PART 4: SECTION 3

CHAPTER 3

CALCULATION OF FORCE REQUIREMENTS

Introduction

1. There are two stages in the calculation of the force requirements for any attack. Having selected the optimum missile/fuse combination for damaging the selected target element, the first stage is to calculate the density or number of missiles required per unit area to achieve the desired amount of damage. The second stage is to determine how many aircraft must be dispatched to achieve the ground density, or number of hits, required.

Density Requirement

2. The degree of damage required to achieve the purpose of the attack must first be decided. This figure usually lies between 50 per cent. and 95 per cent., the higher figure being seldom exceeded because of the enormous increase in effort involved. The density requirement, in tons per acre, for any particular missile to cause the required amount of damage can be calculated from an equation (which allows for the overlap effect of missiles) relating density to the M.A.E. of the missile and the percentage of the damage required.

3. For small targets, or where the missile must hit the target to achieve success, it is simpler to work in terms of missiles required to give an assumed assurance (usually 50 per cent.) of one or more hits on the target, rather than a density over the area. In effect the density chosen is missiles per target area, rather than tons per acre.

Force Requirements

4. In determining the force requirements, accuracy of delivery is of paramount importance. Against a pinpoint target, the force required to achieve a given amount of damage is approximately inversely proportional to the square of the accuracy of delivery. For example, if the bombing errors are halved the force required is approximately quartered. This relationship, however, steadily deteriorates with increase in target size, until when the target width divided by the anticipated accuracy exceeds approximately four the reduction in force is negligible. Accuracy is usually stated in terms of 50 per cent. *Error Radial Overall*, which is defined as follows :—

> "The radius of a circle, with the centre at the Desired Mean Point of Impact (D.M.P.I.), within which half the missiles aimed to hit the Desired Mean Point of Impact may be expected to strike."

5. **Desired Mean Points of Impact.** It may be necessary, where a large area target or a high degree of accuracy is involved, to choose more than one D.M.P.I. so as to give an even distribution of missiles over the whole target area. The distance between D.M.P.Is should be approximately twice the 50 per cent. error radial.

6. **Single Shot Probability.** From the dimensions of a target and the accuracy of delivery, the chance of obtaining a hit within the target area with a single bomb can be calculated. This figure, which is called the Single Shot Probability (S.S.P.) also indicates the percentage of all the missiles launched at a target which will fall within the target area. The value of the S.S.P. can be obtained from tables which relate the target dimensions to the 50 per cent. error radial. The S.S.P. is then used to determine the number or weight of missiles which must be launched to give the Over Target Requirement (O.T.R.) necessary to attain the number of hits or density required.

7. **Aircraft Requirement.** Having calculated the number or weight of missiles required on the target, it is a simple matter to determine the number of aircraft required by dividing the missile requirement by the missile load of an individual aircraft. Finally, to determine the number of aircraft which must be dispatched so that the required number reach the target area, an allowance must be made for ineffective sorties.

8. **Summary of Weapon/Effort Planning.** The sequence of weapon/effort planning is given below in a summary of steps :—

(*a*) Major bombing policy or directive.

(*b*) Selection of target.

(*c*) Analysis of target construction and vulnerability.

(*d*) Selection of the best weapon or missile.

(*e*) Weapon density required at the target.

(*f*) Application of accuracy equation.

*(*g*) Operational accuracy decrease factor.

(*h*) Weight or number of weapons or missiles.

(*j*) Number of aircraft required.

(*k*) Allowance for ineffective sorties.

(*l*) Aircraft to be dispatched.

*The operational accuracy decrease factor is an allowance made for the decrease in accuracy of delivery caused by enemy opposition, aircrew fatigue, etc. This figure will depend on the strength of enemy opposition in any particular theatre of war.