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MILITARY SPECIFICATION

AIRPLANE STRENGTH AND RIGIDITY GROUND LOADS FOR NAVY ACQUIRED AIRPLANES

This specification is approved for use within the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification defines the strength and rigidity requirements for ground loading conditions applicable to Navy acquired airplanes.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS), and supplement thereto, cited in the solicitation.

SPECIFICATIONS

MILITARY

MIL-D-8708	-	Demonstration Requirements for Airplanes.
MIL-A-8860	-	Airplane Strength and Rigidity, General Specification for.
MIL-A-8867	-	Airplane Strength and Rigidity Ground Tests.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Naval Air Engineering Center, Systems Engineering and Standardization Department (Code 93), Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

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SPECIFICATIONS - Continued

MILITARY

MIL-A-8868	-	Airplane Strength and Rigidity Data and Reports.
MIL-A-18717	-	Arresting Hook Installations, Aircraft.
MIL-L-22589	-	Launching System, Nose Gear Type, Aircraft.
MIL-T-81259	-	Tie-Down, Airframe Design, Requirements for.

STANDARDS

MIL-STD-2066	-	Catapulting and Arresting Gear Forcing Functions for Aircraft Structural Design.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2. Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Weights. The design weights shall be as specified in MIL-A-8860.

3.2 Weight distribution and center of gravity positions. Weight distribution and center of gravity (CG) positions shall be all those that are critical as defined by all possible arrangements of variable and removable items for which provisions are required and all combinations of partially and fully loaded multiple bomb racks, internal fuel tanks, and external fuel tanks. In addition, for all specified takeoff and landing conditions for all types of airplanes, these arrangements shall include:

a. The maximum internal fuel loading that can be attained within the applicable design weight with all store stations empty of pylons, adapters, launchers, racks, and stores, and with other useful loadings such as passengers, cargo, guns and ammunition, etc, removed.

b. All asymmetrical store loading configurations which result in the lesser of the following rolling moments:

(1) 1.2 times the maximum rolling moment attainable by loading each store station, in turn, with all possible combinations of pylons, adapters, launchers, racks, and stores specified to be carried by that store station in the detail specification. As each store station is loaded all other store stations shall be empty of adapters, launchers, racks, stores, etc.

(2) Maximum attainable by loading only one side of the airplane with the other side empty of adapters, launchers, racks, stores, etc.

3.3 Limit and ultimate loads. With the exception of barricade loads, all loads specified herein are limit. The barricade loads are ultimate.

3.4 Balance of forces. For conditions for which parameters or values of parameters are not completely specified to the extent necessary for the airplane and its components to be in complete translational and rotational equilibrium, additional forces which are determined by a rational method or which are approved by the contracting activity shall be assumed to act in a manner such that the acceleration of the airplane's component masses are balanced by the externally applied forces. For the loading conditions specified in 3.10 (except 3.10.1.6), 3.11.3 (except 3.11.3.5, 3.11.3.9 and 3.11.3.10), 3.14.1, 3.14.2, 3.14.4, 3.14.6, and 3.14.10, the externally applied forces and airframe responses shall be determined by those dynamic analyses requirements specified in MIL-A-8868.

3.5 Engine thrust. Unless specified otherwise herein, the values of engine thrust and/or power shall vary from zero to the maximum available, as applicable.

3.6 Types of airplanes. The types of airplanes are designated as follows:

CB - Carrier-based airplanes including carrier-based trainer airplanes

LB - Land-based airplanes other than land-based trainer airplanes

LBT - Land-based trainer airplanes

STOL - Airplanes having short field takeoff and landing requirements

VTOL - Airplanes having vertical takeoff and landing requirements

SKI - CB, LB, LBT and STOL airplanes equipped with skis

3.7 Arresting and catapulting forces. For carrier-based airplanes, the horizontal components of the arresting hook and catapult tow forces shall be derived from MIL-STD-2066 for all the arresting gears and catapults with which the airplane is required to operate.

3.8 Variation in servicing of landing gear and tail bumper. For all takeoff and landing conditions specified herein, the shock-strut air or gas pressure, shock-strut oil level, and tire pressure shall be all combinations within the following variations:

a. 15 percent above and 15 percent below the recommended air or gas pressure with the shock strut in the fully extended position.

b. 15 percent above and 15 percent below the recommended oil volume. If the 15 percent above variation cannot be attained, the maximum attainable variation shall be used.

c. 20 percent above and 20 percent below the recommended tire pressure.

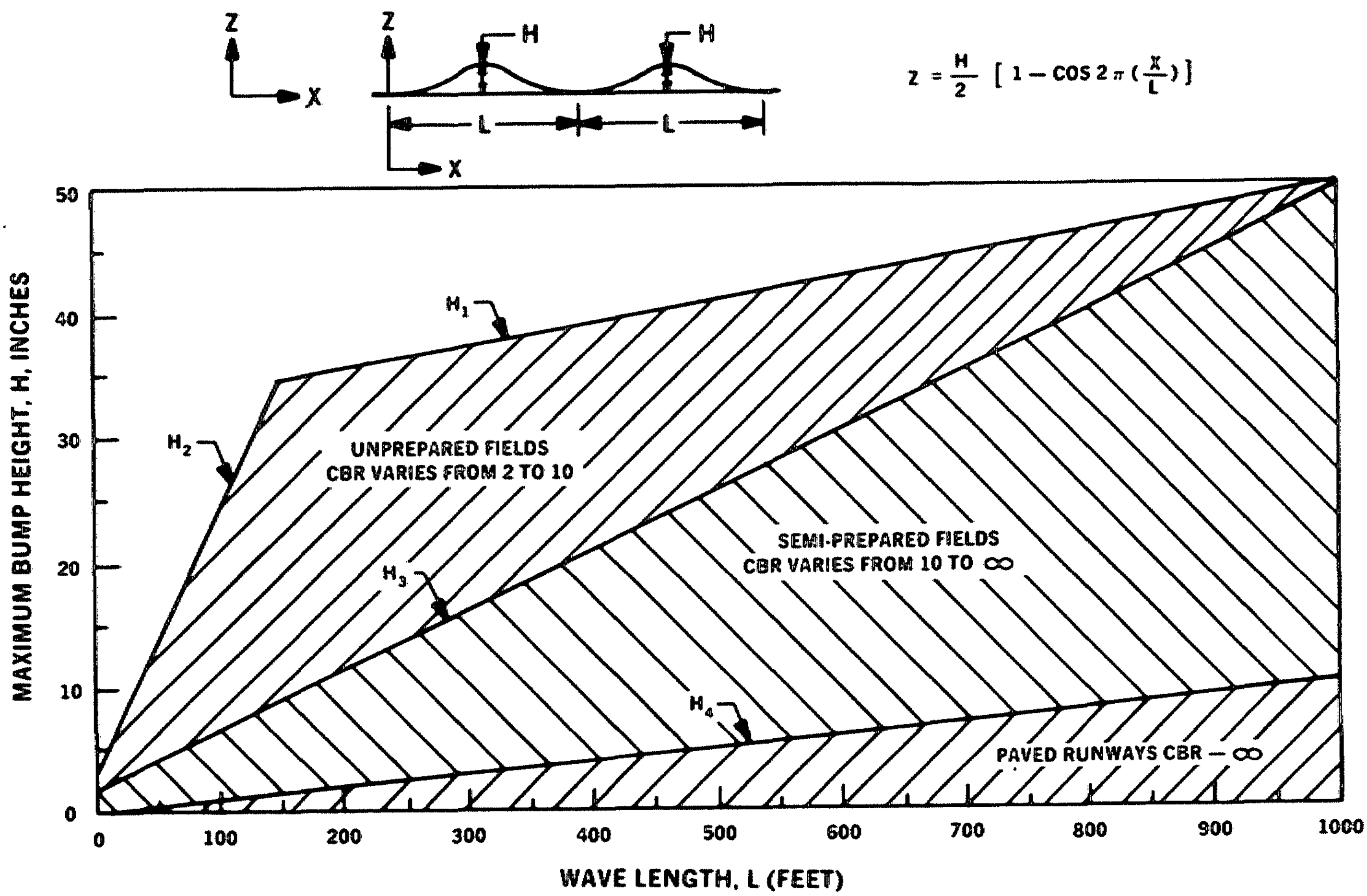
3.9 Field roughness requirements. For field takeoffs from, and landings on (a) unprepared sod, clay, or dirt fields, (b) semiprepared matted sod, clay, or dirt fields, and (c) paved runways, the roughness or range of terrain contours and soil-bearing strength for design shall be as defined in Figure 1. The soil-bearing strength is given in terms of the California Bearing Ratio (CBR) and shall be constant up to a depth of at least one foot. For both the takeoff and landing roll-out requirements specified herein, the ground roughness contours for design shall be 1-cosine shaped undulations of constant wave-length. Such undulations shall have all combinations of heights and lengths specified in Figure 1. The shape of the undulations in the lateral direction shall be held constant. The roughness for takeoff and landing for each type of airplane shall be as follows:

a. Paved runways - CB, LB, LBT, and STOL.

b. Semiprepared fields - CB and STOL.

c. Unprepared fields - STOL.

d. For SKI airplanes snow and ice covered semiprepared fields shall apply.



$H_1 = .015\,L + 35.0$
$(150 < L < 1000)$

$H_2 = .2067\,L + 4$
$(0 \leq L \leq 150)$

$H_3 = .0480\,L + 2$
$(0 \leq L \leq 1000)$

$H_4 = .01\,L$
$(0 \leq L \leq 1000)$

FIGURE 1. Ground roughness for landing and takeoff.

3.10 Takeoff.

3.10.1 Catapult takeoff. Applicable to carrier based airplanes for shipboard catapulting. The design loads for airplane accessories for catapult launching shall also be in accordance with this paragraph.

3.10.1.1 Maximum deck reactions. The airplane design shall be such that the maximum landing gear vertical load, for each landing gear unit separately, which results from the conditions of 3.10.1, shall not exceed the allowable deck reactions determined from Figures 2 and 3.

3.10.1.2 Holdback loads. The holdback loads for shipboard operations shall be as specified herein.

3.10.1.2.1 Buffing. The holdback bar shall engage the slider of the catapult deck hardware at all critical angles resulting from the spotting requirements of MIL-L-22589. During the buffer stroke, a tension load equal to the load H in 3.10.1.2.3 shall be applied to the airplane holdback fitting.

