

Chapter 3

Fighter and Fighter-Bombers Against MT and Tanks

Investigation of an Air Attack on a German Column near La Baleine
(Report No.3)

Air Attacks on Enemy Tanks and Motor Transport
in the Mortain area, August 1944
(Report No.4)

Enemy Casualties in Vehicles and Equipment during
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Investigation of an Attack on a German Column Near La Baleine

I. General Situation

As a result of the American break-through (Operation COBRA), a retreating German column was attacked during the afternoon of 29 July by Rocket-firing Typhoons of 121 Wing, 83 Group and American Thunderbolts carrying 500 lb bombs. 99 sorties were made by 121 Wing.

It is not possible to state how long this particular German unit had been fighting as its name is not known but, on evidence of its abandoned equipment, it was a mixed column containing Panther tanks, SP guns, armoured troop carriers, lorry-drawn A tk guns and howitzers, Pupschen rocket guns, armoured and staff cars.

According to local inhabitants the column was passing throughout the day and was joined by troops from the vicinity who looted as they left.

II. Terrain

The path of the German retreat in the area under consideration is shown in the appended map. It lay through country well dissected by deep narrow twisting valleys, much of the area being heavily wooded.

The side road which was used leaves the main road about 1 kilometre south of ST. DENIS-LE-GAST (MR 315443) and descends rapidly to LA BALEINE where the River SIENNE is crossed. This road has a steep wooded cliff on one side and a sheer drop to the river on the other so that it was impossible for vehicles to draw off the road.

At LA BALEINE (MR 323427) the road crosses the river by a bridge which had been sufficiently damaged by 500 lb bombs dropped by Thunderbolts to prevent heavy traffic from crossing.

After crossing the bridge the road turns south, closely following the course of the river and a few feet above water level. On the east a densely wooded hill rises abruptly from the roadside making manoeuvre impossible. Half a mile down this stretch of the road (at point "A" on the attached map) the road twists sharply away from the river up a side valley. At this corner the road is well exposed to air observation and attack.

For the next quarter of a mile along the road as it climbs up towards the north-east there is a fairly thick screening from the air, but just before the cross-roads ("B") there is a short stretch that is much

more open. At "B" the route followed by some, and perhaps all, the Germans turn south and continue to climb between high banks through farmlands and orchards. At several points along this stretch there are gaps in the road banks giving access to the fields.

To the east of "C" abandoned and destroyed vehicles were found along a fairly level road through fields with trees lining all the hedges and along a similar one turning south from it. As these roads are well outside the area attacked by the Typhoons the route was not examined further.

III. Details of Damage

(Note: Letters and numbers refer to points marked on the attached map.)

Point 1 - Two camouflaged Panthers were placed in an orchard and facing the main road from ST. DENIS-LE-GAST. They were probably in this position for several hours as there were signs that meals had been cooked. Craters caused by 500 lb bombs were seen within 50 yards of the tanks; these are thought to have been dropped by American Thunderbolts which are known to have been operating in the area. The tanks had not been hit but the crews apparently baled out, set fire to their tanks, and destroyed one of the guns by leaving an HE round in the chamber.

Point 2 - A 75 mm SP with thick, concrete reinforcement of the turret was found pushed off the road by a Bulldozer. This SP was undamaged but 5 strikes from the air (cannon or machine gun) had made "cups" in the concrete. There was a 500 lb bomb crater 35 yards away. If the SP had been left to block the road it would have been set on fire by its crew; as it was not, the presumption is that it was abandoned in haste.

Points 3 and 4 - Round about points 3 and 4 a number of 500 lb bomb craters were observed. At point 3 a Panther had been left on the road in perfect condition with full complement of petrol and ammunition. At point 4 another Panther was found undamaged in every respect. If the commanders of these tanks had wished they could have travelled down the right hand bank of the stream and attempted a crossing as Shermans later succeeded in doing.

All along the river bank between point 2 and the bridge at LA BALEINE an assortment of "B" vehicles, all burnt out beyond recognition, had been pushed off the road by Bulldozers. A fair estimate would be eight vehicles (lorries and cars).

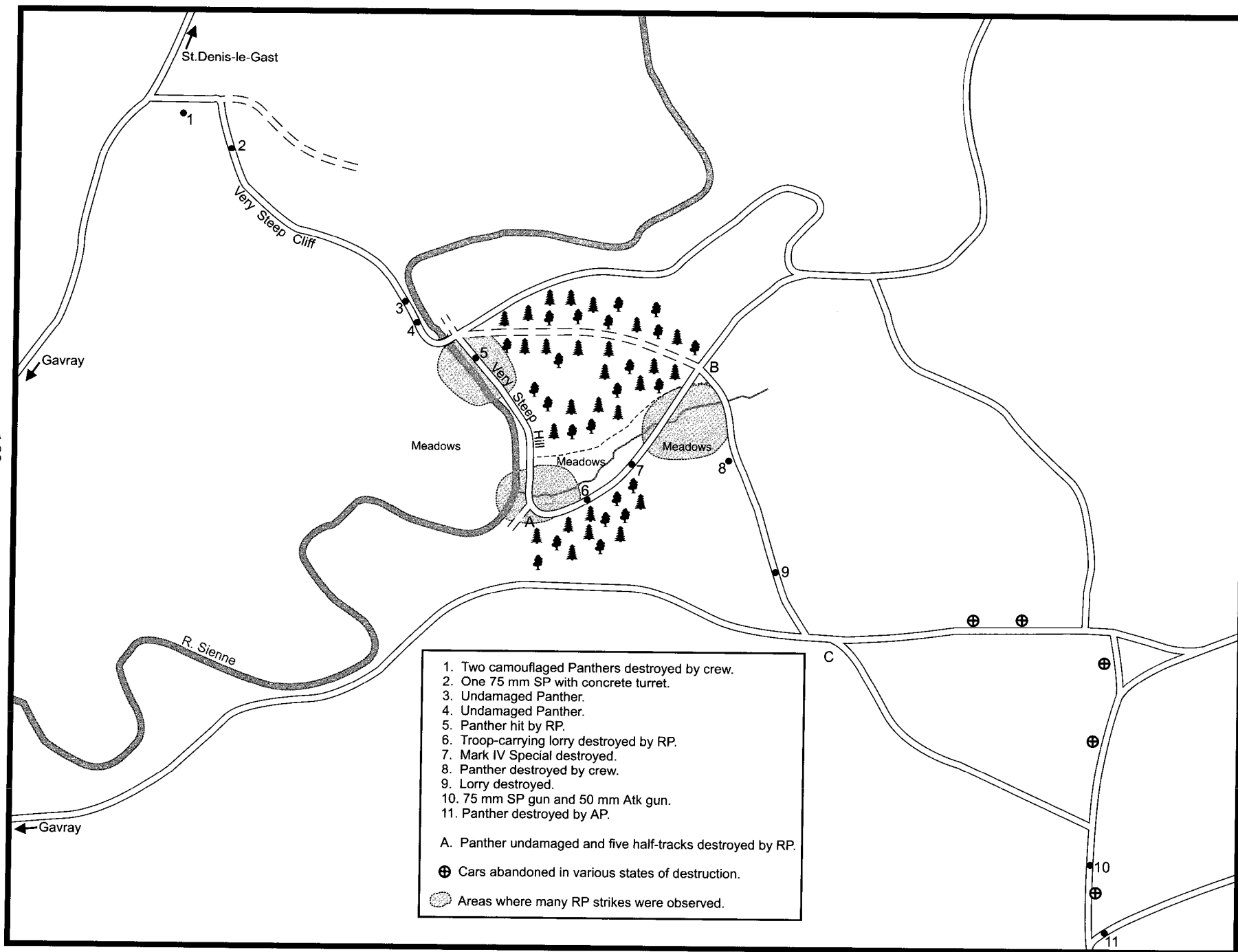
On the east side of the bridge a wrecked German saloon car was found at the foot of a 10 foot bank.

Point 5 - A Panther was found to have been hit in the engine by a rocket projectile. It had brewed up.

Between the bridge and point 5 were a lorry towing a Howitzer and a saloon car; all three were completely wrecked and burnt out. RP strikes on the ground were numerous in this area.

One hundred yards south of Point 5 was another lorry towing a Howitzer; the lorry was a charred wreck but the Howitzer seemed to be undamaged.

A - Just north of corner A, by the edge of the wood, was a burnt out lorry which had been towing a 50 mm A tk gun. A Pupschen rocket gun was also found at this point; both guns were undamaged. At corner A, where many RP strikes were observed, was a Panther which had not been hit by anything and appeared to have been abandoned intact. Also at this corner were 5 armoured troop carriers (half-tracks) which were all completely destroyed. RP was definitely responsible in one case and probably in all, but the damage was too great to allow accurate estimation.



Point 6 - A troop-carrying lorry was found burnt out; RP strikes were numerous in this area and the lorry was probably destroyed by this means.

Point 7 - A Mark IV Special was found completely wrecked and pushed off the road; the great number of strikes in the immediate vicinity would suggest that it had been hit by RP.

A little further up the road were a saloon car and a lorry, both completely destroyed and burnt.

Point 8 - A Panther was found wedged between a barn and a high bank; it also had stones in the tracks. A broken towing hook and tracks on the ground showed that another tank had tried to tow it and failed. This Panther had received no damage of any sort but was set on fire by the crew in the presence of the farmer.

In an orchard opposite Point 8 was a Volkswagen which had been hit in the engine by cannon or machine gun fire from the air.

A few yards up the road from Point 8 an armoured car (captured from the Americans and painted with German markings) had brewed up as a result of a hit in the engine. Although this looked like RP damage there were no strikes or debris anywhere near the point where the fire took place.

Point 9 - A lorry was found burnt out; again there were no signs of rocket strikes.

In fields just off the road, at points marked x on the map, there were cars abandoned in various states of destruction. None of these had been hit by RP.

Point 10 - A 75 mm SP gun was found burnt out but with no visible sign of the cause of the fire. A few yards away was a 50 mm A/tk gun, the breech of which had been deliberately destroyed.

Point 11 - A Panther had an AP hit in the engine and another on the left driving sprocket; the left track was off. The gun had its barrel completely destroyed in the manner that suggested deliberate destruction on the part of the crew. This Panther had brewed up but the tyres were intact. It was a long way from the nearest area where rocket strikes were observed.

Throughout the area no German graves were found and only one German corpse, said by local inhabitants to have been that of a sniper shot subsequent to the passing of the column. It is possible that American forces had taken the dead to a distance to bury them but no proof or disproof of this could be found.

Many French civilians were examined in the area and their evidence confirmed the statements made in this report.

IV. Summary of Damage

The details of damage are summarised in the following table:

[See next page]

		Destroyed by					Abandoned	Totals	
		RP	Possibly RP	Unknown Shells	Unknown causes	Crew			
Armour	Panther	1	-	1	-	3	3	8	17
	PzKw MkIV Special	1	-	-	-	-	-	1	
	Armoured Cars	-	1	-	-	-	-	1	
	Armoured Troop Carriers	5	-	-	-	-	-	5	
	75 mm SP	-	-	-	1	-	1	2	
Guns	50 mm A tk guns	-	-	-	-	1	1	2	5
	Howitzers	-	1	-	-	-	1	2	
	Puschens	-	-	-	-	-	1	1	
Other	Lorries	-	-	-	8	-	-	8	18
	Cars	-	-	-	10	-	-	10	
Totals		7	2	1	19	4	7	40	
		33							

Note to Summary

The high proportion of abandoned Panther tanks to the total number of such tanks should be noted.

The MT was so mangled that identification of the causes of destruction was impossible; in consequence, the "unknown causes" total has been unduly loaded. It would probably give a truer picture of events if the MT losses were spread over all the table in the same proportion as the other losses.

V. Conclusions

There can be no doubt of the success of the attack, the detailed results as stated above being compatible with a high degree of demoralisation resulting in an abandonment of vehicles. It should also be noted, as further confirmation of demoralisation, that in spite of material destruction no German graves were found in the vicinity.

Air Attacks on Enemy Tanks and Motor Transport in the Mortain Area, August 1944

Tactical Situation

1. At the beginning of August 1944, the Allied armies had begun their break-out from the Normandy beach-head; the British and Canadians were pushing southward from CAUMONT and CAEN and the Americans, having driven down the west coast of Normandy, were rapidly moving eastward and northwards thereby threatening to surround the German armies in Normandy.

2. The following diary of events in the MORTAIN area illustrates the circumstances in which the air attacks took place:

- 6 Aug. During the day the enemy counter-attacked strongly against 30 Inf. Div in the MORTAIN area and they re-occupied the town.
- 7 Aug. In the early morning the enemy launched a strong armoured attack in the MORTAIN area. Although small numbers of tanks penetrated U.S. positions at a few points, the situation was soon under control. During the day large enemy concentrations of tanks and MT were attacked from the air with excellent results.
- 8 Aug. Little change reported. Enemy still exerted pressure in the MORTAIN area.
- 9 Aug. The enemy continued his efforts to break through to Avranches with the greater part of his armoured formations. Although the enemy held MORTAIN, 4, 9 and 30 Inf. Divs. with 2 and 3 Armd. Divs. resisted strongly on the high ground to the north, west and south of the town. 35 Inf. Div. made some progress with an attack SW of MORTAIN.
- 10 Aug. SE of MORTAIN 2 Armd. Div. made progress, reaching a point 6 miles east of the town. Heavy concentrations of enemy armour (5 divisions) remained in the MORTAIN-DOMFRONT area but no large scale counter-attacks developed. 4, 9 and 30 Inf. Divs. continued to meet heavy opposition.
- 11 Aug. The enemy withdrew from the MORTAIN salient and the town was re-occupied by troops of VII Corps. North and south of the town all divisions advanced against little or no opposition.

