Aerolineas Argentinas

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CHAPTER 09 – TOWING AND TAXIING

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TOWING - MAINTENANCE PRACTICES

1. General
   A. The airplane is normally towed or pushed by a tow bar attached to the nose gear. Maximum normal towing turning limits are indicated by painted stripes on the nose gear doors.
   B. The airplane is capable of being towed on firm and level terrain by the nose gear with one tire flat on each landing gear if starting loads are held to the minimum. For other abnormal towing loads, such as towing with two flat tires on one main gear, towing on soft terrain, towing up inclines greater than 5 degrees, the towing should be done from the main gears as the structural limitations of the nose gear may be exceeded.

      NOTE: With two flat tires on one main gear, effort should be made to replace one of the flat tires with a serviceable tire before towing to prevent excessive damage to the tires and wheels.

   C. Towing airplane with either or both engines removed presents no problem as long as the center of gravity remains forward of the aft center of gravity limits. Refer to "Center-of-Gravity Calculations for Towing" paragraph.
   D. When it is necessary to tilt the airplane for tail clearance in hangars and storage areas, refer to 7-13-0, Tilt Airplane for Tail Clearance.
2. Equipment and Materials
   A. Standard Tow Tractor
   B. Tow Bar - C09002 (-1, -2, -5, -10, -12 and -13) -9 is replaced by -58 and F72951-51
   C. Eyebolt Assembly, Main Landing Gear Towing - F72719
   D. Wire cable (3/4 inch) with end fittings to match F72719 and tow tractor (local fabrication)
   E. Steering Depressurization Valve Lockout Pin - F72735-13
3. Prepare for Towing Airplane
   A. Do these steps to remove power to the pitot probes:

      WARNING: DO THESE STEPS BEFORE YOU APPLY EXTERNAL POWER. IF YOU DO NOT OBEY THESE PRECAUTIONS, THE PITOT PROBE CAN BECOME VERY HOT. IT CAN BURN YOU.

(1) Push the BAT switch on the P5 panel to the ON position.
(2) Turn the STBY power switch on the P5 panel to the AUTO position.

B. Check airplane is within center of gravity towing limitations and for fuel imbalance.
C. Make sure that ground locks are installed in all of the landing gear (AMM 32-00-01/201).

NOTE: You are permitted to move the airplane withou ground locks.

D. Make sure that the tires and shock struts have the correct pressure (AMM 12-15-31/201, AMM 12-15-41/201, AMM 12-15-51/201).

CAUTION: DO NOT TOW AIRPLANE WITH NOSE GEAR FULLY COLLAPSED OR EXTENDED MORE THAN 22 INCHES FROM BOTTOM OF INNER CYLINDER TO BOTTOM OF STEERING PLATE AS NOSE GEAR STRUT MAY BE DAMAGED INTERNALLY.

E. Apply electrical power (AMM 24-41-0/201).

NOTE: With external power applied or APU providing electrical power, parking brakes in parked position, and hydraulic system ground interconnect valve on (open), system B pump will pressurize both inboard and outboard brake accumulators A and B. If parking brakes are off, only outboard brake accumulator B will be charged and outboard brakes continuously pressurized.

F. Check that brake hydraulic pressure is normal, approximately 3000 psi.
G. Check that antiskid switch is off.
H. On airplanes without nose gear steering depressurization valve or if Lockout Pin is not installed.
(1) Check that hydraulic system A is depressurized.

NOTE: If hydraulic system A is pressurized, system pressure prevents steering actuator bypass valve from opening, preventing nose gear from being turned by the tow bar. (Do not confuse system A pressure with brake accumulator A which pressurizes only the inboard brakes.)

(2) Remove external electrical power (AMM 24-22-0/201).

WARNING: ENSURE HYDRAULIC SYSTEM A IS COMPLETELY DEPRESSURIZED AND DO NOT MAKE ANY ELECTRICAL POWER CHANGES WITH TOW BAR CONNECTED. AN INTERRUPTION OF ELECTRICAL POWER COULD CAUSE MOMENTARY PRESSURIZATION OF ENGINE DRIVEN HYDRAULIC PUMPS WHICH COULD PRESSURIZE SYSTEM A AND CAUSE NOSE GEAR TO ALIGN WITH STEERING WHEEL POSITION. DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL COULD OCCUR.

NOTE: You can operate the APU if you do not operate the engines, or you can operate the engines but do not make changes to electrical power during towing.

I. On airplanes with nose gear steering depressurization valve, depress button and install nose gear steering lockout pin in steering depressurization valve (AMM 32-00-01/201).

CAUTION: TO AVOID DAMAGE TO STEERING COMPONENTS OR TOWING EQUIPMENT, THE DEPRESSURIZATION VALVE BUTTON MUST BE DEPRESSED AND HELD WHEN LOCKOUT PIN IS INSERTED.

NOTE: Nose gear steering depressurizing lockout pin can be installed and removed without entering wheel well from aft of right nose wheel well door.

J. Connect interphone system between control cabin, tow tractor operator and towing ground crew.

WARNING: DO NOT CONNECT A HEADSET AND DO NOT TOUCH CONNECTIONS TO THE AIRPLANE DURING ATMOSPHERIC ELECTRICAL ACTIVITY OR IN STRONG ELECTROMAGNETIC FIELDS. LIGHTNING STRIKE AND HIGH DISCHARGE CURRENTS CAN CAUSE SEVERE INJURY.

K. Check that ramp area is cleared of all stands and equipment in the towing path.
L. Connect tow bar to tow tractor and to airplane.
M. Remove airplane static ground wires.
N. Close the fan cowl panels, thrust reverser (AMM Chapter 71).

CAUTION: MAKE SURE ALL ENGINE COWLS ARE CLOSED AND LATCHED BEFORE THE AIRPLANE IS TOWED. DAMAGE TO EQUIPMENT CAN OCCUR.

O. To tow the airplane with the entry or lower cargo door open is optional.

4. Tow Airplane from Nose Gear
A. Position wing, tail, tow tractor operator and ground crew so that all are in visual contact.
B. Check that cockpit man, ground crew, and tow tractor operator are in intercom communication.
C. Check that wheel chocks are removed.

D. Check that hydraulic brakes are released.
E. Tow airplane. Begin towing slowly and straight ahead before attempting to turn.

CAUTION: MOVE AIRPLANE FORWARD BEFORE STARTING SHARP TURNS. AVOID SUDDEN STARTS AND STOPS. IF TOWING IS BEING DONE UNDER HIGH LOAD CONDITIONS, SUCH AS TOWING WITH BOTH TIRES FLAT ON ONE MAIN GEAR, TOWING ON SOFT TERRAIN, TOWING UP INCLINES GREATER THAN 5 DEGREES, OR SIMILAR CONDITIONS, REFER TO MAIN GEAR TOWING AS NOSE GEAR TOWING STRUCTURAL LIMITATIONS MAY BE EXCEEDED.

F. Limit brake applications to minimum use within safety limitations. Fully charged accumulators are capable of approximately three brake applications.

CAUTION: IF YOU USE A TOW BAR, YOU CAN CAUSE THE SHEAR PINS TO SHEAR IF YOU USE THE AIRPLANE BRAKES WHILE YOU TOW THE AIRPLANE. MOST TOWBARLESS TOW VEHICLES DO NOT HAVE A SHEAR PIN TO LIMIT THE LOADS IF AIRPLANE BRAKES ARE USED DURING TOWING. IF AIRPLANE BRAKES ARE USED WHILE TOWING WITH A TOWBARLESS TOW VEHICLE ATTACHED TO THE NOSE LANDING GEAR, PERFORM THE "HARD LANDING OR HIGH DRAG/SLIDE LOAD LANDING" INSPECTION FOR THE NOSE LANDING GEAR AREAS (AMM 05-51-51).

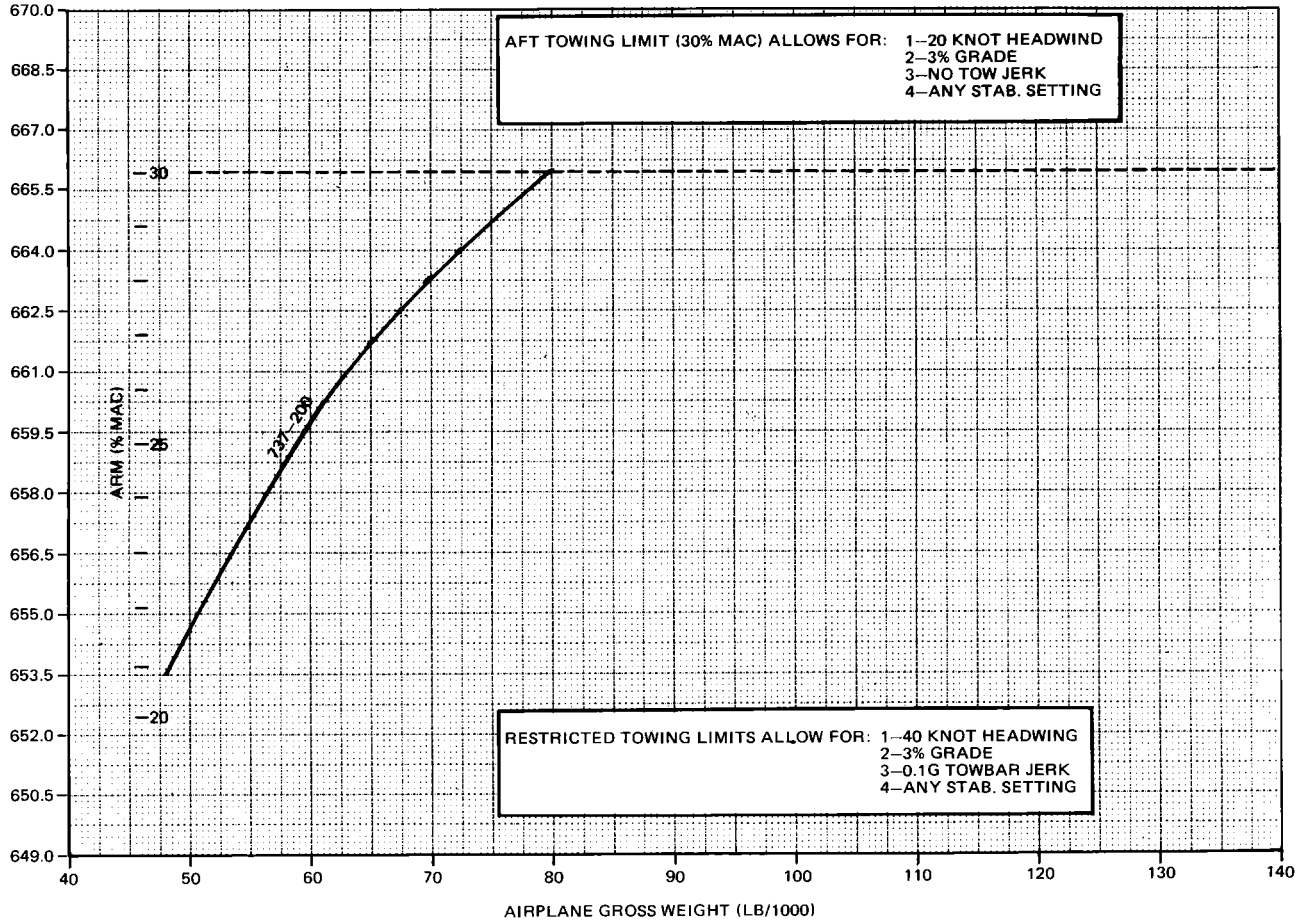
G. Maximum normal turning angle is 78 degrees as indicated by red stripes on nose gear doors. If a greater turning angle is required, disconnect torsion links on nose gear. If an angle in excess of 90 degrees is required, disconnect nose gear taxi light wire. When disconnected, support lower torsion link against dragging to prevent damage to lubrication fittings. See Fig. 202 for turning dimensions. See Fig. 203 for wingtip turning radius for various turning angles. See Fig. 204 for ground turning techniques.
H. Finish towing in a straight path for a minimum of 10 feet to relieve turning stresses remaining in tires and shock struts.
I. At end of towing, position wheel chocks fore and aft of a main gear wheel on each main gear. Place the wheel chocks about 3 inches away from the tires.

