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It is hoped that the attached "background" invasion material may be of interest.

It may be used however editors think fit.

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SECOND FRONT

Planning and Mounting the Invasion

Contents

PLANNING AND MOUNTING THE INVASION

FOREWARD

The following sketch of some of the problems involved in the planning and organization which had to be carried out b the British General Staff and Administrative Staff before an invasion of Western Europe could be undertaken is not to be regarded as a comprehensive or official record of this immense task-involving, as it did, much work whose nature cannot yet be revealed. The picture which it tries to present is simply that seen by an individual officer of the War Department who had facilities for observing in some part th work performed by many branches of the Staff - quorum pars minima fuit.

The story, it must be appreciated, is told exclusively from the angle of the British Army. The reader is asked to bear in mind throughout that the invasion was conceived and organised essentially as a combined operation involving naval, land, and air forces, whose plans had to be closely intergrated at every stage. Furthermore, Allied forces, as well as British, were involved.

Much combined planning, both inter-Service and inter-Allied was therefore necessary, and to this aspect of the preparations for the attack brief but (it is hoped) sufficient reference is made.

The needs of the United States forces in terms of special training and concentration areas, railway facilities and signal communications in this country had to be met by the British War Department, but on the administrative side our Allies had their own organisation.

A description of this is naturally omitted from an account whose aim is to convey some idea of the magnitude of the problems which had to be overcome, both in the general advance planning of the invasion before the appointment of the Supreme Commander, and, more particularly, in the training, organisation, and provision of maintenance for the British elements in the United Nations' invading forces.

1. PLANNING THE INVASION

A. THE GENERAL STAFF SIDE

The great design for the invasion of Western Europe as an essential part in strategy aiming at the destruction of Germany's military power may be said in one sense to have been conceived at Dunkirk. From that day onwards a direct offensive against the enemy from the nearest, and therefore most advantageous, Allied base became the ultimate goal of all those whose responsibility it was to rebuild and re-equip the British Army, and to plan the eventual course of military operations against Germany.

For over a year after Dunkirk the patent diparity between the British Army's resources in men and material compared with those of the enemy made the study of offensive operations against the Continent little more than an academic exercise. At the time of the evacuation there was only one fully equipped division in Great Britain; except for the veterans of the campaign in France, the training of British troops was far from complete, and the immediate necessity was to reconstitute in this country formations capable of coping with the threat (which then seemed a probability) of an attempted invasion of Britain by the enemy.

Moreover, apart from defensive needs at home, means had to be found for securing against enemy attack the vital link in the British Commonwealth's communications represented by Egypt and the Suez Canal. Men and material from Britain, India, South Africa and the Antipodes had to be found first for General Wavell's victorious campaign in East Africa and Libya during the winter of 1940/41; then, in April 1941, substantial military a ssistance had to be sent to Greece; and in the summer of that year the necessity of forestalling enemy threats to Syria and Iran involved a further call upon Britain's still limited resources. Finally, large reinforcements had to be sent from this country to the Middle East for the second Libyan Campaign which began under General Auchinleck against the now greatly strengthened Axis forces in North Africa in November 1941. In short, during the twelve months which followed Dunkirk, the conception of a British return to the Continent in armed force appeared to be receding from the realm even of long-range practicability.

Britain Gains Allies

Two major developments in 1941, however, radically altered the long-term strategic picture which the planning staffs had to consider. First, in June, came the

German offensive against the U.S.S.R. - an event which meant that a large part (and, as events proved, a major part) of Germany's land forces would no longer be available to oppose invasion of the West. The second new factor was the entry of the United States into the world war after the Japanese attack on Pearl Harbour on December 7th.

On a short view the extension of the war to the Far East brought about by Japanese aggression was not conducive to preparations for a Wester European offensive. The defensive campaign which had to be waged in Malaya and Burma called for urgent (though, unhappily, unavailing) reinforcements from the United Kingdom to the slender garrisons on the spot; later, the frontiers of India had to be strengthened by British forces, and Japanese conquests in the South West Pacific necessitated the diversion from the European theatre of Australian forces which would otherwise have been available for the campaign against Germany.

On the other hand, taking a longer view, the entry of the United States into the war imported a factor without which decisive operations against Germany in Western Europe seemed likely to remain in the sphere of wishful thought. That is, in the planned expansion of the U.S. Army there came potentially into being an Allied strategic reserve, on whose basis, it was felt, preliminary planning for a Western European campaign could begin. In the closing days of 1941, the Commander-in-Chief, Home Forces (then General Sir Bernard Paget), the Air Officer Commanding-in-Chief, Fighter Command (then Air Marshal Sir Sholto Douglas) and Admirel Lord Louis Mountbatten, then Chief of Combined Operations, were charged by the British Chiefs of Staff with the task of working out, as joint commanders, plans for operations designed, within the limits of practicability, to draw off German forces from the Eastern front, and eventually to recreate for Germany the threat which the German High Command had always dreaded - the two-front war.

Preliminary Study

At this stage of General Staff planning, much careful and valuable work was done during 1942 in the examination of all the many factors which should influence the choice of areas in which lodgment could be affected, having regard to the potentialities and requirements of land, air and sea forces. The more, however, that the available resources in men and materials for the assault, build-up and maintenance were studied, the more irresistable did the conclusion become that, though bridgeheads might be secured, there was inadequate assurance that they could be maintained against counter-attack by major enemy forces, or, still less, that lodgments could be exploited suffieiently to have any worthwhile impact on the course of the war. In mid-summer, following the conference between the Prime Minister and President Roosevelt at Washington, it was decided that, having regard to then available Allied resources, it would be strategically sounder and more profitable to give priority to operations in the Mediterranean - a conclusion reinforced by the new threat to Egypt which had been created by Rommel's counter-attack and advance as far as El Alamein in the early summer of that year.

The consequent reinforcement of the British 8th Army for the victorious offensive which began under General Montgomery at El Alamein in October, 1942, and the simultaneous despatch of the British First Army in conjunction with the U.S. 2nd Corps to French North Africa, inevitably meant a lengthy deferment of the project for a Second Front in the West. Nevertheless, the preliminary planning which had been done under the aegis of the joint commanders (with whom Admiral Sir Bertram Ramsey on the naval side and the commanders of the U.S. Army in Europe had now been associated) was far from wasted. It was at this time obviously impossible to make detailed operational or administrative plans: sufficiently precise information of the enemy's probably strength in the West on dates far ahead, or of exact shipping resources which could in the event be allotted to the operation was still lacking. Tactically, however, much had been learnt by minor raiding attacks which had previously been mounted by the Chief of Combined Operations, and much more was learnt by the larger scale combined operations at St. Nazaire in March 1942, and at Dieppe in August of that year. In addition, the operations against Madagascar in April 1942 and the landing in North Africa in November of that year, though they did not present anything like the problems involved in a landing on Western Europe opposed by German troops, furnished valuable material for the more detailed working-out of administrative plans in the way of assembly and maintenance of expeditionary forces.

Further more, an immense amount of information had been collected by the Intelligence Staffs regarding the West Wall, its defences and the topography further inland. Much work had also been done on the preparation of the necessary maps for operations on the Continent. The immensity of the work involved may be judged from the fact that many million sheets of maps had to be produced covering all parts

of Western Europe likely to be involved in the operations. In meeting this demand the Survey Department of the War Office had to employ practically every firm in this country whose plant was suitable for map printing. Elaborate steps, moreover, had to be taken to ensure that no individual draughtsman or printer was aware whether or not he was dealing with a zone selected for attack.