3.10.1.2.2 Tensioning. The airplane shall be secured to the catapult shuttle by the launch bar, and to the deck, through the deck ramp structure, by the holdback bar, in all critical attitudes which occur during the tensioning operation. The horizontal component of the tensioning force applied by the catapult shuttle is 5,500 pounds and is reacted by the holdback assembly.

3.10.1.2.3 Release. The airplane shall be in all attitudes resulting from the release operation. The deflection of tires and shock struts shall correspond to the forces acting. The tension load H, in pounds, at the airplane holdback fitting is:

$$H = 1.65 \left[\frac{T + 5500 + 0.2W}{\cos \theta} \right] + .06R$$

where:

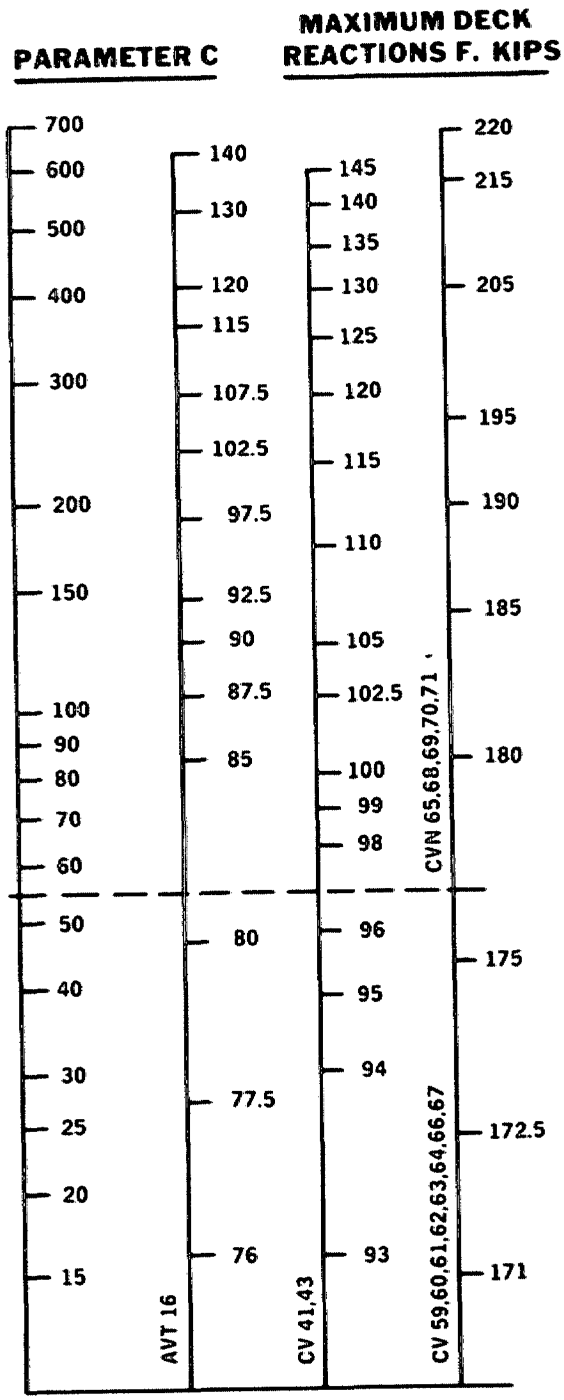
a. T = maximum thrust, with thrust-augmentation devices operating, if airplane is so equipped, including surge effects from ignition, at sea level on a 20°F day, LB.

b. W = maximum design weight, LB.

c. θ = angle between holdback axis and deck at release.

d. The load in the launch bar shall be that required for equilibrium. The side loads shall be those resulting from the maximum possible misalignment of the launch system in combination with the spotting conditions of MIL-L-22589.

e. R = minimum release element load, LB.



Definitions

P	=	Rated load of tire, LBS
p	=	Operational pressure of tire, PSI
r	=	Rated pressure of tire, PSI
C	=	$K \frac{P}{p}$
K	=	$(0.7 \frac{p}{r} + 0.3)^{1/2}$
F	=	Maximum deck reaction from nomogram

Example-Single Wheel — Find the maximum permissible landing gear deck reaction F for an airplane having a single wheel landing gear with a 30 x 7.7 tire for which:

P	=	21,300 LBS
p	=	400 PSI
r	=	360 PSI
K	=	$(0.7 \times \frac{400}{360} + 0.3)^{1/2} = 1.04$
C	=	$1.04 \times \frac{21,300}{400} = 55$

From the nomogram to the left for C = 55 the following maximum deck reactions are obtained.

Ship	Max. Permissible Reaction (KIPS)
AVT 16	81
CV 41	97
CV 59	176.5

Example-Dual Wheels — For dual wheels with the same size tires spaced 14 inches on centers (b') divide the reaction F obtained from this nomogram by the dual wheel load factor K_e from Figure 3:

b'	=	14" (Spacing of dual wheels)
K_e	=	.66 for AVT 16
F'	=	$\frac{81,000}{.68} = 119,000$ LBS
K_e	=	.66 for CV 41
F'	=	$\frac{97,000}{.66} = 147,000$ LBS
K_e	=	.925 for CV 59
F'	=	$\frac{176,500}{.925} = 191,000$ LBS

FIGURE 2. Maximum allowable vertical deck reaction for a single landing - Catapult area.

$$\text{Max Dual-Wheel Reaction} = \frac{\text{Max Single-Wheel Reaction}}{K_e}$$

Curve "A" - CV 59, 60, 61, 62, 63, 64, 66, 67, CVN 65, 68, 69, 70, 71

Curve "B" - CV 41, 43

Curve "C" - AVT 16

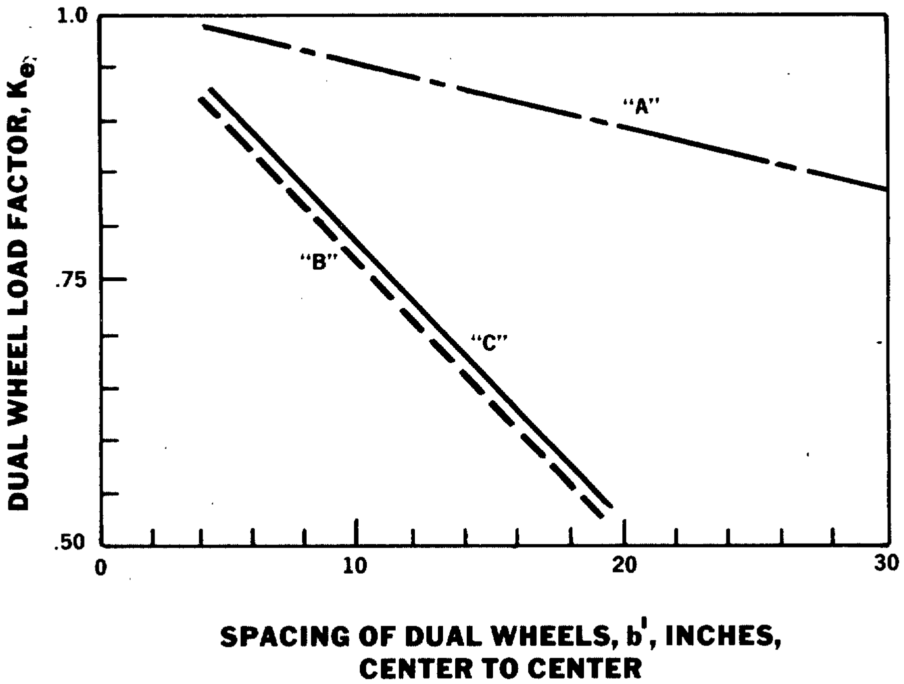


FIGURE 3. Dual wheel load factors for use with Figures 2 and 5.

3.10.1.2.4 Minimum release load. The minimum release load R, in pounds, for the release device is:

$$R = 1.35 \left[\frac{T + 5500 + 0.2W}{\cos \theta} \right]$$

The symbols are defined in 3.10.1.2.3. The allowable tolerance is plus 6 and minus zero percent of the load R.

3.10.1.3 Maximum catapult tow force. For weights ranging from the maximum design weight to the weight required for the primary mission, the maximum catapult tow force shall be the maximum attainable at capacity operation from all catapults from which the airplane is required to operate. For lesser weights, the tow force shall be reduced to that corresponding to the maximum load factor of 3.10.1.4. The mean values of the tow forces of MIL-STD-2066 shall be used to define the limit tow force.

3.10.1.4 Maximum catapult horizontal load factor. The maximum horizontal load factor of the airplane center of gravity resulting from the catapulting operation shall be the sum of the horizontal component of the tow force specified in 3.10.1.3, corresponding to the primary mission weight for each catapult separately, and the maximum horizontal component of thrust specified in 3.10.1.2.3 divided by the airplane weight required for the primary mission.

3.10.1.5 Catapult run. The catapulting loads resulting from all attainable attitudes throughout the catapult run and the spotting requirements of MIL-L-22589 shall be determined for all specified catapulting forces. The engine thrust shall be: (1) the maximum thrust with thrust augmentation devices operating if the airplane is so equipped; (2) intermediate thrust; and (3) maximum continuous thrust, where such values of thrust are usable. The effects of pretension loads, holdback release, and weight variations shall be included.

3.10.1.6 Loading conditions prior to catapult spotting. The loads of this paragraph shall apply to the complete airplane while aft of the JBD (jet blast deflector) and while maneuvering or waiting on the deck in preparation of catapult spotting.

3.10.1.6.1 Airplane configuration. The airplane configuration shall be such that all movable control surfaces such as wings, fins, and other components that can be moved while the airplane is on the deck, shall be in their fully folded and unfolded, swept and spread, retracted and extended positions, and all intermediate positions. Unless the systems provided for operating high-lift devices are so arranged that these devices can only be in the retracted or neutral position before wing folding or unfolding, sweeping or spreading, etc., the high-lift devices shall be in the fully retracted, fully extended and all intermediate positions. Landing gear doors shall be in the fully opened position. Wing fuel and external stores shall include all those that are critical.

3.10.1.6.2 Loads. The forces acting on the airplane shall be those resulting from the maximum attainable pressure in the hydraulic folding system, or maximum attainable system force if other than a hydraulic system is used, in combination with the following:

a. Inertial forces, directed downward normal to the deck, that result in a load factor equal to 1.5.

b. Inertial forces, directed downward normal to the deck, that result in a load factor equal to 1.5, and alternately 0.5, combined with aerodynamic forces which result from a steady wind over the deck having velocities from zero to 60 knots from all horizontal directions, plus the superposition of engine exhaust and/or thrust environment aft of the JBD defined as follows:

(1) The airplane positioned at all angles relative to the catapult track from a heading of directly into the JBD to ±90° of this heading and at all positions aft of the JBD such that the nearest portion of the airplane is at all points laterally along the JBD and at all horizontal distances aft of JBD of 8 feet and greater, as measured from a vertical plane through the hingeline of the JBD.