J. Release the parking brake.
K. Disconnect tow bar.
L. On those airplanes equipped with a nose gear steering depressurizing valve, remove nose gear steering lockout pin from depressurization valve.

WARNING: STAY CLEAR OF NOSE GEAR WHEN STEERING LOCKOUT PIN IS REMOVED FROM STEERING DEPRESSURIZING VALVE IF HYDRAULIC SYSTEM A IS PRESSURIZED.

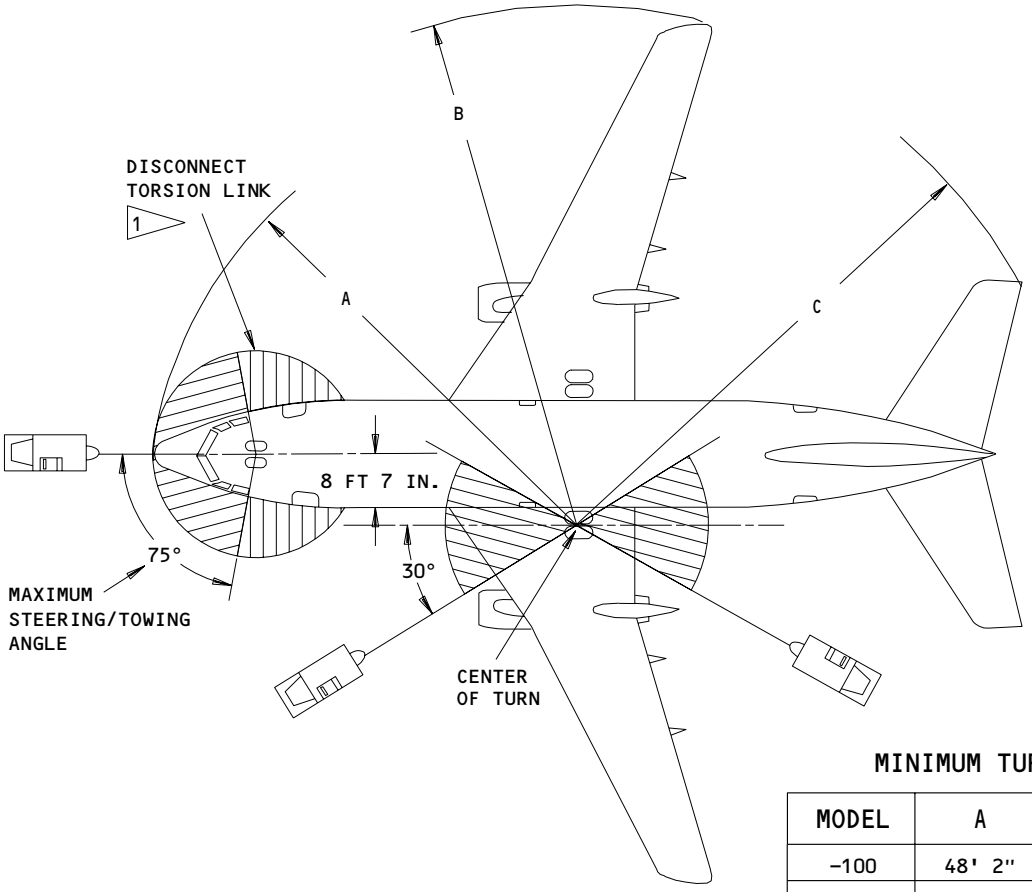
5. Tow Airplane under Abnormal Loads (Main Gear Towing)
   A. Preparation for towing and towing the airplane under abnormal loads is the same as towing airplane from the nose gear except for the following:
      (1) Eyebolt assemblies are installed in place of the jacking cone on each main gear and locally fabricated cables attach the gears to the tow tractors. The nose gear tow bar is not used.
      (2) Hydraulic system A is pressurized and airplane is steered during towing by the nose wheel steering system by directions from the ground crew.
      (3) The airplane motion is interrupted by application of airplane brakes. The number of applications is not limited as the hydraulic systems are operational.
6. Return Airplane to Normal
   A. Attach static ground wires.
   B. Disconnect and stow intercommunication set.
   C. If operating, shut down APU.
   D. If landing gear downlock pins were installed, remove them prior to taxi and takeoff.
7. Center of Gravity Calculations for Towing
   A. During all phases of ground handling and maintenance, the center of gravity (CG) of the airplane must be forward of the aft CG limit (Fig. 201). This CG limit provides a margin of safety to allow for grade, winds, and acceleration forces as noted. The configuration to be towed should be carefully checked to ensure that the CG is forward of the towing limit. If the aft towing limit is exceeded, the recommended procedure is to move the CG forward by adding ballast or fuel. The table in Fig. 201 gives the incremental CG shift for some of the items to be considered. A forward CG shift is (–) and an aft CG shift is (+). All data is for a level airplane.
8. Tow Airplane in High Wind
   A. The airplane may be towed in high winds provided conditions are observed per Fig. 205.
9. Towing Airplane (Pushback)
   A. Make sure the person that works near the area knows the pushback hazard zone as shown in Fig. 206.
      (1) Tow vehicle
      (2) Tow bar
      (3) Nose wheels

Condition	Incremental CG Shift Inches	Incremental CG Shift % MAC
One man in control cabin	-1.6	-1.2
One man at cabin station 990	+1.2	+0.9
One engine removed	+2.7	+2.0
Two engines removed	+5.8	+4.3
1000 pounds attached to nose gear (Nose gear oleo must be deflated amd secured when ballast is attached to the nose gear.)	-6.8	-5.1
1000 pounds centrally loaded in forward cargo hold	-3.8	-2.9
Fuel in wing tanks - pounds		
2,500	-2.0	-1.5
5,000	-3.7	-2.8
7,500	-5.0	-3.8
10,000	-6.3	-4.7
12,500	-7.2	-5.4
15,000	-7.3	-5.4
17,500	-6.0	-4.5



NOTE: USE HORIZONTAL STABILIZER SETTING BETWEEN TRIM UNITS 1 AND 7 WHEN TOWING AIRPLANE. SEE STABILIZER POSITION INDICATOR ON AISLE CONTROL STAND IN CONTROL CABIN

Towing Center of Gravity Limitations
Figure 201



MINIMUM TURNING RADIUS

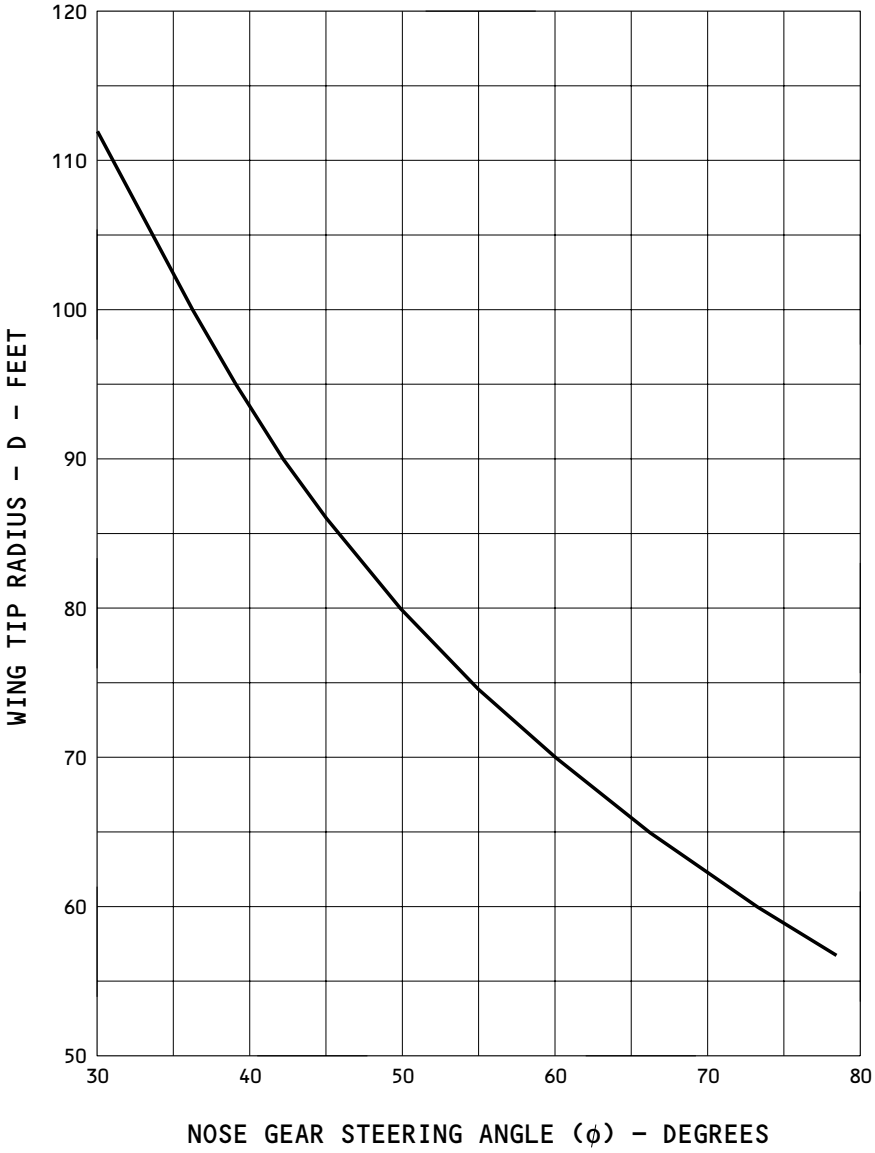
MODEL	A	B	C
-100	48' 2"	57' 5"	54' 0"
-200	51' 4"	58' 2"	57' 0"