By the end of 1942 it may in fact be said that though many tactical, administrative and technical "snags" were still destined to emerge, the British General Staff had a clear picture of the basic factors which must be considered in any proposed landings in Western Europe. In particular, the problems both of assault and maintenance (complicated by the tide factor) in offensives which might have to be sustained for a considerable period across beaches, led to the conclusion that for a combined operation on a scale unprecedented in history, against coasts which the enemy had had years to fortify, it would be necessary to provide in immense numbers special landing craft and other naval weapons and equipment, including troop-carrying aircraft; and, further, that the very substantial assault forces required must be organised and trained to a degree in which no army had ever been trained for a task in which familiarity with equipment and repeated rehearsals would alone offer assurance of adequate mobility in assault and follow-up.

At the Casablanca Conference early in 1943 it was decided to give first priority to clearing the Mediterranean Sea Route, and, endeavouring, by operations against SICILY and the ITALIAN mainland, to knock ITALY out of the war. It was clear that our existing resources in specialised landing craft would be largely absorbed by these operations. It is pertinent to recall that at that time the toll taken by enemy U-boats in sinkings of allied shipping was still sufficiently serious to place a limitation upon the shipbuilding facilities which could be made available for such specialised landing craft. It was, therefore, recognised that the opening of a second front in the west would have to be deferred until 1944. It was, however, decided that active preparations should be commenced forthwith, and that a firm plan should be made as soon as possible.

Plans Take Shape

As a result of these decisions a new chapter in the preparation for the opening of the Second front began at the end of March 1943, a British General Officer, with a General of the U.S. Army as his Deputy, was appointed Chief of Staff to a future Supreme Allied Commander. He was provided with a planning staff consisting of both British and American officers of all three services (Navy, Army, Air), was given a forecast of resources that would be available early in 1944, and was instructed to submit plans for effecting lodgements on the Continent in certain conditions.

As has been shown, this new Headquarters did not start from scratch. It had already to its hand a very considerable mass of preliminary planning material prepared by the staffs of the joint Commanders and could count on having available not only a considerable force of British, Canadian and US troops for the assault, but the promise of additional forces to exploit lodgements once made.

The first task of the combined staff was to select the most advantageous areas in which to effect a lodgement. This was a question of achieving a correct balance of advantage from the points of view of Naval and Air protection and of capacity of the available beaches and ports. The next task was to decide on the relative size of the assault, follow-up and build-up formations that could be organised with the resources, particularly in a landing craft and transport aircraft, given in the forecast. Consideration had also to be given the physical capacity both of Britain as a concentration base and of British ports of embarkation; for, though the potential combined Allied resources in men and material could be regarded as almost infinite, these capacities, as well as the available numbers of assault craft, placed certain limits on the size of the assault forces which cant be allocated for any one landing.

The plan, as evolved, was submitted to and closely scrutinised by the British and U.S. Chiefs of Staff and was finally approved by the Prime Minister and the President at the Quebec Conference in August, 1943. After that, the Chief of Staff was instructed to proceed with active preparations for the implementation of the plan pending the appointment of the Supreme Commander. One of his first tasks was to convert his Planning Staff into a fully integrated operational and administrative headquarters for the Supreme Commander, when appointed. This was accomplished by the end of the year. In the meantime, active administrative preparations in conformity with the approved plan were accelerated, and much work was

done in connection with the training of the forces, the co-ordination of supporting action by Air and Naval forces prior to and on the day of invasion, and the development of the offensive after beach-heads had been secured.

"Tactics for Assault."

An assault on an enemy held coast differs from an offensive against enemy positions in a land theatre in that the assaulting troops arrive in the face of the enemy in abnormal, bunched, tactical formations imposed on them by the vessels in which they are carried. Further the attack cannot be preceded by the normal artillery preparation. In consequence, craft must be designed to give the best possible deployment on the beach and means must be devised to replace the fire support which the assaulting troops cannot themselves provide.

The tactical problem grows more complex as the size of the assaulting force increases. An Infantry Battalion can be transported in a simple type of landing craft from which troops can wade ashore, but their transport cannot be so landed, nor can tanks, or artillery. Hence the evolution of the manifold types of special landing craft and landing ships designed for the transport of infantry, tanks, vehicles, guns and stores. Differing widely in size these craft - in whose design the Admiralty and Combined Operations Headquarters collaborated - had all a common functional purpose, namely, the most rapid deployment of assault force and of its supporting weapons and material.

For an operation dependent upon the effective use of assault craft, equally specialised training of the assault forces was essential. During 1941 and 1942 a number of training centres had been established for the training of forces taking part in raids and in such operations as the landings in North Africa and Madagascar. But it became abundantly clear to the Combined Staff, early in the summer of 1943, while the plan was still being prepared, that much more would be needed for Second Front operations. In consequence, and with the active co-operation of the civil authorities, a number of special Training Centres, for the use of both British and American forces, were organised on the coasts of BRITAIN, involving the clearance of many square miles of populated countryside so that live ammunition could be used by Navy, Army and Air in combined exercises. Here higher training on the Battalion, Brigade and Divisional basis was carried out to supplement the initial basic training given at the old Combined Training Centres.

It was not merely assaulting infantry who had to be rehearsed in their tactics and made familiar with the use of many special weapons, which have been developed - a "Back-Room" story which cannot yet be told. In the various Training Centres RE personnel found replicas of every known defensive device used by the enemy and practised their destruction, learning in their turn the use of equipment whose nature at this stage cannot be described. Similarly Signal Units were rehearsing in the improvisation of the most satisfactory communication nets for a beach landing, while drivers of tanks and supply vehicles became practised in methods of embarkation and in driving vehicles from assault craft on to the beach. Finally, all the tactical problems involved in so loading craft that men and material could disembark at the right time and in the right tactical order on the beach had to be worked out and the lessons learnt in the MEDITERRANEAN AND PACIVIC mastered.

Pari Passu with the training of sea-borne assault forces the training of British Airborne Forces, both parachutists and glider-borne brigades proceeded intensively. Apart, moreover, from the organisation of Airborne Formations with their specialised weapons and methods of supply, much work had to be done in devising and perfecting means of co-ordinating on the army's side the necessary link between the ground forces and air support.

The Supreme Commander

The plan elaborated by the Combined Staff was naturally subject to final revision and approval by General Eisenhower, who assumed in January, 1944, the appointment of Supreme Commander. A further examination was then carried out to check and revise the original forecast of resources made in 1943.

On this final firm basis the Army Staffs of various levels, right down to units, worked out their detailed plans in collaboration with corresponding Naval and Air Staffs. It was during these las few months that the final intricate co-ordination of action by all three Services was completed down to the last detail.

It remained for the Supreme Commander to make the final decision as to the precise date of the assault and to give the word to set in motion the whole intricate machinery which had been built up during the preceding years, some idea of which is contained in the following account of the administrative side of the plan.

B. THE ADMINISTRATIVE SIDE.

The layman might easily suppose that in an operation such as the invasion of Western Europe the Administrative Staff are brought into the picture only after the General Staff, under the direction of the Force Commander, have worked out in more or less final form the plans of attack. Actually, as has already been indicated, this is not so. In the plann ing of the operation, even in the earliest, most tentative stages, intimate contact between the General Staff and the Administrative Staff was essential in order that strategic and tactical intentions might be tested step by step by the yard-stick of administrative feasability.

Not only so. Years ago, when the invasion was still an optimistic idea rather than a definite project, the staffs responsible for the availability of "material" in the widest sense, had to plan designs and arrange provisional demands on production schedules. Weapons, and equipment, transport, ammunition, food and petrol were all fields in which long pre-estimation of the needs was necessary, while plans had to be devised, far ahead, by the Transportation Branch, whose responsibility it would be to rehabilitate port and railway communications in the rear of the invading forces.

With this in mind, let it now be assumed that the operational plan has taken provisional shape. That is to say, the General Staff are now in a position to answer the three questions on which the Administrative Staff must base their own planning. These three questions are: Where? When? and In what numbers? It is for the Administrative Staff to supply the answers, from a multiplicity of angles, to the further question: How?