Air Effort

3. Bad weather prevented flying in the morning of 7 August but arrangements were made for the Second Tactical Air Force to come to the assistance of the IX US Air Force as soon as conditions permitted. The weather cleared quite suddenly about mid-day, between which time and dusk 294 sorties were flown by typhoons of 2 TAF in support of the American ground forces in the MORTAIN area. Although, owing to their many other commitments in France, the IX USAAF only flew some 200 sorties to MORTAIN that afternoon, they continued their attacks over the next three days and flew 441 sorties in all.

4. Conditions on the afternoon of 7 August were ideal from the pilot's point of view as no opposition was encountered from enemy aircraft nor, till late in the day, was there any appreciable flak reaction. Under cover of mist and low cloud the Germans seemed to have neglected all normal precautions and, when the weather cleared, they were sighted in large numbers head to tail in narrow roads and lanes. The pilots reported that they were able to go in very close to attack, rockets being fired at 1000 yards range and cannon and machine guns from even closer. Claims made by the pilots during the MORTAIN Battle (7th - 10th August) are shown in Table I below:

Table I - Pilots' Claims				
	Destroyed	Probably Destroyed	Damaged	Total
Armour				
2 TAF	84	35	21	140
IX USAAF	69	8	35	112
Totals	153	43	56	252
MT				
2 TAF	54	19	39	112
IX USAAF	94	1	21	116
Totals	148	20	60	228
Grand Total (Armour & MT)	301	63	116	480

Ground Investigation

5. Between 12 August and 20 August members of the Operational Research Sections from 21 Army Group and Second Tactical Air Force conducted separate ground investigations of the battle area around MORTAIN (see map at Appendix A). The results of the two investigations were compared and collated to produce the figures shown in Table II. (See opposite page)

6. It was not possible to discriminate between the victims of IX USAAF and of 2 TAF because, although the 500 lb bomb was the favourite weapon of the former and the rocket that of the latter, American pilots fired some 600 rockets in the course of these attacks and British pilots dropped some bombs. The respective merits of the 50 calibre MG and the 20 mm cannon were not considered and all vehicles that had been destroyed by small projectiles fired from the air have been classed as "Cannon or MG."

7. Tanks and other vehicles classed as "abandoned" have not been included in the Air Total in Table II because, although they were probably abandoned as a result of air attack, they can hardly be considered to have been among those which the pilots claimed to have destroyed as such claims are generally supported by mentions of fire or explosion.

8. Similarly those enemy vehicles listed as "destroyed by crew" may be regarded as indirect victims of air attack but cannot justifiably be taken into consideration when comparing pilots' claims with what was found on the battlefield.

9. It is most unlikely that all of the unknown causes were due to air attack, particularly as many of them were found at considerable distances from the nearest signs of such attack and as ground forces were also fighting fierce battles in this area. However, if all the "Unknown causes" are added to the air

totals, the resultant figures (armour, 21 + 15 = 36 and MT, 12 + 26 = 38) are still only about a quarter of the numbers claimed as destroyed by the air forces.

Table II - Results of Ground Investigation

Type of Vehicle		Destroyed by			Air Total	Abandoned Intact	Destroyed by crew	Destroyed by US Army	Unknown Causes	Total Found
		RP	Cannon or MG	Bomb						
Armour	Panther	5	-	1	6	6	4	14	3	33
	Mark IV	2	-	1	3	1	-	5	1	10
	SP Gun	-	-	-	-	-	-	1	2	3
	Armd Troop Carrier	7	4	-	11	1	-	3	8	23
	Armd Car	1	-	-	1	1	-	5	1	8
	Armd Recovery Vehicle	-	-	-	-	-	-	1	-	1
	Total	15	4	2	21	9	4	29	15	78
MT	Car	2	2	-	4	-	-	4	3	11
	Lorry	-	6	-	6	1	1	2	20	30
	Ambulance	-	2	-	2	2	-	-	1	5
	Motorcycle	-	-	-	-	1	-	1	2	4
	Total	2	10	-	12	4	1	7	26	50
Grand Total (Armour & MT)		17	14	2	33	13	5	36	41	128

10. The area was not very extensive and as two teams were searching it over a period of several days it is not considered that any appreciable number of vehicles was missed. This is confirmed by the fact that one of the investigators flew low over the area in an Auster, plotting the positions of vehicles seen from the air; no fresh vehicles were discovered by this means.

11. The efficiency of the German recovery system has been put forward as an explanation of the large discrepancy between the number of vehicles claimed to be destroyed and the actual numbers found. Tanks and lorries that are destroyed as a result of air attack are almost always burnt out and would not be worth salvaging unless time and labour were both plentiful. Many prisoners have been questioned on the subject of the recovery of tanks and it has been established that burnt-out tanks are never salvaged. In addition it has been ascertained that, contrary to certain statements made about the MORTAIN battle,

very little recovery was done in this part of Normandy at the time, in fact the repair and recovery teams were already pulling out of Normandy when the Battle of Mortain was at its height. In any case before considering the recovery of the “destroyed” tanks and MT, the “probably destroyed” (43 tanks and 20 MT) and the “damaged” (56 tanks and 60 MT) must have presented the recovery organisation with a large task without counting any that may have been damaged by the ground forces.

12. At Appendix B is a list of the vehicles found by members of No.2 Operational Research Section together with the causes of destruction where it was possible to assess them. No similar record is available for the vehicles which were examined only by members of ORS/2 TAF.

Conclusions

- (a) The attacks by the Allied Air Forces had a considerable effect on the enemy’s unsuccessful counter-attack at MORTAIN.
- (b) The number of vehicles claimed by the pilots as “destroyed” was about four times the actual number discovered.
- (c) A number of vehicles, though not claimed by the pilots, were lost to the enemy by “indirect” air action (i.e. abandoned or destroyed by the crew).

Appendix B

1. Road Juvigny Le Tertre to St. Barthelmy

At pt 565145

2 Panthers

- (a) AP shot above track on LHS of hull penetrated and killed some of crew. Gun, tracks, engine and petrol all O.K. No fire. Abandoned after AP hit but probably driven off road first.
- (b) 105 mm HE ? strike 2 ft up from hull on LH rear corner of turret. Fragments damaged cupola and periscopes; also top hull plate torn (L shape 10" x 6") just below strike: engine air louvres damaged.

Also 75 AP hit through bogies on LH side. Engine O.K. petrol O.K., gun O.K. Deep scoop by 75 AP on rear. Abandoned by crew unharmed: no bodies, no gore. There were 4 RP strikes in field on other side of road and one on this side hit tree at roadside.

Next field, same side of road

2 Panthers

- (a) No visible sign of damage. Petrol, engine, tracks and gun all O.K. Even sights left on gun. Abandoned undamaged.
- (b) Hit by 75 AP on LHS just below turret in ammunition storage. Brewed up. Also hit on RH track and sprocket. None of these hits could have been from air.

Field north side of road, same place

3 Panthers, 1 Armd Car, 1 Armd Tp Carrier

- (a) Panther received slanting blow into track and bogies on RHS. Definite RP hit as proved by debris but poor explosion as shown by small damage. Everything else in the tank quite O.K.
- (b) Panther received 4 hits from 75 mm AP (3 scooped and 1 penetrated) on underside of front, almost belly. This can only be exposed when climbing bank. Terrific brew up-yet tyres on LHS untouched.
- (c) Panther had 4 75 mm AP scoops on front glacis plate. Gun, engine, petrol and tracks all O.K. Deserted intact.

- (d) Armd Car. RP crater and debris below RH front wheel; explosive force upwards and inwards. Brewed up.
- (e) Armd Tp Carrier had 105 mm AP hit on LHS and was completely brewed up.

On N side of road, few yards further east.

Panther - RP strike under rear had blown petrol tank and caused brew up.

At point 568147 in lane

Panther with two huge holes in turret from above. Also hit on leading edge of front glacis plate (probably RP). 2 75 AP scoops one on glacis and other on mantlet. Major damage (holes in turret) might have been RP but several bomb craters (500 lb .025 sec delay) within 15 yds suggest possible direct hit by bomb. Complete write-off.

Few yards east along road

Armd Tp Carrier complete wreck as amn exploded and blew side off. Brew up from unknown causes.

Other side of road, same ref.

Panther - RP strikes all along road but bazooka hit on LHS into amn stowage space caused brew up. Angle of attack suggests infantryman fired from high bank on roadside at almost point blank range - could have been after desertion.

30 yds further east

2 Armd Tp Carriers, 1 Peoples Car (Amphibious)

- (a) Armd Tp Carrier with RP craters all round it. Complete wreck; looks like RP hit on RH rear corner.
- (b) Armd Tp Carrier with downward strike through side armour and then floor. Almost definite RP.
- (c) Peoples Car brewed up from unknown causes.

At point 570148

2 Armd Tp Carriers

- (a) Direct hit RP. LH near burned out.
- (b) RP hit from RH corner. Brew up.

South side of road

Panther with AP strike on turret. Brewed up.

Orchard W of cross roads

Ambulance and Armd Tp Carrier

- (a) Ambulance peppered with fragments and abandoned.
- (b) Armd Tp Carrier unknown causes brew up.

At cross roads 575144

Panther - holes in floor over track which suggested downward attack but no possible entry for hit, therefore caused by explosion of gun. Unknown causes for brew up (possibly by crew).

2. Road from Cherence le Roussel via St. Barthelamy to Mortain

At point 556157

Armd Tp Carrier and Lorry

- (a) Armd Tp Carrier: 3 RP strike very near; complete blow up and brew up; possible RP.
- (b) Lorry completely wrecked by causes unknown.

Slightly east of 556157

Peoples' Car (Amphibious) completely destroyed by unknown causes. No RP strikes near.

In Bellefontaine

Opened Command Car with Rangefinder. 2 RP craters 2 yds from rear and many more in garden nearby. Brewed up probably RP.

East of Bellefontaine

Armd Tp Carrier and Lorry

- (a) Armd Tp Carrier completely destroyed by unknown causes but RP strikes in neighbouring field.
- (b) As above

Slightly further south

2 Panthers

- (a) 5 AP hit in rear of hull caused brew up. Tracks O.K.
- (b) Hit on RH sprocket. Abandoned and set on fire by crew.

Armd Tp Carrier: direct hit by unknown shell centre of LHS. Brew up.

At point 580138

Panther - no visible cause of damage through bazooka and bits all around. Burnt out in entrance to lane; possibly set on fire by crew.

At same spot

Behind Panther in lane was a lorry quite burnt out and partly exploded. Destroyed by crew.

3. Road Mortain to Barenton

Note: No signs of RP strikes along this road. Some HE, but in general this main road was avoided by the Germans.

Panther wrecked from unknown causes at 619076.

At 628071

An 88 mm gun riddled with HE fragments and end of barrel blown off.

Between there and Barenton

4 lorries destroyed by unknown causes; probably HE or cannon fire from air.

At point 620073

Panther on its side. Unknown shell hit (HE?)

4. Road Barenton to Ger. No RP strikes seen along this road.

88 mm A/T gun at 678066 abandoned.

4 lorries burnt out between Barenton and Le Gue Rochoux.

At point 693095

2 75 mm SP

- (a) AP shot on LHS of gun shield. Brew up.
- (b) Unknown hit on RHS. Brew up. Blew up and hurled gun away from chassis. Probably self-destroyed as a result of bogging.

Other side of road

50 mm A/T gun with trail damaged but otherwise intact.

Armd Tp Carrier (to tow 50 mm A/T). Hole through bottom on RHS. LH wall blown off. Probably HE.

At point 695100

German saloon car riddled with HE fragments.

Half mile further on

Armd Tp Carrier amn exploded and blew back off. Front and engine O.K.

At 700105

Petrol-carrying lorry burnt out and chassis warped by heat.

Another lorry wrecked just near.

This area bombed by 500 lb, one of which made crater across road near second lorry.

5. Ger-Montain Road. No RP strikes seen near this road.

At 695137

German lorry burnt out. Causes unknown

1 km further on

Another burnt out lorry - possibly HE.

Cross-roads at Bire Feugeray

Burnt-out lorry

1° km further west.

Ambulance and Lorry - Both destroyed by unknown causes.

At 653124

Panther in lane. RH track very loose. Crew were about to repair when surprised. Petrol O.K. Gun O.K. Abandoned.

Few yds further west

75 SP (Mk III chassis) complete blow up with gun separate from body.

Peoples car abandoned.

Lorry burnt out.

At pt. 620119

2 lorries burnt out & 1 car wrecked - unknown causes

At 597118

Armd Tp Carrier abandoned with front wheels removed (since).
One dead German on stretcher in back.

At 586123

Mk III with 75 mm hit by AP above track on RHS of hull. Brew up.

On other side of rly.

Another Mk III & Armd TP Carrier (both completely wrecked and burnt out).

6. Road Mortain to Sourdeval

At 587140

German lorry burnt out with 500 lb bomb craters very near.

7/8 mile further north

Lorry and trailer burnt out.

At La Tournerie

Panther without turret, fitted up as recovery vehicle. Hole on front glacis plate exactly like that caused by magnetic bomb. Charred body inside. Burnt out lorry at same spot.

Between La Tournerie and Sourdeval

4 burnt out lorries, 2 M/C and Staff Cars burnt out; Peoples' Car abandoned (all possibly HE).

7. Road La Tournerie to St. Clement

Pt. 596145

Mk III. RH track gone. Hit on rear at RHS by unknown shell. Inside O.K.

Pt. 610140

Panther. One bogey damaged. Both tracks off, being towed. Petrol O.K.; abandoned.
RP strikes in field each side of road and one on a tree at roadside near Panther.

Pt. 620142

Panther ° barrel gone. Minus tracks; was being recovered. Possibly self-destroyed.
Tracked recce car, full of spare parts, used for recovery purposes. Burnt out on road and towed into field. Causes unknown.
Panther brewed up. Gun mantlet thrown forward suggesting demolition.

