to expand, demolitions on a grand scale had to be overcome—demolition of ports, railways, bridges and airfields—combined with extensive and very skilful mine laying.

The repair of well blitzed and intentionally demolished airfields, or more often construction of new ones, was in itself a major task: upon which depended our support from the air.

Twin petrol pipelines were laid from Cherbourg across the Seine at Rouen, and from Boulogne stretching across the Rhine. These were supplied from ships pumping ashore, and later in particular from the famous " PLUTO." The pipelines transported during the campaign more than a million tons of petrol.

Nearly two thousand Bailey bridges were erected, including spans across the Seine, the Meuse, the Rhine and the Weser—some of which were nearly a mile long. It has once more been shown that rivers, even very big rivers with complete demolition belts, do not hold up an army, in spite of the weight of modern traffic.

Armour and the mass of lorries assisting the Army played havoc with the roads, and the maintenance of them in conditions of continual traffic, especially in low-lying districts in severe winter conditions, was perhaps the most heart-rending task that faced the Engineers. They were greatly assisted by the Pioneer Corps, which in this task, as in so many others, did a very excellent job.

The most determined demolitions were in the ports. But it has been proved that it is impossible to destroy a port so badly that it cannot be put into some sort of operation by the time the Navy have cleared the mines obstructing its entrance.

The Sappers were very well equipped; but it is important to remember that it is the human element—the resourceful officers and skilled and willing men—which is the major factor in engineering in war. We were often very short of Sappers, particularly during the big river crossing operations.

*Signals.*

It is fundamental that successful operations demand really efficient communications. It is therefore worth emphasising that a commander, at whatever level, must take his R. Signals adviser into his confidence from the earliest stages in preparing a plan.

Much of Signals' work was of the unspectacular, slogging variety which the provision of a vast network of communications involves. The constant aim of Signals was to build up the solid cable head as far forward as possible, to provide reliable jumping-off places for communications in the battle area. To serve my own Tactical Headquarters, which frequently moved at intervals of every two or three days, use was made of an ultra high frequency wireless of an entirely new type (No. 10 set). This method gave me secure speech communication with my armies and my Main Headquarters.

I think that one of the main Signals lessons has been the necessity for insisting that the officers reach a really high standard of technical ability. Modern equipment becomes increasingly complicated and diverse, and the officers must know all about it, if they are to get the best results.

*The Infantry.*

In spite of predictions to the contrary, the Infantry has lost none of its importance on the battlefield.

Modern infantry is a master of more weapons than ever before, and the infantryman's life depends primarily on the skill with which he uses them; he must reach an increasingly higher standard of training. It has been a war of movement, but although the infantryman may motor into battle, his training must keep him hard and tough—a point which must never be overlooked in these days of troop carrying transport.

The introduction of the armoured personnel carrier is an important innovation in the employment of infantry. It enables infantry to be transported across bullet-swept zones in order to arrive fresh at the vital part of the battlefield. The development of this technique has already gone far, and done much to enlarge the scope of infantry tactics. For example, in the first major attack by the Canadian Army astride the Falaise road on 7 August, infantry carried in " Kangaroos " were moved by night a distance of five miles to their off-loading point; the last four miles of this advance were actually within the enemy positions, and the troops debussed almost on the edge of the enemy gun areas. They then fanned out to overrun the belt of country they were attacking.

The tendency to do more and more by night has been greatly facilitated by the provision of " artificial moonlight ". Artificial moonlight, provided by Searchlight batteries, has now become a standard part of our military organisation and has greatly assisted the activities of the infantryman. It has also proved its value in more rearward areas to the bridge builders and administrative echelons.

It has again been the Infantry who suffered the heaviest casualties. I cannot praise too highly the stamina and persistence which the Infantry displayed in the campaign. Divisions were called upon to remain continuously in action for many months on end—to this they responded admirably, even during the very bitter winter we experienced.

*Airborne Forces.*

Airborne forces must now form an essential part of the Army, as there will often be occasions in which they can play a vital role. Apart from their participation in the battle, the threat of their use can be turned to important advantage, for experience has shown that thereby the enemy can be led to make considerable and even vital dispersions of his front line forces. This is in addition to the need to lock up troops in rear areas for guarding vital zones and installations when the opponent is known to have airborne troops at his disposal.

The use of airborne forces in highly mobile operations is limited, because the time required for planning their descents frequently results in the ground troops over-running the projected dropping zones. But in deliberate operations, such as the seaborne assault, or the assault across a major river obstacle, airborne troops have proved to be a battle winning factor.

The threat of an airborne operation, in conjunction with other factors, was material in causing the Germans to retain major formations in the Pas de Calais during the initial period after our landing in Normandy. Nearer the battlefield, uncertainty as to our intentions, combined with the use of dummy paratroops, caused alarm and despondency to the enemy. This delayed the arrival on the battlefield of portions of his forces at a vital time.