compare with Fig. 10A, opposite.

SECRET

FIG. 10B.—PLOT OF DAMAGE RESULTING FROM KASSEL RAID
of 22/23 October, 1943.

KASSEL BEFORE THE RAID OF 22/23 OCTOBER, 1943

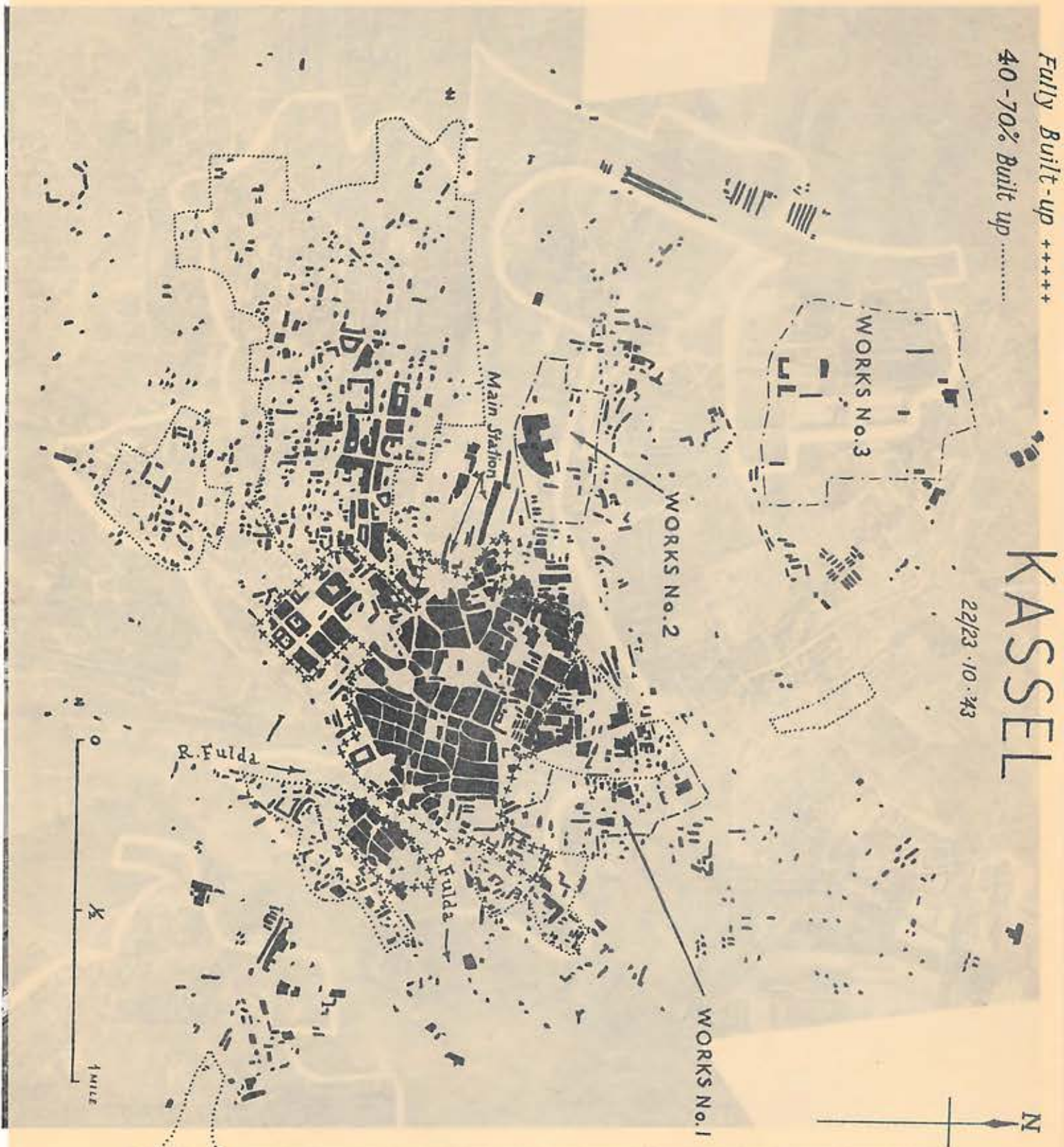


FIG. 10A. A map showing the layout of the works areas of Kassel, including housing, transportation, central business and residential districts, as they were before the bombing raid of 22/23 October. The outline indicates the extent of the city limits. The outline of the city limits of Kassel, as they were before the bombing raid of 22/23 October, is shown by a dotted line. The outline of the city limits of Kassel, as they were before the bombing raid of 22/23 October, is shown by a dotted line.

KASSEL BEFORE THE RAID OF 22/23 OCTOBER, 1943



FIG. 10A.—This mosaic shows the lay-out of the whole target-area of Kassel, including factories, transportation centre, business and residential districts, as they were before the annihilating raid of 22/23 October. The outlying industrial suburb of Bettenhausen (*lower left corner*) was heavily damaged on 3/4 October, when the factory producing F.W.190 aircraft was severely hit.

KASSEL'S PRINCIPAL INDUSTRY: THE HENSCHEL FACTORIES



FIG. 11.—*Above* : Henschel Lokomotiv Werk I had about half of its buildings gutted and the remainder damaged.

Left : Henschel Werk II and the adjoining Rolling-Stock Works were also extensively damaged.

The Henschel Works constituted the largest locomotive-building firm in Europe and since 1942 has been regarded by the Nazis as one of their most important war plants. Tanks, armoured vehicles and military lorries were included in the output of the firm.

II. FLYING INCIDENTS

(a) A Bomber Rams a Ju.88

While returning from Stettin on the night of 5/6 January, 1944, "D" of 207 Squadron destroyed an enemy fighter in an unorthodox but decisive manner. Our aircraft, a Lancaster Mark I, bombed Stettin at 0352 hrs. and, after observing good and concentrated fires in the target area, set course for base. At 0358 hrs., when flying some 20,000 ft. above the south-west margin of the Stettiner Haff, the mid-upper gunner reported a Ju.88 under the starboard wing at 100 yds. range. At the same time another Lancaster was seen on the port bow, level with "D" at 200 yds. range, executing the standard combat manoeuvres.

To allow front and mid-upper gunners to bring their guns to bear, Lancaster "D" made a dive to port. The fighter, whose range had closed considerably, simultaneously began a "curve of pursuit" on the forward Lancaster, thus moving from starboard to port in relation

to aircraft "D." Before it was possible to open fire our pilot had to pull up the Lancaster's nose in order to avoid collision with the Ju.88. It was impossible, however, to avoid it altogether and the port wings of the two aircraft met with considerable force. The port wing of the fighter was seen to crumble, the Ju.88 immediately went into a dive, and the rear gunner saw it explode on the ground. Lancaster "D" returned without difficulty to its base. Damage was confined to slight buckling of the port wing-tip, which was repaired by the Squadron within a few hours.