The first stage in administrative planning for the actual operation was the "Q" appreciation - that is, a study dealing with all the movement and maintenance problems involved in the plan of attack. This is prepared by the Movements and Operations Branches of the Quarter-Master General's Staff. In relation to a projected operation, these Branches are responsible for co-ordinating the various activities of "Movements" of Supply and Transport, and of the Provisioning Branches of the various arms and services, which have to be fitted into the master plan.

Speed and Regularity

The object which the Administrative Staff had to keep in mind may be stated in simple terms. It was to place the assaulting force in a position to attack the enemy and to ensure the synchronisation of its impact on the enemy with a smooth flow of supporting reinforcements of men and material. The attainment of this object - assuming that supplies of weapons, ammunition, vehicles and food have been organised in advance, together with the requisite shipping tonnage for an amphibious operation - involved a task of planning and organising which falls into four phases:-

(i) Formations must be concentrated in an area reasonably adjacent to the points at which they are to embark for the overseas theatre. This area must be cleared to some extent of its normal military population.

(ii) The concentrated troops must then be moved into marshalling areas, where they are divided into assault troops, 1st reinforcements and follow-up "residues" and then split into unit parties and craft loads for embarkation.

(iii) The assult flight, with the "follow-up" wave and a steady increment of "build-up" reinforcements on their heels, must be transported by sea to the target area.

(iv) The force which secures the bridgehead must be sustained by a maintenance flow of ammunition, supplies and stores of all kinds. In relation to each of these phases, the essence of administrative planning was to secure an even regularity of movement and to avoid bottlenecks; and this, in turn, depended upon foresight and organisation, in relation both to the capacity of the beach-head - complicated in Western Europe by the magnitude of tides - and the rate of "lift" which could be attained, having regard to shipping tonnage available and both railway and loading facilities in the United Kingdom base.

For example, faulty calculations might lead to an awkward bottleneck if more troops or supplies arrived off-shore than could be disembarked within the period planned for their unloading. Such a development would obviously throw out of gear the estimated speed of shipping "turn-round", on which the build-up of the Force depends. Similarly, the planned rate of flow of personnel to embarkation points must be regulated to conform precisely with the readiness of craft on which to embark. Again, the flow of reinforcements, both men and material, a break in whose smoothness might jeopardise the very existence of a landing Force, in conditional upon "marrying"

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exactly the projected numbers of troops or tonnage with the rolling-stock and harbour berths at 'Movements' disposal. It must be remembered, too, that in all shipping plans provision had to be made for estimated return movement of casualties, prisoners of War or refugees.

As an illustration of the need for absolute accuracy in planning and execution on the administrative side, it might be pointed out that the unforeseen addition of 50 men to a particular rail movement might mean the addition of an extra coach to the planned train; that this addition might make the train-load too great for the locomotive's capacity; and that, in consequence, the time-table of a whole series of connected rail and shipping movements might be thrown out of gear.

Maintenance The Crux.

Before going, however, into the arrangements which have to be made for the concentration, marshalling and embarkation of the assault and following forces, it may be convenient to consider at this point in somewhat greater detail the crucial problem of maintenance after the first objective of the assaulting forces - the capture of a beach-head - has been achieved. It is on the successful implementation of maintenance plans - subject, as they are, to every imaginable kind of interference from acts of God and the King's enemies - that the operation, on the administrative side, really depends; and these plans began to be executed long before the assault force was concentrated for its task.

In relation to maintenance, the first need is to predict, in the light of past experience, what the probable needs of a numerically expanding force are likely to be, within a period of, say, seven days, having regard to the estimated nature of the operations, in terms both of projected rate of movement and expected intensity of fighting. This estimate, upon whose soundness much depends, is made in the first instance by the branches of the Force Commander's staff concerned with provisioning the various arms of the service. T hey have before them, as a firm basis for calculation, the numbers of men, tanks, guns and vehicles which it is hoped to land day by day; but though ration requirements (i.e.,food) are a relatively simple calculation, estimation of the probable expenditure of ammunition and consumption of petrol involves highly expert judgement, and the minimum requirements in the way of Ordnance replacements and spares of all kinds, and of such engineering stores as, say, bringing material, call for a very exact appraisement both of probable enemy resistance and of the nature of the terrain. Still more difficult, and subject to even more incalculable factors, is the task, which has next to be performed, of estimating requirements for, say, the next two or three weeks. But this estimation in advance is essential to enable the various branches of the Quarter-Master General's Staff of the War Office to organise the complex movement of supplies, ammunition and stores from United Kingdom depots to the fighting men in the bridgehead.

Sea Transport.

Acceptance, of course, of the provisional estimates by the Expeditionary Force of requirements for the first two phases of the operation depends upon the availability of shipping of the requisite types. In considering the planning which had to be done by the "Movements" Branch of the Quarter-Master General's Staff (in intimate association with the Ministry of War Transport) before the shipping factor in the supply equation could be finally "fixed", it is necessary to go back a long way in time. First, a decision had to be taken in the light of the preliminary "Q" Appreciation as to which types of shipping, other than the special assault vessels operating under the White Ensign, would be required both for the conveyance of "follow-up" and "build-up" personnel, and for the transport of maintenance supplies and stores. The conclusion was soon reached that for the assault stages of the invasion it would be necessary to rely predominantly on coastal shipping. That is, vessels would have to be employed whose draught would enable them to get as close in shore as possible, and whose size would not make them unduly vulnerable to attack by enemy aircraft, submarines, or surface vessels.

This decision taken, two questions had next to be examined. First, what proportion of the total coastal shipping in this country could be taken up for the operation without either placing an intolerable burden on internal rail transport, or depriving essential services, such as river-side power stations, of necessary supplies of coal? Secondly - again having regard both to the minimum needs of civil industries and services geared to the war effort and to naval requirements - how many loading berths could be made available and to what extent could the existing availability of berths be supplemented by the construction of special "hards" or other improvised berthing ..

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facilities on the coast? Finding the answer to this question involved a long and meticulous reconnaissance both of ports and beaches.

Next, loading facilities having been provisionally ascertained, plans had to be marked out in detail for the movement of coastal ships, after requisitioning, to the selected ports and other points of loading. Factors which had to be borne in mind at this stage of planning were that small coastal ships have widely different ranges of voyage practicable without refuelling, and very different draughts, both when empty and when loaded with commodities of different types. Moreover, in the "marrying" of ship and port, a further complication was that Allied Continental shipping, which formed a considerable proportion of the available fleet, had so far as possible, for administrative reasons, to be concentrated in single ports, rather than be widely dispersed, for loading.

The positioning and routeing of the fleet provisionally fixed, the final work of planning which had to be perfected might be described as an interpretation of the fleet's gross tonnage in terms of potential discharging capacity at the beach-head. It must be remembered that two ships of the same tonnage will often have very different dead-weight capacities, varying according to the ship's construction, and type of hold and deck space in its design. Not until many elaborate calculations had been made, checked and re-checked, was it possible to arrive at an approximate figure of the numbers of men and tonnage of stores which could be brought to the vicinity of the bridgehead on the heels of the assault, while the rate of discharge to the beach depended upon a further factor - the varying capacity from the ship to shore of D.U.K.Ws and the "dumb" and power-operated barges which also had to be procured and adapted in advance for invasion purposes.

Simultaneously, of course, with the planning outlined above, long-range plans for the direction and movement of ocean-going shipping, affecting routes all over the world, had to be made - remembering always that, even during the peak of the invasion, Britain's general war imports must be maintained and the needs of American forces provided for. As these plans, however, related to the future progress of the campaign rather than the initial stages of invasion, and as the planning and executive authority (once the relevant military date had been provided) was the Ministry of War Transport, they fall outside the scope of this story.