MAXIMUM TOWING LOADS (FORWARD OR AFT)			
MODEL	GROSS WEIGHT	NOSE GEAR	MAIN GEAR
		TOW LOAD ANGLE ±180°	TOW LOAD ANGLE ±30°
737-100	97,800	14,670	24,450
	100,000	15,000	25,000
737-100/-200	110,000	16,500	27,500
737-200	116,000	17,400	29,000
	117,500	17,625	29,375
	120,000	18,000	30,000
	125,000	18,750	31,250
	128,600	19,290	32,150

1 > WITH TORSION LINK DISCONNECTED, NOSE GEAR TOWING ANGLE IS LIMITED TO APPROXIMATELY 90 DEGREES UNLESS NOSE GEAR TAXI LIGHT CABLE IS DISCONNECTED.

CAUTION: DEPRESSURIZE HYDRAULIC SYSTEM A BEFORE TOWING AIRPLANE. FAILURE TO COMPLY COULD RESULT IN DAMAGE TO NOSE GEAR STEERING ACTUATOR.

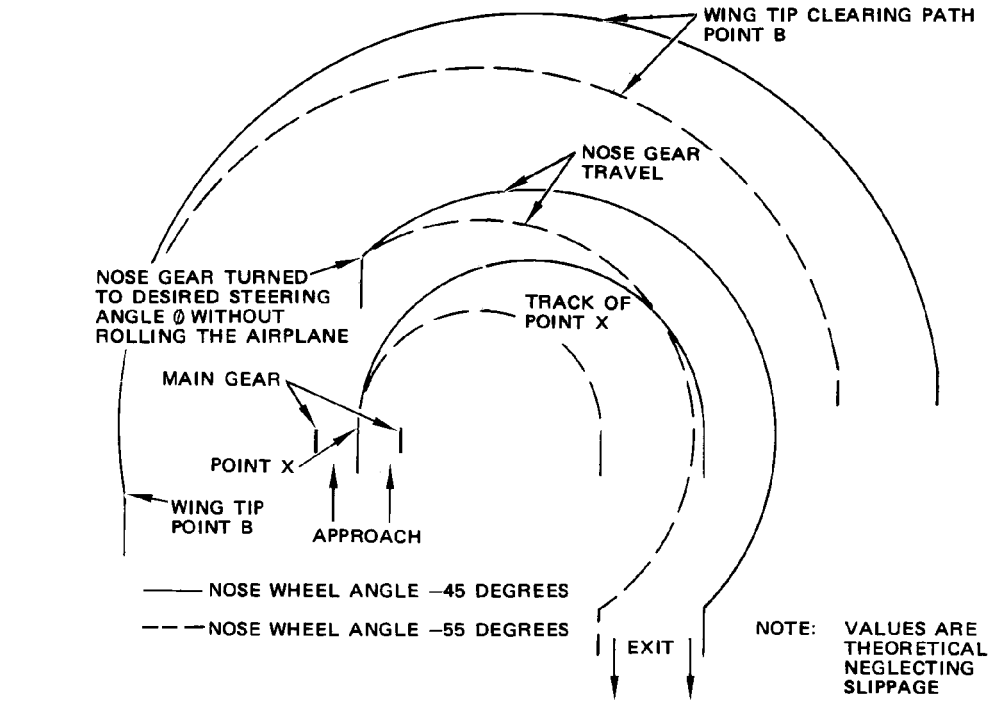
Towing Loads and Turning Radius
Figure 202

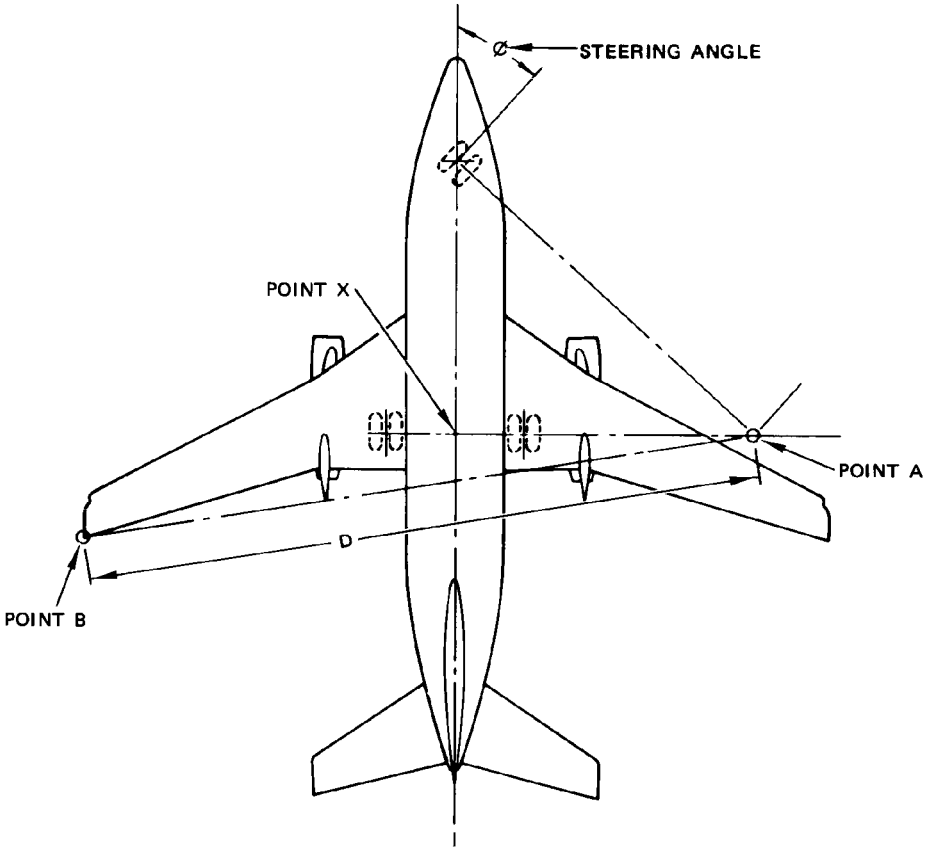


NOTE: ALL WING TIP RADII (D) ARE FOR THEORETICAL TURNS. NO CONSIDERATION IS GIVEN FOR TIRE SCUFFING ON A TURN, FRICTION FACTORS, ETC. ACTUAL RADII (D) WILL BE SLIGHTLY LARGER THAN THEORETICAL NUMBERS.

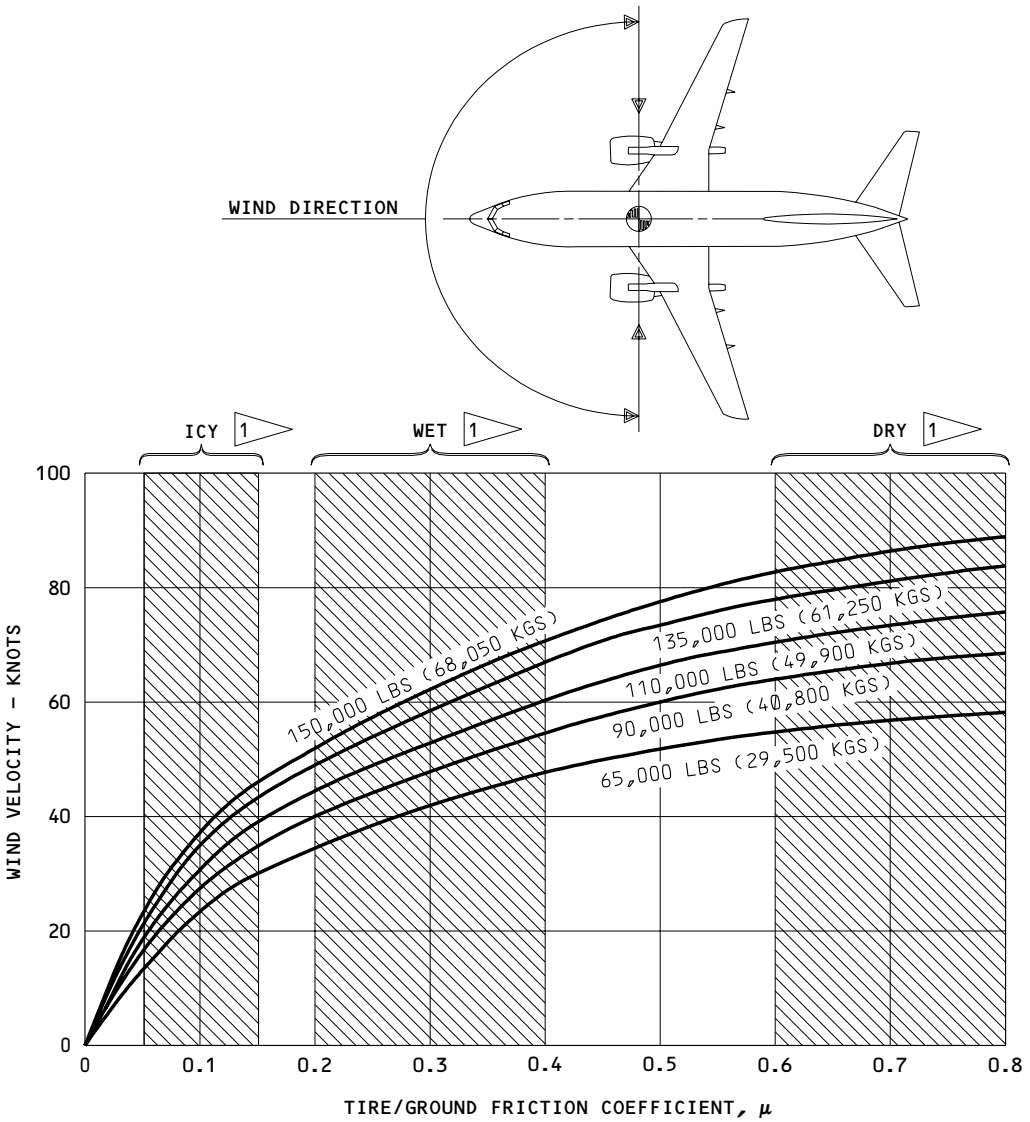
EFFECTIVE TAXI STEERING ANGLE EQUALS NOSE GEAR ANGLE MINUS NOSE GEAR SLIPPAGE ANGLE.
EFFECTIVE TOWING ANGLE EQUALS NOSE GEAR ANGLE.