8. Road Le Gue Rochoux - La Conerie - Barenton

4 burnt out lorries. Causes unknown.

Enemy Casualties in Vehicles and Equipment During the Retreat From Normandy to the Seine

Introduction

The primary object of this investigation is to ascertain the extent of the enemy's losses due directly or indirectly to air attack and to assess the effectiveness of different air weapons.

AREAS COVERED

The area involved can be divided into three portions, which we have named the Pocket, the Shambles and the Chase.

I. The Pocket

This is the area bounded by a line passing through the following places:- FALAISE, CONDE-SUR-NOIREAU, VASSY, TINCHEBRAY, GER, BARENTON, DOMFRONT, LA FERTE-MACE, ARGENTAN. In this area the retreat appears to have been reasonably orderly, casualties were not particularly heavy but increased steadily towards the eastern end.

The area immediately east of MORTAIN is not included as it was a battle rather than a retreat area. It has been dealt with in a separate report.

II. The Shambles

This area is at the mouth of the Pocket and is bounded approximately by a line passing through PIERREFITTE (on the FALAISE-ARGENTAN Road)-ARGENTAN-CHAMBOIS-VIMOUTIERS-TRUN-PIERREFITTE. Here the retreat appears to have become very disorderly, the density of the casualties is high and the area is well described by the name given.

III. The Chase

The area leading to the SEINE crossings, showing signs of a reasonably orderly retreat and with casualties lightly spread over a large area.

Part I. The Pocket

1. Collection of data

The method of investigation in the Pocket has been to patrol the most likely roads and to record the following data:-

- (a) Type of vehicle or equipment
- (b) Cause of casualty
- (c) Date of casualty
- (d) Direction in which proceeding
- (e) Whether burnt or unburnt
- (f) Ease of visibility from the air
- (g) Degree of dismantling of the vehicle

Local inhabitants were interrogated whenever possible.

In addition to the main roads a number of side roads were also examined in particular where it appeared likely that vehicles might be found.

Statements by inhabitants as to where vehicles were or were not to be found proved to be mainly correct when checked and have therefore been used to avoid searching every road in the area. Even so, we have no doubt that vehicles have been missed and that our totals are at the best only approximate. However, from the wooded nature of the country and the conditions in which the vehicles in side roads were found, we are confident that few of these had suffered directly from air attack.

There was difficulty in estimating the time at which a casualty had occurred. Local inhabitants informed us of many which dated from about D-Day. In many cases it was obvious from the appearance of the wreckage, and from the state of development of plants growing in burnt verges that the casualty was an old one. Further evidence of date was provided by the direction in which the vehicle was pointing and the degree of dismantling. It is assumed that during the retreat only a small number of vehicles could have been pointing west and that although wheels or tyres and possibly items of ignition systems might have been quickly removed as spares, it would hardly have been feasible to remove such items as engines and back axles. There was no evidence that any major dismantling was being carried out by the French or our own troops; plenty of opportunities were still outstanding and were not being used to any appreciable extent while we were in the area.

2. Results

(a) At Appendix A is a table giving details of the total numbers of vehicles and equipments that were found and examined. By comparing the numbers on side roads with those on main roads in a few areas, it is estimated that all side roads had been examined, the total would have been increased by not more than 50% in the case of guns and AFVs and 30% for other vehicles.

The table is of general interest only; it contains all vehicles and equipments found, regardless of the date on which they became casualties. However it may serve as a comparison with other counts that have been or will be made.

(b) The table at Appendix B includes only those casualties which occurred or might have occurred since the encirclement of the enemy. It is impossible to assess exactly what proportion of abandoned vehicles and equipments can be attributed to air action. Abandonment must often have come as a result of the extreme congestion and disorganisation which prevailed during the retreat; traffic was often totally blocked and petrol became scarce. Inasmuch as the congestion and disorganisation can be attributed very largely to the air, abandonment must in the majority of cases be attributed to air action. All abandoned vehicles and guns are therefore included in Appendix B.

A number of casualties attributed to air attack must first have been abandoned. Unless a vehicle had been set on fire or was in a traffic stream, there can have been no means of telling from the air whether it was already a casualty. Several cases have been quoted by local inhabitants of vehicles that had been shot up from the air repeatedly. One particular example was just outside of PUTANGES where an armoured troop carrier abandoned in a somewhat conspicuous place with no petrol was said to have been machine-gunned twelve times. Its appearance and that of the roads and buildings nearby supported these statements.

(c) At Appendix C is a trace showing the roads that were patrolled and illustrating the results given in Appendix B. It shows how the density of casualties increased progressively from the western to the eastern end of the Pocket, as would be expected. The assembly of guns around the point A (MR 846175) had all been abandoned at about that point, though they were actually found in a REME workshop. The concentrations around the points B and C, (MRs, 9224 and 0626) were in for repair or had been stripped to provide spares for other vehicles.

Appendix A Total Damage to Enemy Vehicles and Equipment in "the Pocket" (from D-Day onwards)

Type	RP	Bombs	Cannon and MG	AP	HE	Mines	Destroyed by Crew	Abandoned	Accident	Unknown Causes	Total	%
Tanks	4	2	0	8	2	0	32	33	0	9	90	7.1
SP Guns	5	0	0	2	2	0	12	4	2	4	31	2.4
Armd Vehs	2	2	21	1	5	1	8	12	0	4	56	4.4
Lorries	5	36	283	0	40	8	11	192	9	75	659	52
Cars	0	9	86	0	14	3	9	165	24	42	352	27.7
Motor cycles	0	0	2	0	3	1	0	10	3	3	22	1.7
Guns	0	0	1	0	5	0	9	41	0	4	60	4.7
Totals	16	49	393	11	71	13	81	457	38	141	1270/ 100%	
%	1.2	3.8	31	1	5.6	1	6.4	36	3	11		

Note: Figures for guns and AFVs may be increased by not more than 50% when missed sideroads and lanes are taken into account; Figures for other vehicles may be increased by about 30% for the same reason.

(d) Wherever possible the wheels of vehicles had been removed. Inhabitants invariably informed us that the Germans had taken them, and it has been subsequently confirmed through I channels that this was their normal practice.

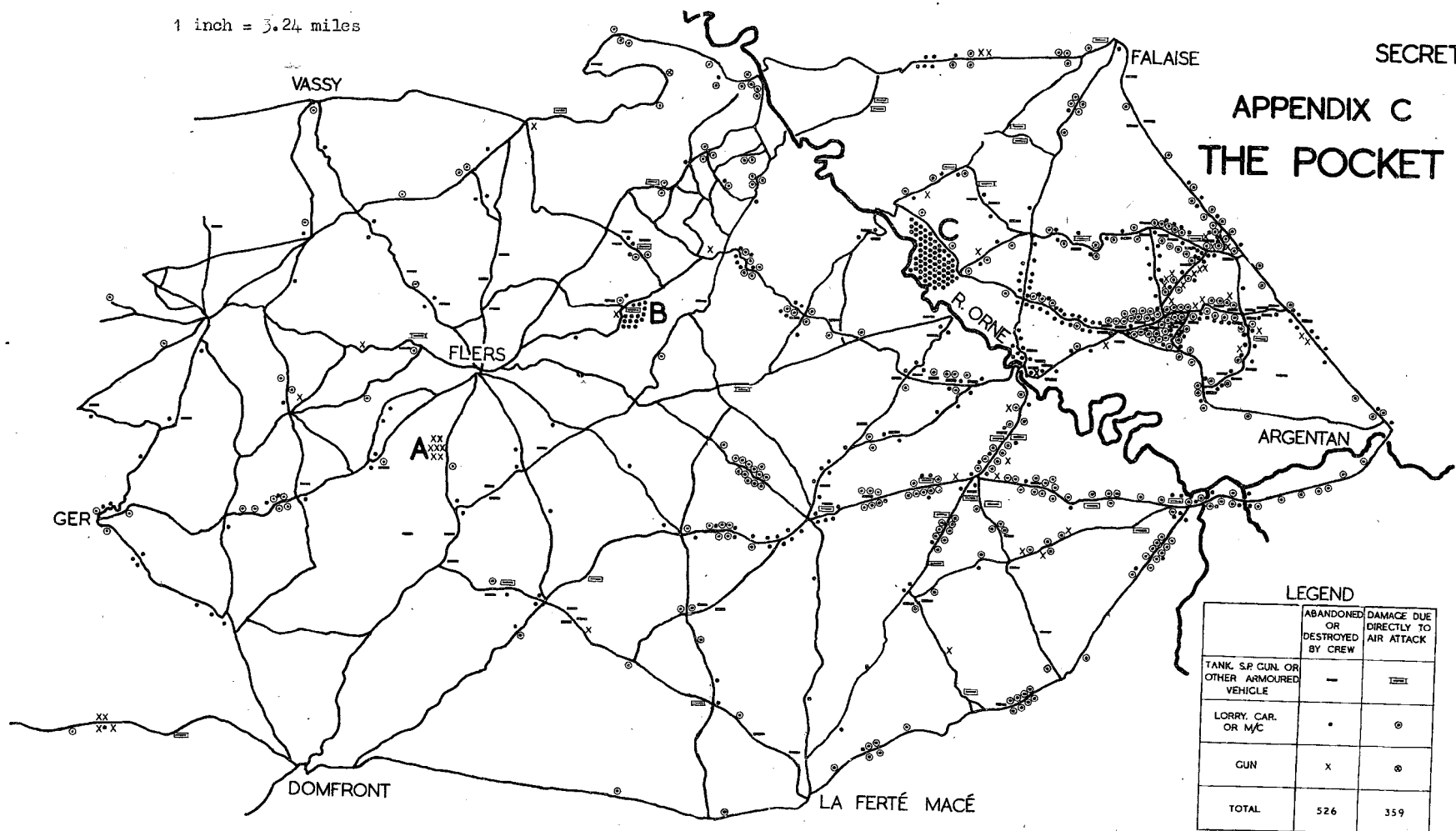
(e) The great majority of soft vehicles that had been hit by cannon and machine gun attack were burnt. In a sample of 153 lorries and cars near the mouth of the Pocket 77 had been hit and burnt, 7 hit and not burnt, 4 burnt but not hit, 65 neither burnt nor hit. It was found to be almost a rule that where the pock marks of strikes appeared in the roads there a burnt vehicle was to be found.

Appendix B Analysis of Damage by Air Attack to Enemy Equipment During "the Pocket" Period Due directly or indirectly to Air (AP, HE, Mines, Accidents and Unknown Causes excluded). (When it is not certain whether damage was occurred in this phase of the battle or earlier, it is included in the table.)						
Type	RP	Bombs	Cannon and MG	Air Total	Abandoned or Destroyed by Crew	Grand Total
Tanks, SP Guns, Armoured Vehicles	11	4	18	33	100	133
Lorries, Cars, Motorcycles	4	43	278	325	376	701
Guns	0	0	1	1	50	51
Totals	15	47	297	359	526	885
Percentages	1.7	5.3	33.5	-	59.5	-
Note: Figures for guns and AFVs may be increased by not more than 50% when missed sideroads and lanes are taken into account. Figures for other vehicles may be increased by about 30% for the same reason. A further addition of 10% might be made to all figures to allow for those casualties which have been attributed to unknown causes but which were in fact due to air action.						

SCALE:

Approx 1 : 200,000

1 inch = 3.24 miles



SECRET

APPENDIX C THE POCKET

LEGEND

	ABANDONED OR DESTROYED BY CREW	DAMAGE DUE DIRECTLY TO AIR ATTACK
TANK, S.P. GUN, OR OTHER ARMoured VEHICLE	—	▬
LORRY, CAR, OR M/C	•	⊙
GUN	X	⊗
TOTAL	526	359

Part II. The Shambles

1. Area Covered

The area covered is bounded approximately by a line passing through PIERREFITTE (on the FALAISE - ARGENTAN ROAD) - ARGENTAN - CHAMBOIS - VIMOUTIERS - TRUN - PIERREFITTE.

2. Collection of Data

The method of investigation used in this area was to patrol all the main roads and any side roads which, from the evidence of German signposts, had been used in the retreat.

A preliminary examination showed that there were so many vehicles that a detailed examination of each was impossible; accordingly a simplified investigation involving a general count and a detailed study of samples only was made. Vehicles were classified as follows:

- (a) Heavily armoured vehicles - Tanks and SP guns
- (b) Lightly armoured vehicles - ATCs and Armoured Guns
- (c) Soft vehicles - lorries
- (d) Soft vehicles - cars
- (e) Guns

Classes (a) to (d) were further sub-divided into burnt and unburnt. In the case of cars and lorries classification into burnt and unburnt had proved a good indication of whether the vehicle had been hit or abandoned (see Part I para. 3 (e)), hence the reason for adopting this classification.

In view of the high density of vehicles in this area as compared with The Pocket no attempt was made to discriminate between old and recent casualties. The number of old ones is considered to be insignificant.

Random samples were taken from time to time and examined in detail; one in seven of all vehicles were so examined and one in three of tanks and SP guns.

Local inhabitants were questioned but provided little information. Few had been in the area during the relevant period, but such information as they did provide confirmed our inferences.

Horse-drawn transport was excluded from this survey for several reasons. Firstly it is so easy to destroy that it is difficult to tell afterwards what weapon was responsible; secondly the stench of dead horses was so overpowering that where there was any number of horse-drawn vehicles that area had to be passed with all speed. It is estimated that about a thousand carts and wagons, some belonging to the German Army and some farm carts impressed for the occasion, were seen in the area.