Since this incident a certain Dr. Karl Holtzammer has broadcast on the German radio an account of the "ramming tactics" recently adopted by their night fighters. "It means that the enemy machine is destroyed, but the fighter is destroyed too." This seems to be another example of a German half-truth.

(b) A Lancaster Defeats Three Fighters over Kassel

The concentrated mass of fire which enveloped Kassel on the night of 22/23 October attracted a great swarm of enemy fighters. Towards the end of the attack the target area was described as "completely ringed by fighter flares," combats were frequent, and several bombers were engaged by a number of fighters simultaneously.

Lancaster "B", of 61 Squadron, was first engaged at 20,000 ft., two minutes after bombing, by a F.W.190, which approached from dead astern. When it was at about 600 yards range both mid-upper and rear gunners opened fire at the enemy with long bursts. At 500 yards range strikes were observed on the enemy aircraft, which then burst into flames and, directly afterwards, broke up with a violent explosion. The rear gunner's claim that this fighter was destroyed was supported by the mid-upper gunner and the wireless operator.

While firing at the F.W.190, the mid-upper gunner was wounded in the left hand by bullets from a second fighter, attacking on the starboard beam somewhat above the Lancaster. On instructions from the upper gunner, the pilot executed a "corkscrew" manoeuvre to starboard and as the fighter broke off the attack the rear gunner gave it a burst of fire, but no strikes were observed. At the same moment a third fighter attacked from the port beam and bullets, entering the belly of the Lancaster, came up through the floor. The rear gunner turned his guns on the third opponent and fired approximately 400 rounds as this fighter in turn made off. The Lancaster continued on course for base.

Both turrets were now out of action, owing to damage sustained during the second engagement, and the Navigator reported fire amidships, which

was setting off ammunition in the tracks. The wireless-operator went aft and, together with the rear-gunner, succeeded in controlling the fire with extinguishers, finally beating it out with his gloves and scarf.

The wireless-operator, having attended to the mid-upper gunner's injury, next attempted to restore the damaged oxygen system, as three members of the crew, including the navigator, had become unconscious. The flight-engineer, though wounded in the head, also helped in this task, but, as no results were forthcoming, they transferred their attention to the defective intercomm. system—the whole time without oxygen.

Meanwhile the pilot, having found the air speed indicator, all compasses and intercom. out of action, managed to control the Lancaster and set a course by *Polaris*. After some time he endeavoured to descend through thick cloud in the hope that the navigator and the other unconscious members of the crew would recover, but heavy icing and static were encountered. Climbing above the cloud the pilot flew "astro" courses for 2 hrs. 30 mins., with the starboard inner engine giving trouble and many of the engine gauges out of action. Eventually, after descending to cloud-base at 2,500 ft., the navigator regained consciousness, succeeded in repairing damage to his equipment, and obtained a fix 40 miles off the coast of Norfolk. The pilot and flight engineer managed to get the starboard inner engine running satisfactorily in time to make an excellent landing. This was accomplished without further damage, despite all the trimming controls having been shot away, an elevator jammed, useless hydraulics, a burst starboard tyre, and with very little control of the rudder.

(c) A Defiant Wellington

The crew of a No. 6 Group Wellington X (aircraft "N" of 432 Squadron) had an eventful and successful trip on 8/9 October, 1943.

On the run up to the target, which was Hanover, the rear gunner reported a fighter about 700 yards off on the starboard quarter. The fighter, later identified as a Ju.88, was rather below the Wellington when first sighted, but climbed to come in on the starboard quarter. As soon as the Ju.88 opened fire, with a short burst apparently from cannon only, the rear gunner replied and the fighter broke off the attack at 500 yards range on the port quarter below the Wellington. That was the last our crew saw of the enemy aircraft. The Wellington flew on, undamaged, and bombed the target from 18,500 ft. as the fires were beginning to develop around the aiming point.

Four minutes after bombing, while on a course towards Holland, the rear gunner sighted another Ju.88 some 500 ft. below flying in the direction port bow to starboard quarter. At

about 900 yards range the fighter turned in to attack on the starboard quarter level with the bomber. When it had closed in to about 700 yards the rear gunner opened fire with a short burst and instructed the pilot to execute a "corkscrew" manoeuvre to starboard. As the Wellington went into the diving turn the enemy opened fire, but his tracer passed to port. Our gunner fired again, with a long burst, when the range had closed to about 600 yards. The Ju.88 continued to come in and, as the Wellington began to climb, the rear gunner saw his tracer scoring hits on the fighter, range now being about 300 yards. At this stage the enemy's port engine caught fire, part of the port wing appeared to break off, and the Ju.88 lurched over on that side. As it fell blazing and smoking, to port, our gunner gave it a final short burst and then watched it fall and explode on the ground 18,000 ft. below. This was also observed by the wireless operator stationed in the astro-dome. The Wellington continued to its base entirely undamaged.

(d) A Seaworthy Bomber

As an indication of the length of time for which Lancaster aircraft may remain afloat after ditching in favourable circumstances, the case of "C" of 103 Squadron is of interest. On the night of 13/14 April, 1943, this aircraft (a Mark I Lancaster) took part in the first substantial attack on Spezia, the chief Italian naval base. After successfully bombing the target, the Lancaster set course for base across the western Alps. Having accomplished the major part of the operation without mishap the aircraft ran out of petrol while over the English Channel and was obliged to ditch at dawn some 60 miles south of the English coast.

Visibility was clear and the sea was calm apart from a swell. The pilot approached the water at 100 m.p.h. with 20° flap and with all engines serviceable, and finally ditched in an 85-m.p.h. glide, alighting along the crest of the swell. The first impact was moderate, the second was slight, and the whole crew immediately took to the

dinghy. After 3½ hours they were rescued by a Walrus aircraft of 276 Squadron—that Squadron's hundredth rescue. The Walrus took off with three of the Lancaster crew after the remaining four were taken aboard an A.S.R. launch. None of the crew was injured.

The Lancaster remained afloat for 33 hours after ditching and then sank only after the tail was broken off by a ship which attempted to tow it into port. While it is very encouraging to know that these bombers are capable of such feats of seaworthiness in the most favourable circumstances, it is well to remember that they are not to be regarded as anything but exceptional as far as normal operational experience is concerned. Often it is only a matter of a few precious minutes, and to take advantage of the interval between ditching and sinking calls for a high degree of efficiency and thorough acquaintance with each stage of the ditching procedure and dinghy drill.

III. MISCELLANEOUS ITEMS

(a) An Assessment of Results, 1940-1943

The purpose of this assessment is to show how apparently unrelated raids on individual towns are in fact all part of a complete and unified offensive, in which each success marks a definite advance towards a definite object. It attempts to give a clear picture of the results so far achieved by this offensive as a whole—a picture which has only recently been made possible by the piecing together and assembly of information about the results of attacks on many different towns.

