20. DETERMINATION OF EQUIVALENT ANNUAL DEPARTURES BY THE DESIGN AIRCRAFT.

a. Since the traffic forecast is a mixture of a variety of aircraft having different landing gear types and different weights, the effects of all traffic must be accounted for in terms of the design aircraft. First, all aircraft must be converted to the same landing gear type as the design aircraft. The following conversion factors should be used to convert from one landing gear type to another:

To Convert From	To	Multiply Departures By
single wheel	dual wheel	0.8
single wheel	dual tandem	0.5
dual wheel	dual tandem	0.6
double dual tandem	dual tandem	1.0
dual tandem	single wheel	2.0
dual tandem	dual wheel	1.7
dual wheel	single wheel	1.3
double dual tandem	dual wheel	1.7

Secondly, after the aircraft have been grouped into the same landing gear configuration, the conversion to equivalent annual departures of the design aircraft should be determined by the following formula:

$$\log R_1 = \log R_2 \times \left(\frac{W_2}{W_1}\right)^{\frac{1}{2}}$$

where R_1 = equivalent annual departures by the design aircraft

R_2 = annual departures expressed in design aircraft landing gear

W_1 = wheel load of the design aircraft

W_2 = wheel load of the aircraft in question

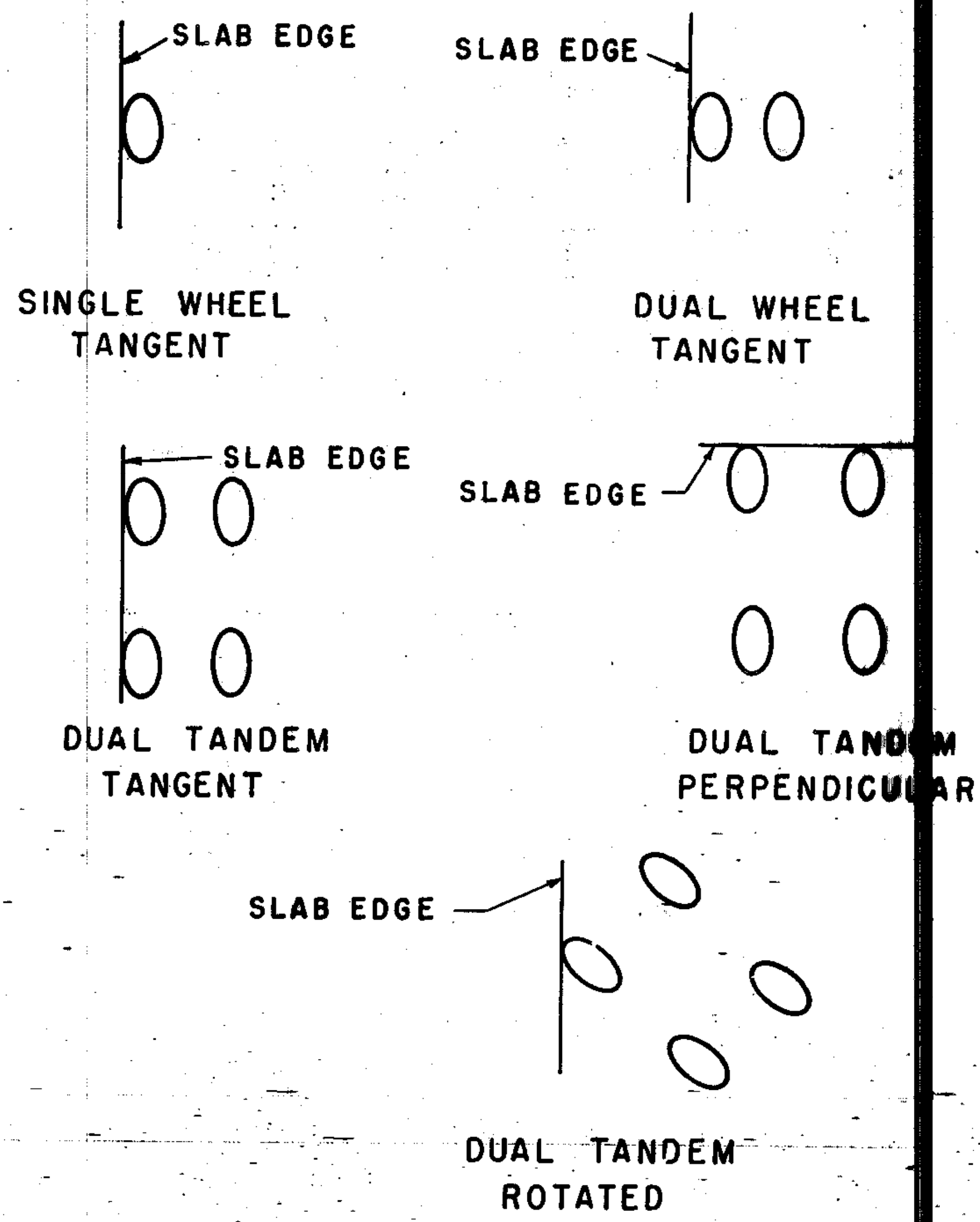

FIGURE 1. ASSEMBLY POSITIONS FOR RIGID PAVEMENT ANALYSIS

TABLE 1. SINGLE WHEEL ASSEMBLY

Gross Weight lbs.	(kg)	Tire Pressure psi	(MN/m^3)
30,000	(13 600)	75	(0.52)
45,000	(20 400)	90	(0.62)
60,000	(27 200)	105	(0.72)
75,000	(34 000)	120	(0.83)

TABLE 2. DUAL WHEEL ASSEMBLY

Gross Weight lbs.	(kg)	Tire Pressure psi	(MN/m^2)	Dual Spacing in.	(cm)
50,000	(22 700)	80	(0.55)	20	(51)
75,000	(34 000)	110	(0.76)	21	(53)