From Depot To Ship.

When shipping and beach capacity for the first stages of the invasion was balanced against the estimated maintenance requirements of the Force, some adjustments between the two had naturally to be made, and these in turn sometimes required revision of the original apportionment between different kinds of supplies and stores. When eventually the various branches of the staff of the Force were given a firm allocation of tonnage available on a sequence of dates for their special requirements, they notified the War Office Branches responsible for the provisioning of their particular arm of the service, specifying the quantities of different categories of supplies which should make up their tonnage allocation. The Provisioning Branches, having ascertained what the loading ports were to be, then decided which depots were to meet the requirements.

After that, the organisational task reverted to the Quarter-Master General's Branch: that is, Movements had to plan the exact time-table and routeing which stores should adhere to in their passage from depot to loading port. This aspect of administrative planning involves in the first instance the building-up of skeleton time-tables for use between every depot and every port. These, when filled in, give details of the depot, times of special tains' departure from the depot and arrival at the port, the code number of these trains, the maximum number of waggons each can pull, and the route by which the journey is to be accomplished. The immensity of the organisation required can be judged from the fact that for the mounting of the ladning of the First Army's expedition to North Africa over 1,000 special trains had to be provided in this country, as well as over 15,000 additional waggons on regular freight tains.

Stores for maintenance in the first phase of the operation - were naturally preloaded, the shipping being dispersed as a precaution against enemy attack in many ports. At this point complex administrative problems arise. Not merely are the cargoes destined for disembarkation at a number of different points in the bridgehead or bridgeheads, but, for the first few days of the invasion, when numbers of fighting men, guns and vehicles are increasing as rapidly as possible and the volume of maintenance shipping is subject to certain limitations, it is vitally important that the flow of supplies should be evenly balanced as between different categories. That is to say, a situation must not arise in which on one day nothing but ammunition arrives, so that the troops remain hungry; nor will the operation work smoothly if on the next

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day there is a glut of rations but an acute shortage of, say, materials which the R.E. require to overcome tactically important obstacles.

Hence, for the early phases of the maintenance of the bridgehead, every ship had to be loaded with a mixed cargo - so much food, so much ammunition, so much signals equipment, so many engineering and ordnance stores, and so much water and medical supplies, not forgetting the fact that the Army is responsible for transporting for the R.A.F. materials needed at any airfields captured or constructed. Furthermore, in planning the arrival at the bridgehead of various Ordnance and engineering stores, priority had to be determined in relation to the degree of importance of tasks foreseen.

Finally, an additional factor which the administrative planners had to bear in mind was that the vessels employed would inevitably not all be of the same capacity. Thus, though three vessels might begin unloading at the same time, the cargo in the last hold of vessel No. 1 might be ashore a day or more before the unloading of vessel No. 3. was complete, so that if allowance were not made for this factor, the evenly balanced inflow of supplies of different categories would be dislocated.

Bearing always in mind that an adequate margin for loss by accident or enemy action has to be provided, it will be seen that even on broad lines the task of organising the pre-loading of maintenance shipping for the first phase of a sea-borne invasion is complex. In detail, it calls for an immensely elaborate organisation. A single pre-loaded ship may include many hundreds of categories of different sorts of supplies and stores. Originally these would be assembled in a multiplicity of specialised depots; hence, many months before the invasion it was found to be advisable to pre-stock carefully sited depots, organised on what be termed a "Departmental Store" basis, covering the widest possible range of essentials. Thus the complexity of rail and road movement was to some extent reduced. Even so, however, the cargo for one relatively small pre-loaded ship might emanate from, perhaps, 20 different "departmentalised" depots in the United Kingdom.

Crated in accordance with a packaging technique perfected by the experience of nearly five years of war, the supplies duly moved from depot to loading port, some by train, others by road. As loading proceeded, it was often found that last minute modifications to the plan were required, since it is practically impossible to foresee with precise exactitude how many packages of different shapes and sizes and weighing, say, 500 tons, will go into a particular ship of that theoretical capacity. Thus, particular stores, shut out from one ship, might have to be rushed to another ship in a different port.

So much for pre-loading of planned maintenance. For the second phase of the operation the organisation of supplies and their movement from depot to port also had to begin long before the first of the assault troops set foot on enemy soil. After that, though volume of traffic grows, and places an increasing strain on transport, the problem is simpler in that, gradually, uniform cargoes can be loaded, and eventually daily shipments will depend upon periodic notifications from the Force of its requirements.

The Force's Material Needs.

After this sketch of the general framework within which the detailed planning for the maintenance of the invasion Force had to be worked out, it may be convenient next to consider the various material requirements whose provision had to be arranged for and whose movement had to be co-ordinated. Responsibility in this field - excluding the R.A.M.C.'s province - is divided between the Supply and Transport Branch, Ordnance and the Provisioning Branch of the R.E. The first-named Branch is responsible for seeing that the Force receives not merely food and water, but also the petrol to enable it to move and fight. The Ordnance Corps and the R.E. Provisioning Branches between them cope with all the other material needs of a fighting force except medical supplies.

The immense problem of the general procurement and co-ordination of food supplies for the British Army, whether located at home or in its many overseas theatres, falls outside this story. It is also impossible to deal here with the part played by the Ministry of Food through the Merchant Navy in conveying food from all quarters of the globe, and in balancing the needs of the civilian population with military requirements greatly increased (in terms of United Nations' "food strategy") by the despatch of large U.S. Forces to Western Europe. The intention of the following paragraphs is to indicate briefly the nature of the special planning and advance organisation which had to be carried out to meet the particular needs of an opposed invasion of Western Europe.

In connection with any operation starting from this country and involving the

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deployment of a Force in a theatre overseas, the Supply and Transport Branch of the Staff has to plan and organise the provision of the R.A.S.C. supply units which will eventually form the link between the base port across the sea and the soldier in the front line. These units include port organisations concerned with the unloading of vessels, the base supply depots and their forward distributing depots up the lines of communication, together with field bakeries and butcheries and their vehicles. The scale on which these units must be planned depends obviously on the size of the force, and whether the projected theatre can reasonably be relied upon to provide both water and such foodstuffs as fresh vegetables and potatoes.

The procurement of the bulk supplies which will eventually flow into this mechanism overseas, the building-up of reserve depots from which they will be drawn in this country, and the advance notification to Movements of the tonnage for which rail, road and water transport will be required - all this involves long-range planning of meticulous accuracy. In particular, it must be borne in mind that whereas reserve depots of ammunition and other Ordnance and Engineering stores can be built up over a long period with simple safeguards against deterioration by weather, many bulk foodstuffs are definitely perishable goods, so that the turn-over and replenishment of stocks must be arranged for to prevent wastage.

So much for the long-range planning required for the eventual maintenance of a Force overseas in respect of rations - in addition to which, it should be appreciated, the Supply and Transport Branch is also responsible for the provision of those hospital supplies which give sick or wounded men suitable "comforts" in their diet. In the case, however, of opposed landings, involving the deployment of large forces, and their maintenance for possibly a considerable period over beaches, a factor which the Supply and Transport Branch had to reckon with in their arrangements is that, particularly in the early phases of the operation, it would be essential to conserve shipping space and to devote as much dead-weight capacity as possible to the conveyance of personnel, fighting vehicles, weapons, ammunition and special operational equipment. Field bakeries, and butcheries, with their cold storage plants, and the field kitchens which units must take forward with them if bulk supplies are to be converted into satisfying daily menus, are bulky and require much shipping space. Hence, for the present invasion, to an infinitely greater extent than that necessitated by any earlier overseas operation in this war, it was realised by the Supply and Transport Branch that, for a considerable period, maintenance of the force across the sea must depend upon types of rations economical in shipping and vehicle space, and involving the minimum of cooking. To meet such operational needs much thought and experiment had been put into designing different forms of packed rations, regard being had both to their nutritional value and to their immunity from damage in the peculiarly difficult conditions accompanying and immediately following beach assaults.