It is an intermediate assessment for the obvious reason that the final assessment of results will consist of four words only—"UNCONDITIONAL SURRENDER OF GERMANY." But as far as it goes—and it goes down to the end of December, 1943—the picture is as complete as it is possible to make it. It does not pretend to be absolutely complete even to this date, and to prevent any possible misunderstandings it will be as well to state at the outset what aspects of the offensive are covered by this assessment and what are not.

This will involve a certain amount of preamble, defining what is here meant by "Results" and the method by which they have been assessed. But anyone who skips the preamble may easily get a wrong impression of the whole and, since this is not a detective story, the reader is urged to restrain his natural impulse to look at the end first.

To begin with, this assessment deals only with the evidence of daylight photographs—evidence, that is, which can be completely relied upon and which can be accurately measured.

Next, it is concerned only with measured acreages of devastation within specified areas of German towns—namely, non-industrial areas more than 40 per cent. built up. There are good reasons for these apparently arbitrary limits. The "40 per cent. or more built-up" limit excludes suburban districts, and though considerable damage has been done in some of these thinly built-up districts, they are outside what is regarded as the "target area" of the towns attacked. The "non-industrial" limit excludes the very impressive total of damage to industrial and public utility plants because the significance of such damage cannot be measured in terms of area alone. The destruction of a relatively small building such as a power station may bring a whole works to a standstill, and *vice versa* the destruction of a very large building containing nothing of importance may have practically no significance at all. In any case, the offensive is directed against a town as a whole in order to affect the output of all its industries simultaneously instead of going through the laborious process of trying to attack each factory individually.

Finally, this assessment is concerned only with photographed and measured acreages of

devastation within these specified areas of 38 German towns, namely:—

Aachen.	Kiel.
Berlin.	Krefeld.
Bochum.	Leipzig.
Bremen.	Lubeck.
Brunswick.	Mainz.
Cologne.	Mannheim.
Darmstadt.	Munchen Gladbach.
Dortmund.	Munich.
Duisburg.	Munster.
Dusseldorf.	Nurnberg.
Emden.	Oberhausen/Mulheim.
Essen.	Osnabruck.
Frankfurt A.M.	Remscheid.
Gelsenkirchen.	Rostock.
Hagen.	Saarbrucken.
Hamburg.	Stettin.
Hanover.	Stuttgart.
Karlsruhe.	Wilhelmshaven.
Kassel.	Wuppertal.

These are shown on the map appearing on the frontispiece.

It will be seen that this list includes practically every objective in Germany, attacked by Bomber Command, that can reasonably be described as a town. It excludes a few places like Friedrichshafen (where the attack was not on the town).

This list of towns, therefore, represents all but a negligible part of the town targets so far attacked in Germany. In fact, when the weight of bombs claimed dropped on these 38 towns during the whole period under review is compared with the weight claimed dropped on the whole of Germany during the same period, the figures indicate that the attacks on these towns amount to over 90 per cent. of the total attack on Germany. The results obtained from these attacks are therefore representative of the results of the offensive as a whole.

There is just one other point to clear up before the reader's impatience is satisfied and the results are announced. The attacks on these towns represent, as has been stated, very nearly the whole of the Command's offensive against Germany; but what proportion of Germany as a whole is represented by these attacked towns?

In arriving at the answer, all country areas and villages can obviously be ruled out as being outside the scope of our offensive. The same reasons rule out small towns, and since the question "How big is small?" admits only of an arbitrary answer, the line shall be drawn at towns with 50,000 inhabitants. Now the total population of all towns in Germany with 50,000 or more inhabitants amounts to 18,000,000, which is 72 per cent. of the urban population of Germany. In terms of population, the 38 German towns attacked represent

over 13,000,000, or just under three-quarters of the possible total.

The industrial value of these 38 towns in terms of output has also been calculated, and is found to be 64 per cent. of total industrial value of all towns in Germany with 50,000 or more inhabitants.

The scope of the offensive having been thus defined, what do the results add up to?

The total "target area" (as defined above) of these 38 towns in which the devastation is to be measured, amounts in round figures to 84,000 acres or 130 square miles. Of this total area, Bomber Command's offensive from the beginning of the war to the end of December, 1943, had destroyed a total of 23,300 acres, or $32\frac{1}{2}$ square miles, or 27.7 per cent. of the total area attacked. This figure does not include the results of several attacks in December for which photographic cover has not yet been obtained.

It is difficult to take in the meaning of destruction on this scale, so enormously greater than anything our Air Force has accomplished elsewhere. It may make the figures more comprehensible if they are translated into an equivalent destruction of British cities, but this cannot be done exactly, since equivalent figures for areas of specified building densities in this country cannot be used in this paper. On a population basis, it is found that the 10 largest towns (excluding London) in England and Scotland have a combined population of 6,000,000 or one-third that of the 38 German towns which have been upwards of one-quarter destroyed. The total destruction in Germany is therefore equivalent to the destruction of approximately *three-quarters* of the built-up area of the following British towns:—

Glasgow.	Birmingham.
Liverpool.	Manchester.
Sheffield.	Edinburgh.
Leeds.	Bristol.
Hull.	Bradford.

In visualising what we may expect to achieve in the future, it must be borne in mind that almost the whole of the results to date have been accomplished in the last year only and in the main within the last 10 months.

Here are the actual figures. By the end of December, 1942, Bomber Command's offensive had destroyed 2,350 acres out of a total of 74,582 attacked, or 3.2 per cent. In March, 1943, the offensive really began in earnest with the

devastating attack on Essen, and it has continued unabated ever since to reach by the end of December the figures quoted of 27.7 per cent. of the total area attacked.

This is, of course, partly due to expansion and re-equipment with heavy bombers in 1943, and the consequent increase in the weight of attack. But it is also due to the great increase in the efficiency of the attack, which can be measured by calculating the acres devastated per ton of bombs claimed dropped. Improved navigational aids and the development of the Pathfinder technique have meant that many more of the bombs intended for a town do, in fact, fall upon the most closely built-up parts of it.

Summing up, it can be said that the expanded, re-equipped and more efficient Bomber Command of 1943 has—disregarding anything done before this year—accounted for about 25 per cent. out of the total 27.7 per cent. destruction of the "target area" of the 38 towns so far attacked. But there are other towns to be attacked, and the total "target area" will therefore gradually increase—by an average of about 1,000 acres a month, if the 1943 rate of increase continues. This, it should be noted, is very considerably less than the present rate of destruction.

It is obvious that it will not be necessary to destroy every building in the whole of this area in order to bring about the surrender of Germany. (In any case, this would be impracticable, since the more that is destroyed the more difficult it is to destroy what is left.) It is further not possible to dogmatise on how much will have to be destroyed before the enemy surrenders.