3. Results

(a) Although it is possible that a few tracked vehicles may have been missed in the wooded area to the north-east of ARGENTAN, the total count of 3043 vehicles, tanks and guns is probably a very good estimate of the losses which the enemy suffered in this area. This total was made up as follows:-

	Tanks and SP Guns	Lightly Armoured Vehicles	Lorries	Cars	Guns
Burnt	112	64	1011	224	-
Unburnt	75	93	767	445	-
Totals	187	157	1778	669	252

(b) At Appendix F is a map showing the roads which were patrolled and the approximate distribution of vehicles and equipment found on them or in their vicinity. Four categories are represented, lorries and cars being lumped together as they appeared to us to have been equally vulnerable.

The exact positions of the vehicles are not shown on the map as they were only recorded according to the stretch of road near which they were found. The map therefore only represents average densities of vehicles along stretches of road.

(c) In the area enclosed by the dotted line the great majority of casualties are presumed to have been due to land action or abandonment. It is in this area that the jaws finally closed, artillery fire was brought to bear on massed enemy transport and the Polish armour came down from the north. There are many shell craters and abundant examples of fragment strikes on vehicles, but whether before or after abandonment is not known. The majority of the vehicles are to be found drawn up along hedges, in narrow lanes, and in orchards. A German officer captured at ST. LAMBERT-SUR-DIVES gave a most lucid illustration of the chaotic state of affairs that existed on the main TRUN-CHAMBOIS road at the time. His statement is quoted at Appendix E.

(d) The table at Appendix D gives an analysis of 82 tanks and SP guns which were examined in detail. The 38 destroyed by the crew were all set on fire, while the 33 abandoned had suffered only minor, if any, damage. The numbers shot from the ground or the air are too small to make it possible to estimate from them the total number so destroyed, but it is reasonable to presume that much the greatest number of burnt vehicles were destroyed by the crew and the unburnt abandoned. Had any considerable proportion of the unexamined armour been destroyed by RP, our attention would undoubtedly have been drawn to them by the presence of the typical craters.

Appendix D Analysis of Tanks and SP Guns ("Shambles" Area)						
Type	AP (shot)	RP (air)	Destroyed by crew	Abandoned	Other or Unknown Causes	Total
Tiger	0	0	9 (incl 3 Tiger IIs)	3	0	12
Panther	3	0	8	11	0	22
Mark IV	2	2	12	6	0	22
Mark III	2	0	1	1	1	5
SP Guns	1	0	8	12	0	21
Totals	8	2	38	33	1	82
In addition, the following tanks and SP guns were observed but not examined in detail: 69 which were burnt and 36 unburnt. This adds a further:						105
Grand Total						187

Few fuel tanks were inspected for fear of booby-traps. In those that were, the quantity of fuel varied from nothing to practically full, but with a bias towards the former.

(e) 31 lightly armoured vehicles (mostly armoured troop carriers) were examined in detail with the following results:

	RP	Cannon or MG from Air	Arty Fire	Destroyed by Crew	Abandoned by Crew	Unknown Causes
Burnt	1	5	2	3	0	5
Unburnt	0	0	0	0	13	2

The ratio of unburnt to burnt in the sample is approximately 1:1 and in the remainder 1.6:1. It is clear that the sample was not truly representative and, in the case of the burnt vehicles, the numbers in each category are too small for generalisation. It is probably safe to assume that the majority of unburnt vehicles were abandoned and that a large proportion of those burnt were destroyed from the air.

(f) The 2447 lorries and cars, almost equally divided between burnt and unburnt, constituted the majority of the vehicles found in the area. The 330 which were examined in the samples included 158 burnt and 172 unburnt; analysis of the samples yields the following:

Cannon or MG from the air	99
Bombs (mostly fragmentation type)	9
Rocket Projectiles	2
Total "Air" casualties	110
Shellfire	15
Mines and accidents	11
Destroyed by crew	7
Unknown causes	52
Abandoned undamaged	135
Grand Total	330

Of the 110 "air" casualties, 91 were burnt and 19 unburnt and of the 135 abandoned vehicles 124 were unburnt as against 11 which were burnt. The samples did not include any vehicles from the area (see para. 3 (c) above) where land forces are known to have caused the casualties. The figures quoted above show that, outside this one area, it is probably safe to assume that the number of burnt soft vehicles is a good measure of the number of casualties directly due to air attack (c.f. Part I para.3 (e)).

The area enclosed by the dotted line contains some 350 cars and lorries destroyed by ground forces, to which one should probably add a further 150 for vehicles similarly destroyed along roads in the vicinity. The very congested area slightly south-west of this contained almost 200 cars and lorries which had been left in a great hurry; the Germans had attempted to set fire to most of these but were only partially successful. Few signs of air attack were observed here and the local farmers told us that the Germans had deliberately destroyed their transport and fled without having been attacked by aircraft.

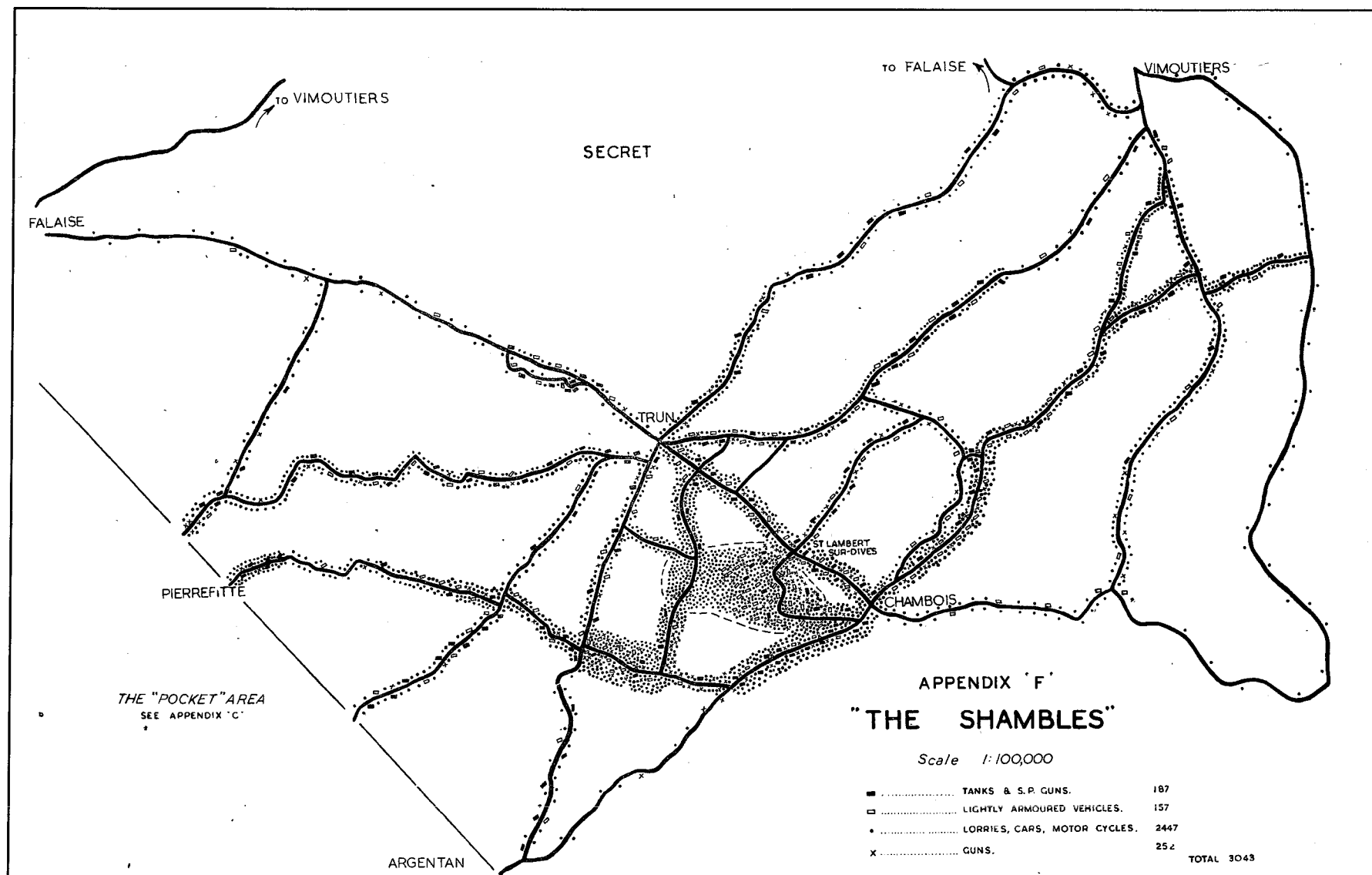
It appears that, in the Shambles area, about eight hundred vehicles may reasonably be considered as directly destroyed by air attack and a somewhat larger number as abandoned along roads which were attacked by aircraft.

(g) The 252 guns were all classed as abandoned because, although a few showed strikes by fragments from bombs or shells, none were really destroyed by these means. They had almost all been put out of action by their crews.

Appendix E

The following information was obtained from interrogation of an Officer PW captured on 21st August, 1944 at ST. LAMBERT-SUR-DIVES:-

“At 2 o'clock we received a report that the gap had been forced. We were accordingly to move and drove off with three cars. We drove two or three kilometres and then came onto roads which were completely blocked. There were four or five columns of traffic which had run into each other, with dead and wounded in between. We put our vehicles into one column and got stuck in it. Then we went on foot from 3 o'clock in the morning until six. Eventually we arrived forward at the place where the gap was supposed to be, and met about two to three hundred men. They were composed of a paratroop “Battalion,” to which SS and Army and GAF and Navy personnel had attached themselves. Two tanks joined us - a Mark IV and a Panther; they were put in the vanguard with scouts ahead and one platoon behind them, and then the troops. Suddenly there was heavy firing into the sunken road. At first it sounded like fire from Anti-Tank guns and mortars and MGs, interspersed with rifle fire. The tank immediately reversed and ran over some of our men, whereupon all the infantry streamed back. I took up the position at the rear to hold up the retreat and I shot the first one who came along. An RSM stood beside me and brought them to a halt. Then the tank drove up and I ordered it to drive ahead again. Soon however the tank was hit and set on fire. We lay down flat and then came heavy firing along the sunken road from ahead. We had a great many dead and wounded. We lay for 10 minutes and then the fire eased off a bit. I heard the sound of tanks, so I made two men come forward with “Faustpatronen” which we still had with us. It slowly became light and then we saw Americans in the opposite hedge. We fired at them with MG and tommy-gun fire. Then the enemy started firing again. There was suddenly heavy fire out of the whole hedge with cannon and MGs. Then someone at the rear started to wave a white flag on a stick. We shot him at a distance of 100 m. After a second attempt with a white flag had also proved unsuccessful, we heard the noise of an enemy tank ahead again. In the meantime we had brought up our second tank, the “Panther.” This was given orders to take up a position behind the shot-up Mark IV tank and to shoot up the advancing tank with its guns. The “Panther” made a mistake in not taking up a position diagonally behind the Mark IV but driving past it. It was hit and burst into flames. Later, another white flag appeared, and again we fired at the troops surrendering. We were occupied with trying to get up to the enemy tank with the “Faustpatron” when American troops captured us.”



Part III. The Chase

1. Area Covered

The area is bounded approximately by a line passing through VIMOUTIERS - LIVAROT - LISIEUX - PONT L'EVEQUE - PONT AUDEMER - QUILLEBEUF - along the left bank of the R. SEINE to LES ANDELYS - EVREUX - GACE - VIMOUTIERS.

2. Collection of Data

(a) The roads examined were the principal ones leading from the Shambles area to the crossings of the Seine and especially those which were known from sortie reports to have carried a great deal of traffic or to have been attacked from the air.

(b) Casualties to vehicles and equipment were counted and recorded under the following headings:-

- (1) Heavily armoured vehicles - Tanks and SP guns
- (2) Lightly armoured vehicles - ATCs and Armd. cars
- (3) Soft skinned vehicles - lorries, cars, and M/Cs
- (4) Guns

No samples were examined in detail but, in order to investigate the destruction of armour from the air, two thirds of the heavily armoured vehicles were examined individually with great care.

Horse-drawn vehicles were not counted but were not very numerous except near the banks of the SEINE.

(c) Local inhabitants provided useful information especially concerning the causes of casualties to heavily armoured vehicles.