(2) Another airplane positioned on the catapult in battery position at all off-center spotting conditions specified in MIL-L-22589, with all engines running at maximum power (afterburners and/or other thrust augmentation devices operating). This other airplane shall be selected from the current inventory of carrier-based airplanes and shall be that which produces the most critical velocity and temperature effects on the airplane aft of the JBD.

3.10.2 Field takeoff. Applicable to all types of airplanes. The ground roughness shall be as specified in 3.9. During each takeoff, the airplane shall be required to accelerate, using maximum takeoff power, to takeoff speed over all critical combinations of specified bump heights and wave lengths and soil bearing strength.

3.11 Landing. Strength is required for landing impact and landing roll-out on paved runways, semiprepared fields, unprepared fields and carrier decks and for arrested landings on carriers and on expeditionary airfields as defined herein.

3.11.1 Coefficient of friction. For all types of airplanes, except those airplanes equipped with skis, the coefficient of friction between the tire and landing surface during wheel spin-up shall be all linear variations of the coefficient of friction shown in Figure 4. For SKI airplanes, the coefficient of friction between the ski and landing surface shall be constant at all values between 0 and 0.4.

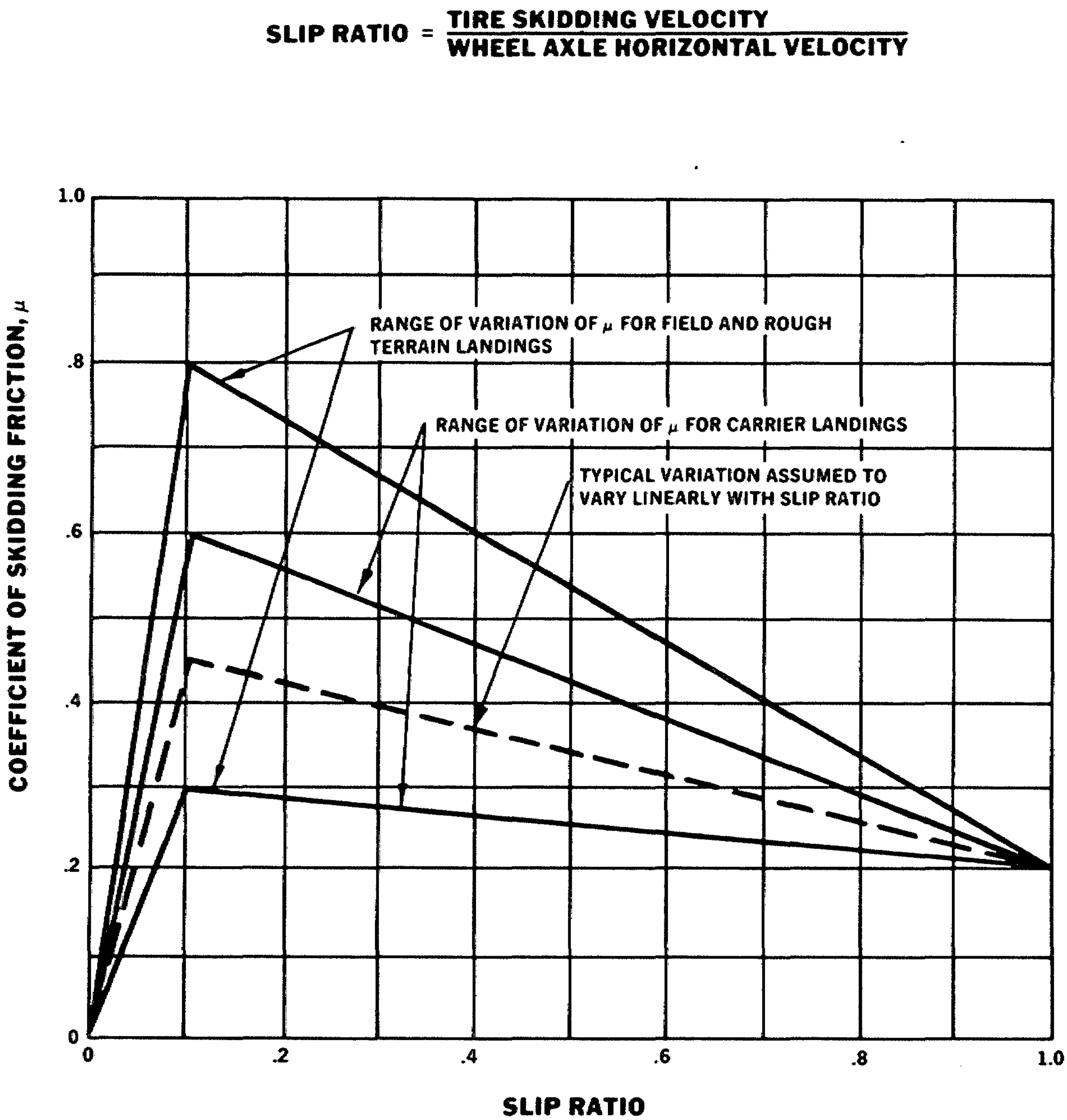


FIGURE 4. Variation of coefficient of skidding friction between the tire and landing surface with instantaneous slip ratio.

3.11.2 Types of landings. Strength is required for each type of airplane for the types of landings defined as follows:

	Types of landing	Types of airplanes
a.	Touch-and-go and carrier arrested landing	CB
b.	Touch-and-go and field arrested landing on prepared and semi-prepared fields	CB
c.	FCLP (field-carrier-landing-practice) on prepared runways	CB
d.	Field landing and arrested landing on prepared runways	CB
e.	Flared field landing on prepared runways	CB, LB, STOL
f.	Flared field landing on snow and ice covered semi-prepared fields	SKI
g.	Trainer field landing on prepared runways	LBT
h.	Vertical and short field landings on prepared, semi-prepared, and unprepared fields	VTOL/STOL
i.	Simulated landings by laboratory tests	All types

3.11.3 Landing conditions.

3.11.3.1 Multivariate distribution of landing impact conditions. The design envelope of initial landing conditions shall include the variables defined in Table I for each type of airplane and landing. Such design envelopes shall be determined by combinations of the variables of Table I in the form of a multivariate distribution. The distributions of each variable, independently, shall be defined by the normal or Gaussian distribution function for all variables except sinking speed. The sinking speed distribution shall be defined by the Pearson Type III distribution function. The normal distribution function is defined by the mean and standard deviation, and the Pearson Type III distribution function is defined by the mean, standard deviation, and skewness coefficient. (For a skewness coefficient of zero, the Pearson Type III function becomes the normal distribution function). In Table I, the mean is denoted by a bar over the parameter symbol, the standard deviation by the symbol σ, and the skewness coefficient by the symbol α_3. Extreme conditions for each envelope are defined by those combinations of variables having a joint likelihood of occurrence equal to a constant as determined by the following equation:

$$P_T = P(V_A \gtrless V_{A_i})\, P(V_E \gtrless V_{E_i})\, P(V_V \gtrless V_{V_i})\, P(\theta_P \gtrless \theta_{P_i})\, P(\theta_R \gtrless \theta_{R_i})$$

$$P(\dot{\theta}_R \gtrless \dot{\theta}_{R_i})\, P(\theta_Y \gtrless \theta_{Y_i})\, P(d \gtrless d_i)$$

TABLE I. Variation of Landing Impact Conditions

Symbol	Variable	Type Landing / Type Airplane	See Paragraph 3.11.2(a) CB	See Paragraph 3.11.2(b)(c) CB	See Paragraph 3.11.2(d) CB	See Paragraph 3.11.2(e)(f) CB, LB, SKI STOL	See Paragraph 3.11.2(g) LBT	See Paragraph 3.11.2(h) STOL
V_A	Approach Speed (KN)	$\bar{V}_A$	$1.05V_{P_{A\,min}}$	$1.05V_{P_{A\,min}}$	$1.05V_{P_{A\,min}}$	$1.05V_{P_{A\,min}}$	$1.05V_{P_{A\,min}}$	$1.05V_{P_{A\,min}}$
		σ_{V_A}	4.0	5.0	5.0	5.0	5.0	5.0
V_E	Engaging or horizontal ground speed, (KN)	$\bar{V}_E$	$\bar{V}_A - 20$	$\bar{V}_A$	$\bar{V}_A$	$\bar{V}_A$	$\bar{V}_A$	$\bar{V}_A$
		σ_{V_E}	5.0	8.0	8.0	8.0	8.0	8.0
V_V	Sinking speed, (FPS)	$\bar{V}_V$	$0.128\,\bar{V}_E$ but not < 11.5	$0.0885\,\bar{V}_E$ but not < 6.0	$.112\bar{V}_E - 5.32$	3.6	8.5	$0.044\bar{V}_E + 7.5$
		σ_{V_V}	$0.015\bar{V}_E + 1.667$ but not < 3.0	2.0	$.007\bar{V}_V + 1.097$	1.33	2.8	$0.006\bar{V}_E + 2.5$
		α_3	0	0	0	0.5	0	0
θ_P	Airplane Pitch angle, (DEG)	$\bar{\theta}_P$	See note (a)	See note (a)	See note (a)	See note (a)	See note (a)	See note (a)
		σ_{θ_P}	2.25	2.25	2.25	2.25	2.25	2.25
θ_R	Airplane Roll angle, (DEG)	$\bar{\theta}_R$	2.0	2.0	2.0	2.0	2.0	2.0
		σ_{θ_R}	2.5	2.5	2.5	2.5	2.5	2.5
$\dot{\theta}_R$	Airplane Roll rate (DEG/SEC)	$\bar{\dot{\theta}}_R$	0	0	0	0	0	0
		$\sigma_{\dot{\theta}_R}$	3.0	3.0	3.0	3.0	3.0	3.0
θ_Y	Airplane Yaw angle, (DEG)	$\bar{\theta}_Y$	0	0	0	0	0	0
		σ_{θ_Y}	3.0	3.0	3.0	2.5	2.5	3.0
d	Off-Center engagement distance (FT)	$\bar{d}$	0	0	– –	– –	– –	– –
		σ_d	6	6	– –	– –	– –	– –
		P_o	1×10^{-3}	1×10^{-3}	1×10^{-3}	1×10^{-4}	1×10^{-3}	1×10^{-3}
		P_T	7.8125×10^{-6}	7.8125×10^{-6}	1.5625×10^{-5}	1.5625×10^{-6}	1.5625×10^{-5}	1.5625×10^{-5}

TABLE I. Variation of Landing Impact Conditions — Continued

NOTES: (a) $\bar{\theta}_p$ shall correspond to $\bar{V}_V$, to a mean wing-lift-to-weight ratio of 1.2, and to each of the following values of approach speed, separately: 1.0 $V_{P_{Amin}}$, and 1.05 $V_{P_{Amin}}$. The mean pitch angle $\bar{\theta}_p$ shall be determined from that trimmed lift curve for the power approach configuration in free air at sea level on a tropical day.