But without attempting any prophecy, it is quite reasonable to take 50 per cent. destruction of the slowly increasing "target area" as the "first objective" of Bomber Command. If 50 per cent. destruction be taken as the Command's immediate objective, it will be seen that, since 1 March, 1943, Bomber Command has covered half the distance.

How soon this first objective will be reached depends primarily upon the rate of delivery of new aircraft to the Command, coupled with increasing efficiency on the part of crews in placing their loads in the target area. It can, however, be said that given sufficient aircraft it is definitely possible for Bomber Command by their own efforts to deliver the knock-out blow that will bring final victory over Germany within a few months.

(b) The Bombing Offensive in 1943.

1943 had long been anticipated as the year of achievement for Bomber Command. Had resources been available for the execution of the Combined Bomber Offensive on the scale as planned it would also have been the year of victory over Germany. As it is, although we have gone a long way and the end is now in sight, the decisive blows have still to be delivered.

Some of the direct results of strategic bombing during the year have been briefly indicated in the earlier part of this review. It is intended here to recall the difficulties which have been progressively overcome to make those results possible and also to remove some prevalent misconceptions of the aim and consequences of our attacks on German industrial centres.

It was not until the beginning of the year 1943 that the Command was in a position to carry out its long planned policy of true strategic bombing; that is to say, the bombing of selected targets on a scale sufficient to break the industrial capacity and undermine the morale of the enemy rather than to perform an ancillary role in support of operations by land or sea.

In order successfully to prosecute such an offensive, there were three main problems which had to be solved. These were,—

- (i) Lack of sufficient suitable aircraft, aircrews and airfields.
- (ii) The difficulty of hitting the target in the conditions with which we were faced.

- (iii) The problem of countering the growing strength and effectiveness of the enemy's defences.

The provision of sufficient aircraft and crews was held up by commitments overseas and other requirements, no less than 23 squadrons being transferred during 1942 to the Mediterranean and India to co-operate with land operations or to Coastal Command to assist in the "Battle of the Atlantic." However, an increase in striking power was gradually being built up by the replacement of medium by heavy bombers, so that by the beginning of 1943 when the flow of suitable aircraft on an increased scale began, it was possible at last to make a start with the policy of continuous large scale strategic bombing, which has continued ever since unabated.

The second factor, namely the difficulty of hitting the target at night, may be expressed quite simply as the difficulty of seeing in the dark. It is difficult enough at night when flying several miles up to pin-point a target in friendly territory, but to do so over hostile territory against heavy defences with camouflage and cunningly placed decoys is almost an impossibility. It became essential, therefore, to aid the navigators by providing special equipment to assist in locating and marking the target.

It was known that only a small percentage of the bombs actually hit the key factories which were the targets for attack in the early days, and it was decided therefore to concentrate on the larger industrial complexes, where a considerable degree of scatter would still result in the hitting of worthwhile objectives. The problem then to be solved was that of grouping the bombs dropped by the whole force into the smallest possible area and to ensure that the centre of this pattern of bombs coincided with the aiming point.

This led to the institution of the Pathfinder Force, whose function put in its simplest form was to place a marker bomb, which is only a large firework, on the aiming point so that it could be easily identified and bombed by the main force. As they were a relatively small force, their aircraft could be manned by the best crews employing the latest equipment and devices which were necessarily in short supply. There were, of course, obvious dangers to the employment of such technique for not only would the whole attack be a failure if the Pathfinders as a whole failed to identify the target accurately, but the dropping of marker bombs in the wrong place by one aircraft might lead away a substantial portion of the main force. However, although there is still much to be learnt, there is overwhelming evidence that in general the technique has succeeded in producing an accuracy and concentration of bombing never previously achieved at night by any Air Force in the world.

The third problem was that of countering the enemy's defences, which were rapidly becoming stronger, chiefly due to a substantial increase in his night fighter units coupled with new methods of plotting and attacking our aircraft. It is not possible to say much about this subject as the lives of the crews depend upon keeping the enemy as far as possible in ignorance of our methods. There is no doubt, however, that the great amount of thought devoted to methods of outwitting the enemy, both by means of improved tactics and

measures designed to jam and interfere with the radio controlled systems essential to his night air defence, have met with considerable success. The results are that the number of bombers missing out of every hundred despatched to targets in Germany was less in 1943 than in 1942, and, in addition, owing to the greater loads carried by the heavy bombers, we were able to drop two and a half times the weight of bombs for every aircraft lost.

Strategic bombing was thus rendered possible, and its effects are seen in the broadest terms in the withdrawal of the German armies on the battle fronts and the progressive deterioration of morale and production of all kinds at home. It is difficult, however, for the uninitiated to get any clear idea of the connection which links the bombing of cities with the defeat of armies in the field.

Because the areas of devastation created by Bomber Command are so vast, there is a tendency in many quarters to regard it as a form of mass bombing by which sooner or later, by the application of the law of averages, the right places will be hit. Nothing could be further from the truth. Direct results achieved by daylight precision bombing are, of course, much easier to understand and assess. The effect of the destruction or partial destruction of a factory producing a given number of aircraft or other war material can be expressed in terms of the estimated reduction of output of the German war machine. The difficulty of presenting the results of the bomber offensive by night in such simple terms is probably largely responsible for the erroneous belief that this type of bombing in itself does not similarly and substantially reduce the enemy's means of production. It is important that this misconception should be eradicated once and for all and a clear understanding obtained that the day and night bombing offensive are complementary in fact and not only in name.

It is worth examining, therefore, such information as is at our disposal to show to what extent the German war potential has already been crippled. For this purpose, the lessons learned from the enemy's attacks on this country are of immense value. But there are two fundamental differences. In the first place, our raids are so much more severe both in weight and effectiveness that by comparison the "Blitz" now appears hardly more than a succession of minor attacks. Secondly, the Britain of 1940/41 had such ample resources awaiting mobilisation that much of the damage to industry and trade was unimportant, since only a small part of the whole was integrated to war purposes. With Germany to-day the situation is reversed. Everything is important and harnessed to war production or to the supply of essential requirements for the civil population. Paradoxical though it seems, with a population of a hundred millions and the greater part of Europe "enslaved," Germany has experienced a critical labour shortage for nearly two years.

Apropos of the weight of our present attacks, it is worth recalling some of the results of German raids in the spring of 1942. In two English towns attacked on the Coventry scale (measured by weight of H.E. falling on the administrative area) the effect in working days lost was *four* times as great as in another town raided on *half* the scale. The normal Bomber Command raid is now five or six times the weight of the German's attack on Coventry; and our heaviest so far was about five

times as great as the biggest effort ever made by the Luftwaffe against Britain. Thus, even on the basis of *pro rata* statistics valid for the "Blitz," the effects of the 1943 offensive on German production of all kinds can be shown to have been extremely severe. We can estimate roughly with the help of reconnaissance photographs, the minimum production loss caused by direct damage to factories. But we know from our own experience that the losses from other causes are certain to be even more serious.