Wing Tip Clearance Radius
Figure 203





Ground Turning Techniques
Figure 204



NOTE: AT WIND SPEEDS ABOVE THE WEIGHT CURVES, THE AIRPLANE IS SUSCEPTIBLE TO WEATHERVANING.

A. LIMITING FACTOR IS ADHESION OF NOSE GEAR TIRES WITH GROUND.

B. WIND IS FROM ANY DIRECTION.

C. ALLOWABLE STEADY WIND PLUS GUST VELOCITY SHALL NOT EXCEED 2/3 TIMES STEADY WIND PLUS GUST VELOCITY REQUIRED FOR WEATHERVANING.

D. STEADY WIND PLUS GUST VELOCITY = PEAK WIND VELOCITY.

E. WIND GUST VELOCITIES ANTICIPATED SHALL BE ADDED TO STEADY WIND VELOCITY TO APPRAISE GROUND OPERATIONS.

F. FOR TOWING AND MANEUVERING IN CLOSE PROXIMITY TO BUILDINGS OR OTHER LARGE AIRCRAFT THE ALLOWABLE WIND VELOCITIES SHALL BE REDUCED BY 1/3.

G. FLAPS UP

H. STABILIZER SET AT 3 PILOT UNITS.

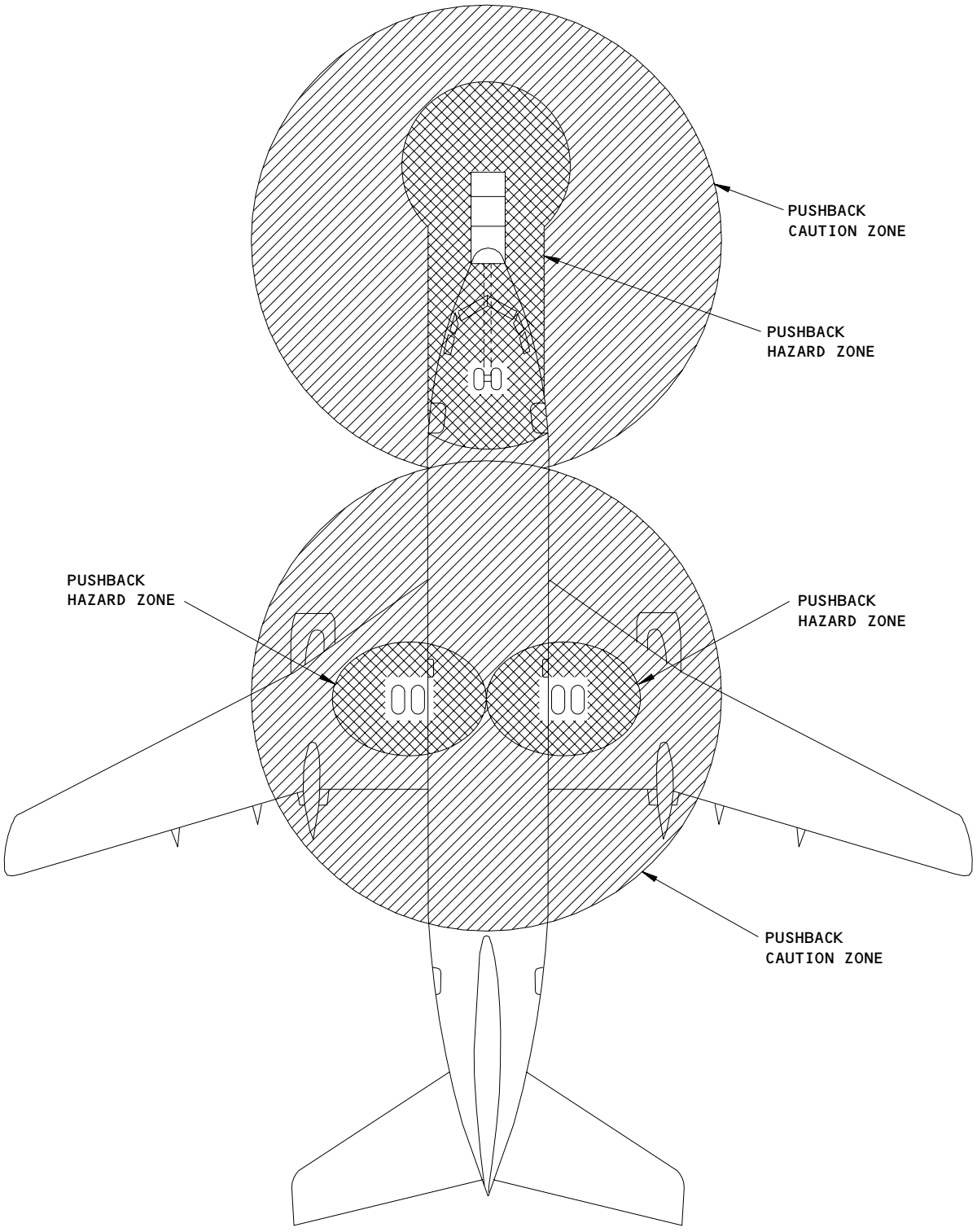
J. VALID FOR ALL C.G.'S

1 APPROXIMATE NORMAL RANGES SHOWN

Wind Velocity During Towing
Figure 205

(4) Main wheels

WARNING: WHEN YOU TOW THE AIRPLANE, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOW VEHICLE, TOW BAR, NOSE WHEELS, AND MAIN WHEELS. PERSONS ON THE GROUND MUST KNOW IT IS POSSIBLE TO BE RUN OVER BY THE NOSE WHEELS, MAIN WHEELS AND THE TOW VEHICLE. THIS IS BECAUSE THE AIRPLANE WILL CHANGE POSITION DURING PUSHBACK AND TOWING. MAKE SURE YOU KEEP A MINIMUM OF 10 FEET SEPARATION BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. IF YOU DO NOT KEEP THE MINIMUM DISTANCE, A FATAL INJURY COULD OCCUR.



WARNING: MAINTAIN A MINIMUM OF TEN FEET (3 METERS) SEPARATION BETWEEN PERSONS ON THE GROUND, AND THE NOSE WHEELS, THE TOW BAR AND TOW VEHICLE, AND THE MAIN WHEELS WHILE THE AIRPLANE IS MOVING.

Towing Hazard Zones
Figure 206

TOWING AIRPLANE WITH FLAT TIRES - MAINTENANCE PRACTICES

1. General
   A. The airplane can be towed by the nose gear if there is no more than one flat tire per gear. Towing with flat tires should be done slowly and sharp turns avoided to minimize damage to the flat tire or wheel rim (Ref 9-10-0).
   B. If there is more than one flat tire per gear, either replace the flat tires, as required, with serviceable tires so there is only one flat tire per gear, or tow the airplane with cables attached to each main gear.

      CAUTION: THE BREAKAWAY LOAD MAY EXCEED NOSE GEAR TOWING LOAD CAPABILITY WITH MORE THAN ONE FLAT TIRE PER GEAR.

2. Equipment and Materials
   A. Eyebolt Assembly - Main Gear Towing - F72719
   B. Wire cable (3/4 inch) equipped with end fittings for main gear towing
3. Towing Airplane with More than One Flat Tire per Gear
   A. Install eyebolt assembly at bottom of each main gear. Position eye in the direction of towing.
   B. Attach cables between eyebolts and tow vehicles.
   C. Pressurize hydraulic system A (Ref 29-11-0).

      NOTE: When pulling airplane with cables, directional control is maintained by uneven pull of towing vehicles and hydraulic steering by control cabin occupant. The only braking available is by airplane brakes.

   D. Move airplane as required, maintaining control of all towing activity through one person in visual contact with both towing vehicle operators and control cabin occupant. Refer to 9-10-0, Fig. 201, for maximum angle of pull through main landing gears.

TAXIING - MAINTENANCE PRACTICES

1. General
   A. Safety Aspects of Taxiing
      (1) Taxiing an airplane requires caution and precision and should be done only by qualified personnel. The taxi path must be clear of all personnel and vehicles. Proper taxi authority from airport ground control must be obtained to avoid interference with other airport operations. Clearance from buildings and other airplanes must be maintained at all times. Electrical power must be applied for operation of taxi lights, navigation lights, radio and intercom equipment, and other systems needed for safe taxiing. The applicable airplane hydraulic systems must be pressurized to provide pressure for airplane braking and nose wheel steering systems. Taxi operations conducted at night or in adverse weather conditions require additional crew awareness of surroundings such as parked vehicles, maintenance stands, and pavement surface conditions. An airline taxi checklist for maintenance personnel is essential to assist the crew in a safe taxi operation.
   B. Maintenance Personnel Requirements
      (1) Personnel required for taxi operations include a cockpit crew and a ground crew. The minimum number of cockpit personnel required is two (one taxi qualified person and one observer). One or two ground crew personnel are required for removal and replacement of chocks, for assistance in engine start-up, for providing guidance for airplane movement, and for clearing the taxi path. In areas of congestion or close quarters (hangers, ramp areas next to the terminal, airplane parking areas, etc.), additional ground personnel may be required for use as wing guides and observers. One cockpit person must be qualified on all aspects of taxi operations such as:
      NOTE: It is not necessary for the observer to be taxi qualified.
      (a) Cockpit preparation
      (b) Engine start-up, operation, and shutdown procedures
      (c) Engine fire and emergency procedures
      (d) Radio and intercom operation and procedures
      (e) Taxi procedures (turning methods, wingtip clearances, taxi speeds, etc.)