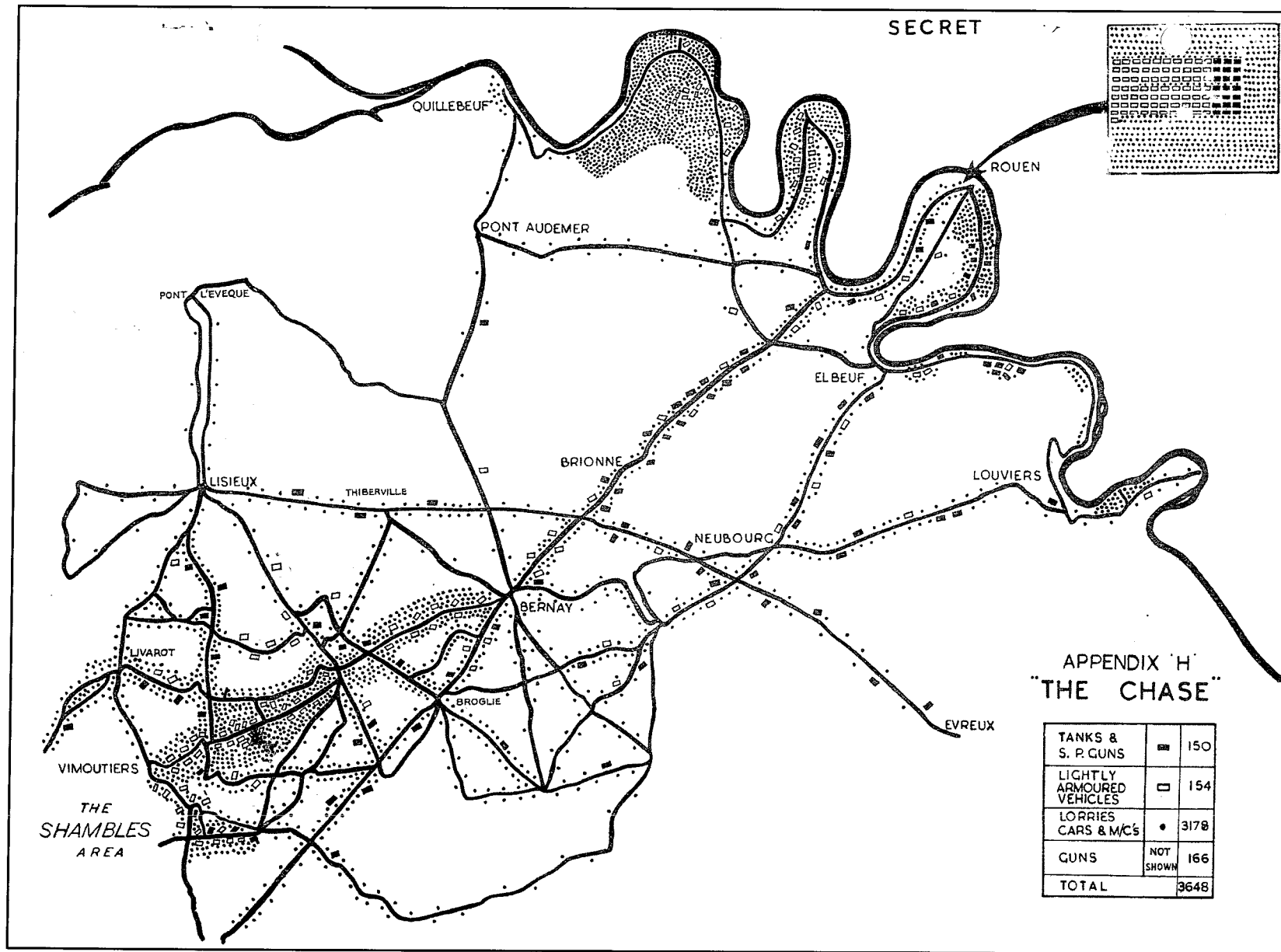
3. Results

(a) At Appendix H is a map showing the roads that were patrolled and the vehicles and equipment that were counted on them. The marks on the map do not represent the exact locations but rather that the vehicle or equipment was found on the adjacent stretch of road. They therefore provide a measure of the densities of casualties along the various stretches.

The total number of vehicles and equipment counted are set out in their categories in the following table:-

	Tanks and SP Guns	Lightly Armoured Vehicles	Lorries, Cars, M/Cs	Guns
Burnt	114	115	2275	-
Unburnt	36	39	903	-
Total	150	154	3178	166
Grand Total				3648

(b) As it was not possible to cover every road in such a large area, the total number of casualties is not known and cannot easily be inferred but some indications can be given. The main axis along which



SECRET

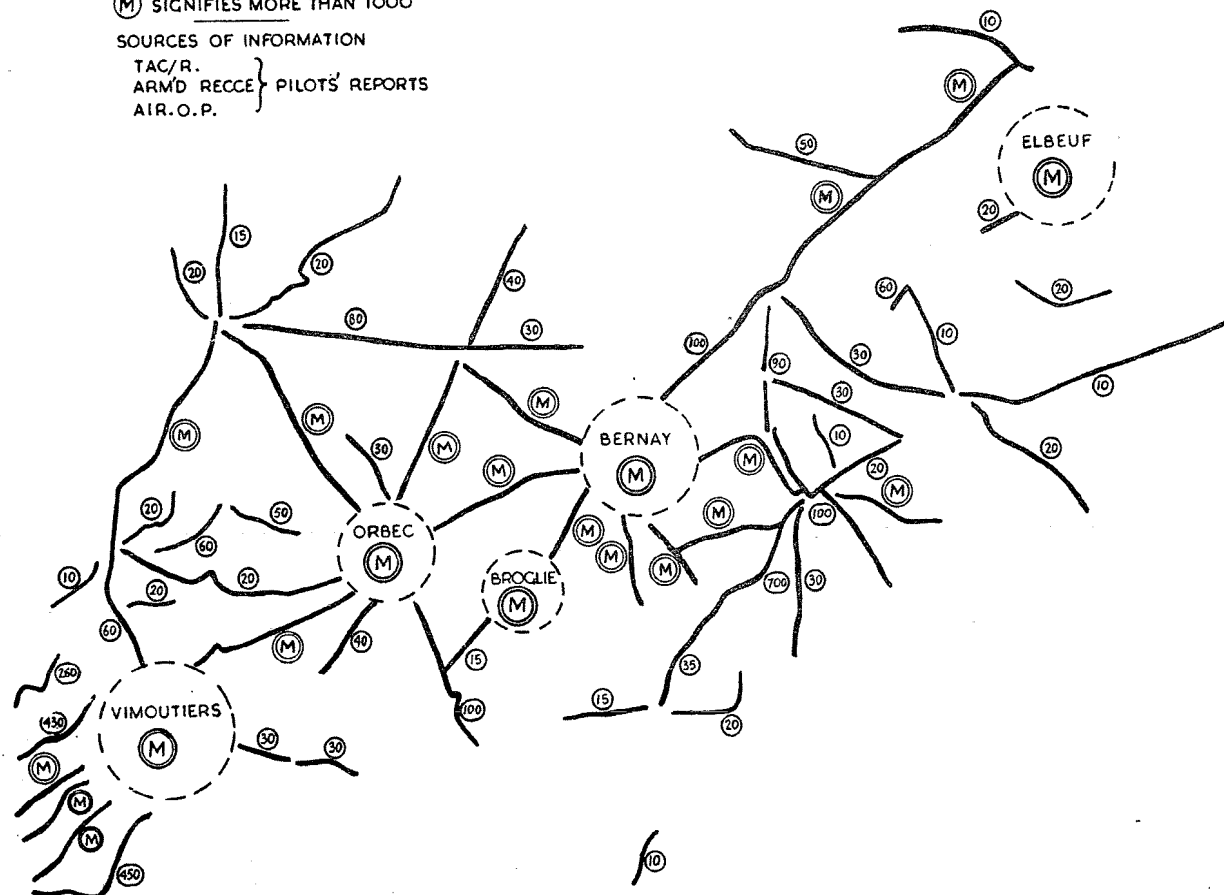
LEGEND

FIGURES INDICATE NUMBERS
OF VEHICLES **REPORTED** TO BE
MOVING ALONG ROADS.

(M) SIGNIFIES MORE THAN 1000

SOURCES OF INFORMATION

TAC/R.
ARM'D RECCE } PILOTS' REPORTS
AIR.O.P.



Note: In the original report, this map was a transparent overlay for Appendix H

the densities of casualties are high is clearly indicated on the map and the limits to north and south at which they become low are fairly well defined. In an area south-east of BERNAY all likely roads were covered and found to contain much smaller densities than the main roads running north-east through the town. As will appear later, there is reason to suppose that air attack was in a large measure responsible, directly or indirectly, for the casualties and the roads which we were told had been so attacked were all covered.

Taking these factors into account we have estimated that the total number of casualties was less than twice that recorded.

(c) On the left bank of the river to the west of the wrecked bridge in ROUEN was found a mass of burnt vehicles and equipment consisting of 20 AFVs, 48 guns, and 660 other vehicles. It appears that a traffic jam was formed owing to a misapprehension that there was a serviceable bridge. The RAF and IX USAAF attacked the jam and started fires which destroyed the lot.

(d) 98 out of 150 tanks and SP guns were examined in detail and the results of the examination are set out in Appendix G. The hardest cases to assess were those which were brewed-up and had burst open as a result of explosions of ammunition or demolition charges. In almost all such cases the cause was assessed as destruction by the crew and this was frequently confirmed both by the presence of empty German demolition charge containers and by local inhabitants who told us that the tank had broken down or run out of petrol and had been set on fire by the crew. On only one occasion did an inhabitant tell us otherwise, when he persisted that a Tiger tank had been "mitraille par les avions," and one of the crew killed; in this case there was a shot mark on an engine louvre but it did not appear to have penetrated and it was more likely that the tank had been surprised with a hatch open. Other possibilities are that abandoned tanks were set on fire by our own troops either as a policy or through joie de vivre; only one such case was confirmed and the point is a minor one as it could only lead to transference of tanks from the category of "destroyed by crew" to that of "abandoned." None of the tanks examined had been destroyed by RP, nor were many of the typical craters found near them. Such fuel tanks as were examined in unburnt vehicles contained little or no fuel.

(e) The condition that numbers of burnt and unburnt soft vehicles are approximately equal to the numbers shot and abandoned does not apply in this area in the way that it was shown to do in the areas covered by Parts I and II of this report. It may have held good in the greater part of the area where, as in the Pocket, the burnt lorries were commonly accompanied by the tell-tale pock marks of cannon and machine gun fire on the roads, but in the neighbourhood of the SEINE it was clear and was confirmed by inhabitants that the Germans were setting fire to their vehicles when there was little hope of getting them across the river.

The ratio of burnt to unburnt soft vehicles is not noticeably higher in this area than in those parts covered by Parts I and II.

(f) The trace overlying the map at Appendix H shows the total numbers of vehicles reported from air sources on various roads and in certain areas on all days during the relevant operations. Although the figures are undoubtedly very rough, the trace does show that the densities of casualties do not confirm to the traffic densities on the roads, and that heavier casualties might well have been caused had a greater concentration of air attack been devoted to the roads with most traffic. A striking example of this is provided by a comparison between the main road east of LISIEUX and the smaller THIBERVILLE - BERNAY road. A civilian inhabitant of THIBERVILLE who appeared to be particularly intelligent confirmed that the density of traffic on the smaller road was very much higher than that on the main road but that, whereas the main road was constantly attacked from air, the other never was, though he had constantly prayed that it would be.

(g) There were few indications of land action in the area and the enemy casualties were undoubtedly due mainly to air action, either directly or indirectly. The example of the two roads mentioned in the previous paragraph indicates that where there was no air action there were no casualties. The attention received by the SEINE crossings may be presumed to have caused the large amount of abandonment and destruction of vehicles by the Germans. The mass of burnt vehicles due directly to air action has already been referred to.

(h) Most of the 166 guns were found left by the roadside in the western part of the area; they had almost always been put out of action by their crews. They have been omitted from the map at Appendix H to avoid further congestion.

Appendix G Analysis of Tanks and SP Guns ("Chase" Area)					
Type	AP (shot)	Destroyed by Crew	Abandoned	Other or Unknown Causes	Total
Tiger	0	7	4	0	11
Panther	2	23	1	2	28
Mark IV	3	16	7	2	28
Other Tanks	0	0	2	1	3
SP Guns	3	9	12	4	28
Totals	8	55	26	9	98
In addition, the following tanks and SP guns were observed but not examined in detail: 39 which were burnt and 13 unburnt. This adds a further:					52
Grand Total					150

Part IV. The Seine Crossings

1. Area Covered

Having followed the path of the German retreat as far as the SEINE and tried to estimate his losses, it seemed that it would be of value to try to find out how much equipment had got across. Accordingly the left bank of the SEINE was covered from LES ANDELYS (3991) to QUILLEBEUF (7932).

2. Method of Investigation

Most of the information set out in this part of the report was obtained from local inhabitants including officials of the Gendarmerie, the FFI, and the Fire Brigade. The roads leading to the crossings were examined for abandoned and destroyed vehicles and those which were found have already been included in Part III of this report.

3. Results

(a) The points marked on the map at Appendix J are numbered to correspond with the following paragraphs which contain notes on the twenty-four crossings which were discovered.

- (i) PETIT ANDELYS (3991). The Germans had a ferry which only worked at night. During daylight vehicles were hidden in woods around TOSNY. All kinds of vehicles were ferried across to PETIT ANDELYS including tanks, but during the last few days only impressed civilian horse-drawn traffic was carried.
- (ii) BERNIERES - LA ROQUETTE (3592). There was a small ferry which carried horse-drawn vehicles and some pieces of artillery. This ferry was sunk as a result of air action and the service was discontinued.
- (iii) Between LA ROQUETTE and MUIDS (3491). The Germans tried to build a pontoon bridge but Allied aircraft gave it constant attention (there was a regular daily raid at 1900 hrs) and, although on one occasion a tank managed to cross, the enemy gave up the unequal struggle.
- (iv) VENABLES - MUIDS (3189). Two ferries, each capable of carrying six lorries, made about 4 trips per hour for six nights and three days. No tanks were ferried across. During the three days, though the weather was bad, much abuse was made of the Red Cross. Over 20 burnt and abandoned vehicles were found on the west bank of the SEINE at this crossing point.
- (v) ANDE (2791). The Germans had intended to build a bridge here and the two ends remain, but all that passed over was infantry in small boats.
- (vi) PORTE JOIE - HERQUEVILLE (29992). Much traffic passed this way. At first there was one ferry in daylight and two at night, but latterly they used as many as five ferries, all capable of carrying 60 tonnes. A smaller ferry (35 tonnes) operated from a farm a few hundred yards upstream. An old lady there said that the Germans had a pontoon bridge which they used at night and tied up under the trees on the east bank during the day, but other and more reliable sources of information explained that the ferries were moored under the trees in a line and might look like a floating bridge. About 40 tanks were seen to cross on the 60 tonne ferries and these included some broken-down tanks being towed by good ones. These crossings were in use for a fortnight and, though planes were frequently seen and heard attacking transport on roads, the ferries were never attacked. The troops were said to be very disorganised and all were asking the way to AMIENS. Only a few abandoned vehicles were found near this crossing.