However, we do not have to rely entirely on statistics based on our own experience of several years ago, as there is reliable evidence from a variety of other sources of what is actually happening all over the Reich. Early last June (while the Battle of the Ruhr was in progress) the Ministry of Economic Warfare, which has the task of analysing all the evidence, estimated that overall industrial production in Germany had declined by something between 15 and 20 per cent. as compared with 1942. "There are many causes for this: fatigue, dilution of labour, shortage of materials, deterioration of machinery, and so on. But a good half of the decline can be attributed direct to the air raids; and as the air raids have been largely concentrated on the Ruhr we may take it that the industrial production of the Ruhr declined by something like 35 per cent., and in the rest of Germany by about 10 per cent."

Some months later, when Hamburg had been ruined and the destruction of the capital begun, a further estimate of the position was given by a member of the Directorate of the Reichsverband Deutsche Industrie. This authority is reported to have said that "the drop in production in Germany caused by R.A.F. raids is now estimated at 25 per cent. Twelve per cent. is due to direct damage to factories, and 13 per cent. to the effects on workers." In view of the cumulative effect of heavy damage all over the country on every branch of production these high figures are by no means difficult to believe. Every unfavourable economic factor has been accentuated by the bombing which has created at the same time new demands for labour and materials, both for reconstruction of buildings and for replacements of all kinds. Finally, as some of the Ruhr newspapers have frankly admitted, the orderliness of industrial administration has become badly upset as a result of the 1943 raids; when that happens in one district it affects others, and the supply of equipment for the armed forces is immediately threatened by the resulting chaos.

In the Hamburg raids of July-August, 1943, the chaos was particularly far-reaching. Mass evacuation swept away even key workers and administrators, and the newspapers were still printing appeals to such personnel to return to the wrecked city many weeks after the raids. By that time preliminary attacks were being directed against Berlin, and reliable evidence shows that the capital was evacuated in an atmosphere of genuine panic. Businesses and households were hurriedly removed to other cities only to find that no preparations had been made to receive them. On returning to Berlin they found their former premises taken over to house the bombed-out. Those officially evacuated were, for the most part, scarcely better off, and it is clear from the newspapers that German morale is seriously affected

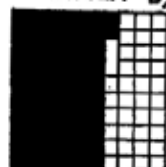
by the billeting treatment of evacuees, especially of the bombed-out. Just as in the last war, these unfortunates fare badly in the reception areas, where they are described as "about as welcome as the Plague." This explains another theme of the German press last summer: "A person without a roof over his head has been liquidated just as effectively as one who is starving." The Germans are certainly in a position to speak with authority on that subject, and it would be hard to dispose more effectively of the argument that the destruction of house property is not a true military objective.

The total effects of the progressive destruction of Germany's industrial centres are altogether too vast to review shortly, but here are a few specific examples of their impact on the supply of war equipment. An immediate shortage of crankshafts for aero-engines resulted from damage caused in night raids on Cologne, Essen and Hamburg last summer. Several thousands of Daimler-Benz engines lacking only the crankshaft had to be placed in store, and by mid-August the shortage was so acute that operational fighter units had aircraft grounded owing to lack of replacements. Production of a new type of flak was successfully held up for several months owing to damage to an important machine-tool works in Düsseldorf. Having been hit repeatedly during our raids on Düsseldorf this works was finally abandoned and the business merged with a Leipzig firm in time to experience the successful "blind" attack on that city on 3/4 December, 1943. The construction of U-Boats at the Blohm and Voss yards was seriously hampered since March, 1943, because Krupp's and other Ruhr plants were unable to maintain deliveries of plates for the hulls and conning towers. By June the night shift had been abandoned in the riveting shops and they were only working 8 hours a day when the destruction of Hamburg began at the end of July. The supply of Radar apparatus to the German armed forces, which is falling short of the very heavy requirements, was greatly aggravated by the 1943 raids on Berlin. In the course of these raids the most important valve-making plant in Europe (Osram, Charlottenburg) was seriously damaged, as was one of the Radar research establishments at Telefunken. Several of the other large electrical engineering firms in the capital suffered heavily; for instance, Siemens and Halske and A.E.G.

Perhaps the most spectacular result achieved so far is to be seen at Essen. The great steel and armament works was first heavily damaged in two raids in March, 1943. On the basis of English repair rates the direct damage to the works should have caused a total loss equivalent to two months' loss of output for all departments. This was obviously an underestimate since it took no account of all the other effects of the raids, including some 75,000 people simultaneously rendered homeless. Appreciable fresh damage, both to Krupp's and to the city, was inflicted in the course of April and May so that in June—when the works should have been approaching full production—most of the buildings damaged in March still showed no signs of repairs. Towards the end of July one more attack fell with particularly good effect on this formidable target, and two months later there was still no sign of any serious attempt to restore Krupp's to anything like its former

PLOT OF DAMAGE RESULTING FROM TWO RAIDS ON WUPPERTAL (ELBERFELD ~ BARMEN)

BARMEN 29/30 May 1943

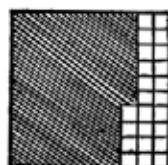


□ = 1% of
built-up areas

■ DESTROYED OR
SERIOUSLY DAMAGED

BARMEN

ELBERFELD 24/25 June 1943



□ = 1% of
built-up areas

■ DESTROYED OR
SERIOUSLY DAMAGED

ELBERFELD

Limit of Built-up Areas

0 1/2 1 mile

FIG. 12.—Two Raids eliminated the Ruhr city of WUPPERTAL : an illustration of the effectiveness of current night bombing technique. (See page 13.)