C. Communications

(1) Most of the airplane and much of the ground operations activity near the airplane are out of the field of view afforded by the flight deck windows. Communication between airplane and ground crews is required during engine start-up, removal and replacement of chocks, and engine shutdown. The use of hand signals, lights, and intercom and/or radio communications is important to a safe operation. Communications with ground control authority is also required for taxi operations. This ensures that tower personnel are aware of the taxi movement and the path to be taken.

D. Guidelines for Taxiing

(1) Maneuvering the airplane on the ground is accomplished in a manner similar to that used for other tricycle geared airplanes. Nose wheel steering and engine thrust, as required, should be used for taxiing the airplane.

(2) Always use the largest turning radius possible and never attempt to turn the airplane until it is moving. Make all turns at a slow taxi speed to avoid possible skidding. When an outboard engine is used to assist in a turn, use as little power as is necessary. Do not allow the airplane to stop in a turn.

(3) Avoid use of brakes to aid in making a turn. The minimum radius turn should be made with maximum nose wheel steering and engine thrust only. Braking during a turn results in scrubbing of the main gear and nose gear tires.

(4) The wingtips and the horizontal stabilizer describe larger arcs during a turn than the nose of the airplane. Therefore, these must be watched carefully for clearance with buildings, equipment, and other airplanes on the ramp.

(5) While taxiing the airplane, the center of gravity (CG) must always be within the ground stability limits shown in Fig. 201. Determine airplane center of gravity for the current configuration using component weight and CG computing methods in approved weight and balance manuals.

(6) Clearance when passing a parked airplane or other obstacle should be maintained. If the APU in either airplane is operating, the taxi maneuver must be made so as to provide a minimum clearance of 50 feet between the APU exhaust port and the adjacent airplane's wingtip (fuel vent).

(7) The normal taxi speed should not exceed approximately 20 knots. Speeds in excess of this when combined with long taxi distances cause heat buildup in the tires. When approaching a turn, speed should be slowed to that appropriate for the conditions. On a dry surface, use approximately 8 to 12 knots.

(8) Whenever possible, finish taxiing in a straight line roll for a minimum of 12 feet to eliminate torsional stresses remaining in landing gear components and tires.

(9) Taxiing under adverse weather conditions requires increased awareness of pavement surface conditions and taxi speeds. If the taxi ways are covered with snow, slush, or ice, the use of the anti-ice system should be considered. Taxi with flaps up. When taxiing on a slick surface at reduced speeds, use of differential engine thrust will assist in maintaining airplane momentum through a turn. Light differential braking may be more effective than nose wheel steering on very slick surface.

2. Airplane Characteristics

A. The wingtip describes the largest arc while turning and determines the minimum obstruction clearance path. Basic factors that influence the geometry of a turn are as follows:
   (1) Nose wheel steering angle
   (2) Engine power settings
   (3) Center of gravity location
   (4) Airplane gross weight
   (5) Pavement surface condition
   (6) Airplane ground speed
   (7) Amount of differential braking

B. The operating characteristics of jet powered airplanes necessitate care to prevent injury to personnel and damage to property. Personnel must not only avoid the engine inlet, but also the exhaust nozzle, where hot, high velocity gases are discharged. The velocity of the fan discharge air, particularly at high thrust settings, is sufficiently high to cause serious injury or fatality. When the thrust reverser is in the reverse position, the fan air is discharged forward while the exhaust gasses are still discharged rearward.

3. Prepare to Taxi

A. The airline taxi checklist should be used for preparing and taxiing the airplane.

B. Preparation for taxiing should include, but not necessarily be limited to, the following actions.
   (1) Perform an exterior inspection of the airplane:
      (a) Ensure that wheel chocks are in place.
      (b) Ensure that all cowling, doors, and hatches are secure.
      (c) Ensure that engine inlets and exhausts are clear.
      (d) Ensure proper clearance of flight control surfaces from all ground equipment and other obstructions.
      (e) Check tires for acceptable condition.

(f) Check for a minimum of 2 inches shock strut clearance (i.e., amount of inner cylinder chrome surfaces exposed) on main landing gear.

CAUTION: DO NOT TAXI AIRPLANE WITH ANY SHOCK STRUT FULLY COMPRESSED. DAMAGE TO SHOCK STRUT COULD OCCUR.

(g) Check that exposed surface of nose gear cylinder chrome does not exceed 10 inches.

CAUTION: DO NOT EXCEED MAXIMUM ALLOWABLE NOSE GEAR SHOCK STRUT EXTENSION OF 10 INCHES. EXTENSION GREATER THAN 10 INCHES COULD RESULT IN CENTERING CAM ENGAGEMENT WHICH COULD CAUSE PROBABLE DAMAGE DURING A TURN. AFT CENTER OF GRAVITY LIMITS MAY ALSO BE EXCEEDED, RESULTING IN TAIL TIPPING.

(h) Check that nose gear torsion lines are connected.

(2) Adjust cockpit seats to provide proper view from flight deck windows and to permit proper access to and proper operation of rudder and brake pedals.

(3) Ensure that airplane systems are configured so as to permit electrical power to be safely applied. Apply electrical power for operation of the systems required for engine start-up and taxiing.

(4) Check that fuel quantity indicators on center instrument panel (P-2) indicate at least 1675 pounds of fuel in each tank No. 1 and 2 for hydraulic fluid cooling plus amount needed for engine start-up and taxi operations.

CAUTION: A MINIMUM OF 1675 POUNDS (760 KILOGRAMS) OF FUEL IN TANK NO. 1 AND TANK NO. 2 IS REQUIRED TO PROVIDE HYDRAULIC FLUID COOLING. HYDRAULIC SYSTEM WILL OVERHEAT IF HEAT EXCHANGER IS NOT SUBMERGED.

(5) Check flap position and make sure that flap handle and flaps are in corresponding positions before applying hydraulic power.

(6) Ensure that hydraulic systems are pressurized for braking and nose wheel steering operation. One cockpit crew member should monitor brake pressure at all times during taxing.
   (a) Hydraulic power for main gear outboard brakes is supplied by system B. Power for main gear inboard brakes is supplied by system A. Nose wheel steering system is powered by hydraulic system A. Landing gear control lever must be in down position to activate nose wheel steering. Backup power for brakes and steering comes from standby system reservoir in system B. If all hydraulic systems are inoperative, airplane should not be taxied. However, if all hydraulic systems are lost during taxi operations, brakes may be operated from parking brake accumulator.

      NOTE: Accumulator, when fully charged, allows approximately 3 brake applications.

(7) Turn on VHF radio and select proper frequency for communications with airport ground control authority.
(8) Turn on service interphone and/or hand radios for ground crew communications.

4. Taxi Airplane
   A. Contact airport ground control and obtain necessary clearance for engine start.
   B. Instruct ground crew to remove chocks and static ground wire (as required).
   C. Turn on rotating beacon light. Beacon must remain on as long as engines are operating.
   D. Turn on navigation lights. Lights must remain on as long as airplane is moving.
   E. Start and operate engines (Ref Chapter 71).
   F. When ready to taxi, contact airport ground control and obtain clearance to taxi.
   G. On signal from ground crew, release brakes and start to taxi.
      (1) Apply power smoothly and evenly to obtain airplane movement. Return engines to idle when airplane begins to move.
      (2) Start roll straight ahead before beginning any turn.
      (3) Use nose wheel steering wheel or rudder pedals to turn airplane. Maximum rotation of nose wheel steering wheel will provide approximately 65 degrees of nose wheel steering. Maximum rudder pedal movement will produce approximately 7 degrees of nose wheel steering.
      (4) Monitor ground crew during turning to remain clear of all obstructions. If taxi lines are available, taxi with nose wheel on the line.

(5) Taxi slowly, with engines at idle. Use the Inertial Navigation System (INS) (if installed) in ground speed (GS) mode to monitor taxi speed. If airplane taxi speed is too fast at idle, slow down by gradual and even application of brakes for a short duration, then release. As airplane gains speed, reapply brakes. This cyclic application of brakes permits brake cooling while brakes are off. Do not try to maintain constant taxi speed by riding brakes.

CAUTION: DO NOT RIDE BRAKES TO MAINTAIN TAXI SPEED. EXCESSIVE USE OF BRAKES WITHOUT SUFFICIENT TIME TO COOL CAN CAUSE BRAKES TO OVERHEAT. THIS COULD RESULT IN BRAKE DAMAGE OR RELEASE OF TIRE INFLATION PRESSURE DUE TO MELTING OF WHEEL THERMAL FUSE PLUGS.

(6) Make turns at as large a radius as possible to reduce tire scrubbing and landing gear side loads. Keep airplane rolling in turns; do not stop in a turn.

(7) On completion of a turn, taxi in a straight line for a minimum of 12 feet to relieve tire and gear turning stresses.