100,000	(45 400)	140	(0.97)	23	(58)
150,000	(68 000)	160	(1.10)	30	(76)
200,000	(90 700)	200	(1.38)	34	(86)

TABLE 3. DUAL TANDEM ASSEMBLY

Gross Weight lbs.	(kg)	Tire Pressure psi	(MN/m^2)	Dual Spacing in.	(cm)	Tandem Spacing in.	(cm)
100,000	(45 400)	120	(0.83)	20	(51)	45	(114)
150,000	(68 000)	140	(0.97)	20	(51)	45	(114)
200,000	(90 700)	160	(1.10)	21	(53)	46	(117)
300,000	(136 100)	180	(1.24)	26	(66)	51	(130)
400,000	(181 400)	200	(1.38	30	(76)	55	(140)

Specific design curves are presented for wide body aircraft. The aircraft characteristics are shown on the design curves.

b. Fatigue effects are taken into consideration by converting traffic to coverages. The coverage concept provides a means of normalizing pavement performance data which can consist of a variety of wheel sizes, spacings and loads for pavements of different cross sections. For rigid pavements, coverage is a measure of the number of maximum stress applications occurring within the pavement slab due to the applied traffic. One coverage occurs when each point in the pavement within the limits of the traffic lane has experienced a maximum stress, assuming the stress is equal under the full tire print. Each pass (departure) of an aircraft can be converted to coverages using a single pass-to-coverage ratio which is developed assuming a normal distribution and applying standard statistical techniques. The pass-to-coverage ratios used in developing the rigid pavement design curves in Chapter 3 are given in Table 4. Annual departures are converted to coverages assuming a 20-year design life. Coverages are determined by multiplying annual departures by 20 and dividing that product by the pass-to-coverage ratio shown in Table 4.