Special Ration Packs.

Here it may be useful to interpose a brief description of the different types of ration packs which will figure as mute dramatis personae in this story of the supply arrangements for the Invading Force.

First comes the 24-hour ration pack. This is designed specially for the day of the assault, and is issued separately to each man together with a Tommy cooker and its patent fuel. It has a high calorific value (4,000 calories), though its gross weight, in a waxed cardboard container, is less than 2¼ lbs. It comprises pressed blocks of pre-cooked dehydrated meat and of rolled oats with sugar and fats, together with a compressed block of tea, sugar and milk powder. (The meat and oatmeal blocks can be gnawed dry if water is not available). Other ingredients are chocolate, boiled sweets, chewing gum, sugar tablets and meat extract cubes.

Then, there is the composite pack, familiarly known as the Compo. Made up in seven different types, the Compo pack comprises different assortments of canned meat, fish, vegetables and fruit, jam and margarine, sweets and chocolate, biscuits and cheese, tea-sugar-milk powder, salt, cigarettes, matches and soap. Having a gross weight of about 64 lbs., it provided one day's ration for 14 men with a calorific value of 3,590 calories per man per day. Somewhat similar in composition, but made up in two, three or five men packs according to the size of tank crews is the reserve ration pack carried in armoured fighting vehicles for emergencies.

Next, there is self-heating soup and cocoa, brought rapidly to boiling point by igniting chemicals in a tube-shaped cylinder within the tin; and, finally, the "Bag" ration, which consists of sweet biscuits, chocolate and chewing gum - the first two commodities to be consumed by troops while waiting for embarkation, the last designed as a remedy for sea-sickness.

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In the making of the Compo pack on which, except for the first stages of the assault, the Expeditionary Forces, will rely until (it may be many weeks ahead,) utilisation of bulk supplies can be organised, it will be appreciated that heavy demands on the tin - plate industry were involved - one instance of the help which the civilian population have given by self-denial to the invasion.

Meals for the Assault.

With these types of ration in mind, we can proceed to a brief review of the more detailed supply planning which had to be put in hand when the invasion's administrative project had definitely crystalised. This planning falls logically into four phases - the concentration, the marshalling, the sea passage, and the maintenance of a Force in a bridge head.

The plan adopted for the feeding of the Force in the concentration area was that units should draw and cook their own rations in the normal manner, supplies being obtained from depots in the various home Commands concerned. Though, however, the total number of troops which had to be supplied in the United Kingdom was not affected by concentration, the redistribution in the location of divisions and other formations involved considerable problems. For example, special trains for the conveyance of potatoes from certain areas had to be arranged for to cope with the increased demands of certain Home Commands. Special arrangements for the supply of meat had also to be made with the Ministry of Food. By the time concentration was complete, all formations had also to be supplied by Command depots with a pre-determined number of days' Compo rations to be carried in their vehicles, first or second line.

The next supply arrangements which had to be organised were the provision of rations to be specially cooked and supplied to troops during their stay in the marshalling area - the period of stay being estimated to vary from hours to a considerable number of days. In the marshalling area all troops were to be issued with their landing rations, consisting of two 24-hour rations, complete with Tommy cooker, a normal emergency ration, a tin of 20 cigarettes, and a water - sterilising outfit. They had also to be issued with the "Bag" ration for consumption during the move to the embarkation point or while awaiting to embark.

Next, plans had to be made and implemented for victualling the assault craft and "follow-up" ships, other than those for which the Navy or the Ministry of War Transport would be responsible. Two sets of rations had to be placed on board, those to be consumed during the passage (careful allowance having been made for unforeseen delays) and those consisting of a reserve ration to be touched only in case of emergency.

Finally, the pre-loading of rations and hospital supplies on the general principles already described for the maintenance of a Force in a bridgehead had to be fitted, with the demands of other arms and services, into the general 'Movement' picture. As Supply reserve depots of food are normally less specialised - i.e. more comprehensive in their range of stocks - than those of Ordnance or the R.E., special "invasion" depots did not need to be organised in quite the same way but in view of the strain which it was foreseen there would be on rail transport immediately before and during the early stages of the invasion, plans had to be worked out whereby, through a careful selection of depots, rail movements could be reduced and simplified.

The part played by Home Commands in implementing the plans in relation to concentration and marshalling areas is reviewed in later paragraphs. To assist Commands in that task, however, special supply detachments had to be organised and lent both to marshalling areas and to personnel embarkation points. Other R.A.C.S. detachments had to be located, at the many ports in which maintenance supplies were to be loaded, in order to ensure that no hitches occurred and that, so far as is humanly possible, no oversight or ommission should lead to a fighting man going into action hungry.

Wheeled Transport.

Though it is still as axiomatic as it was in Wellington's day that an Army marches on its stomach, the magnitude of the role now played by mechanical transport in the maintenance of armies is sufficiently well-known to need little fresh emphasis. The design and planning of the Army's road transport services are cared for, like the supply of food, by the Supply and Transport Branch of the War Office in conjunction with the R.A.O.C. In terms of vehicles, few Branches were required to begin at an earlier date their planning for the "Second Front".

In the first place, even in relation to what might be termed normal supply vehicles

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the production programmes had to be settled and put in hand years before the invading force was finally assembled with all its transport. Not merely was it necessary for the Supply and Transport Branch to make long-range provisional forecasts of the numerical strength of the Force which might be employed, but, since different types of supply vehicles are more suitable for one country than another, it became necessary (long before the decision as to the target areas of the invasion was taken) to make provision, in planning demands on production programmes, for the more likely eventualities.

A further problem which had to be solved was that involved in the decision (taken for reasons already described) to use small coasters predominantly in the maintenance of the bridgehead for a considerable period. This decision, with its inevitable reaction on the availability of internal rail transport both for Service and civilian needs, meant that great dependance must be placed on inland road transport for the conveyance of supplies to loading ports both before and during the progress of the invasion.

Years ago, it was foreseen by the Supply and Transport Branch that the policy (whose soundness no-one questioned) of economising in the consumption of petrol by concentrating freight traffic so far as possible on the railways, even for short journeys, might result in such a curtailment of civilian road industry that this industry would not have the necessary resilience to cope with the sudden added strain of invasion needs. In collaboration, therefore, with the Ministry of War Transport, steps had to be taken long in advance to safeguard against such an eventuality without the adoption of measures which would result in uneconomic petrol consumption. It became, in short, one of the Army's responsibilities to try to ensure that the civil road industry would be able to play its part in the maintenance of the invasion in circumstances in which it would be necessary to concentrate military vehicles to an increasing extent on the actual movement of the Expeditionary Force, with its supply train, overseas.

Finally the question arose of foreseeing the special types of vehicle which would be required for this particular operation, and of developing their design and production. Certain vehicles, such as the tank transporter, may be said to have been developed primarily for use in the campaign in North Africa, but Western European eventualities were even in this case also prominently in mind. The vehicle, however, which has place of honour in the special provisions made by the Supply and Transport Branch for an invasion of Western Europe is the D.U.K.W., that is, the amphibious lorry, whose function it is to transport personnel and supplies from ship to shore and to convert itself instantly on reaching the beach into a land vehicle. The use made in operations against Sicily and the Italian mainland of a considerable fleet of D.U.K.W's was essentially a reh earsal for an assault on a much larger scale against the West of Europe - the purpose to which they owe their original conception.