- (vii) Between PORTE JOIE and POSES (2995). A single ferry was operating for the carriage of heavy transport. No further details were obtained.
- (viii) POSES (2999). A pontoon bridge was in use here for 5 nights and 3 days. A local inhabitant kept a record of the traffic as it passed his house; this was said to amount to 16,000 vehicles, mostly lorries but including also some light armour and two large tanks. Although this great total was well substantiated, we were loath to accept it as it means that traffic was passing at the rate of 3 vehicles per minute for the whole of the relevant period, which would have been a masterpiece of organisation.

This is the only point at which the use of a bridge was confirmed and the figure given above, even though it is thought to be too large, indicates the great difference that the use of a bridge made.

There was very little air activity and, when the bridge was once damaged, it was rapidly repaired. The Germans had appreciably lowered the level of the river here by blowing the weir 2 kilometres downstream.

Vehicles are said to have approached the POSES crossing from both north and south but very few were found burnt or abandoned on the roads leading to the bridge.

- (ix) LES DAMPS (2499). A chain ferry was operating between two moored barges for 5 nights and 3 days, making about 4 trips per hour; it carried four lorries at a time. This might account for some 1500 vehicles, but a local inhabitant insisted that about 20,000 had crossed there.

The railway bridge at LES DAMPS was wrecked by our bombers.

- (x) PONT DE L'ARCHE (2299). The bridge here was destroyed in 1940. The Germans had built a wooden one on the same site and it was stated locally that the RAF had wrecked it some time this year. Three Panthers, an Mk IV and a 75 mm SP gun were found on the west bank near the bridge.
- (xi) CRIQUEBEUF (1800). Only a small number of Germans crossed the SEINE here and they were mostly infantry. They had intended to build a bridge but never really started.
- (xii) CAUDEBEC-LES-ELBEUF (1399). A chain ferry working only at night and making about 15 trips per night was capable of carrying 6 lorries at a time. It is said to have taken some tanks. Two Mk IVs and an SP gun were found abandoned near the ferry as were also upwards of 200 carts and a few lorries.
- (xiii) Elbeuf (1199). The FFI informed us that there were two ferries operating here and one at Orival. These were working continuously for five days and nights, making approximately three crossings in an hour. Each ferry could carry either 1 tank or three lorries.
- (xiv) AMFREVILLE (2110). A ferry was improvised from two large metal pontoons and this was in use for two days and nights. Local inhabitants say that not more than 60 vehicles crossed here but the true figure is probably somewhat greater. No tanks crossed at this point.
- (xv) ROUEN (2015). Members of the local Fire Brigade informed us that the railway bridge was not in use during the relevant period. A great many small improvised ferries were working continuously carrying men and animals. Two regular ferries were in use but, as far as they knew, had carried only soft or lightly armoured vehicles. They did not know of any tanks crossing at Rouen but had heard that tanks had been ferried across at LA PETITE COURONNE.

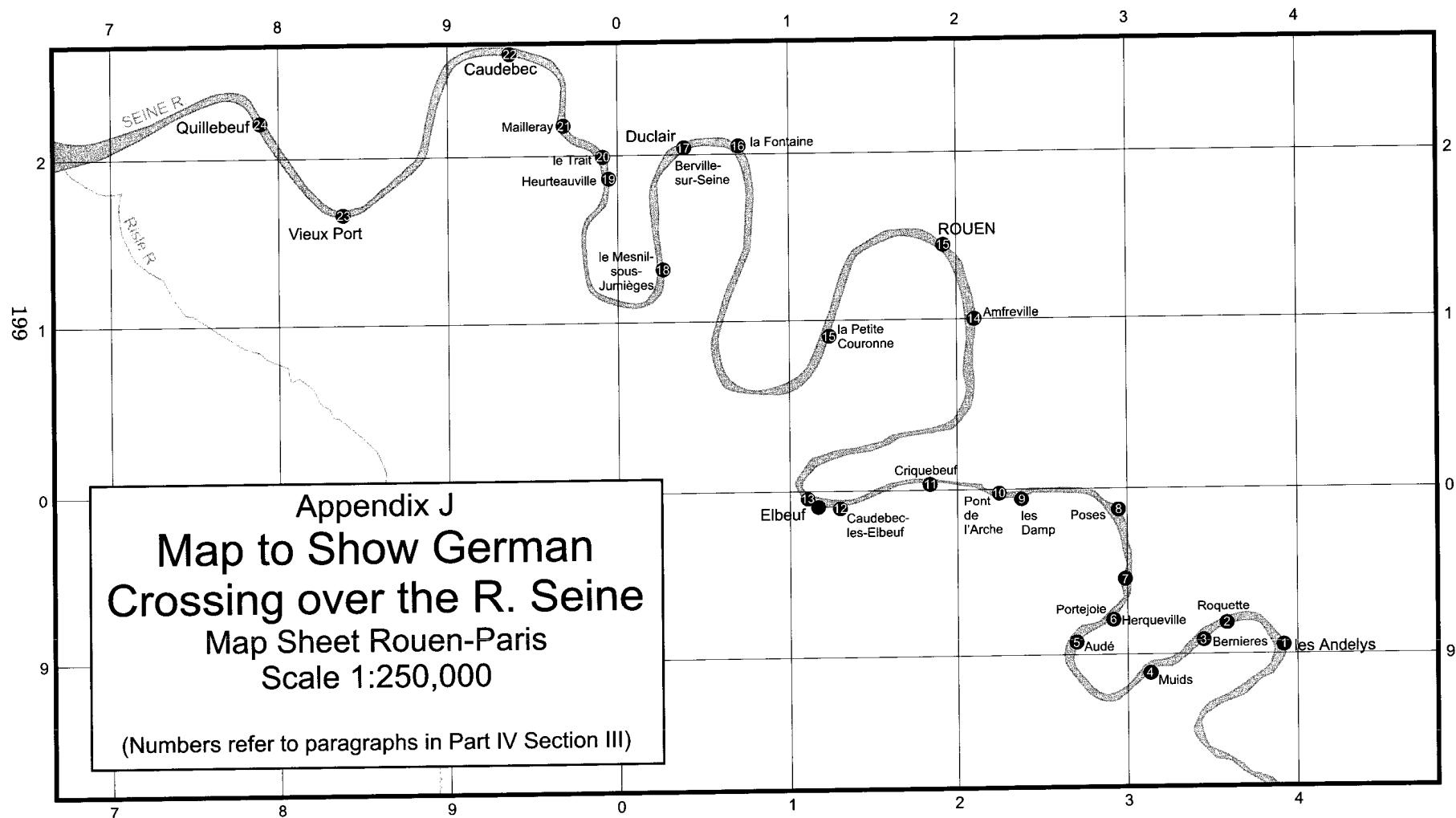
They gave as the reason for the traffic jam that drivers had been directed to Rouen expecting to find a bridge and far more vehicles arrived than could possibly be taken across. They said that when the jam became serious many vehicles were driven off into the woods and abandoned, but they could not tell us where and we did not see any sign of them as we came through the woods.

- (xvi) LA FONTAINE (0721). There was no ferry but a raft was used to carry several hundred men and 20 vehicles during the course of the retreat.
- (xvii) BERVILLE - DUCLAIR (0421). The ferry was sunk three weeks before the German retreat. Improvised rafts carried hundreds of men across but no vehicles passed this way.
- (xviii) LE MESNIL SOUS JUMIEGES (0213). The Germans were crossing here for three days in small boats and improvised rafts or by swimming. No vehicles ferried here.
- (xix) HERTAUVILLE (9918). The ferry which previously worked here was sunk by air action shortly before the retreat and there is no evidence of how much they managed to get across at this point except that two rafts were left there.
- (xx) LE TRAIT (9919). There were at least three points here where boats and rafts were used for ferrying men, several thousand of them, but very little equipment was seen to cross.
- (xxi) MAILLERAYE (9722). There was one ferry which operated chiefly at night. It was said to have had a capacity of nearly 10 vehicles and yet only ferried some 50 vehicles per night for five nights. These figures include no tanks.
- (xxii) CAUDEBEC-EN-CAUX (9326). One ferry was sunk by air action some three weeks before the retreat; another was sunk by the Germans when they left but in the meantime it had carried some 40 to 50 tanks and between 1500 and 2000 other vehicles. Also many anti-tank guns were carried across. This traffic passed on two foggy days and five nights.
- (xxiii) VIEUX PORT (8317). There was no ferry here but local inhabitants estimated that about 200 men and 40 horses crossed in small boats.
- (xxiv) QUILLEBEUF (7922). The ferry that originally operated here had been taken up stream before the retreat began but some three hundred Germans crossed on improvised rafts. No vehicles were ferried.

(b) From the information provided we have estimated roughly that about 40,000 items of motor transport and 250 tanks and SP guns could have crossed the river. The figure of 40,000 is probably more than the Germans possessed when the retreat started but it is reasonable to suppose that the ferries were observed to be carrying the loads stated at the frequencies stated only when things were working smoothly. The 16000 vehicles alleged to have crossed at POSES (see (viii) above) have been included, although we questioned its accuracy. The figure therefore only gives an indication of what might have been taken across with perfect organisation and no interference. The figure of 250 for tanks and SP guns is compatible with an "I" estimate of 160 as the number of tanks left to the Germans out of the total that they had in Normandy.

(c) The ferrying capacity above ROUEN was far greater than below and this may be compared with the fact, as shown in Part III, that few enemy vehicles were found near the banks of the SEINE above ROUEN but a great many below.

(d) At all the crossings examined the inhabitants stressed the point that the Germans had travelled chiefly at night but that, in the vitally important week, there were three days when the visibility was very poor and during which they were able to ferry much traffic across in daylight without any great interference from the RAF.



Part V. Discussion of Results and Conclusions

Introduction

The German retreat from Normandy to the SEINE and beyond is by no means the first occasion on which a large scale withdrawal, enforced by land action, has been laid open to air attack. The Turkish retreat through the pass an NABLUS, that of the Germans from ALAMEIN, and the British retreats to DUNKIRK and in GREECE are all examples, but in none of these cases, as far as is known, has a detailed study of the resultant casualties been made.

The results of such air attacks are primarily of importance to the advancing army who may have to fight once more against the survivors; it therefore appears relevant to discuss from the military point of view the results of the survey that has been made and, notwithstanding the very great success achieved by the air forces, to consider how even greater success might have been achieved with the resources available.

1. Total Casualties

(a) At Appendix K are two tables; the first shows the totals found during the ground survey and the second gives figures amended to allow for vehicles which were missed. The percentages added in the case of the Pocket were arrived at by examining two small areas in very great detail to compare side roads with main roads. In the Shambles area only a small addition had been made because the area was thoroughly searched. In the Chase, where the examination was not so complete, high percentages have been added. In round figures the amended totals are as follows:

Vehicles and Guns	
Pocket	1500
Shambles	3500
Chase	5000
Total	10000

This figure, in view of the nature of the estimate for the Chase, is an approximation which, however, is unlikely to be in error by more than 2000 either way.

(b) We have been unable to obtain a figure for the total number of mechanically-propelled vehicles that the German army had in Normandy, but there were known to have been 16 Infantry and 10 Panzer divisions. Had these been up to strength, which they certainly were not, the figure would have been about 45,000 without including non-divisional transport. It is, however, known from captured documents that they were up to 60% strength in artillery and it is therefore reasonable to assume that, including the great number of impressed vehicles used in the retreat, the Germans must have had at least 30,000. It thus appears that two-thirds of this total was withdrawn to the far side of the Seine and that had the number of casualties been doubled it would have made a considerable difference to the enemy's subsequent ability to retreat and resist.

2. Comparison of Casualties and Claims

As it is of value to the army to know how many casualties the enemy had suffered and pilots' reports are the only immediately available source of such information, it is interesting to compare the casualties due to air attack with the claims made.

(a) Total Claims

In the Pocket casualties directly due to air attack have been quite accurately assessed at 359, with a possible addition on account of missed vehicles which might bring it up to 500. In the Shambles an estimate of 800 has been made. For the Chase only a very rough estimate can be made, but as many as 2000 would be reasonable. This yields a total of over 3000.

Details of sorties by Spitfires, Typhoon and Mustang aircraft of 2nd TAF, and by P-38s and P-47s of the IX USAAF together with claims for vehicles destroyed in the areas which we have covered have been provided by ORS, 2nd TAF, and A-2, IX USAAF respectively. The significant figures are as follows:

	2 TAF	IX USAAF	Total
Sorties Flown	9896	2891	12787
Claims for MT destroyed	3340	2520	5860
Claims for Armour destroyed	257	134	391
Total Claims	3597	2654	6251
Claims per sortie	0.36	0.83	0.49

The above figures do not include the 531 sorties flown by medium bombers to attack the MT concentration near ROUEN when the pilots made no claims but we found about 700 vehicles which have been included in the 2000 mentioned above.

Although our estimate of over 3000 for the total casualties due directly to air can only be very approximate, the total is certainly less than the total claims made by the two air forces. However, there is no difference of order between totals of claims and casualties, and it is therefore reasonable to accept the former as having been a fair measure of the latter.

(b) Claims for Armour

The particular claims for destruction of armour cannot be upheld. Of the available weapons, bombs, cannon and machine gun can only be expected to destroy heavily armoured vehicles on exceptional occasions and had they been a common cause of tank casualties we could not have failed to have observed it. 222 claims for destruction of armour were made by Typhoon pilots who presumably fired Rocket Projectiles (RP), but out of a total of 456 heavily armoured vehicles (tanks and SP guns) counted, 301 were examined in detail and only 10 found to have been destroyed by RP. Even if armoured troop carriers are included, it is found that only three out of the 87 examined were destroyed by RP. If armoured troop carriers destroyed by cannon or machine gun are included, a total more nearly approaching the claims might be obtained, but if such vehicles, which are readily distinguishable from AFVs are claimed as armour, this should be discontinued as militarily they are only of minor importance compared to AFVs.