(b) $V_{P_{Amin}}$ is the minimum usable approach speed for a tropical day as defined in the detail specification, except that it shall be determined for the applicable landing design weights.

(c) For flared field landings at the maximum landing design weight for all types of airplanes except LBT, the values of σ shall be reduced by 50 percent and the mean pitch attitude for the condition of the mean approach speed of 1.05 $V_{P_{Amin}}$ only, need apply. For LBT airplanes the maximum design weight shall apply to the values as given in the table.

(d) The airplane pitching velocity $\dot{\theta}_p$ (radians per second) shall be determined as follows (nose up positive).

$$\dot{\theta}_p = \frac{g}{V_A}\left(\frac{L}{W} - 1\right)$$

where g = 32.2 FPS^2

V_A = airplane airspeed, FPS

L = airplane lift, LB

W = airplane weight, LB

(e) For CB airplanes the arresting hook shall engage the first arresting cable. Initial landing gear contact with the deck shall occur at all distances from a distance of 60 feet aft of the first arresting cable to that distance forward of the first arresting cable such that arresting hook engagement and landing gear touch down are simultaneous. The arresting force shall be all those forces from the upper to lower boundaries as derived from MIL-STD-2066 for the specified engaging speeds.

where:

a. The symbols $\gtrless$ denote greater than and, alternately, less than.

b. V_{A_i}, V_{E_i}, V_{V_i}, θ_{P_i}, θ_{R_i}, $\dot{\theta}_{R_i}$, θ_{Y_i}, and d_i are the initial conditions for each variable.

c. P is the probability that the value of the variable under consideration is greater than and, alternately, less than the given or i^{th} value of that variable.

d. The equation has the constraint that the symbol > shall be used with the i^{th} values of the variable which are equal to or greater than the mean value and, alternately, the symbol < shall be used with the i^{th} values of the variable which are less than the mean value.

e. The initial conditions for each variable shall be all values between the extreme minimum and extreme maximum.

f. Extreme values for each variable, independently, are those values corresponding to a probability P_o of being greater than the maximum value or less than the minimum value. P_T is the product of the probabilities P and is equal to a constant times P_o. Values of P_o and P_T shall be as given in Table I.

3.11.3.2 <u>Three-point and tail-down landings</u>. Applicable to all types of airplanes. The wing lift shall be equal to the weight of the airplane. The sinking speed shall be equal to the maximum value, and the horizontal ground speed shall be all speeds specified in Table I. The airplane roll angle shall be zero and, alternately, 2.0 degrees. For the three-point landing, the airplane pitch angle shall correspond to that angle for simultaneous contact of all landing gear wheels with shock struts fully extended and tires undeflected. For the tail-down landing, the airplane pitch angle shall be that corresponding to 90 percent of $C_{L\ MAX}$ in level flight using the trimmed lift curve for the power approach configuration in free air at sea level on a tropical day. For CB airplanes, the arresting force or hook load shall be that resulting from the engaging speeds of Table I.

3.11.3.3 <u>Free-flight engagement</u>. Applicable to CB airplanes. The airplane shall engage the arresting cable under the following conditions:

a. The sinking speeds of the airplane CG shall be all those sinking speeds specified in 3.11.3.1 that are less than the mean sinking speed.

b. For approach speeds less than $\bar{V}_A$, the engaging speeds shall be all values up to $\bar{V}_E$, and for approach speeds greater than $\bar{V}_A$, the engaging speeds shall be all values greater than $\bar{V}_E$.

c. The wing lift shall be 1.0 and, alternately, 1.3 times the weight of the airplane. For the latter value of 1.3, the obstruction run-over requirements need not apply.

d. The approach speeds shall be all speeds between $\bar{V}_A$ - 12KN and $\bar{V}_A$ + 12KN, except that they need not be less than $\bar{V}_{P_{A\ Min}}$.

e. The pitch attitude shall be consistent with the sinking speed, air speed, and wing lift.

f. The roll attitude shall be 2.0°.

g. Arresting forces shall be all forces from the upper to the lower boundaries as derived from MIL-STD-2066 for the specified engaging speeds.

h. The height of the airplane CG above the deck shall be all values corresponding to wire pickup with the hook in the full-down trail position, to wire pickup with the hook rotated so that the main landing gear wheels touch down simultaneously with wire pickup.

i. The airplane pitching velocity $\dot{\theta}_p$ shall be determined as follows:

$$\dot{\theta}_p = g/V_A\ (L/W - 1)$$

where:

g = 32.2 FPS^2
V_A = airplane approach speed, FPS
L = airplane lift, LB
W = airplane weight, LB

3.11.3.4 Taxi-in engagement. Applicable to CB airplanes. The airplane shall taxi into the arresting gear at all engaging speeds specified in 3.11.3.1. The arresting forces shall be all those resulting from the specified engaging speeds applicable to arresting gear for which strength is required. The airplane pitch attitudes shall be the three-point attitude, and, alternately, the maximum tail-down attitude specified in 3.11.3.1, or that maximum tail-down attitude that can be attained at the specified engaging speeds for a lift-to-weight ratio of 1.0, whichever is less. The head wind velocity shall be zero.

3.11.3.5 Drift landing. Applicable to all types of airplanes. The shock strut compressed positions shall be all those from 15 to 90 percent of the maximum stroke of the strut. For auxiliary gears, the vertical ground reaction shall be one-half of the maximum vertical load resulting from all specified symmetrical landing impact conditions, excluding obstruction run-over loads, and shall act in combination with a side load of 40 percent of that vertical load. The side load shall act to the right and, alternately, to the left. If the auxiliary gear is designed to swivel or to be steerable, the specified side load shall be reacted by the swiveling, shimmy damper, or steering mechanism so as to prevent the auxiliary gear from swiveling or turning. In lieu thereof, a more rational method of reacting the specified side load on auxiliary gears through the damper or steering mechanism, as proposed by the contractor in the ground loads criteria report and accepted by the contracting activity, may be used. For the main gear, the vertical ground reaction shall be one half of the maximum vertical load resulting from all specified symmetrical landing impact conditions, excluding obstruction runover loads, and shall act outwardly and inwardly, in combination with a side load of 60 percent and 80 percent respectively, of that vertical load.

3.11.3.6 Maximum deck reactions. Applicable to CB airplanes. The design of the airplane shall be such that the maximum landing gear vertical ground loads for each landing gear unit separately, which result from all the conditions of 3.11.3.1 through 3.11.3.5 shall not exceed the allowable deck reactions determined from Figures 3 and 5, and Figures 6 and 7, as required.

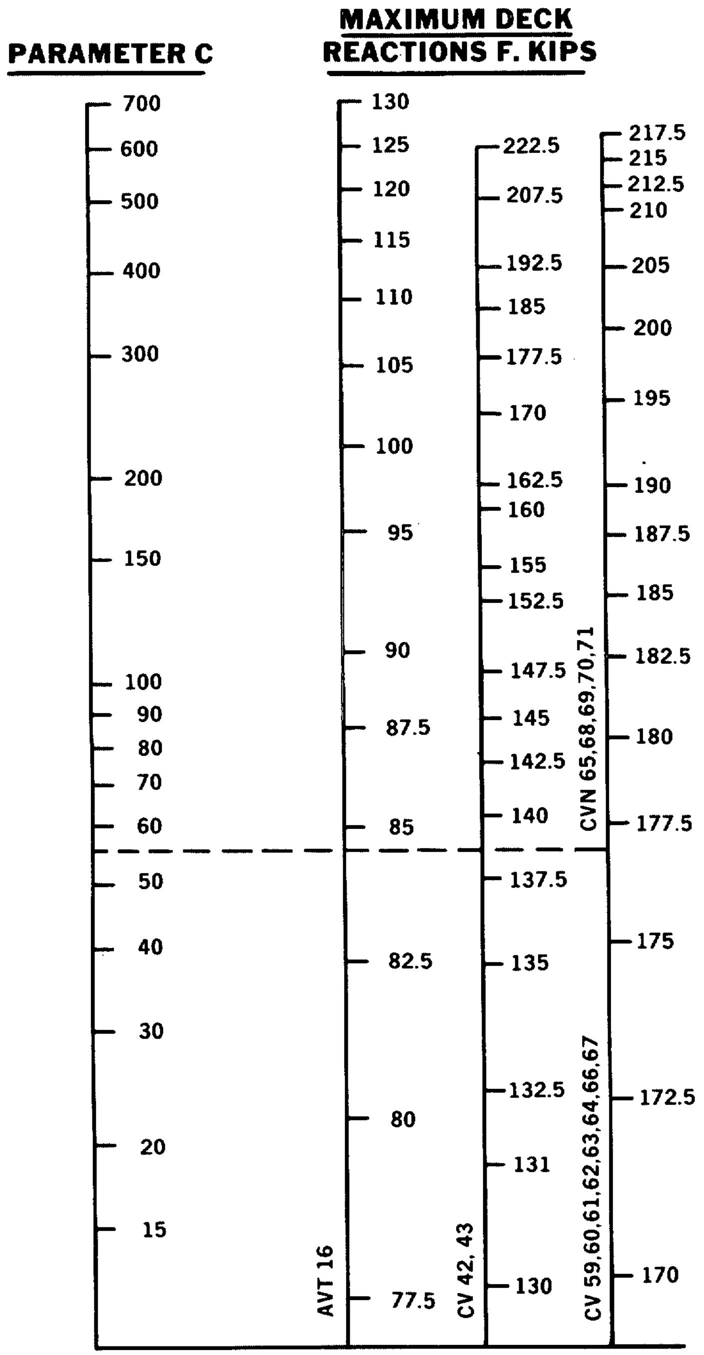
3.11.3.7 Landing impact over obstructions. Applicable to CB, STOL and SKI airplanes unless otherwise specified in the following paragraphs. During the landing impact, the landing gear wheels or skis shall run over obstructions such as 1-cosine contours, steps, holes and carrier deck obstructions for the initial conditions of 3.11.3.1 and 3.11.3.3. The CBR of these obstructions shall be infinite.