For the manning of D.U.K.W's, extensive water-training of R.A.S.C. personnel was necessary, while special motor boat companies operating fast launches had to be organised for work in connection both with beach and port unloading. In addition, like all unit drivers, the drivers of normal R.A.S.C. supply vehicles had to have systematic instructions in manoeuvring lorries through comparatively deep water from assault craft. Finally, in connection with the operations of airborne divisions, the task fell to the Supply and Transport Branch of organising and training special Teams for the expert work of stowing, and ejecting from aircraft, supplies needed for the maintenance of troops engaged inairborne assault.

"Juice".

In the maintenance both of fighting and supply vehicles - to say nothing of special equipment vehicles and of the emphibious D.U.K.W 's and other ferry craft- the provision of petrol, oil, and lubricants is an essential element for which the Supply and Transport Branch of the War Office is also responsible. As in the case of food and road transport services, the operational planning for invasion had to be interpreted at an early stage of planning in terms of P.O.L. requirements, which, even in the early phases of the operation may represent over 1/3 of maintenance tonnage. Between bulk reserves, moreover, held in the United Kingdom and the "fighting and other vehicles operating in the bridgehead, an elaborate chain of organisation had to be planned and made ready by the Supply and Transport Branch.

First, a forecast had to be made of requirements in petrol containers, not merely for the assault, but for a considerable period thereafter. Means would probably not exist at first of landing bulk supplies direct from ship to lodgement areas. Consequently, reliance would have to be placed on packed P.O.L. For this purpose, so far as petrol is concerned, it was decided that the staple means of conveyance in the early ...

stages of the assault (so far as the final stage of transport up to units is concerned) in all stages of operations, should be the 4½ gallon Jerrican - a model based on the container used by Rommel's Army in North Africa.

The next step in the planning of P.O.L. supplies for the invasion consisted in the selection, very many months ago, of sites for reserve depots of pre-packed containers in the United Kingdom, factors governing their selection being accessibility to the designated loading ports and suitability from the point of view of protection against enemy air attack. Of the many depots built up by the Supply and Transport Branch for this purpose some have a capacity considerably exceeding 30,000 tons of packed containers.

Then came the planning of the supplies immediately required by the invading forces. For the early phases of the operations, P.O.L. had to be pre-loaded, like other supplies, in accordance with the previously agreed estimate of requirements. But in the case of P.O.L., the Supply and Transport Branch also had to devise means whereby D.U.K.W's and ferry craft plying between ship and shore should be assured of adequate supplies of fuel and lubricants.

The picture of organisation, planning and training in this field requires to be completed by a brief reference to the creation of special R.A.S.C. petrol units, whose duties range from the filling of containers to their repair, from the driving and maintenance of the bulk petrol vehicles (which in due course replace the Jerrican in the rearward areas of a theatre of operations) to the conveyance of oil from ocean-going tanker to shore and the operation and maintenance of bulk installations and reserve depots.

"Warlike" and Engineering Stores.

The next main category of the Force's material needs which has to be considered is the immense range of "Warlike Stores" which come within the purview of the Royal Army Ordnance Corps. These include not merely ammunition of all types, but stocks of clothing and accoutrements, Signals equipment, certain R.E. stores, replacement tanks, guns and other weapons, together with a multitude of spares required for the maintenance and repair both of "fighting" and other vehicles. The total range of Ordnance stores held in this country runs into more than half a million different items - a figure sufficient to illustrate the complexity of the organisation required in building up the chain of supply between the Ordnance depot in the United Kingdom and the individual fighting man or vehicle in the front line.

It would be inappropriate here to attempt to give a complete picture of the Ordnance organisation planned for the various stages of the overseas lines of communication which it is hoped eventually to establish. This is a story which can well be kept for later telling. So far as the initial phase of the invasion of Western Europe is concerned, the immediate task of Ordnance was two-fold. On the one hand, special "invasion" depots, together with transit depots, had to be organised from which to draw, both for pre-loaded "build-up" craft and for the immediate needs of the assault brigades, those items from the encyclopaedic Ordnance list which, it was judged, would be operationally essential for opposed landings.

This done, and the flow of Ordnance stores to loading ports organised in accordance with a Movements time-table, the next task was to devise and equip a special organisation to operate as a "first flight" of maintenance on the beaches. This organisation takes the form of the Ordnance Beach Detachment, whose task it is to deal with what is known as the assault Force's "Landing Reserve". This consists of specially prepared boxes of stores which can be easily handled over beaches and contain estimated essentials, i.e. weapons and parts of war equipment which units must be able to reply upon during the initial assault.

As the bridgehead grows in size, the "Landing Reserve" is gradually built up into a wider range of Ordnance stores, entitled a "Beach Maintenance Pack". Thereafter the development of the projected Ordnance supply chain depends upon the course taken by operations.

A further point of organisation required for the initial assault was to ensure that every unit and formation would be aware of precisely what Ordnance stores would arrive at beach-heads at various stages, so that transport should not be sent back from fighting units on fruitless errands.

The provision of certain stores is the responsibility of the Royal Engineers and not of the Royal Army Ordnance Corps. These mainly comprise either stores of engineers'

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origin used by other arms - for example, crawler tractors (bulldozers) - or heavy constructional engineering machinery and Transportation material such as lighters, cranes and rolling stock. The organisation planned by the R.E. for the despatch and unloading of these stores resembles that already described in the case of Ordnance.

The R.A.M.C.'s Part.

The picture of the Services which cater for the needs of the invasion Force would not be complete without reference to the plans which had to be made by the Army Medical Department for dealing with casualties.

It does not fall within the scope of this account to describe the eventual elaborate organisation planned for the evacuation of casualties when the extent of liberated territory becomes sufficient to permit the establishment in the overseas base of General Hospitals, with its normal "foreward" system, going up, through Casualty Clearing Stations, Divisional Field Dressing Stations to Advance Dressing Stations, Casualty Clearing Posts and Regimental Aid Posts. For this organisation much planning and pre-arrangemen of equipment and transport by air, road, rail and sea, was necessitated, while numerous hospitals in Britain had to be cleared, so far as it was deemed necessary of civilian patients in order to meet estimated military needs.

For the assault, however, and the early stages of the campaign, much special medical planning was required in order both to ensure the arrival (by air or sea) of needed medical equipment, supplies, blood plasma, etc., and also to make the best possible use of returning transport - aircraft or ship. For some purposes arrangements were made to adapt modified landing ships as casualty carriers; and to cope with a situation in which the invading Force might have advanced some way inland but no rail traffic could yet be organised, provision had to be made for specially fitted lorries to supplement normal ambulance convoys in casualty clearance.

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2. MOUNTING THE ATTACK

We have so far surveyed briefly the elaborate planning and organisation which had to be carried out in order to ensure that when the Assault Force had effected a landing, its reinforcement and maintenance should not suffer from any failure of supplies. Before going on to a description of the actual administrative mechanism which had to be put into operation to launch the assault, a word must be said about the work which had to be performed by Home Commands and Districts (the basic military organisation in Britain) in connection with the preparation of the "springboard" - that is the concentration and marshalling areas from which the Expeditionary Forces would proceed to their allotted embarkation points.

Tasks of Home Commands

In the first place, Command staffs had to arrange for the provision of requisitioned buildings or tented camps - involving much work by the R.E. and Pioneer Corps - for the reception of each "invasion" division on its arrival in the concentration area. On completion of its journey, undertaken partly by road and partly by rail in accordance with the timetable arranged by "Movements" and involving the provision of staging camps for road parties en route, each division had to be provided with special instructions, giving a guide to all local supply depots and welfare facilities.

In the concentration area, as already stated, formations drew supplies and did their own cooking in the normal way, but an immense amount of detailed work had to be done by Commands in executing the plans for feeding greatly increased numbers of troops and in seeing that all discrepancies in equipment and stores were made good, all boots "vetted", and all vehicles brought up to full-scale. At this stage, moreover, the waterproofing of vehicles had to be carried out - an aspect of invasion-organisation which may appropriately be dealt with at this point, and which brings us to the work of yet another branch - the Royal Electrical and Mechanical Engineers.