THE DECLINE AND FALL OF GERMANY'S LARGEST

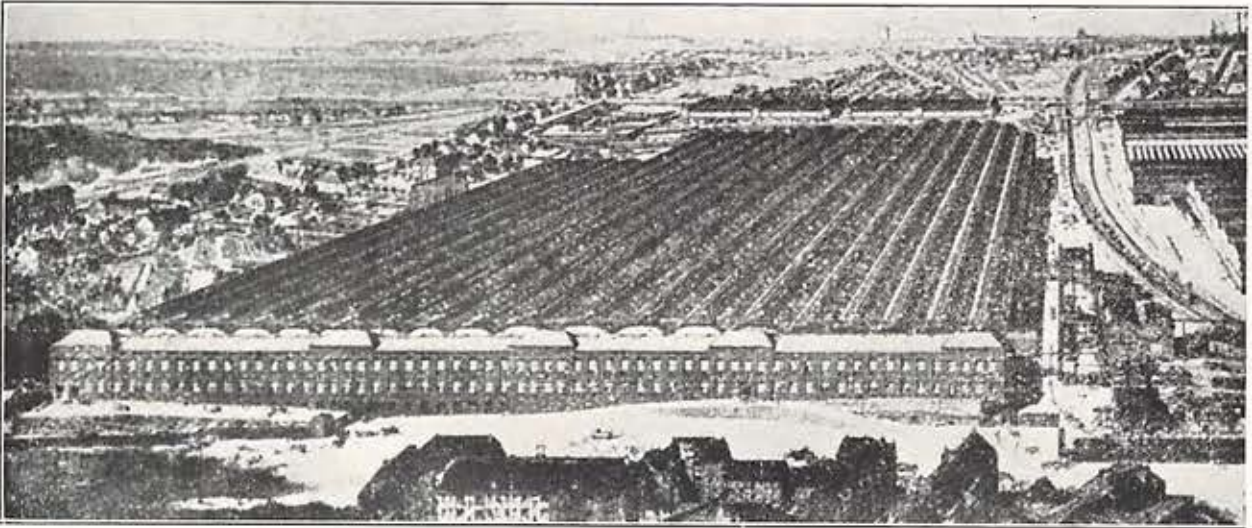


FIG. 13.

The largest unit of Krupp's Steel and Armament Works was the huge Locomotive Construction Plant, erected after the last war. (See external view, Fig. 13, above.)

It was in this building that HITLER broadcast to the workers of Germany on 27 March, 1936, when he was preparing for the present war (Figs. 14 and 15).

To the 120,000 workmen assembled he emphasized that the works "produced the arms of peace no less than the arms of war."

"The workers of Krupps," he continued, "whose halls were almost empty a few years ago, are the best witnesses to Germany's great achievements under the Nazi régime."



FIG. 15.

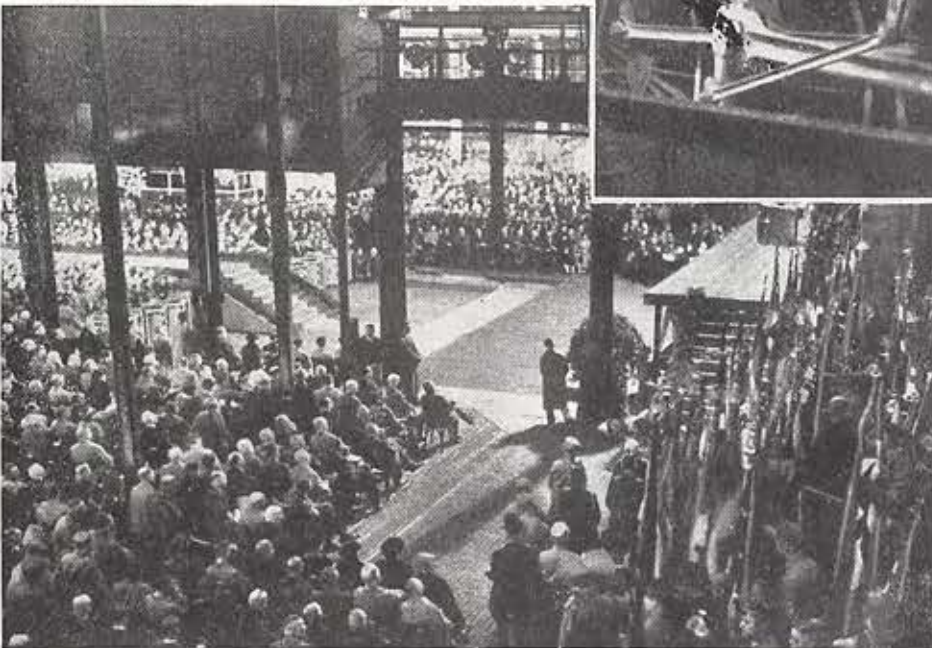


FIG. 14.

Hitler speaks to the Krupp workers (March, 1936).

ARMAMENTS AND HEAVY ENGINEERING WORKS



FIG. 16.—After the Bombing: the Krupp Loco. Plant (A) burning from end to end, 13 March, 1943. The adjoining workshops (B and C) produced rolling stock, medium guns and howitzers.