3.11.3.7.1 Contours of 1-cosine shape. The landing gear wheels or skis shall run over discrete (single) contours having the shape described in 3.9. The minimum length of the contours shall be 2 feet and the maximum length shall be equal to the horizontal distance traveled during the compression stroking of the landing gear shock struts and tires.

3.11.3.7.2 Steps and holes. The steps and the holes shall extend infinitely in the lateral direction and the maximum length shall be infinite. The top edge(s) of the steps and holes shall have a 1/2-inch radius. For semiprepared fields, the height of the step and the depth of the hole shall be 2 inches, and the minimum length shall be 2 inches. For unprepared fields, the height of the step and the depth of the hole shall be 4 inches, and the minimum length shall be 4 inches.

3.11.3.7.3 Carrier deck obstructions. Applicable to CB airplanes. These obstructions shall be a 1-3/8-inch diameter arresting gear cable and, separately, a 1-1/4-inch high guide light cover plate.

3.11.3.8 Landing roll-out on rough fields. Applicable to all types of airplanes. The ground roughness shall be as specified in 3.9. Landing roll-out shall be defined as that portion of the landing after initial landing impact and after initial maximum compression stroking of all landing gear shock struts and tires. The airplane shall be required to decelerate during the landing roll-out using all available reverse thrust, brakes, and other deceleration devices as provided, over all critical combinations of specified soil bearing strength, bump heights, and wave lengths. For each landing roll-out, the bump height, wave length, and contour shape in the lateral



Definitions

P	=	Rated load of tire, LBS
p	=	Operational pressure of tire, PSI
r	=	Rated pressure of tire, PSI
C	=	$K \frac{P}{p}$
K	=	$(0.7\frac{p}{r} + 0.3)^{1/2}$
F	=	Maximum deck reaction from nomogram

Example-Single Wheel — Find the maximum permissible landing gear deck reaction F for an airplane having a single wheel landing gear with a 30 x 7.7 tire for which:

$P = 21{,}300$ LBS

$p = 400$ PSI

$r = 360$ PSI

$$K = (0.7 \times \frac{400}{360} + 0.3)^{1/2} = 1.04$$

$$C = 1.04 \times \frac{21{,}300}{400} = 55$$

From the nomogram to the left for C = 55 the following maximum deck reactions are obtained.

Ship	Max. Permissible Reaction (KIPS)
AVT 16	84.5
CV 41	138.5
CV 59	177

Example-Dual Wheels — For dual wheels with the same size tires spaced 14 inches on centers (b') divide the reaction F obtained from this nomogram by the dual wheel load factor K_e from Figure 3:

$K_e = .56$ for CV 41

$$F' = \frac{138{,}000}{.56} = 247{,}500 \text{ LBS}$$

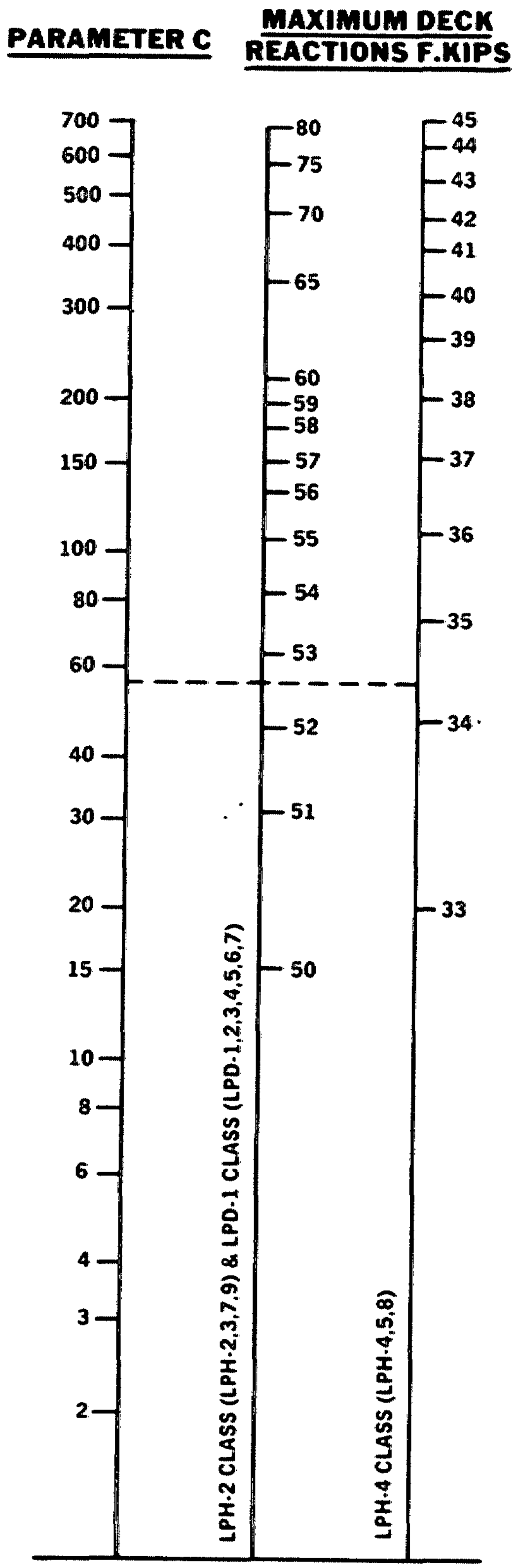
$K_e = .905$ for CV 59

$$F' = \frac{177{,}000}{.905} = 195{,}500 \text{ LBS}$$

$K_e = .575$ for AVT 16

$$F' = \frac{84{,}500}{.575} = 147{,}000 \text{ LBS}$$

FIGURE 5. Maximum allowable vertical deck reaction for a single landing gear - Landing area.



Definitions

P = Rated load of tire, LBS

p = Operational pressure of tire, PSI

r = Rated pressure of tire, PSI

C $= K \frac{P}{p}$

K $= (0.7\frac{p}{r} + 0.3)^{1/2}$

F = Maximum deck reaction from nomogram

Example-Single Wheel — Find the maximum permissible landing gear deck reaction F for an airplane having a single wheel landing gear with a 30 x 7.7 tire for which:

P = 21,300 LBS
p = 400 PSI
r = 360 PSI

K $= (0.7 \times \frac{400}{360} + 0.3)^{1/2} = 1.04$

C $= 1.04 \times \frac{21,300}{400} = 55$

F = 52,500 LBS (For LPH-2 Class)

F = 34,300 LBS (For LPH-4 Class)

Example-Dual Wheels — For dual wheels with the same size tires, spaced 16 inches on centers (b') divide the reaction F obtained from this nomogram by the dual wheel load factor K_e from Figure 7:

b' = 16" (Spacing of dual wheels)

K_e = 0.65 for LPH-2

F' $= \frac{52,500}{0.65} = 80,800$ LBS

K_e = 0.84 for LPH-4

F' $= \frac{34,300}{0.84} = 41,000$ LBS

FIGURE 6. Maximum landing reaction for single landing gear with single and dual wheels.

$$\text{Max-Dual Wheel Reaction} = \frac{\text{Single Wheel Reaction}}{K_e}$$

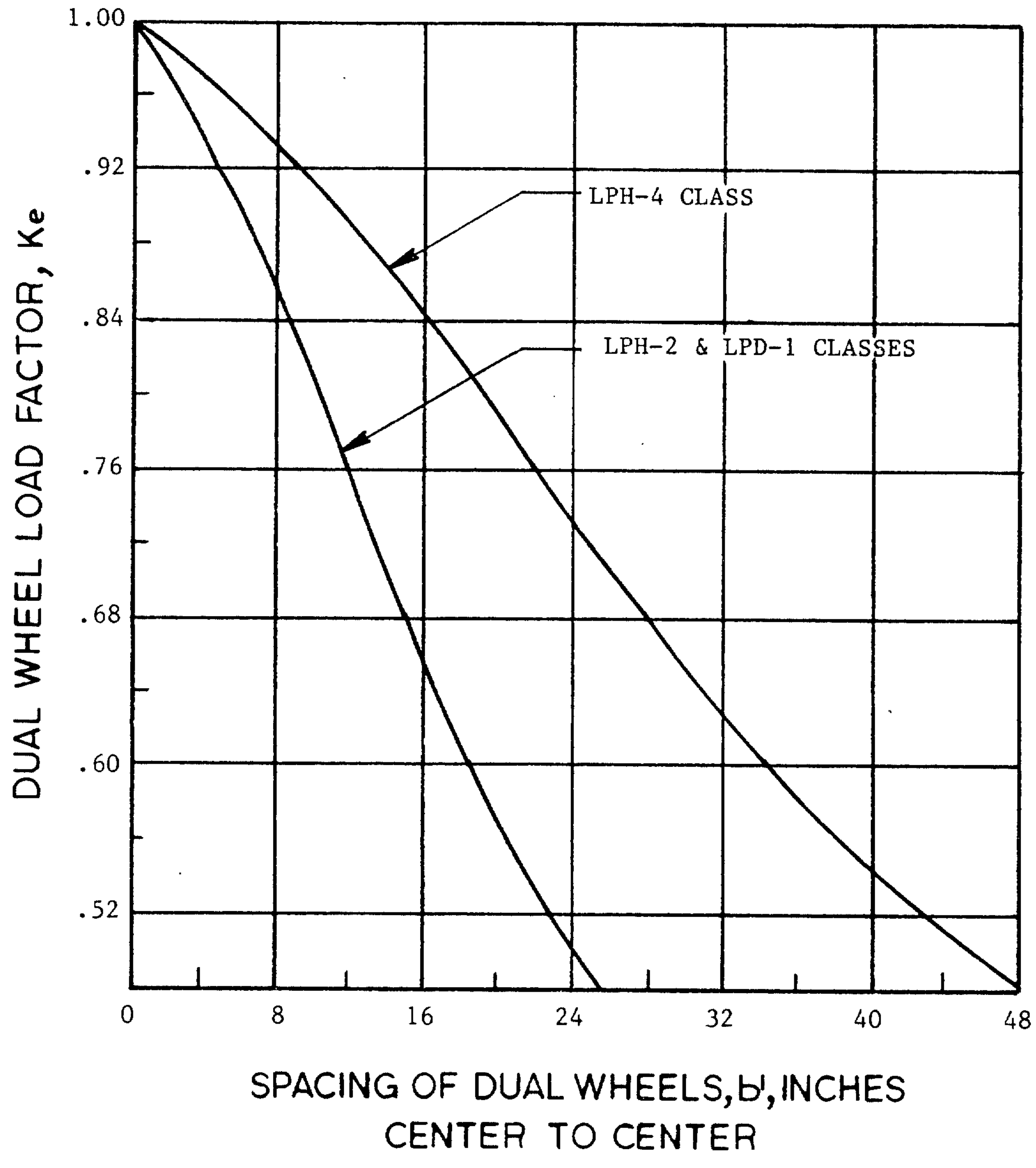


FIGURE 7. Dual wheel load factors for use with figure 6.

direction shall be constant, the undulations shall be continuous, and the soil bearing strength shall be constant. Separately, the airplane shall be required to traverse each specified contour shape during the landing roll-out at all critical speeds, such that angles up to 45° will occur between the path of the airplane and the lateral axis of the contour.