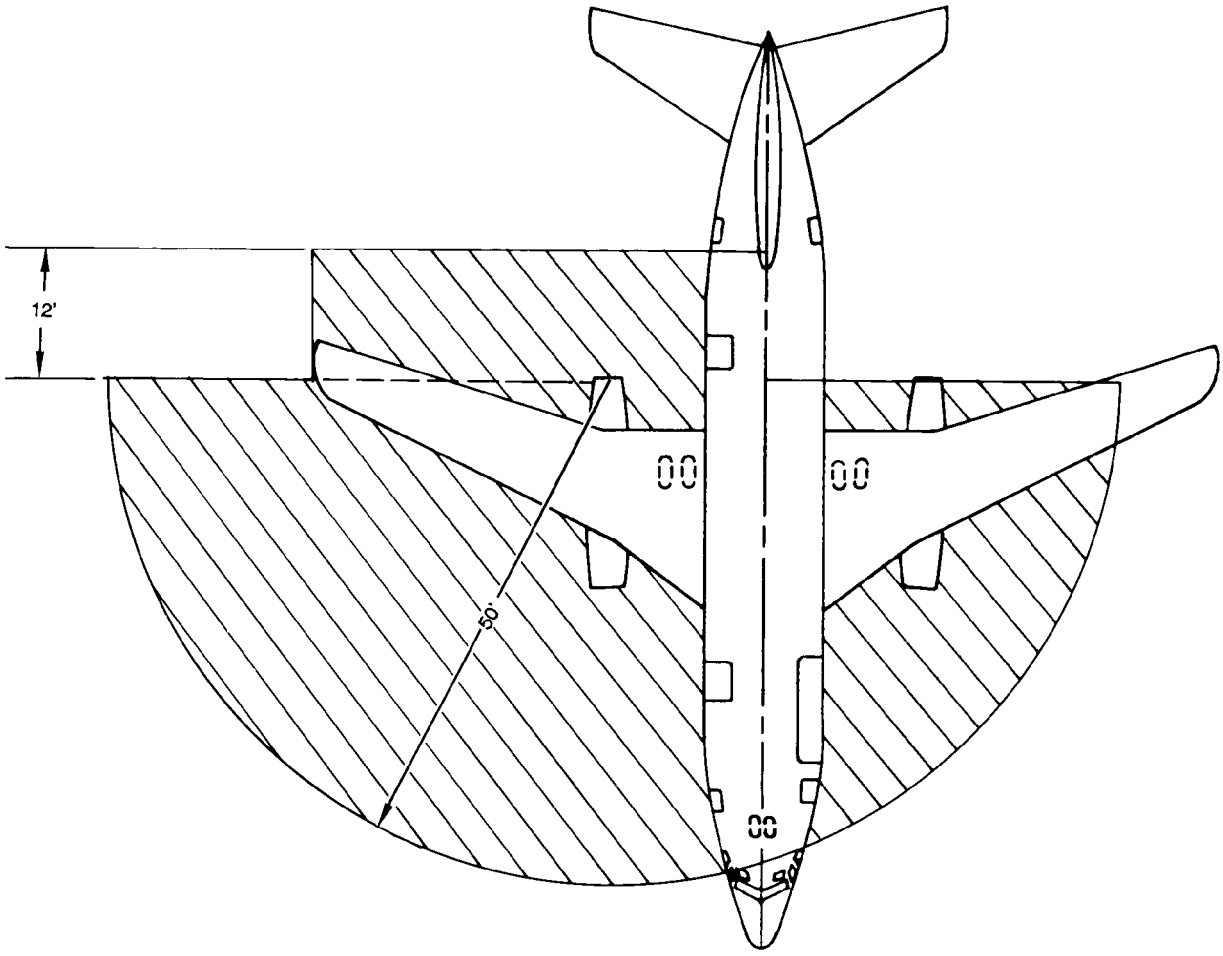
H. Apply brakes as necessary to stop.

I. Set parking brake.

J. Use airline checklist to deactivate and shut down airplane systems.

K. Instruct ground crew to install wheel chocks and static ground wire (as required). Place the wheel chocks about 3 inches away from the tires.

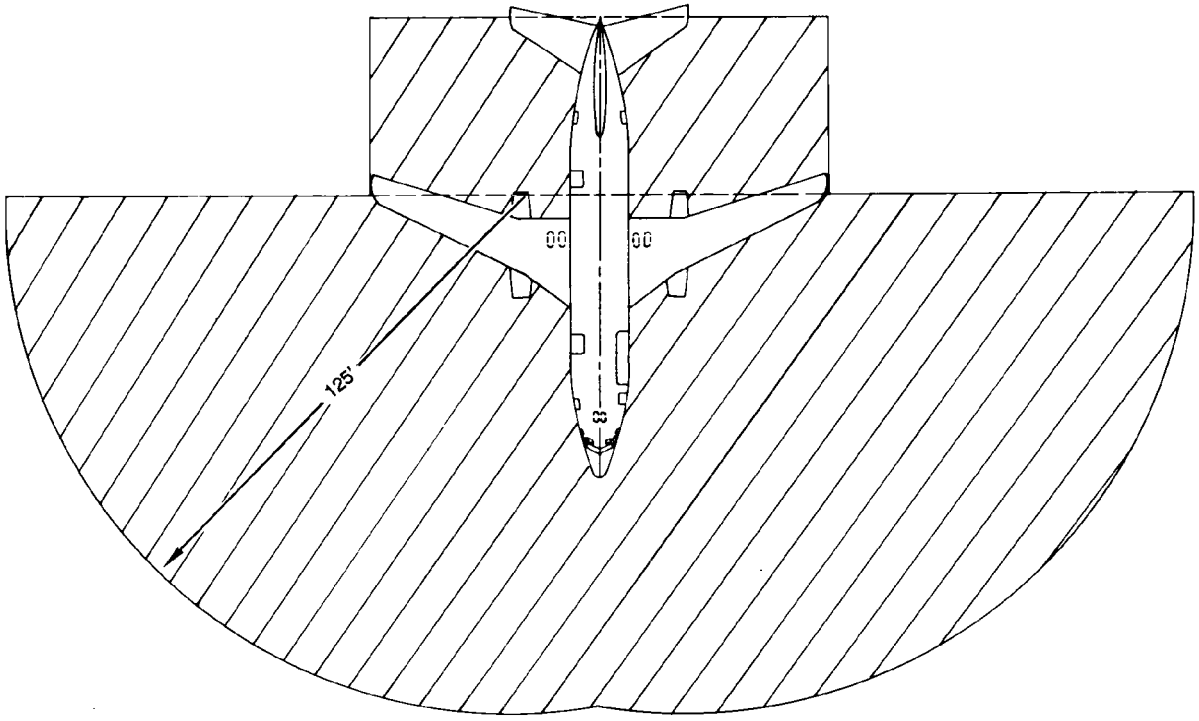
L. Release parking brake after chocks have been properly set (optional).



REVERSER OPERATION AT IDLE THRUST

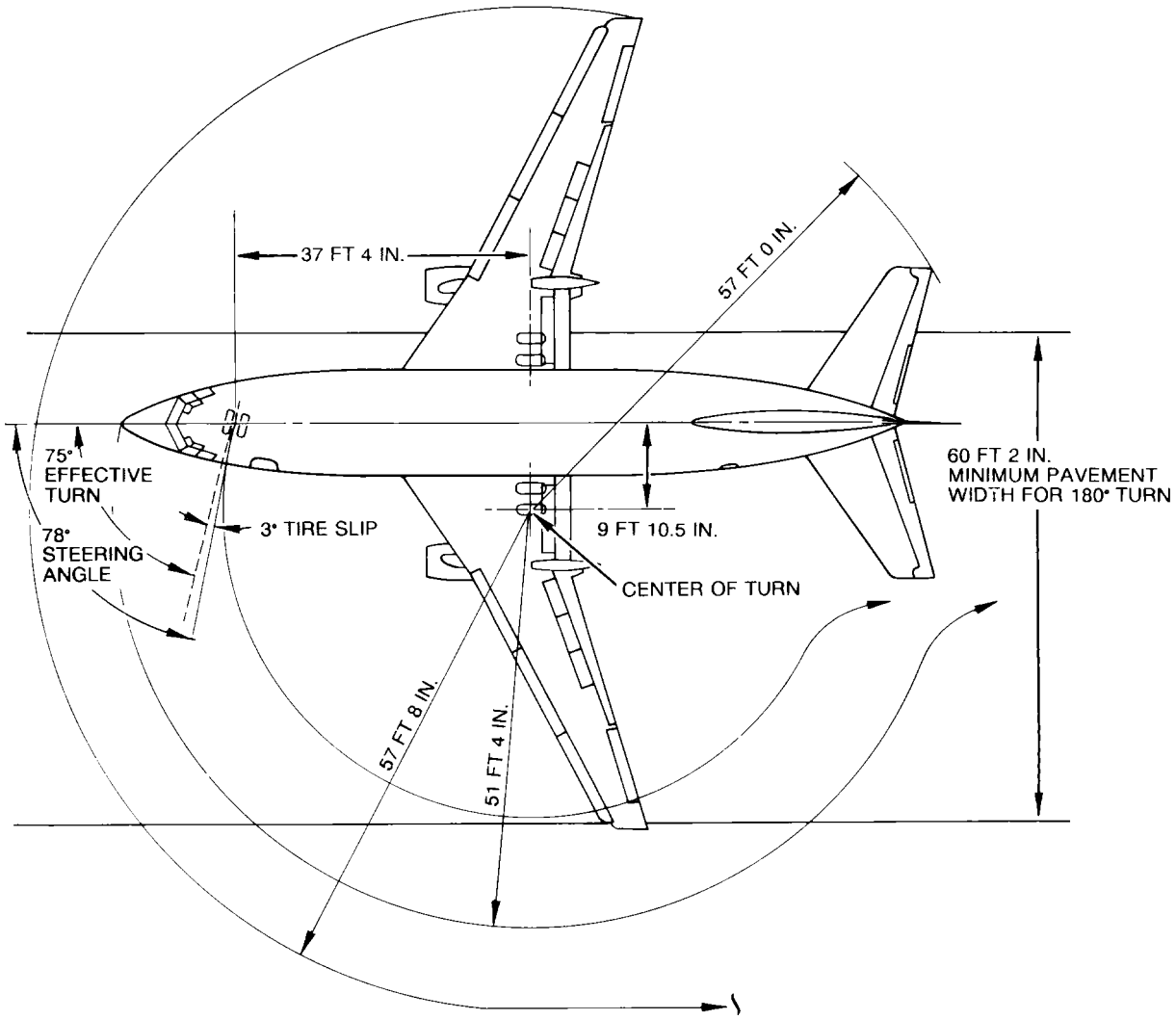
NOTE: RIGHT ENGINE SHOWN, LEFT ENGINE HAZARD ZONE SIMILARLY LOCATED WITH RESPECT TO THE LEFT ENGINE. FOR BOTH ENGINES RUNNING, HAZARD ZONE IS COMBINED PERIMETER OF BOTH SINGLE-ENGINE HAZARD ZONES.

