aircraft is inevitably detrimental to these operations. I therefore consider that in any future campaign the airfield construction programme should envisage the immediate provision of at least one air transport landing strip per army and that these landing strips should be constructed so as to be capable of handling a minimum of 50-60 aircraft per hour.

452. In order to minimise the influence of the weather factor, consideration should also be given to the launching of air supply missions from forward airfields in close liaison with and, where necessary, under the local tactical air command.

Employment of Balloons in the Assault Phase.

453. I have already referred to the reasons for using balloons for protection of the beaches during the assault phase and to the results achieved by their use. Here I think it proper to mention the reasons for the final choice of the Mk. VI (V.L.A.) balloon and also some of the difficulties experienced during the planning stages.

454. Mk. VI (V.L.A.) balloons flying normally at an operational height of 2,000 feet, were chosen for this work for the following reasons:—

(i) The extreme lightness of the ancillary equipment and the practicability of using a light hand winch which could be carried ashore by crews.

(ii) The economy in operating personnel—only two airmen were required for each balloon.

(iii) No extra initial lift was required as the balloons were transported flying.

(iv) The possibility of transporting replacement balloons unmanned flying from L.C.T. and L.S.T.

(v) The comparatively small hydrogen requirements for maintenance and re-inflation.

455. During the planning stage it was realised there would be some difficulty in the employment of the balloons during the passage of the original assault forces. It was essential that balloons should not be brought in so early or at such a height as to give any premature warning on the enemy's Radar system. Inter-Service agreement was made, permitting balloons to go into the beach-head flying at 100 feet, not less than seven miles behind the assault. This height is the worst possible at which to fly a balloon owing to its inclination to dive on encountering erratic air currents near the ground. It was decided, however, after experiments on exercises that this restriction was acceptable, and in the event, no undue casualties resulted.

456. A further problem solved in the preparatory phase was the manner of transportation of the planned number of 240 balloons for the British area and 145 for the American area. As the Navy proposed to carry balloons for their own protection on one-third of the L.C.T. and all of the L.S.T., it was necessary to devise a method of flying two balloons from each L.S.T. in order to have available the planned number in the beach-heads. After several experiments, this was accomplished.

457. To provide the necessary number of inflated balloons for each craft, to maintain them during the marshalling period and during any possible period of postponement, and to replace casualties during that time, required a large number of small vessels and extensive shore servicing and hydrogen organisations at all appropriate ports. These were comparatively easily provided in England from the resources of R.A.F. Balloon Command and the Admiralty Shore Servicing Section, but it should be remembered that such facilities, if not fortuitously available as in this case, have to be arranged.

Provision of Maps.

458. The design, production and supply of maps for use by the air forces under my Command was the responsibility jointly of the War Department, Washington, and the War Office, London. Shortly after the outbreak of hostilities, the Geographical Section, General Staff, (later the Directorate of Military Survey). War Office, attached an officer to each of the principal Royal Air Force Commands, to study their requirements and to ensure adequate production and distribution of air maps. This practice was adopted for the Allied Expeditionary Air Force, a Deputy Assistant Director of Survey (British) being appointed as Chief Map Officer. Later, an officer of the Corps of Engineers, United States Army was also assigned to the Map Section.

459. Upwards of 120,000,000 maps were prepared for Operation "Neptune", of which a large proportion was used by the air forces. They embraced small and medium scale "Air" maps, maps for use in co-operation with ground forces, and an astonishing number of special maps for planning purposes, which were widely distributed to Staff Officers, mainly of the Operations and Intelligence Branches. Equally important for successful planning was the knowledge that special maps would be available for particular operations, e.g., topographical lattice maps for use in craft fitted with special Radar navigational devices and dropping zone maps for use by pilots towing gliders.

460. Headquarters, A.E.A.F. had its own drafting section and reproduction facilities were readily accorded to it by both United States and British armies. Thus, special maps required to illustrate plans, Operation Orders and Staff Memoranda could be made available, often in a matter of hours.

461. When all the Allied Air Forces were based in the United Kingdom, the normal British channels of supply were used, but once overseas, other methods had necessarily to be devised, and the supply of maps to Commands and sub-formations differed slightly as between United States and British forces.

462. Arrangements were made whereby Royal Air Force Commands should draw maps from the British armies to which they were affiliated, and in accordance with normal United States practice, formations of the Ninth U.S.A.A.F. obtained their maps under arrangements made by the Office of the Chief Engineer, ETOUSA. This provided for the establishment of a Ninth U.S.A.A.F. Map Depot, with an Assistant Deputy Engineer in charge, whose duty it was to supply all elements of that force. Events were to prove that although both systems worked well, modifications to improve the service were necessary from time to time, and on this matter I have made comments in later paragraphs.

463. During the initial phase of operations on the Continent, the Director of Survey, 21 Army