3.11.3.9 Arresting. Applicable to CB airplanes. The maximum aft-acting horizontal component of the arresting force shall be the mean arresting force as specified in 3.7 for the most critical arresting gear for which strength is required. The engaging speed shall be the maximum specified in 3.11.3.1. The axial arresting hook force shall act in the plane of the arresting cable through the cable groove of the hook point. The point of application of this force shall be at all lateral positions from the centerline of the hook point to the left, and alternately to the right, equal to one-half the radius of the hook point. The side load resulting from these laterally displaced loads shall act to increase the side load at the hook attachment to the fuselage.

3.11.3.9.1 Arrested run with side load. The airplane pitch attitudes shall be all those specified in 3.11.3.1. The landing gear wheels shall be just clear of the deck. A side load of 1.0 times the airplane weight shall act in combination with all aft-acting horizontal components of arresting hook forces in excess of 2.0 times the airplane weight. The direction of the side load shall be to the right and alternately, to the left.

3.11.3.9.2 Arrested run with brakes. The airplane shall be in the three-point attitude in a braked roll. The sum of the vertical components of the deck reactions shall be 2.0 times the airplane weight. Drag loads produced by braking at each main wheel shall be equal to 0.8 times the vertical reaction on each main wheel but the sum of these drag loads need not exceed the airplane weight. The side load at the hook point shall be zero.

3.11.3.10 Barricade engagement. Applicable to CB airplanes. For a barricade engagement the following apply:

a. The airplane shall engage the barricade on center and at all off-center distances up to 10 feet.

b. The main and nose gear wheels shall be on the deck and, alternately, just clear of the deck with shock struts fully extended.

c. The vertical engaging straps shall be symmetrically spaced, and allowed to slip or bunch along the wing leading edge due to normal engagement dynamics. The degree of slipping, bunching, and cutting of vertical straps shall be based on the detailed design of the wing leading edge sweep and configuration, and strap induced local structural failures.

d. Figures 8 and 9 illustrate the directions of the ultimate loads on wing components for symmetrical engagements. The resultant ultimate force on the airplane shall act in the plane of the barricade loading straps and shall have a drag component as specified in the type or detail specification.

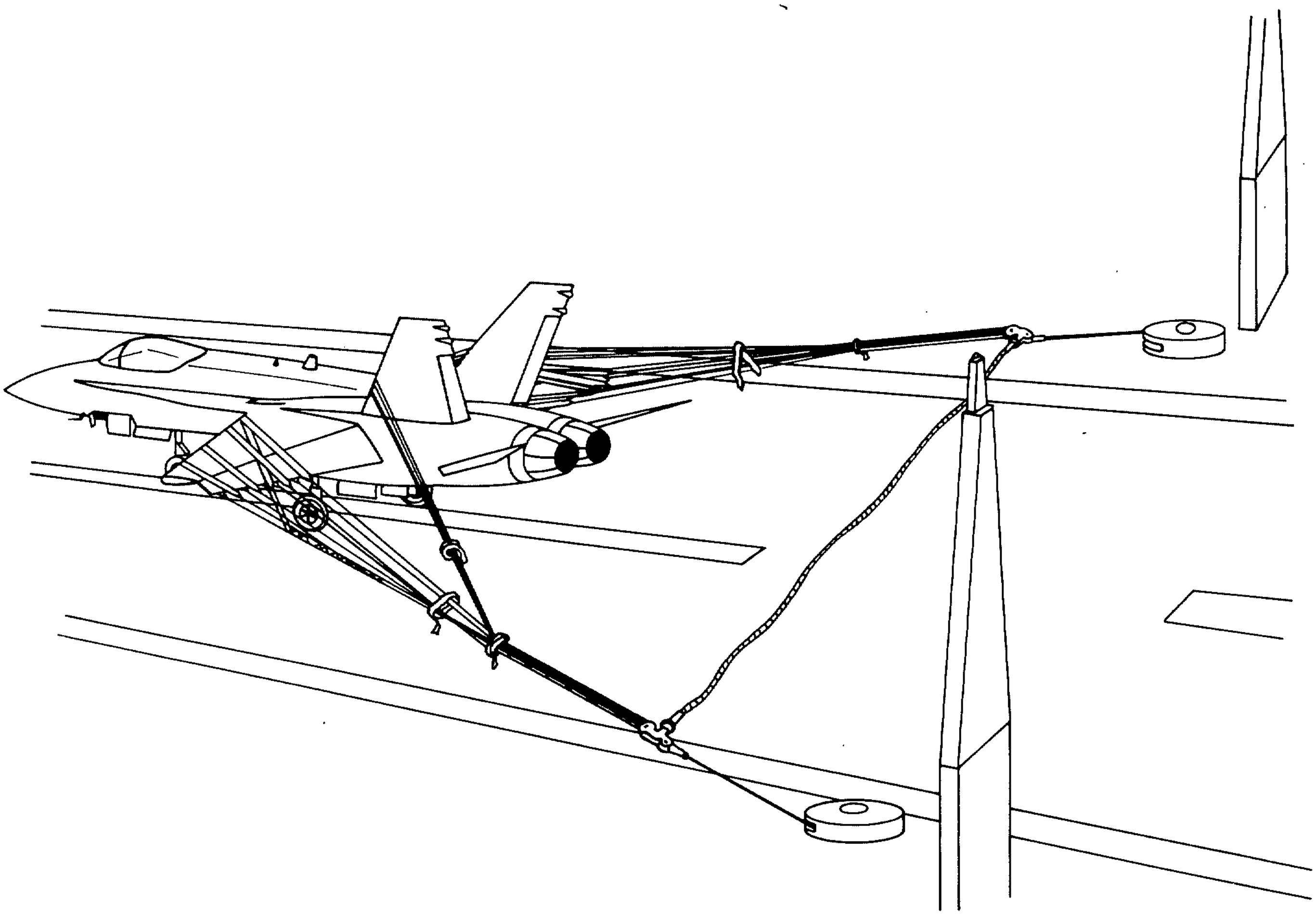


FIGURE 8. Barricade engagement - (typical).

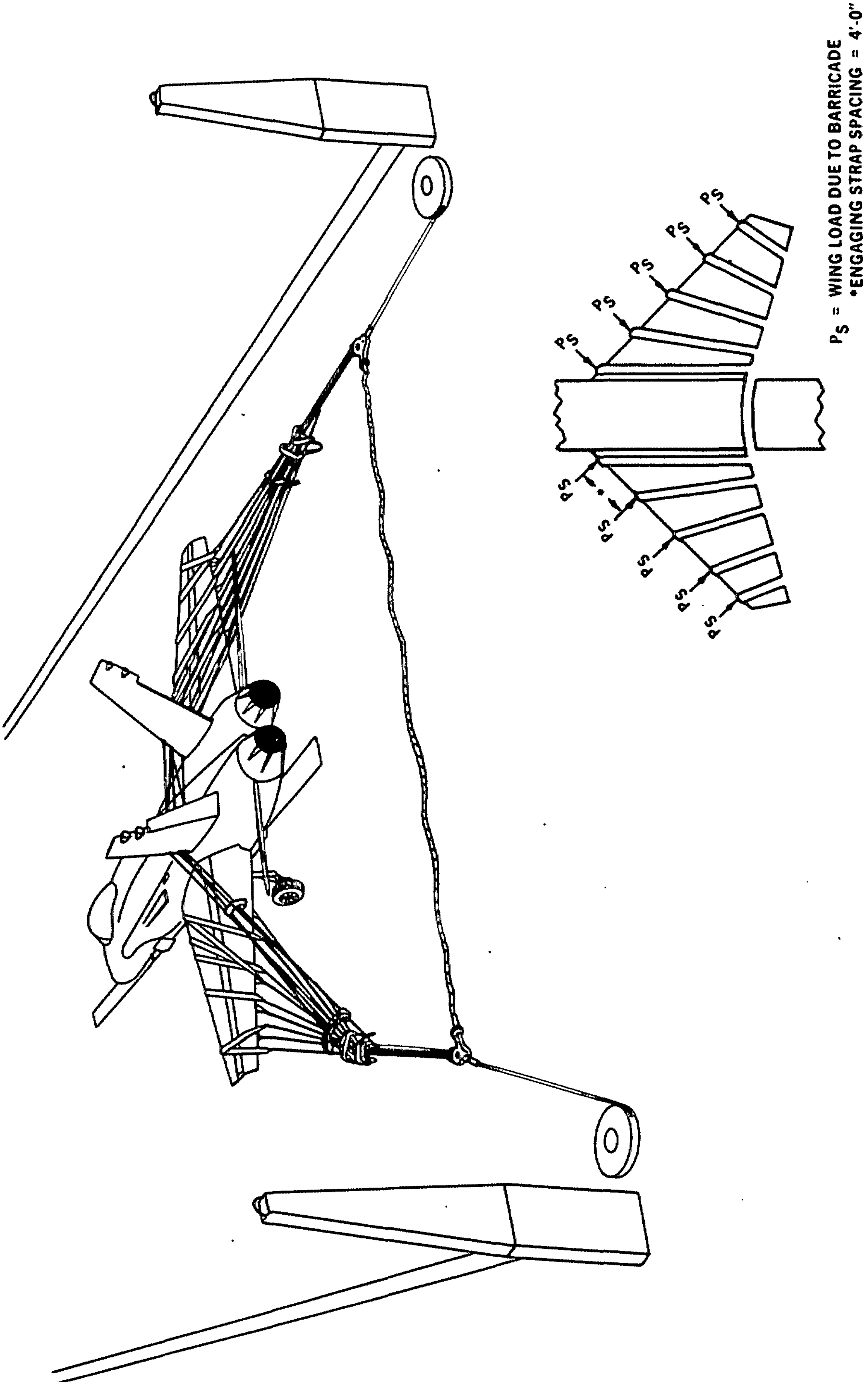


FIGURE 9. Barricade engagement - wing leading edge strap loading.