JT8D Turbofan Engine Hazard Areas
Figure 201



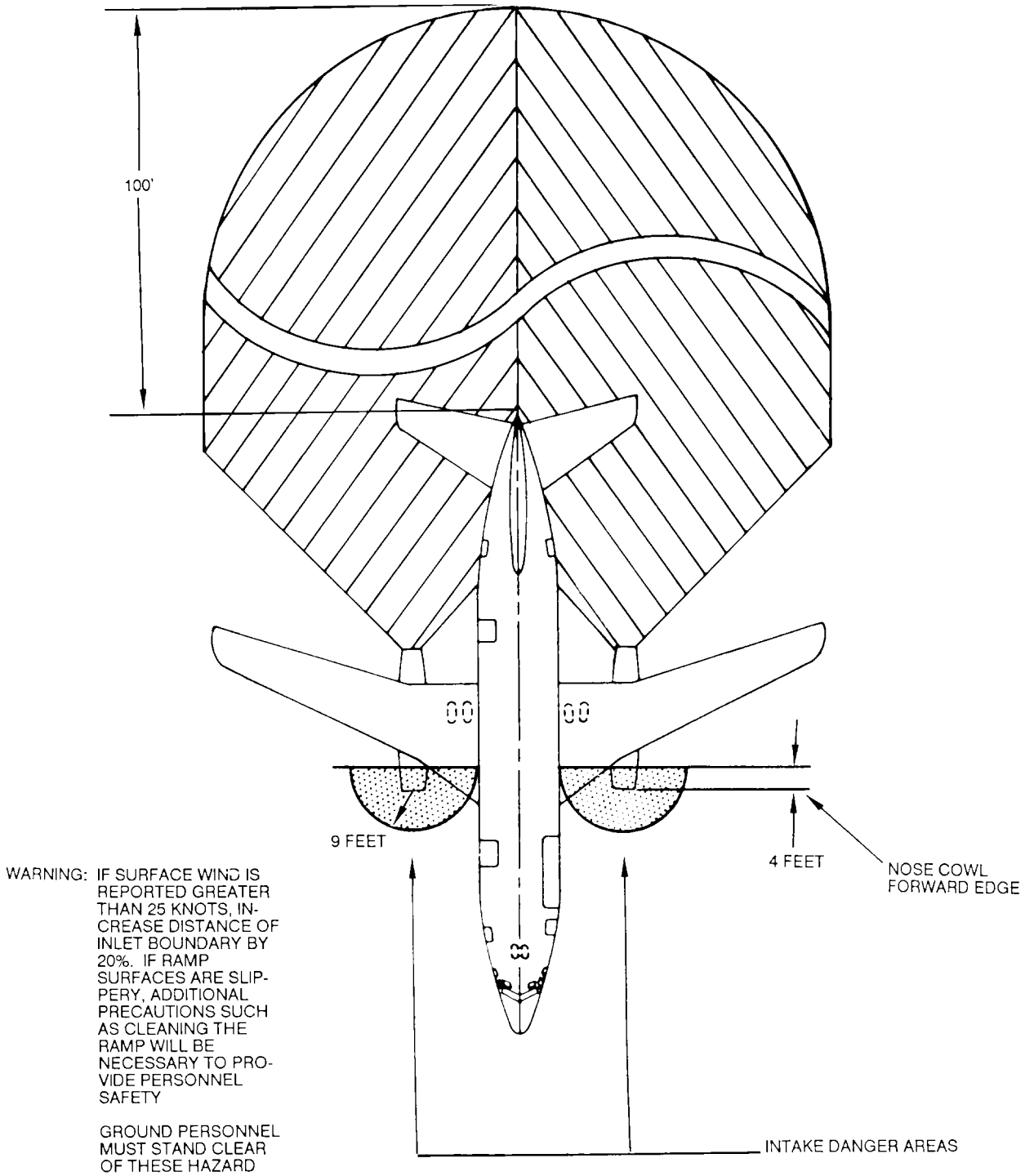
REVERSER OPERATION AT BREAKAWAY THRUST (BOTH ENGINES OPERATING)