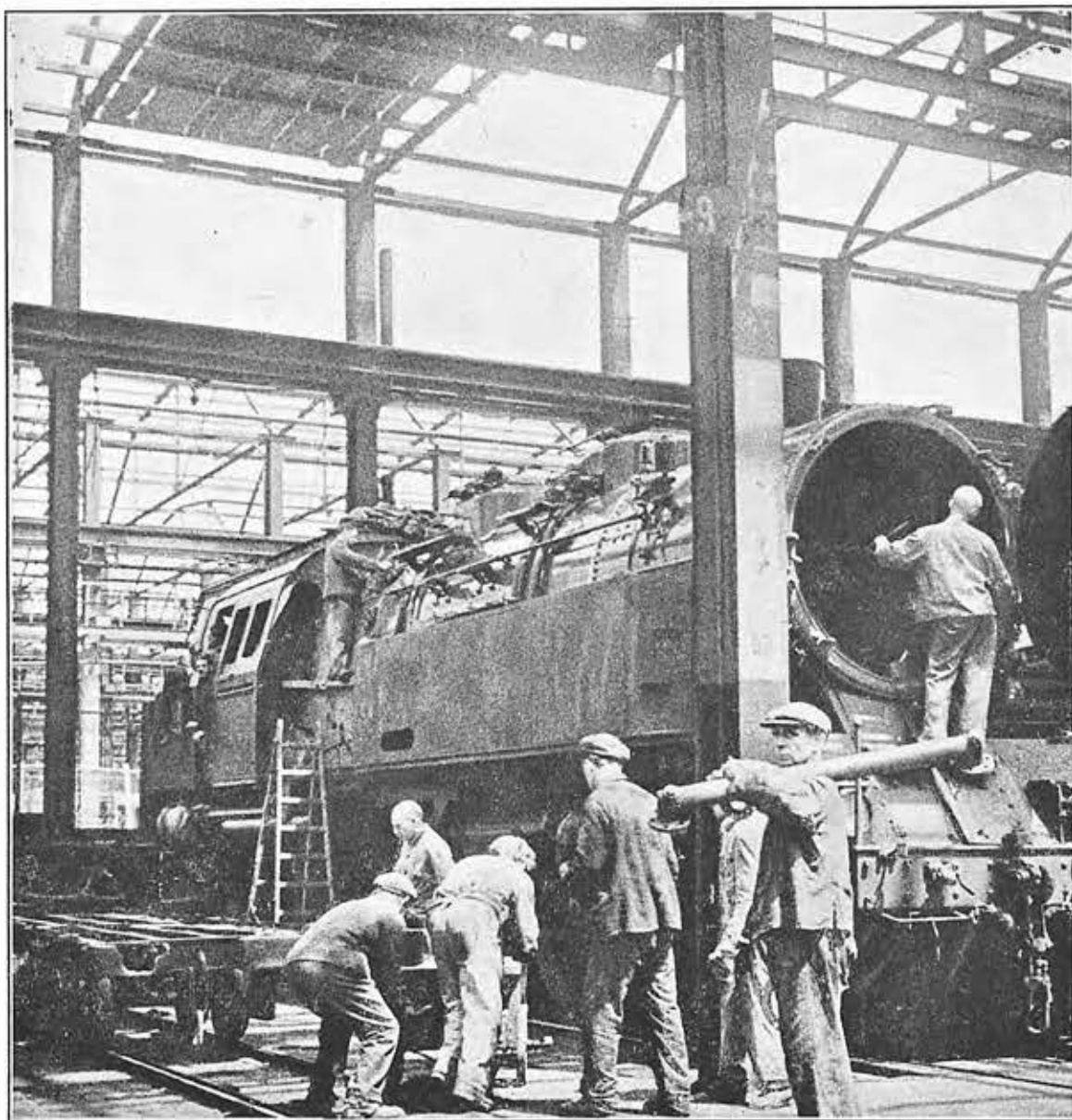


Fig. 17.—A ground photograph of the same building (A, above), now roofless and with most of its equipment destroyed. No reconstruction has been attempted but, after clearing up the debris, some partly-finished locomotives remaining in the ruins were eventually completed under very difficult conditions.

In the absence of even temporary roofing, such as is used in Britain, this work could only proceed during the day. Yet the German Press published this photograph as evidence in support of the official contention that production has not been gravely affected by air attacks! (See also diagram, Fig. 18, facing next page.)

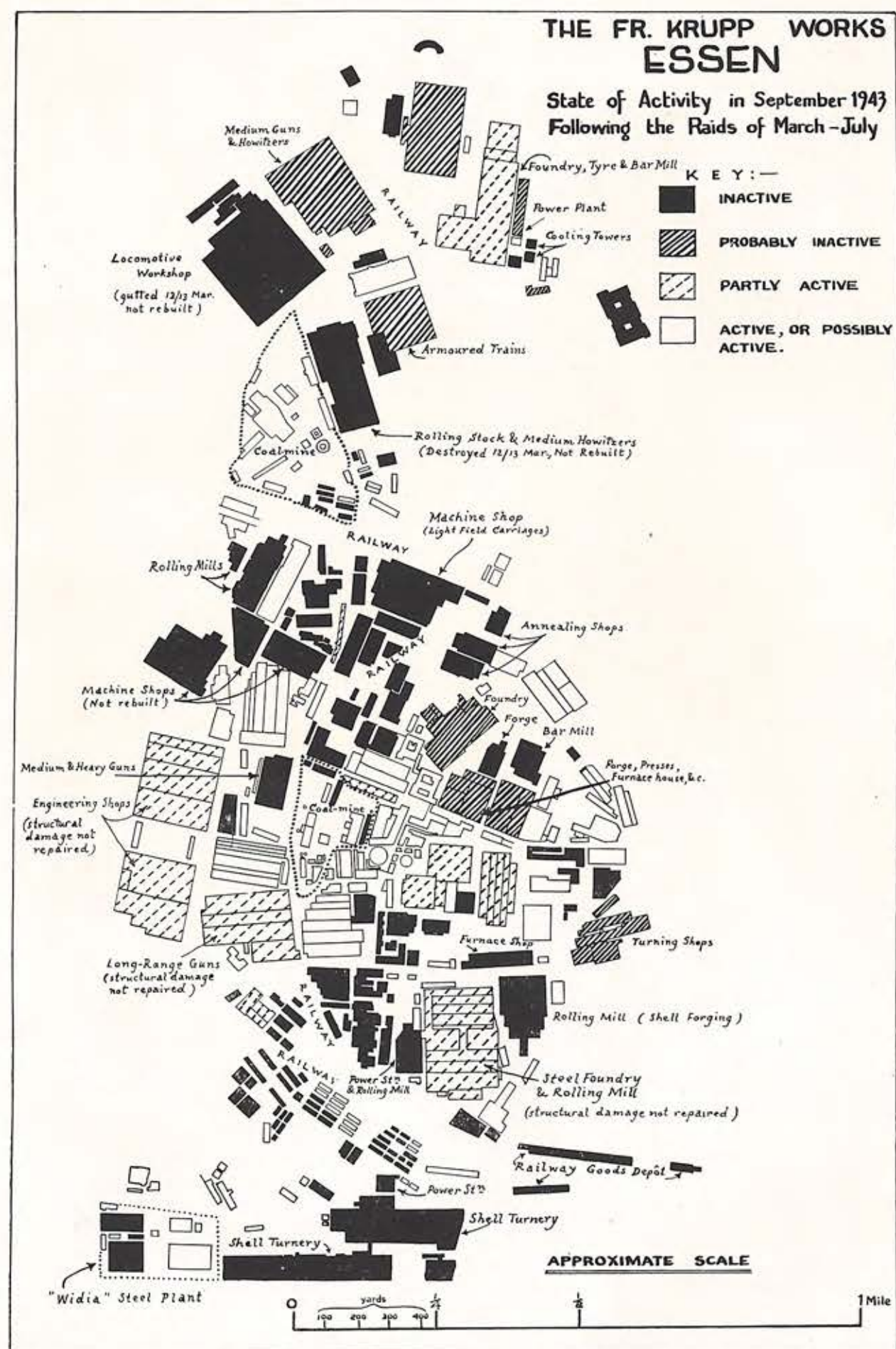


FIG. 18.—The state of Krupp's Works, two months after the last attack. The great armaments works was first heavily damaged in March and on the basis of English repair experience this should have caused a total loss equivalent to two months' output for all departments. But fresh damage was done in April and May, so that, when the works should have been approaching full production again—in June, most of the buildings damaged in March still showed no sign of repairs. The particularly heavy attack in July ensured that recovery would be indefinitely delayed; so that for half a year, at least, the largest individual armaments and heavy engineering plant in the Reich was prevented from playing any significant part in the Nazi war effort. (See pages 14-15.)

output. (See diagram on opposite page.) So that for at least half a year the largest individual armaments and heavy engineering plant in the Reich was prevented from playing any significant part in the Nazi war effort.