TABLE 4. PASS-TO-COVERAGE RATIOS FOR RIGID PAVEMENTS

Design Curve	Pass-to-Coverage Ratio
Single Wheel	5.18
Dual Wheel	3.48
Dual Tandem	3.68
B-747	3.70
DC 10-10	3.64
DC 10-30	3.38
L-1011	3.62

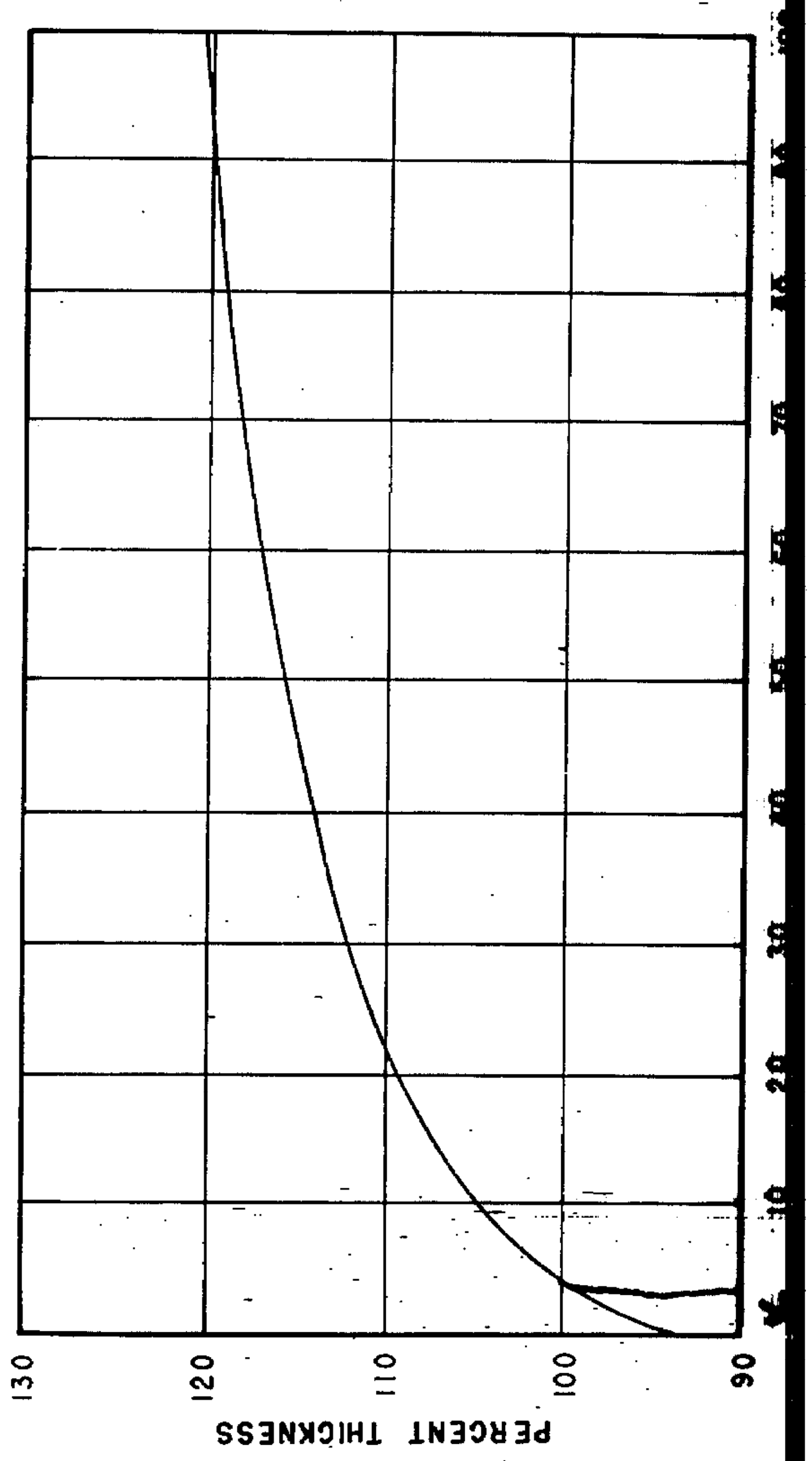

FIGURE 2. PERCENT THICKNESS VS. COVERAGES