JT8B Turbofan Engine Hazard Areas
Figure 202

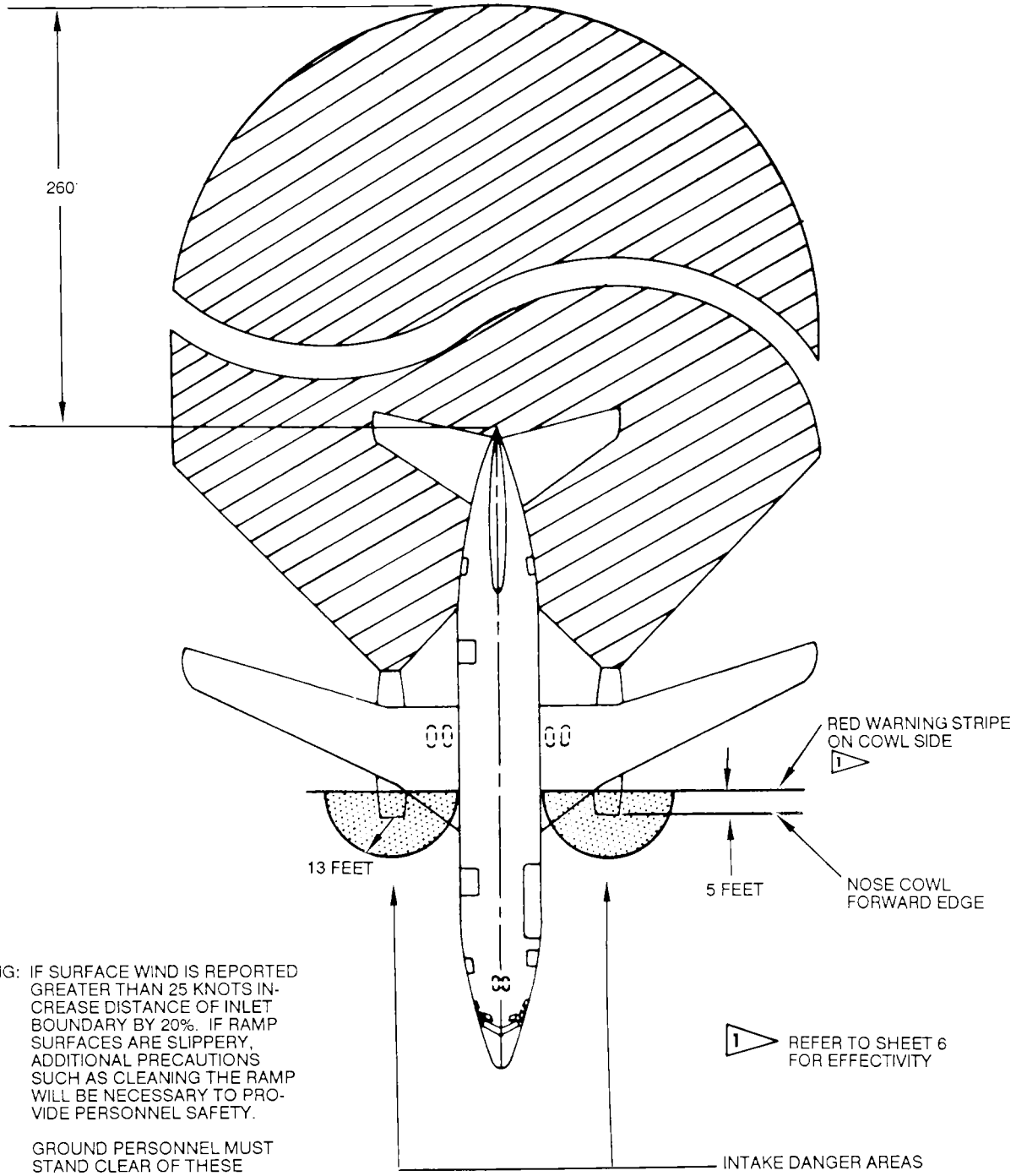


1 THE MAXIMUM TOWING ANGLE IS 75 DEGREES.

Taxi Turning Radius
Figure 203

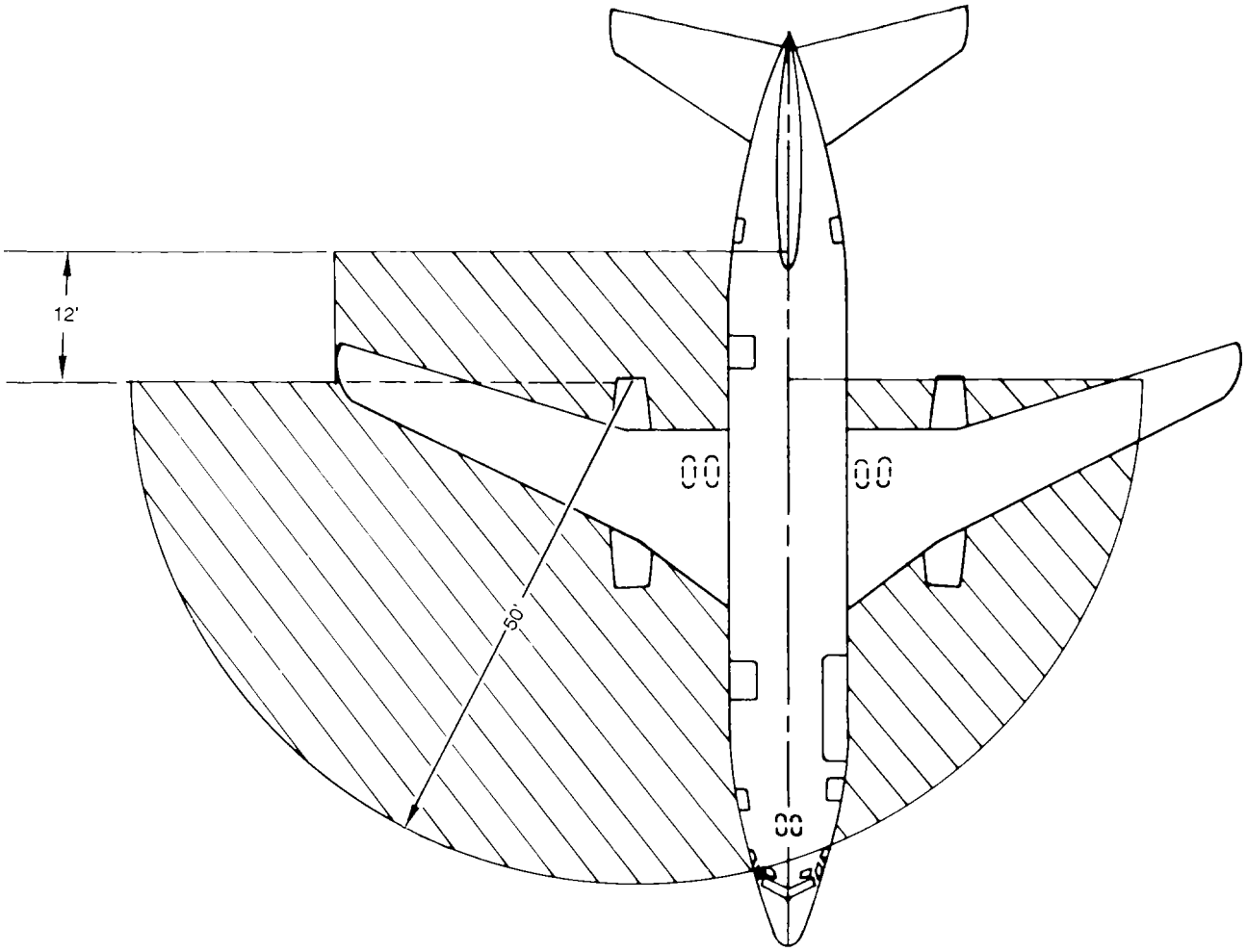


JT8B Turbofan Engine Hazard Areas
Figure 204



FORWARD BREAKAWAY THRUST (BOTH ENGINES OPERATING)

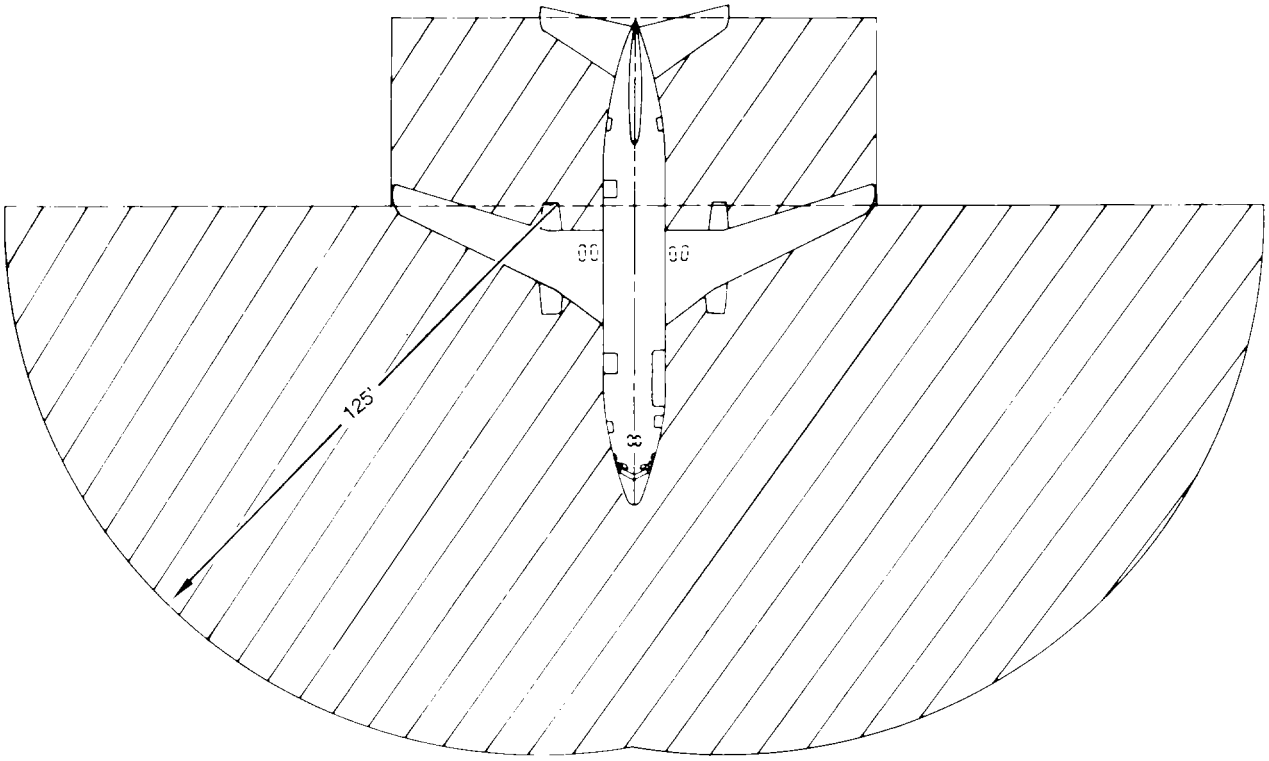
JT8D Turbofan Engine Hazard Areas
Figure 205 (Sheet 1)



NOTE: RIGHT ENGINE SHOWN, LEFT ENGINE HAZARD ZONE SIMILARLY LOCATED WITH RESPECT TO THE LEFT ENGINE. FOR BOTH ENGINES RUNNING, HAZARD ZONE IS COMBINED PERIMETER OF BOTH SINGLE-ENGINE HAZARD ZONES.

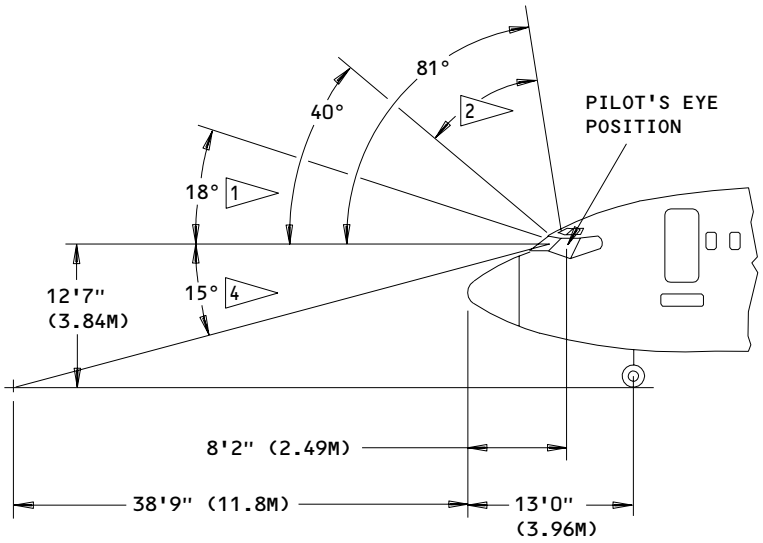
REVERSER OPERATION AT IDLE THRUST

JT8D Turbofan Engine Hazard Areas
Figure 205 (Sheet 2)

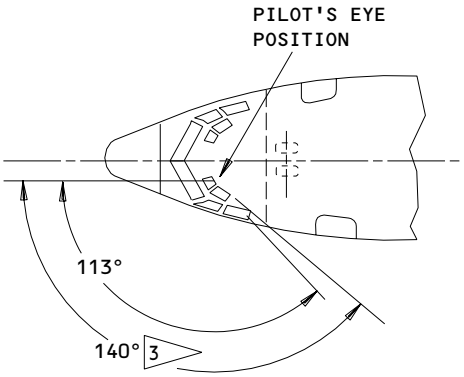


REVERSER OPERATION AT BREAKAWAY THRUST (BOTH ENGINES OPERATING)

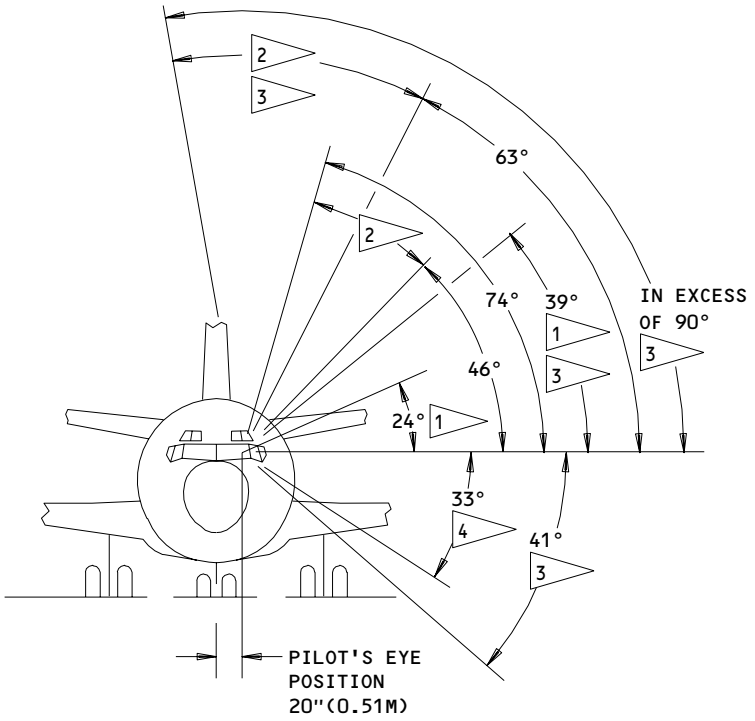
JT8D Turbofan Engine Hazard Areas
Figure 205 (Sheet 3)



VISUAL ANGLES IN PLANE PARALLEL TO LONGITUDINAL AXIS THROUGH PILOT'S EYE POSITION



VISUAL ANGLE IN HORIZONTAL PLANE THROUGH PILOT'S EYE POSITION



VISUAL ANGLES IN PLANE PERPENDICULAR TO LONGITUDINAL AXIS THROUGH PILOT'S EYE POSITION

NOTE: HEAD ROTATED ABOUT POINT 3.3 IN. (0.08M) AFT OF PILOT'S EYE POSITION.

1 UPWARD VISION THROUGH MAIN WINDOW

2 VISION THROUGH EYEBROW WINDOW

3 WITH HEAD MOVED 5 IN. (0.13M) OUTBOARD

4 DOWNWARD VISION THROUGH MAIN WINDOW

Angle of View
Figure 206