This is all the more striking in that steel works are known to be very difficult targets to put out of action for any length of time by direct bombing attacks. Given the necessary priority for material and labour, many of the repairs can be executed without much trouble and delay. The few vital points in such a works cover only a very small area; British experience shows these are more susceptible to interference from the indirect effects of bombing. The interruption of water supply may actually destroy a vital portion, such as a blast furnace, of a plant otherwise entirely undamaged. And the rebuilding of a blast furnace is a long and costly process. Again, very large tonnages of raw material are needed in a smooth flow for the operation of a big steel works. The Battle of the Ruhr—and the continuous offensive since that time—produced circumstances most unfavourable to the maintenance of a smooth flow of supplies. Railways and canal systems became congested owing to the cumulative effects of numerous incidents,

and the piling up of huge stocks of Swedish iron-ore on the quays at Emden, showed what was happening. But one of the greatest of all the difficulties at Essen was certainly the labour problem caused by the shortage of housing. It was reported in June that the fact that 100,000 people had no roofs over their heads made resumption of activity at Krupp's out of the question.

The number of German war plants which find themselves in a similar position is already impressive. And that number grows with every successful raid on an industrial centre.

Obviously by now there are innumerable shortages of essential equipment and components of all kinds of which we have no knowledge, but there is already more than enough evidence to show that the policy of destroying industrial cities rather than concentrating on specific "bottlenecks" and supposed "key" factories has been more than justified by results. The Bomber Force, by successfully overcoming the inherent difficulties of carrying out this task and by carrying it near to completion in 1943, has already proved its efficacy as a war-winning weapon. It now remains to finish the job in 1944.

(c) The Protection of our Airfields

There was in the early days considerable doubt as to where this responsibility should properly lie and in particular whether it should be a commitment of the Army or the Air Force. The various problems that arose are indicated in the four definite phases through which we passed before the final institution of the R.A.F. Regiment.

The safety and security of the bases from which the Bomber Offensive is mounted is so fundamental to all air operations that it is perhaps a little surprising that the precautions taken in the early days amounted to little more than somewhat sketchy arrangements with the local Army authorities, and a handful of station personnel whose duty it was to man machine guns with which to deal with enemy attack from the air. It was not, in fact, until the war started in earnest and Germany overran one country after another that the urgency of creating some body with the responsibility and means of providing the necessary protection began to be fully appreciated.

This rudimentary phase was succeeded by the second phase which was largely forced into existence by the collapse of France, which was followed by the threat of invasion, making defence from ground attack as important as defence from attack by air. At this stage the Station Defence Force came into being comprising personnel of the Royal Air Force specially allotted to it both from recruit intake and by transfer from other branches. The Station Defence Force was allotted in varying strength to stations according to their estimated liability to attack and was charged not only with the responsibility for manning such A.A. weapons as were available, but also with the duty of protecting the station in general and the airfield in particular from capture by the enemy.

The task of this force was defined as follows:—

- (1) To repel enemy attack from the air and on the ground in order that our own aircraft might continue to operate.

- (2) To ensure that the enemy should not occupy the airfield and subsequently operate from it.

- (3) To protect aircraft and aircrews and

- (4) To guard vital installations on the station itself.

These four aims are still the object of airfield defence, but their order of importance is dependent upon changes from time to time in the strategical war situation.

After the Station Defence Force had been in existence for a short time the Air Ministry, in consultation with G.H.Q., Home Forces, began to provide experienced soldiers to act as advisors to the Station Commanders on the problems of defence of their stations and to be available, if called upon, to take command of the garrison in action, thus relieving the Station Commander of a considerable measure of responsibility at a time when the conduct of air operations might well be expected to occupy most of his time.

The third phase saw the provision on airfields where ground attack appeared possible, of Army units whose size varied according to the assessment of the risk. These Army units did not supersede the Station Defence Force, but rather acted in conjunction with it on those stations where they were provided. Except on stations where A.A. Troops of the Royal Artillery were deployed, the Army's role was confined to defence against land attack and the responsibility of A.A. defence remained in the hands of the Station Defence Force. There was therefore in effect a dual responsibility.

The fourth and final phase was marked by the formation of the R.A.F. Regiment, which coincided with the acceptance by the Air Ministry from the War Office of full responsibility for the defence of all its airfields and installations. The formation of the R.A.F. Regiment was therefore followed by the withdrawal, as soon as practicable, of Army units from Air Ministry property.

This very briefly traces the development of airfield defence from the outbreak of war to the present time.

There is, however, another equally important aspect of the problem of airfield defence, namely, the development of the use in emergency of all combatant Air Force personnel. This development has been largely dependent upon the availability of suitable weapons, and it was not until the summer of 1941 that circumstances permitted this problem to be dealt with on more than a very incomplete basis. At that time the decision was taken that every man in the R.A.F., other than non-combatants, should learn to use a weapon and to fit himself to take an active part in defending his station, and the enormous task of training virtually the whole of the male personnel in this Command was set on foot. Supplies of weapons were becoming available and, encouraged by this, the campaign of training, backed by everyone throughout the Command, forged ahead.

It would be wrong to suggest that no setbacks were encountered, for indeed many such took place, and many discouragements due to influences which could not be foreseen or countered had to be faced. Despite this, however, definite and notable progress was achieved until the present state, in which virtually every combatant member of the Command has been trained and armed, was reached.

The two component parts of Station Defence have steadily progressed and, what is more important, grown into a mutually supporting organisation. The control of this has undergone just as complete a change during the same period. At the outbreak of war the defence of a station was just one more headache for the Station Commander. The first definite step towards organising the defences was signalled by the arrival of the Local Defence Advisors, the Army officer whom G.H.Q., Home Forces, provided first

in the summer of 1940 and have continued to make available as required ever since. This was followed by the appointing of G.S.O.2.s to Group Headquarters to act in advisory capacity to the Air Officers Commanding and to co-ordinate the defence plans throughout each group. The G.S.O.2.s were in turn controlled by the G.S.O.1 at Command Headquarters, who acted similarly as advisor to the Commander-in-Chief and was responsible for co-ordinating the plans of the several Groups. This system of control was continued on the formation of the R.A.F. Regiment when senior officers of that force took over the G.S.O.1 and G.S.O.2 posts at the Command and Group Headquarters. The new appointments were filled, in many cases, by those who had under the previous organisation been carrying out these duties and who were transferred or attached to the R.A.F. Regiment on the change of policy.

The R.A.F. Regiment has already seen service overseas, and with the development of the offensive it may well be that more and more squadrons of the R.A.F. Regiment will be drawn away from our airfields for this purpose. In these circumstances the acid test will be applied to the training that many squadrons of the R.A.F. Regiment have undergone whilst in the Command, and, if experience to date can be accepted as a measure for the future, there is every reason to believe that the results will be viewed with satisfaction and pride. With this prospect in mind the importance of maintaining the standard of training which has been achieved among station personnel cannot be over stressed, for it must not be imagined that the risk of attack on our airfields has vanished for ever. To maintain, by constant practice, the high standard reached is perhaps more difficult than to attain the standard in the first place, particularly as no actual test of war has so far occurred. Yet this must be done, and there can be no slacking off either for instructors or pupils until final victory is won.