3.12 Ground maneuvering.

3.12.1. Braking. Applicable to all types of airplanes equipped with wheels and brakes. The landing gear and tires shall be in their static positions.

3.12.1.1 Two-point braked roll. The airplane attitude shall be that corresponding to the auxiliary wheel just clear of the ground with the auxiliary landing gear shock-strut fully extended and the main landing gear and tire compressed to their static position. The vertical load factor acting at the CG shall be 1.2 at the landplane landing design weight and 1.0 at the maximum design weight. A drag reaction, at each wheel in contact with the ground, shall be assumed acting at the ground equal to 0.8 of the vertical reaction and shall be combined with the vertical reaction.

3.12.1.2 Three-point braked roll. The airplane shall be in the three-point attitude. The vertical load factor acting at the CG shall be 1.2 at the maximum arrested landing weight and 1.0 at the maximum design gross weight. A drag reaction, at each wheel equipped with brakes, shall be assumed acting at the ground equal to 0.8 of the vertical reaction and shall be combined with the vertical reaction.

3.12.1.3 Unsymmetrical braking. The airplane shall be in the three-point attitude. The vertical load factor at the airplane CG shall be 1.0. One main gear shall be assumed braked and developing a drag load at the ground equal to 0.8 of the vertical reaction at that gear. The airplane shall be placed in static equilibrium, with side loads at the main and nose gear reacting the yawing moment, and with vertical loads at the main and nose gear reacting the pitching moment. The forward acting load at the CG shall be 0.8 of the vertical reaction at that main gear which is braked. The side load at the nose gear shall be acting at the ground, and need not exceed the vertical reaction multiplied by a coefficient of friction of 0.8. The nose gear shall be aligned in a fore and aft direction.

3.12.1.4 Reverse braking. The airplane shall be in the two-point attitude with the nose gear fully extended and just clear of the ground. The vertical load factor at the CG shall be 1.0. A forward acting drag reaction, acting at the ground equal to 0.8 of the vertical reaction, shall be combined with the vertical reaction for each gear that is equipped with brakes.

3.12.2 Turning. Applicable to all types of airplanes. The airplane shall be in the static three-point attitude. The sum of the vertical ground loads on the landing gear shall be equal to the weight of the airplane. The drag loads shall be zero. The side loads on each landing gear shall act in the ground plane and in combination with the landing gear vertical loads, such that the total resultant load passes through the airplane CG. The ratio of the side load to the vertical load shall be the same at each landing gear. The sum of the side loads shall be 0.5 times the weight of the airplane, except that this sum need not exceed a value which would result in overturning.

3.12.3 Pivoting. Applicable to all types of airplanes except SKI airplanes. With brakes locked on the landing gear unit about which the airplane is rotating, the airplane shall pivot about one wheel, or in the case of multiple wheels, about the centroid of contact area of all wheels in the gear unit. The vertical load factor at the CG shall be 1.0 and the tire coefficient of friction shall be 0.8.

3.12.4 Taxiing. Applicable to all types of airplanes. The airplane shall be in the three-point attitude. The drag loads and side loads at each gear shall be zero. The sum of the vertical loads acting at the ground shall be equal to twice the weight of the airplane. Separately for the design of the nose gear and its support structure only, the sum of the vertical loads, acting at the ground, shall be equal to three times the weight of the airplane.

3.12.5 Frozen ski. Applicable to SKI airplanes. The airplane shall be in the three-point attitude with each ski alternately assumed fixed. The loads and torques shall be those resulting from application of maximum engine power or thrust available at -60°F to the engine(s) on the side opposite from the fixed ski.

3.12.6 Steering. Applicable to all types of airplanes. The airplane shall be in the static three-point attitude with the nose gear swiveled in all possible positions. A torque equal to the maximum available steering torque shall be applied to the nose gear.

3.13 Ground handling conditions. Applicable to all types of airplanes.

3.13.1 Towing. The airplane shall be in the three-point attitude. The resultant of the vertical reactions at the ground shall be equal to the weight of the airplane and shall pass through the center of gravity. The towing conditions shall be as specified in Table II. The values of T used in obtaining the loads specified in Table II are those defined in Figure 10. These towing loads shall act parallel to the ground. The side component of the tow load at the main gear shall be reacted by a side force at the static ground line of the main gear to which load is applied. In cases where, because of the airplane configuration or the type of auxiliary gear swiveling which is provided, the load directions specified cannot be obtained, the maximum attainable angle of the specified load which will not result in side load on the auxiliary wheel shall apply. Additional loads necessary for equilibrium shall be as follows, considering each separately:

a. Inertia of the airplane.

b. If a tow point is at or near a main-gear unit, a force acting at the axle of the wheel nearest the tow point or the bottom of the ski, as applicable, in a direction opposite to the component of the tow load parallel to the plane of symmetry, equal in magnitude to this component or the vertical reaction at a main gear unit, whichever is lesser, combined with inertial load required for equilibrium. If a tow point is at the plane of symmetry, a force acting at the axle of the auxiliary wheel or the bottom of the auxiliary ski, as applicable, in a direction opposite to the direction of the tow load, equal in magnitude to this tow load or the vertical reaction at the auxiliary gear unit, whichever is less, combined with inertial loads necessary for equilibrium.

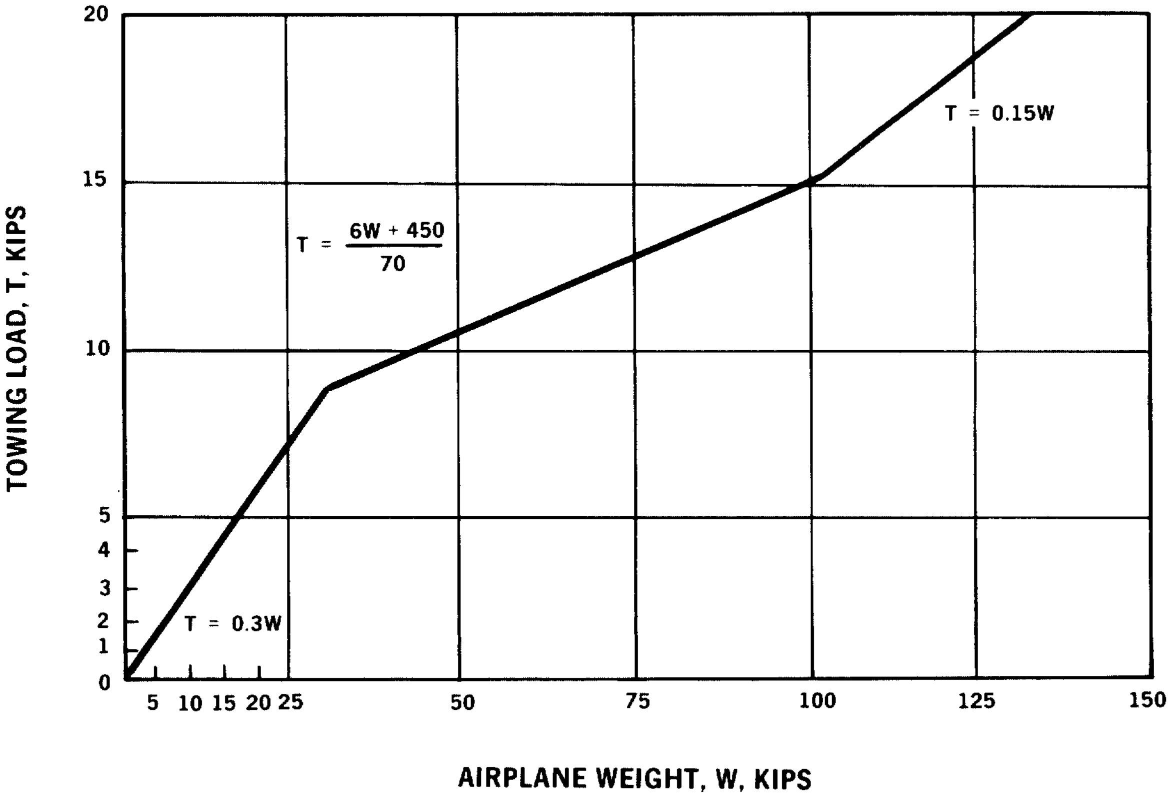


FIGURE 10. Towing loads.

TABLE II. Towing conditions.

Condition	Towing load: Direction from forward (degrees)	Towing load: Magnitude	Rotation of auxiliary wheel relative to normal position (degree)	Tow point
1	0	0.75T		At or near each main gear
2	±30			
3	180			
4	±150			
5	0	T	0	At auxiliary gear or near plane of symmetry
6	180			
7	0	T	180	
8	180			
9	±45	0.5T	±45	
10	±135			
11	±45	0.5T	±135	
12	±135			

3.13.2 Jacking. Jacking loads shall be those specified in Table III. The vertical load shall act singly and in combination with the longitudinal load, the lateral load, and both longitudinal and lateral loads. The horizontal loads at the jack points shall be reacted by inertial forces as to cause no change in the vertical loads at the jack points.

TABLE III. Jacking loads.

Component	Landing gear 3-point attitude	Other jack points level attitude
Vertical	1.35F*	2.0F
Longitudinal	0.4F	0.5F
Lateral	0.4F	0.5F

*F is the static vertical reaction at the jack point.

3.13.3 Hoisting.

3.13.3.1 Normal hoisting. For normal hoisting, the following shall apply:

a. The airplane shall be in the level attitude.

b. The vertical component of the hoisting force shall be 2.0 times the weight of the airplane.

3.13.3.2 Emergency hoisting. For hoisting from carrier-deck catwalks and ditches, the following shall apply:

a. The landing gears shall be resting on a plane having an inclination of 45° to the horizontal.

b. The airplane fore-and-aft axis shall be oriented at all angles in azimuth.

c. All landing gear wheels shall be assumed locked and there shall be sufficient friction to keep the wheels from rolling or skidding.

d. The airplane vertical load factor shall be 2.0.

e. The direction of the hoisting cable shall be normal to the horizontal.

3.13.4 Securing. Securing loads shall be as specified in MIL-T-81259. The maximum load in each cable shall not exceed 10,000 lbs.