Waterproofing

As already indicated, an essential part of the plan of attach was the assault of beaches and the maintenance of the invasion Force over them for an indeterminate period. This meant that many thousands of mechanical vehicles had to be waterproofed. Secondly, mechanical provision had to be made for the employment of numerous special weapons designed for the assault; and, lastly, steps had to be taken to ensure, so far as is humanly possible, that the progress of the mechanical equipment of the invading forces from concentration area to marshalling area and from marshalling area to embarkation point was not impeded either by the breakdown of vehicles or by road blocks caused through damage to vehicles by enemy air attack.

Though the solution to the first problem - the landing of vehicles over a beach - was found in the single word "waterproofing", the development of the technique of waterproofing presented intricate problems which the Directorate of Mechanical Engineering had to solve.

As all motorists are aware, a car with a reasonable clearance can safely negotiate a shallow water-splash; and a standard 3-ton lorry, provided it is carefully driven, can proceed through freshwater of greater depth. For the purposes, however, of an amphibious operation, not merely was it necessary to cope with the corrosive effects of sea water, but tanks and other vehicles would have to be driven ashore from landing craft through water which might be rough and whose depth might well exceed the capacity of a vehicle not specially adapted.

The problem of waterproofing, moreover, must not be thought of solely in terms of normal fighting and supply vehicles. The task had also to be accomplished of waterproofing the vulnerable contents of an immense list of special vehicles ranging from office trucks to self-propelled artillery.

Many hundreds of R.E.M.E. personnel had to be dispersed in concentration and marshalling areas to deal with waterproofing and the task of urgent recovery and repair of vehicles which might develop mechanical faults or be damaged by enemy action on the way to the embarkation point. In addition, much work, of which it is not yet possible to write, had to be done by the R.E.M.E. for many months past in making special modifications to vehicles required by the plan of attack, and in the fitting to specially adapted vehicles of special weapons and devices for use in the assault.

After this digression, it is time to return to the sea-ward movement of the invasion Force, with whose well-being Home Commands, and Districts had still much to do.

From Concentration to Marshalling

To be ready for the movement of troops from their concentration areas to the marshalling areas in which preparation for embarkation had to be done, an elaborate traffic control system had to be worked out by Commands and Districts. Along each main road control points had to be established - linked by telephone with ambulance posts and vehicle recovery posts (for breakdowns), and with Civil Defence Headquarters, in case enemy action should render any road temporarily impassable. In the Commands concerned, the strength of the military police had to be more than doubled for traffice control duties, and each man "on point" had to be specially trained and briefed for his task.

Finally, when Movements set going the flow of formations from concentration to marshalling areas, Command Headquarters had to work out details, a day ahead, for all the road convoys and rail parties involved. This planning was done in a control room at each Command Headquarters, where civil police, railways and all sides of Civil Defence were represented. Provision had to be made for many contingencies: the breakdown of vehicles necessitating replacement from Command stocks; casualties of personnel, through accident or sickness, which must be made good from a specially organised local reinforcement pool; the bombing of a convoy; the last minute mislaying of a field dressing or small, but essential, piece of equipment. In the control room, an illuminated map showed the progress of every convoy along the road in its passage to the demarcation line between concentration area and marshalling area - a line represented by what are known as "Road Convoy Regulating Points".

The Work of Signals

This is perhaps an appropriate place at which to interpolate a note on the immense work which had to be done by the Royal Corps of Signals in preparing for the invasion. They had not only to meet the demands of the British army, but also had to plan and execute (with the loyal collaboration of the G.P.O.'s depleted staff), the greatly expanded network required for the U. S. Forces in the United Kingdom, and for the communications of Supreme Headquarters. This involved the putting into operation, since 1942, of thousands of new circuits, and the installation of millions of miles of telephone wire.

Of particular importance, in order to ensure that no bottlenecks developed through faulty communications, was the provision of an elaborate communications network in the concentration and marshalling areas. At the Headquarters of each marshalling area, a considerable telephone exchange had to be established, with a smaller exchange in each subsidiary headquarters in the camp. Moreover, as a means of giving instructions to troops as to marshalling arrangements, the Signal Corps had to provide and man many scores of static and mobile loud-speaker equipments in the marshalling areas.

Marshalling the Force.

The reasons why special marshalling areas had to be provided for the invasion have already been adumbrated, but call now for perhaps fuller explanation. In the case of the despatch of an army on a long overseas voyage which is to end in an attack (for instance, the expedition of the First Army to North Africe), large ocean-going transports are employed, on some of which a complete Brigade can be accommodated. The final tactical dispositions of the troops for an assault performed by landing craft are, in fact, made on board ship. For shore-to-shore attacks, however, the tactical loading of the assault craft has to be done before embarkation.

The principle, as has been shown, is that the first wave of the assault should land as far as possible in the form of self-supporting combat teams. Furthermore, even in the case of following "fights", it is desireble that risks from enemy action during the passage should be spread by distributing among the assault craft infantry, gunners, sappers, and so forth, so that - whatever casualties might occur during the passage - it would still be a "balanced" assault force, its parties trained to regroup quickly into their own formations, which

reached the enemy shore. And this applied also to subsequent "build-up" personnel and material.

Accordingly, the function of the marshalling area mechanism - known popularly to Movements staffs as the "mincing machine" - is to break up units (battalions, armoured squadrons, batteries and so forth) into unit parties, varying numbers of which will make up a craft load.

Many months before 'D' Day for the invasion was even approximately fixed, much work had to be done in the planning and organisation of the marshalling areas, whose various sizes depended on the capacity of the embarkation area they were to serve. Their sites had to be selected - not too far from embarkation points to cause mechanical difficulties for water-proofed vehicles; their lay-out must be as inconspicuous as possible to the eyes of reconnoitring enemy aircraft, yet not so small as to cramp movement or cause congestion unduly vulnerable to enemy air attack. Many problems of sanitation and water supplies had to be overcome, and many new roads built or improved, before work began on the construction of the many tented and hutted camps which were required. In this work and in the construction of camps and vehicle standings, the number of Pioneer Corps personnel employed ran, at the peak, to many thousands.

"Hotel Service"

It will have been noted that, as they pass into marshalling camps, formations and units lose their identity and become simply "parties", the serially numbered components of craft loads. That is, they are no longer self-supporting as they were in the concentration area; They lack means to draw and cook rations. Each camp, therefore, had to be provided with a staff drawn from troops of Home Forces, to provide the men of the invasion Force with "hotel service", as well as to control tactical movement. A single camp, capable of containing, say, 2,500 men at one time, had to be manned by a "hotel staff" of a dozen officers and 400 other ranks, including 60 cooks - not a large number when it is remembered that troops would be entering and leaving the camp at all house of the day and night and that meals on arrival and departure would be called for, as well as the regular service of three hot meals a day.

Within the camp, apart from the small Control Staff of officers and other ranks working under the orders of Movements, guides had to be provided, no matter how carefully each camp was signposted; for units would frequently arrive in the dark, and the essence of the mounting scheme was that not a moment's unnecessary delay should occur. Special huts or tents capable of containing a large map model had also to be installed for "briefing". Then, too, in the marshalling areas, as well as in the concentration areas, a carefully balanced organisation was necessary for providing casualty replacements either of men and material, and for the issue of various rations - "Landing", "Emergency" and "Bag" - described in an earlier section. Here, too, arrangements had to be made for the early despatch to the assault forces of special packs devised by N.A.A.F.I. to meet needs until Expeditionary Force Institutes could be established overseas.

The Mechanism of Movement.