It seems hardly to lie in our province to examine this discrepancy in further detail, nor from the military point of view is there much to be gained by doing so. The facts that remain are that 456 tanks

and SP guns were actually counted, and the total is certainly greater, while only about 250 are estimated to have crossed the SEINE. It follows that owing to the conditions imposed by the retreat, and with the present state of reliability of German armour, a very large proportion of that armour was lost.

3. Effectiveness of Weapons

The principal weapons used for the direct destruction of enemy vehicles and equipment were cannon, machine gun, RP and bombs.

We have not been able to differentiate at all clearly between the relative effectiveness of the first two; both appear to have been very deadly to all except heavily armoured vehicles and the figures given in the preceding parts of the report speak for themselves. As indicated in 2 (b) above, RP have not produced the results against armour which might have been hoped for, whilst against soft vehicles they are clearly less suitable than cannon and machine gun fire. It is suggested that RP in its present form suffers the grave disadvantage of being virtually a "one shot" weapon which even in the hands of the most skilful pilot has poor accuracy, whereas the protracted burst of fire from cannon or machine gun gives a far greater chance of scoring hits.

There was little scope for the really effective use of bombs as suitable area targets seldom presented themselves, but in the case of the one ideal target near Rouen the results were highly satisfactory.

4. Indirect Effects of Air Attack

Statements of PW have shown how traffic was disorganised by air action. The three principal effects appear to have been:

- (i) Movement was restricted to the night until congestion and haste positively compelled day movement.
- (ii) Crews had to stop and take cover when aircraft appeared.
- (iii) Vehicles were driven off main roads on to the side roads.

It is hardly possible to assess these effects numerically in terms of casualties, but the delay resulting from them must have been largely responsible for the inability of the enemy to get away, and consequently for a large number of vehicles abandoned or destroyed by their crews.

5. Interdiction

In three places the densities of casualties were particularly high, namely near the mouth of the SEINE, near ROUEN and in the Shambles area. Elsewhere the casualties were fairly uniformly spread along roads, and, although it is known that temporary obstructions did occur, they could be cleared and so delayed rather than prevented the enemy's escape. Where the densities were high, interdiction of enemy movement was virtually established, in the first instance by the natural obstacle of the river SEINE, and in the last by the action of ground forces.

It is considered that the evidence points to interdiction as being the primary task to be performed against a rapidly retreating enemy so that his retreat can be stopped and that infliction of casualties should in the first instance be of importance only in so far as it contributes towards interdiction. Once the interdiction has been established congestion must result and casualties can be inflicted at a very high rate by any weapon that can be brought to bear.

If the policy of interdiction followed by destruction could be adopted, it is considered that the total casualties resulting would in the end be higher than if destruction alone were concentrated upon. In the particular retreat which has been considered, what was a very severe defeat might have been approximated to a complete rout. It should however be borne in mind that unless the interdiction is successful the results will probably be less satisfactory than if the effort had been concentrated only on destruction.

Appendix K Total Enemy Losses in Vehicles and Equipment During the Retreat				
A. Totals found by No.2 Operational Research Section				
Category	Pocket	Shambles	Chase	Total
Tanks and SP Guns	121	185	150	456
Lightly armoured vehicles	56	157	154	367
Lorries, cars & M/Cs	1033	2447	3178	6648
Guns	60	252	166	478
B. Estimated totals allowing for vehicles not seen				
Tanks and SP Guns	169 (121 + 40%)	222 (185 + 20%)	240 (150 + 60%)	631
Lightly armoured vehicles	78 (56 + 40%)	188 (157 + 20%)	246 (154 + 60%)	512
Lorries, cars & M/Cs	1239 (1033 + 20%)	2692 (2447 + 10%)	4449 (3178 + 40%)	8380
Guns	72 (60 + 20%)	277 (252 + 10%)	232 (166 + 40%)	581
Revised Totals	1558	3379	5167	10104

Addenda to No.2 ORS Report No.15

A. Comments from 2 TAF

ORS Report No.15, "Enemy Casualties in Vehicles and Equipment during the Retreat from Normandy to the Seine" has been studied by HQ 2nd TAF. The following is a summary of the comments that have been made:

1. It would be wrong to regard the data provided in the report as yielding information on which to make recommendations for changes in weapons, tactics or operational doctrine, although the factual side of the report can itself be accepted.

2. Part V - Introduction

Whereas the large scale withdrawal is stated to have been "enforced by land action," the ultimate cause of the withdrawal should more properly have been attributed to the factor of combined service action.

3. Part V - para. 2 (b)

(a) The air claims against armour are certainly too high if armour is attributed as meaning AFVs. However, in close country and under operational conditions, it is not agreed that armoured troop carriers are readily distinguishable from AFVs.

(b) The circumstances of the examination did not make it possible to take account of the moral effects of RP. A lack of effectiveness in causing material damage cannot be accepted as a reason for abandoning RP as a weapon against armour until it can be replaced with something better.

4. Part V - para. 4

The demoralising effect of air action is not adequately stressed and the report should be considered only as relating to the limited aspect of the material effects of air action.

5. Part V - Introduction and para. 5

No conclusion aimed at deciding "how even greater success might have been achieved with the resources available" can be based on examination of results of destruction alone. Other factors must be taken into account, such as weather, enemy flak, improper use of Red Cross and limitations of bomb line. In fact, a policy of interdiction was followed in so far as it was tactically possible, and, with suitable terrain such as the crossings of the Seine, it was successful.

B. Additional Vehicles

Reference Part V para. 1 (a) and Appendix K

1. Since this report was published a census has been carried out by 197 Inf Bde Battlefield Clearance Group over an area almost identical with that which we named "the Shambles." The results of this census show that the percentages added for vehicles missed in this area were too small. The 197 Inf Bde results compared with the estimated given at Appendix K, part B, column 2, are shown below:

	ORS	197 Inf Bde
Tanks and SP Guns	222	358
Tracked vehicles, lorries, and cars	2880	4715
Total	3379	5644

2. As far as can be ascertained, the differences arises entirely from vehicles and equipment which we failed to discover in narrow lanes, orchards, farm yards and woods. Such vehicles were in almost every case abandoned, consequently the effect on the accuracy of the report is quantitative rather than qualitative.

3. The final estimate for total losses sustained by the enemy in the whole area, as given at Appendix K, should be amended to read "12369" instead of "10104."

C. Omission

Part V, para. 3 - Effectiveness of Weapons

By an unfortunate oversight the following sentence was omitted from the final draft report:

"Whenever an RP was found to have hit an armoured vehicle, that vehicle was invariably destroyed."

Air Attack on Enemy Armour in the Ardennes Salient

1. When No.2 ORS started on this investigation early in January 1945, the tactical situation was such that very few of the claims for the destruction of enemy armour by the Allied Air Forces were within our lines. ORS/2 TAF joined in at the middle of the month and, by that time, the snow lay so thick on the ground and covered the vehicles so thoroughly that the progress of the joint investigation was of necessity very slow. The location and identification of rocket craters and of Patches of burnt ground resulting from Napalm fire bombs was impossible.

2. In the period 17th December, 1944, to 16th January, 1945, the three tactical air forces, 2 TAF, IX TAC, and XIX TAC, claimed the destruction of 413 Armoured vehicles in the area; of these 324 were described as tanks. The claims were made at 154 different points throughout the Ardennes salient. At the time of writing it has only been possible to search the neighbourhood of 30 such points involving claims for the destruction of 66 tanks and 24 other armoured vehicles. These points are shown in the map at Appendix D. The detailed notes given at Appendix A show that an area within two or three kilometres of each claim was searched, and, in the course of this, 101 German armoured vehicles were examined; all these lay in the northern half of the salient.

3. The table below shows the distribution as to causes of the 101 casualties to German armour which were examined.

Cause		Royal Tiger	Panther	Mark IV	SP Gun	Light Armour	Total
Air	Bomb	1	0	0	0	0	1
	Possibly air attack	0	3	0	2+	1	6+
Ground	AP shot	1	16	1	10+	8	36+
	HE shell	0	3	0	1	4	8
	Demolition	2	10	1	0	4	17
	Abandoned	1	10	0	4	7	22
Other Causes		0	0	1	1	0	2
Unknown		0	5	2	1	2	10
Total		5	47	5	18	26	101
+ One SP gun had AP penetrations and a possible rocket strike and has been included under both counts.							

4. In a number of cases bombs had been dropped among tanks that had already been destroyed by ground forces but even when they were as close as 15 yards from such "dead" tanks no extra damage had been caused.

5. 18 PW from armoured formations (see Appendix C) were interrogated to obtain their impressions of the effectiveness of air attack against armour and information about their recovery system. Unfortunately no members of tank crews from the area examined were contacted. Only one PW had seen or heard of a tank being damaged from air attack; he came from a workshop and quoted two cases of damage to gun barrels and three to engines by cannon fire and one direct hit by a bomb.

6. Information was provided that the enemy have an efficient recovery organization (at least on paper), but that it is normally devoted to recovering tanks with slight damage or mechanical defects. Burnt out or destroyed tanks are almost invariably left. It seems unlikely, therefore, that completely destroyed tanks, such as those which received direct hits from bombs, would be recovered in preference to those with little or no damage, many of which were found in the area. Statements from a number of local inhabitants who had stayed in the area during the fighting confirm this.

7. Visits have been made to many Tank Destroyer Battalions and other American units involved in the fighting; all the Ordnance Evacuation Companies, who were responsible for clearing the roads and recording the location of allied and enemy vehicles on the battlefield, have also been visited. By collating the information gathered from all these sources it has been possible to arrive at an estimate for the number of tanks, SP guns and armoured vehicles lost to the enemy in the northern half of the salient. This estimate, which amounts to 300, is shown in detail at Appendix B together with several other facts of general interest which have emerged from the investigation.

8. It is believed by the writers of this report that the contribution of the air forces towards the stemming and final elimination of the enemy thrust into Belgium was very considerable, but that it was not by the direct destruction of armour, which appears to have been insignificant; but rather by the strafing and bombing of the supply routes, which prevented essential supplies from reaching the front. More evidence is being collected on this aspect of the air attack and a separate report will be issued later.

Appendix A

1. 18 Dec. 44 - IX TAC

4 P-47s with 8 x 500 lb GP bombs fused 8-15 secs delay.

Air Claim: 4 tanks destroyed K 7603.

Ground Check: In and around Malmedy were found 4 Panthers, all disguised as Shermans by the addition of thin sheet metal superstructures. One of these had been destroyed by the crew and the others by American artillery.

2. 18 Dec. 44 - IX TAC

3 P-47s with 6 x 500 lb GP bombs fused 8-15 secs delay

Air Claim: 3 tanks destroyed K 7603.

Ground Check: See serial 1 above.

3. 18 Dec. 44 - IX TAC

14 P-47s with 28 x 500 lb GP bombs fused inst., 1/40 secs.

Air Claim: 12-15 tanks destroyed K 710003 - K 717025.

Ground Check: At K 700000 was a Royal Tiger facing east; there were no visible signs of damage; no bomb craters found. The fighting compartment had been burnt out; It is possible that the

fuel had run out. At P 685993 was another Royal Tiger facing east but its gun was pointing west. The rear half of the turret was smashed and the roof over the driver's and hull-gunner's compartment was stove in. A bomb crater, probably 500 lb GP with 1/40 sec delay, was found some 17 yards to the east of the tank. The complete absence of human remains suggests that the crew had baled out on the approach of the aircraft. The destruction of this tank was seen by an officer of 740 Tank Bn which was being held up by the Royal Tiger; he said that it was hit by a bomb dropped from a P-38 on 25th December, 1944.

4. 18 Dec. 44 - IX TAC

4 P-47s with 8 x 500 lb GP bombs fused 8-11 secs delay.

Air Claim: 2 medium tanks destroyed K 6810.

Ground Check: Nothing found in the area.

5. 24 Dec. 44 - IX TAC

4 P-47s with 10 rockets and strafing.

Air Claim: 12 armoured vehicles destroyed P 519862.

Ground Check: At P 515875 were two Panthers both destroyed by AP shot, one through the side plating and the other into the engine compartment.

At P 518864 was a Panther destroyed by 4 75 mm AP penetrations. There were bomb craters in the area.

6. 24 Dec. 44 - IX TAC

14 P-47s with 37 x 500 lb GP bombs fused 1/10, 1/40 sec.

Air Claim: 1 tank destroyed P 533831.

Ground Check: At P 554837 was a 75 mm SP gun with two AP penetrations in the front plate; it was brewed up. There was also a large hole which had cracked the left half of the front plate; this hole was too large to have been caused by 75 or 90 mm AP and it is just possible that a High Velocity Aircraft Rocket with 100 lb head had done it. There were no craters nearby. Date of death on two German graves alongside were 1 and 5 Jan. 45.

7. 24 Dec. 44 - IX TAC

11 P-47s with 22 x 500 lb GP bombs fused inst.

Air Claim: 1 armoured vehicle destroyed, P 5993.

Ground Check: At P 583937 was an Armoured Troop Carrier abandoned at the roadside with no damage whatsoever. At P 589936 a second ATC was found overturned and with its machine gun damaged. A third had been collected by 462 Ord. Evac. Co from P 587938 in good condition. No bomb craters were found within the area. The actual square quoted in the claim is an area of precipitous hills covered with trees.

8. 25 Dec. 44 - IX TAC

3 P-38s with 6 x 500 lb GP bombs fused inst.

Air Claim: 2 tanks destroyed P 5390.

Ground Check: In this area were found 11 Panthers in the conditions described below:

4 were almost completely undamaged although three tracks were off.

5 had no signs of external damage but had been burnt out.