3.14 Miscellaneous.

3.14.1 Sudden extension of landing gear. Applicable to all types of airplanes. For the condition of sudden extension of the landing gear after rebound at landing, rolling over obstructions and passing over the deck edge subsequent to touch-and-go landings and catapulting, the following shall apply:

a. The landing gear servicing requirements of 3.8 shall apply.

b. The condition of the hydraulic fluid (foaming) in the shock strut shall be that which results from touch-and-go landings or catapulting, as applicable.

c. For CB airplanes, the deck edge shall be considered as a step.

d. The landing gear strut extension and tire compression shall be in all positions from fully compressed to fully extended.

e. To prevent failures resulting from possible malfunctions, the load factor acting on the unsprung mass of the landing gear shall be not less than 20.0.

3.14.2 Hook shock absorber. For CB airplanes. The arresting hook shall be in all positions within its limits of travel as determined by the stops.

The axial force in the hook shock absorber shall be in accordance with MIL-A-18717 and that resulting from the requirements of 3.11.3.

3.14.3 Hook impact. For CB airplanes. A compressive load, equal to one-quarter of the load necessary to cause failure of the arresting hook when it is loaded as a pin-ended column, shall be applied to the arresting hook attachment structure. The direction of this load shall be along the axis of the hook shank for the hook in the full down position.

3.14.4 Sudden extension of the arresting hook. For CB airplanes, the arresting hook shall suddenly extend from the full up position to full extension as the airplane passes over the deck edge.

3.14.5 Extension and retraction of landing gear. Applicable to all types of airplanes. The following loads shall act separately and simultaneously, with the landing gear in all positions between fully extended and fully retracted:

a. Aerodynamic loads up to the limit speed specified for the takeoff and landing configurations.

b. Inertia loads corresponding to the maximum and minimum symmetrical limit load factors specified for flight in the takeoff and landing configurations.

c. Inertia loads resulting from accelerations of those parts of the landing gear that move relative to the airplane during extension or retraction. The accelerations shall be those resulting from use of maximum available power of the extension and retraction system.

d. Gyroscopic loads, as applicable, resulting from wheels rotating at peripheral speed equal to 1.3 times the stalling speed in the takeoff configuration and retracting or extending at the maximum rates attainable.

3.14.6 Braking wheels in air. Applicable to all types of airplanes, except SKI. The airplane shall be airborne in the takeoff configuration with the landing gear in any position between fully extended and fully retracted. The airplane vertical load factor shall be 1.0. The airspeed and wheel peripheral speed shall be 1.3 times the stalling speed in the takeoff configuration. The maximum static braking torque shall be applied instantaneously to stop the wheel rotation. The loads shall be determined by a dynamic analysis of the motion of the landing gear and local airframe back-up structure.

3.14.7 Load distribution on dual wheels. Applicable to airplanes with landing gear units having dual wheels. For landing gear units having wheels in tandem or multiple wheels, other than dual, the load distribution shall be as specified in the detail specification.

3.14.7.1 Symmetrical distribution. The landing gear loads of this specification shall be equally distributed among the wheels at each landing gear unit.

3.14.7.2 Unequal tire inflation. The landing gear loads resulting from the conditions specified in 3.10, 3.11, 3.12.1.1, 3.12.1.2, 3.12.2, 3.12.4, and 3.13 on each landing gear unit shall be distributed such that 60 percent of the total wheel load is on one wheel and 40 percent on the other wheel, except that for the drift and turning conditions the 60 percent load need not be applied to the inboard wheel with the inward acting side load, or to the outboard wheel with outboard acting side load.

3.14.7.3 Flat tire landing. The wheel loads resulting from the landing conditions specified in 3.11 reduced to 45 percent of the specified loads for carrier landings and to 60 percent of the specified loads for all other landings, shall be applied to each wheel separately.

3.14.7.4 Flat tire taxiing. The wheel loads resulting from the taxiing conditions, reduced to 50 percent of the specified loads, shall be applied to each wheel separately.

3.14.7.5 Flat tire towing. The wheel loads resulting from the towing conditions shall be applied to each wheel separately.

3.14.8 Load distribution on skis. The longitudinal and treadwise distributions of the specified loads on skis shall be as follows:

a. The longitudinal distribution for vertical drag and side loads shall be as shown in Figure 11. For skis having tines, the side load distribution shall be applied to either tine where applicable.

b. Except for rolled landings, the treadwise distribution for vertical, drag and side loads shall be as shown in Figure 11 and apply to the inboard and, alternately, to the outboard direction. For rolled landings, the distribution shown in Figure 12 shall be 3 to 1 from edge to edge of the ski.

3.14.9 Maximum allowable load factor on occupants. Occupants of the airplane shall not be subjected to a peak vertical load factor greater than 20 for all conditions required by this specification. Also the type of structure surrounding and under the occupants shall be such that in crashes following collapse of the nose gear, large amounts of energy will be absorbed by progressive failure of the structure to limit the vertical load factor at the seat to 20. This requirement is intended to provide a reasonable probability of survival predicated on human tolerance to vertical loads.

3.14.10 Tail bumpers. A side load of 0.2 times the vertical ground load shall act in combination with the vertical and drag load. If the tail bumper is equipped with a skid or pad in lieu of a wheel, the drag coefficient of friction shall be constant at 0.4.

3.14.10.1 Loads for landing. The tail bumper loads are those which result from the requirements of 3.11.

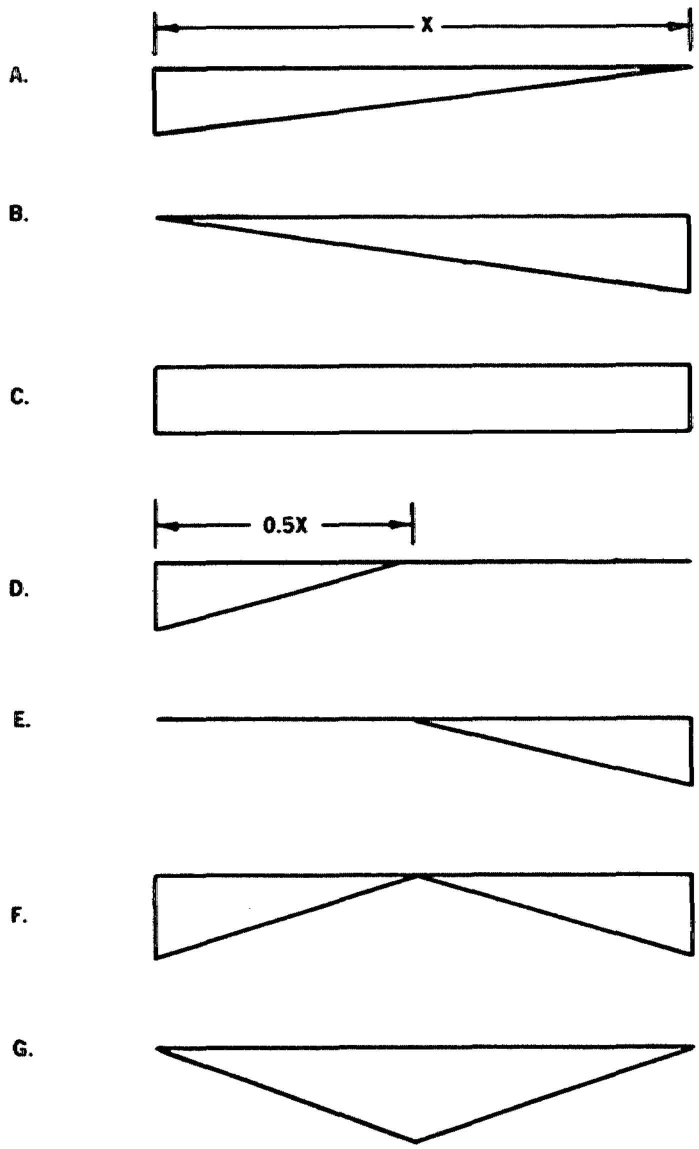


FIGURE 11. Lengthwise ski load distribution.

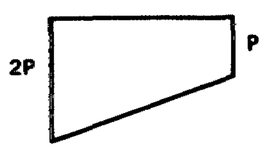


FIGURE 12. Treadwise ski load distribution.

3.14.10.2 Loads for over-rotation on takeoff. The tail bumper loads are those which result from the motion of the airplane for which the following shall apply:

a. Grounds speeds shall be all speeds up to the takeoff speed.

b. Airplane pitch attitudes and pitch velocities shall be all those that can be attained by application of full elevator control power with full aft stick force applied instantaneously, except that the pitch attitude corresponding to 0.9 $C_{L_{MAX}}$ need not be exceeded.

c. Airplane weights shall be all those from the minimum flying weight to the maximum design weight.

3.14.10.3 Load for tipback. The tail bumper loads are those which result from the motion of the airplane for which the following shall apply:

a. The airplane shall be rolling backwards at a constant speed of 5 knots.

b. The deck inclination shall be plus and, alternately, minus 5° with respect to the fore-and-aft axis of the airplane.

c. The motion of the airplane shall be stopped by application of brakes.

d. The coefficient of friction between the tire and deck shall be applied instantaneously and held constant at 0.95.

e. The weight and weight distribution, airplane configuration, and thrust shall be those that are critical.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements specified herein. Unless otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of section 3. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, and does not commit the Government to accept defective material.

4.2 Methods of inspection.

4.2.1 Design data. Structural design and analysis data shall be in accordance with MIL-A-8868.

4.2.2 Laboratory tests. Laboratory tests shall be in accordance with MIL-A-8867.

4.2.3 Flight tests. Navy flight test demonstrations shall be in accordance with MIL-D-8708.

5. PACKAGING

This section is not applicable to this specification.

6. NOTES

6.1 Intended use. The requirements of this specification are intended for use in the structural design and substantiation of airplanes.

6.2 Ordering data.

This paragraph is not applicable to this specification.

6.3 Supersession data. See supersession data in section 6 of MIL-A-8860. This specification supersedes MIL-A-8863A.

6.4 Definitions. For definitions of terms used in this specification see section 6 of MIL-A-8860.

6.5 Subject term (key word) listing.

Airplane
Airplane rigidity
Airplane strength
Airplane weight
Arresting
Barricade engagement
Braking
Catapulting
Coefficient of friction
Deck reactions
Flight tests
Ground loads
Ground maneuvering
Ground roughness
Landing
Takeoff
Tipback
Towing

6.6 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - AS

(Project 1510-N023)

INDEX

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER: MIL-A-8863B(AS)

2. DOCUMENT TITLE: Airplane Strength and Rigidity, Ground Loads for Navy Acquired Airplanes

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION *(Mark one)*

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ OTHER *(Specify)*: ______

b. ADDRESS *(Street, City, State, ZIP Code)*

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional

b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional

c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional

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