As has been shown, the staffs of Home Commands and Districts were responsible, within the centralised Movement plan, for executing movements in detail from concentration areas down to Road Convoy Regulating Points. From there to the marshalling area, Movement Control - a local embodiment of the Q(Movements) Branch of the War Office - became responsible for the reception of troops into the marshalling camps, their conversion into craft loads and the movement of these craft loads to embarkation points. Two further sub-divisions ("Sector" and "Embarkation") of Movement Control were responsible for traffic at the "hards" and for embarkation of the Force and its assault vehicles into craft, for each of which a Unit Sheet and Ship Sheet had to be devised and prepared in advance. The Unit Sheet would show the battalion, battery or squadron Commander exactly how to split his unit into parties for embarkation in different craft, while the Ship Sheet would show the craft load Commander (who is to be distinguished from the naval Commander of the vessel) exactly what unit parties would go to make up his command.

To co-ordinate the whole movement, not merely from marshalling area craft, but seawards right from the concentration area, an Inter-Service organisation was devised bearing the name of "Build-up Control". This body had three constituent elements - three heads and antennae. One was "Turnround Control" -

- a naval staff organisation whose responsibility was the execution of "Build-up Control's" plans in terms of assault craft and shipping movement; the second was "Movement Control", with its marshalling area, "Sector" and "Embarkation" subsidiaries. The third was a detachment of the staff of the Force Commander, whose task it would be to acquaint the Force Commander with the progress of movement, and convey his wishes to the other constituents of "Build-up Control". Their job-a- day-long, night-long labour based on a great pin-pointed map showing hourly dispositions of assault craft, freight and personnel ships, naval escorts, and locations of concentrated and marshalled troops - was to execute the Commander's intentions within the limits of movement practicability.

For the first "flight" of the assault, craft could, of course, be pre-loaded at comparative leisure in accordance with plans (Known as " loading tables") prepared long in advance by Brigade and unit staffs, showing detailed tactical loading requirements to fit the needsof the plan of attack. In the case, however, of the "follow-up" forces, a flexible mechanism - much trickier for staffs - had to be evolved to permit of variations required by the development of the battle overseas, or unforeseen shipping losses. Accordingly, though a provisional priority list for the despatch of successive formations would have been drawn up before the event in accordance with the Force Commander's wishes, a system (in which spare marshalling sub-areas played a leading part) had to be devised for controlling and, if necessary, modifying movement as the situation demanded. It is over this system that "Build-up Control" during the past few days, will have been exercising unremitting supervision; and the job which it has to perform will continue for many days as the invasion forces pass on their journey from concentration camps in the green fields of England to the dust of battle across the sea.

The Landing

After the sea passage, the landing - led by the first assault waves of infantry and sappers and followed by supporting troops. Behind them again, would come the "follow-up" forces and the leading convoys of maintenance ships whose pre-loading has been described, and on board which are specially trained R. E. personnel organised by the Transportation Branch for the working of derricks and ship-to-shore barges.

Meanwhile, on shore an elaborately planned organisation would have begun to take shape, consisting of Beach Groups and their various detachments. These detachments - sailors, soldiers and marines - include personnel whose task it is to erect signs identifying each beach, marking on each the safe limits of landing and indicating wrecks, unexpected shoals and other obstructions. Other parties would immediately reconnoitre areas for the disembarking troops to assembly and reform in tactical order, and for vehicles to be sorted out. All these areas have to be marked by standardised signs.

At the same time, other parties would be setting up signal centres with wirlesss communication to the forward troops and to the Assault Force headquarters. Then would come the stores - Ordnance, Engineering, R.A.S.C. and medical. For each of these a particular section of the beach would have been pre-allocated, its location being roughly determined beforehand from maps and aerial photographs.

The whole of the organisation of the beach would be under the control of the officer designated - the "Beach Commander". He lands immediately after the first wave of the assault troops, and is responsible for seeing that each specialised section, either of personnel or stores, finds, as it lands, its right place in the beach area, and that it does not impede other sections as they come in and start on their tasks.

It was here, on beaches swept by enemy fire, in an assault against the strongest defence system ever constructed, that the test had to come of the efficacy of months and years of planning, training, organisation and rehearsals. The design born in the minds of men who saw the beaches of Dunkirk sink despondently below the horizon had in due season become an actuality. A British Army had begun its return to a Continent where, thirty years ago, British soldiers had striven with allies in the cause of freedom.

POSTSCRIPT

At this point the story of the planning, preparation and mounting of the invasion of Western Europe comes to an end. Later, more glowing chapters will be written by the ardours and endurances of the fighting men who make up the Force at grips with the enemy. The chronicle now completed is of those who, as cogs in a great machine, laboured long and patiently in the hope that they might so help the fighting men to victory.

The record, however, would be incomplete if a tribute were not paid to the many men and women, not in the Regular Army, who contributed to the preparations for the attack.

Place aux Dames

Personnel of the A.T.S. serving with the R.A.S.C., R.A.O.C., and R.E.M.E. were responsible for much of the work which had to be done in building up of reserve depots and invasion depots in this country, and for the despatch and transport of stores from depot to ship. On them - to give only a few instances - fell many tasks in the packaging of stores, in marking vehicles with identification signs, and in installing and testing wireless sets and other electrical equipment in tasks. Heavy calls, too, were made on A.T.S. personnel in the course of the great expansion of signal communications in the United Kingdom which arose from the needs of the invasion. Finally, to give one more example, 90% of the staff of the Army Blood Supply Depot was drawn from A.T.S. personnel, who worked night and day shifts during the past six months preparing special containers and outfits to be dropped by parachute.

The Home Guard

Long since, the Home Guard, formed originally to co-operate with the Regular forces in resisting an expected enemy invasion, had begun to fulfil a new function - that of releasing regular forces for operations overseas. The part which the Home Guard has thus played by supplying gun teams to supplement the regular personnel of heavy A.A. batteries, and by manning certain coast defence artillery, is familiar.

During the mounting, however, of the invasion of Western Europe, there fell upon the Home Guard a special responsibility. The possibility always existed that the enemy might endeavour, by air-borne attack on concentration areas or loading ports, to bring about a dislocation of our preparations at a moment when the Expeditionary Force was being marshalled for its special purpose and was therefore not grouped tactically for defence, and when many trained men in the Home Forces divisions were temporarily diverted to special roles in speeding the mechanism for the despatch of the assault Force.

This meant that, while the invasion was being prepared, the Home Guard in the areas of Britain particularly concerned had to be on extra duty in very many different ways. It would be impossible to give a generalised picture for each town and village. In one large town the Home Guard might be largely employed on rocket batteries. In another, their principal task might be to guard a railway viaduct or big ammunition store. In yet another it might be to patrol a stretch of open moorland suitable as a dropping zone for a small airbor attack.

All this state of readiness and training could only be achieved by careful planning and administration. To organise an instrument of defence out of the spare time of thousands of men of different occupations, leaving them free and fit to carry on essential work, was not easy. It was done.

One and All

One and All

When attention turns from A.T.S. and Home Guard to others who contributed to the mounting of the invasion, comprehensive mention becomes impossible. There were the civil police on whose shoulders added security tasks were laid, theN.F.S. and the many Civil Defence workers. There were the merchant seamen, railwaymen, road and transport drivers and dockers, without whom the army could not have been despatched. There were the farmers who, unprotesting, gave their land for training and rehearsal; the G.P.O. staffs who gladly shouldered increased toil; the anonymous millions who cheerfully accepted billetting of troops, bans on access to cherished coasts, restricted train facilities and domestic coal shortages caused by the mobilisation of so much coastal tonnage for the invasion. Above all, there were the wives and mothers who lived in coastal areas, which became for the enemy priority targets, and who stayed there because they or their husbands had essential work to do near their homes. One and all, with faith and prayers in their hearts, gave of their best that the Army might fare well.