2 had been destroyed by AP shots.

There were some bomb craters in the area.

9. 25 Dec. 44 - IX TAC

12 P-47s with 23 x 500 lb bombs fused 1/10, 1/40 sec and strafing.

Air Claim: 10 plus tanks destroyed P 5390.

Ground Check: See Serial 8 above.

10. 25 Dec. 44 - 2 TAF

8 Typhoons with 60 Rockets.

Air Claim: 1 AFV destroyed K 7903.

Ground Check: At K 7803 were four Panthers disguised as Shermans (see Serial 1).

At K 8002 was a 75 mm SP gun also disguised as a Sherman; this had been abandoned practically intact after an HE round had caused minor damage at the rear.

No rocket craters could be found in the deep snow.

11. 25 Dec. 44 - IX TAC

1 P-47 with 2 x 165 gallon Napalm Fire bomb.

Air Claim: 1 tank burnt out P 0683.

Ground Check: At P 065832 was a Panther with some damage caused to the muzzle-brake and superficial damage to the turret hatch. At P 064832 was a Mk IV completely burnt out with 2 AP penetrations. There were also 3 Armoured Troop Carriers abandoned undamaged.

12. 26 Dec. 44 - IX TAC

10 P-47s with 17 x 500 lb GP bombs fused 1/10, 1/40 sec, and 4 rockets.

Air Claim: 1 Medium Tank destroyed K 8001.

Ground Check: At K 8002 was the 75 mm SP gun described in serial 10 above.

13. 26 Dec. 44 - IX TAC

7 P-47s with 14 x 500 lb GP bombs fused 1/10, 1/40 sec.

Air Claim: 1 Medium tank destroyed at P 790937.

Ground Check: At P 780920 was a Panther which had probably been bogged down. There were no signs of external damage and it had been brewed up; destroyed either by crew or Americans. There was a bomb crater 40 yards away and another smaller one (either shell or rocket) only 15 yards from the tank. At P 779919 was another Panther. An AP shot had penetrated the driver's compartment and damaged the transmission as a result of which the tank was not a runner but its turret could be rotated; a track was missing and a tow rope attached.

At P 778918 was a brewed up Panther without tracks. A hole in the lid of the driver's compartment might have been caused by a rocket; about 15 yards away was a possible rocket crater.

At P 777919 was a 75 mm SP gun brewed up after four AP penetrations.

Note that no rockets were fired in this attack.

14. 26 Dec. 44 - IX TAC

10 P-38s with 20 x 500 16 GP bombs fused inst.

Air Claim: 5 Tiger tanks destroyed P 5081.

Ground Check: At P 506810 were 2 very large tracked personnel carriers; these might have been destroyed by bomb fragments and later removed from the proximity of the craters.

At P 516811 were 2 Panthers 50 yards from the road, very thickly covered by snow and in the middle of a minefield. The cause of their destruction is unknown.

15. 26 Dec. 44 - IX TAC

11 P-38s with 13 x 500 lb GP bombs and 7 x 165 gallon Napalm Fire Bombs.

Air Claim: The town of Houffalize was set on fire. 1 tank destroyed leaving the town P 6172.

Ground Check: At P 607726 was a Panther on the road out of the town; this had been brewed up. The cover of the engine compartment was missing and the floor was blown out; there were cracks and bulges in the rear plating but the engine block was well preserved which suggests the use of several demolition charges rather than bomb damage. No bomb craters were found near the tank.

16. 26 Dec. 44 - 2 TAF

7 Typhoons with 53 rockets.

Air Claim: 2 tanks destroyed P 0683.

Ground Check: See Serial 11 above.

17. 27 Dec. 44 - IX TAC

9 P-38s with 10 x 500 lb GP bombs and 6 x 165 gallon Napalm Fire Bombs.

Air Claim: 1 tank destroyed at crossroads, P 573857.

Ground Check: At this point, a crossroads, were a number of Sherman tanks, American SP guns and some RAF soft transport all destroyed by shellfire or their crews. Bomb craters were found around the crossroads. There was a German Armoured Troop Carrier at P 580849 which had been destroyed by fire.

18. 27 Dec. 44 - IX TAC

4 P-38s with 4 x 500 lb GP bombs fused inst. and 3 x 165 gallon Napalms.

Air Claim: 2 tanks destroyed P 5785.

Ground Check: See Serial 17 above.

19. 27 Dec. 44 - IX TAC

4 P-38s with 4 x 500 lb GP bombs fused inst. and 3 x 165 gallon Napalms.

Air Claim: 1 tank destroyed P 5384.

Ground Check: Nothing was found within 2 kilometres of the map reference given.

Square P 5384 is completely wooded.

20. 27 Dec. 44 - IX TAC

6 P-38s with 8 x 500 lb GP bombs fused inst. and 4 x 165 gallon Napalms.

Air Claim: 2 tanks destroyed P 7189.

Ground Check: Nothing was found except some bomb damage to the town of Vielsalm which had also been visited by the mediums of 2 Group, RAF.

21. 27 Dec. 44 - IX TAC

4 P-38s with 8 x 500 lb GP bombs fused inst.

Air Claim: 1 tank destroyed P 5276.

Ground Check: At P 551740, between Filly and Mormont, were two Armoured Recovery Vehicles on Panther chassis; both had been abandoned and no bomb craters were found.

22. 27 Dec. 44 - IX TAC

4 P-47s with 8 x 500 lb GP bombs.

Air Claim: 2 tanks destroyed P 495824.

Ground Check: At P 497823 was a Panther brewed up; definitely blown up from the inside; both tracks were broken and the sprocket on one side was off thus giving the impression that repairs had been in progress.

23. 31 Dec. 44 - 2 TAF

8 Typhoons with 57 rockets.

Air Claim: 2 tanks destroyed P 7892.

Ground Check: At P 774920 was a brewed up Panther; part of the turret was blown out. It was impossible to determine the cause. Quite close was a 75 mm SP gun on a Mark III chassis; this was also completely burnt out. It had been hit by AP shots on the turret and lower hull. There were signs of cannon or machine gun strikes from the air though they had not penetrated. This SP gun was found only 15 yards away from the edge of a bomb crater.

24. 1 Jan. 45 - IX TAC

14 P-47s with 27 x 1000 lb GP bombs fused inst.

Air Claim: 6 armoured vehicles destroyed P 485808.

Ground Check: At P 471810 was an Armoured Troop Carrier in pieces at the roadside; it is suggested that engineers had demolished it to clear the road but it might well have been bomb damage had there been any other signs of bombing in the area.

25. 1 Jan. 45 - IX TAC

12 P-38s with 22 x 500 lb and 1 x 1000 lb GP bombs fused inst.

Air Claim: 2 tanks destroyed P 485840.

Ground Check: At P 479850 was an armoured troop carrier brewed up. It had been hit by an HE shell in the front and the surrounding trees were much cut about by shellfire.

26. 2 Jan. 45 - IX TAC

7 P-47s with 14 x 1000 lb bombs fused inst.

Air Claim: 1 tank destroyed P 773918.

Ground Check: For ground check see Serial 23, which refers to this area where a bomb crater was found very near an SP gun.

27. 2 Jan. 45 - IX TAC

4 P-47s with 8 x 1000 lb GP bombs fused inst.

Air Claim: 4 tanks destroyed P 458789.

Ground Check: At this point were a number of small huts which might have been taken for tanks from the air. There were many bomb craters but La Roche had also been bombed by 2 Group, RAF.

28. 5 Jan. 45 - IX TAC

7 P-47s with 14 x 500 lb GP bombs fused 1/10, 1/40.

Air Claim: 1 armoured vehicle destroyed P 605742.

Ground Check: At P 604747 was a large tracked personnel carrier off the road for repairs after a hit in the radiator; bonnet and radiator had been removed. Then a large explosion had taken

place in the engine compatible with a rocket strike or a demolition charge but not a bomb. Numerous cannon or machine gun strikes from above were observed in the bodywork. It is unlikely that the hole in the radiator had been caused by a bomb splinter as there were no other fragment strikes and the tyres were not punctured.

29. 2 Jan. 45 - IX TAC

7 P-47s with 14 x 1000 lb GP bombs fused inst.

Air Claim: 3 tanks destroyed P 4381.

Ground Check: Bomb craters were found in this area which contained a number of brewed up Shermans but no German armour.

30. 5 Jan. 45 - IX TAC

4 P-47s with 8 x 500 lb GP bombs fused 1/10, 1/40 sec.

Air Claim: 3 armoured vehicles destroyed P 627877.

Ground Check: At P 627879 was a Panther on its side at the foot of a steep embankment, inspection plates were off, cylinder head removed and also several bogies off on the exposed side all suggesting cannibalisation afterwards. Otherwise no damage except what would result from falling down the slope. It is possible that it was unable to turn the corner when coming down the hill. There were no craters in the neighbourhood.

Appendix B

1. An estimate of the armour lost to the enemy during the period 17th December, 1944 to 16th January, 1945 in the northern half of the Ardennes Salient. As all duplications have been eliminated the figures quoted for the various units are less than they recorded.

Source of Information	Royal Tiger	Tiger	Panther	Mark IV	Other Tanks	SP Guns	Other Armour †	Total
Examined by ORS	5	0	47	5	0	18	26	101
Recorded by Ord Evac Coys	1	0	18	12	5	12	10	58
Claimed by Tank Dest Bns	0	2	22	8	33	0	0	65
Claimed by Tk Bns	8	0	19	8	15	0	8	58
Claimed by 83 Inf Div	0	0	7	11	0	0	0	18
Total	14	2	113	44	53	30	44	300
† There were, no doubt, many armoured vehicles among those described as "half-tracks" but, except where definitely described as armoured, these have been ignored.								

2. The claims for destruction of armoured vehicles by the tactical air forces were as follows:

	In the Area Examined			In the Whole Salient		
	Tanks	AVs	Total	Tanks	AVs	Total
IX TAC	62	23	85	140	69	209
XIX TAC	2	0	2	176	19	195
2 TAF	2	1	3	8	1	9
Totals	66	24	90	324	89	413

3. In the attacks resulting in claim for the destruction of armour in the salient the following were used:-

	Bombs			Rockets
	GP	Frag	Fire	
IX TAC	1110	34	54	98
XIX TAC	530	132	111	134
2 TAF	-	-	-	340
Totals	1640	166	165	572

In addition many of the tanks claimed by IX and XIX TACs were attacked by MG fire and some only by this means.

4. Among the non-armoured vehicles seen at the roadside there was an unusually high proportion of tracked and partially tracked vehicles. This was borne out by the findings of the Ordnance Evacuation Companies.

5. Civilians of some standing, such as the local "maire" or "cure" were interviewed in a number of villages in the La Roche area. None had ever seen tanks on transporters but a few cases were reported of damaged tanks being towed back from the front by other tanks. The great age and poor quality of the MT in use by the enemy was noted by the Belgians who said that the Germans had great difficulty in climbing the many hills. Although this area was well forward there was a great amount of horse-drawn transport; one "maire" said that between 25 and 30 wounded horses were brought back to his village every day for veterinary treatment and subsequent evacuation to the rear. Trains of handcarts towed by Norwegian ponies were mentioned.

Appendix C

Summary of interrogations of PW on the subjects of air attack on tanks and the recovery of damaged tanks.

1. Uffs. L (103 Pz Abt) had once been attacked 17 times in one day by fighters and fighter-bombers but his tank suffered only superficial damage.
2. Obergefreiter R. had driven tanks and SP guns for 4 years. He had been shot up on four occasions, 3 times by AP and once by HE, but had not experienced a brew-up. Each time his AFV had been recovered.
3. Uffs. R. (361 Pz Jager Bn) had 5 casualties to his SP guns in Alsace, none due to air attack, and all had been recovered. He said that all tanks worth salvaging are recovered.
4. Obergefreiter P. was twice attacked by aircraft when on the move; both times the crew stayed in the tank and no damage resulted.
5. Obergefreiter B. (107 Pz Bde) had no experience of air attack.
6. Gefreiter A. (78 Regt) had driven half-tracks. He saw 2 half-tracks hit by rockets near Bastogne and both were burnt out; five others, knocked out by ground forces, were recovered but the rocket victims were left.
7. Obergefreiter S. (3 Pz Regt) said that two of the 75 mm SP guns in his company had been destroyed by shellfire but he did not see either of them recovered.
8. Signaller W. (130 Pz Regt) said that, when conditions were favourable, they were attacked from the air as often as 3 times a day. No tanks had been put out of action by the air force. A bomb fell 10 metres from his tank but no damage was caused. Of the casualties he had seen, none had been recovered.
9. Feldwebel P. (33 Pz Regt) said that they took cover in woods during air attacks and suffered no casualties. Six of the 14 AFVs in one company were knocked out by ground forces and three of these were recovered.
10. Pte. S. (an SP gun unit) was only once attacked from the air - by 4 fighter-bombers. He stayed in his AFV and no damage resulted. Of 3 AFVs which he had seen knocked out by ground forces, two were brewed up and not recovered but the third which did not catch fire was salvaged.
11. Obergefreiter H. (10 SS Pz Regt) was in the regimental workshop, which had 2 tank transporters and 3 x 18 ton tractors. He said that all but burnt out tanks were recovered. Since D-Day he had repaired nearly a hundred AFVs (mostly engine or transmission trouble). He knew of six tanks damaged by air attack, one direct hit from a bomb and 5 caused by 20 mm cannon fire; he knew of no tanks hit by rockets.
12. 2 PW (115 Pz Bn) had never seen any positive results from air attacks on tanks.
13. Crew of a Mk IV tank (33 Pz Regt) stayed inside their tank when attacked from the air. They had not seen any tank knocked out by aerial attack though they thought it just possible that their own had been so hit in the engine. They said that "brew-ups" were never salvaged.

