CHAPTER 07

LIFTING AND SHORING

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Record of Temporary Revisions

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LIFTING AND SHORING - DESCRIPTION AND OPERATION

1. Description
   A. Lifting (jacking) is accomplished by using conventional tripod jacks to raise the aircraft at three points.
      (1) The nose, or fuselage jackpoint, is located just aft of the nose wheel well. The jack pad is secured to this point after existing screws are removed.
      (2) The wing jackpoints are located on the wing, just aft of the main landing gear. The jack pads are secured to these points after existing screws are removed.
      (3) The jack pads and attaching parts are stored in the loose equipment kit in the baggage compartment.
   B. Single-point main gear and nose gear jacking is also permissible.
      (1) Either main gear can be raised independently by using a specialized hydraulic axle jack at the main landing gear torque link socket.
      (2) The nose gear can be raised by using a specialized hydraulic jack and adapter positioned at the left hand side of the nose gear strut assembly.
      (3) The specialized hydraulic jack and adapters are part of the aircraft's ground support equipment.
   C. For emergency lifting, it may be necessary to use a sling or inflatable pneumatic elements (bags) for the initial lift to be followed up with conventional tripod jacks.

1. Jacking

CAUTION: DEPENDING UPON AIRCRAFT WEIGHT AND CENTER OF GRAVITY LOCATION, STRUCTURAL LIMITS MAY BE APPROACHED OR EXCEEDED DURING JACKING PROCEDURES. TO AVOID STRUCTURAL DAMAGE, EXERCISE CAUTION WHEN JACKING AIRCRAFT THAT WEIGH OVER 15,000 POUNDS (SEE FIGURE 202). DO NOT JACK AIRCRAFT THAT EXCEED THE STRUCTURAL C.G. ENVELOPE.

NOTE: The entire aircraft may be lifted by wing and fuselage jack points to perform landing gear tests, removal and installation of nose and main landing gear, leveling, and for other major repairs.

The axle jack method of lifting the aircraft is for tire and brake change only.

The aircraft should be on a level surface and protected from wind gusts, preferably in a hangar.

A. Jacking the Aircraft (Tripod Jack Method) (See Figure 201.)
(1) Acquire necessary tools and equipment.

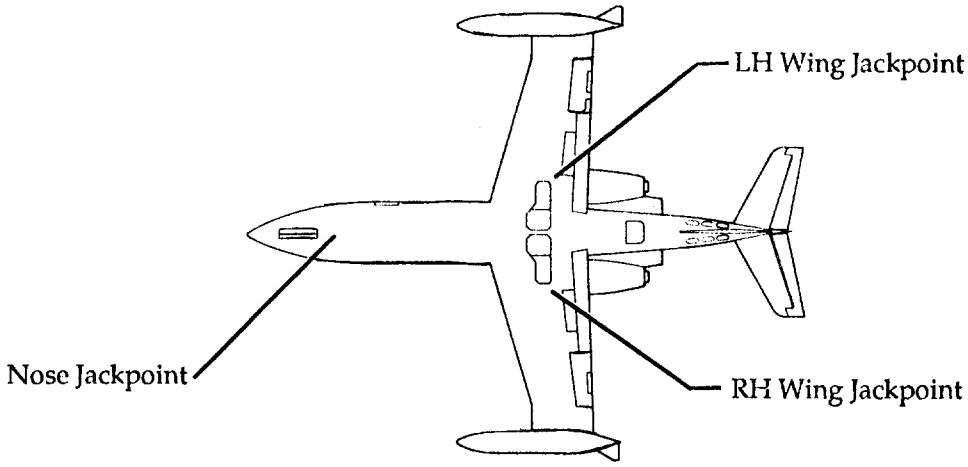
NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Jack Pad, Nose	2370102-4 or 4507100100-003	Bombardier Aerospace Learjet Inc. Wichita, KS	Provide aircraft nose with lifting point.
Jack Pads, Wing	2572006-3 or 4507100101-003	Bombardier Aerospace Learjet Inc. Wichita, KS	Provide aircraft wing with lifting point.
Tail Stand	2471016-1	Bombardier Aerospace Learjet Inc. Wichita, KS	Support aircraft.
Tripod Jacks (Minimum Capacity of 10,000 lbs.)		Commercially Available	Jack aircraft.

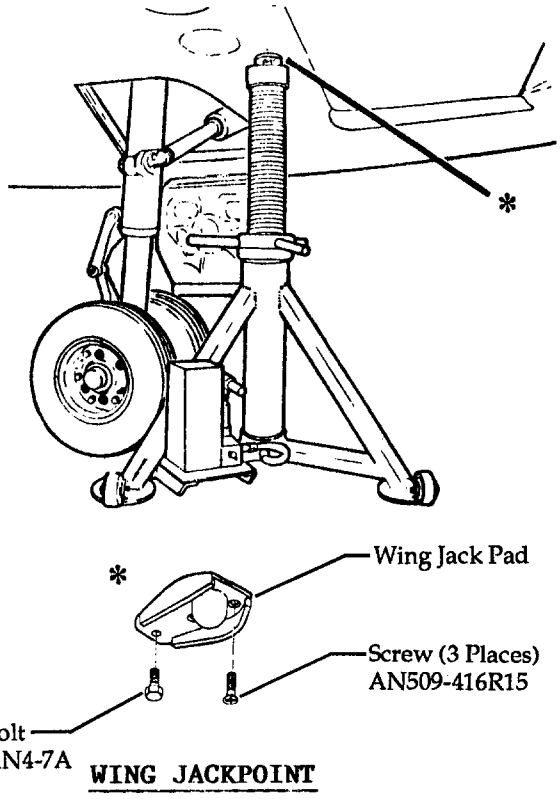
(2) Attach tail stand to ventral fin.
(3) Attach ground cables to aircraft.
(4) Remove screws from jack pad locations and secure jack pads to structure.
(5) Place jacks at jack pad locations.

CAUTION: DO NOT RAISE AIRCRAFT MORE THAN REQUIRED TO PERFORM MAINTENANCE.

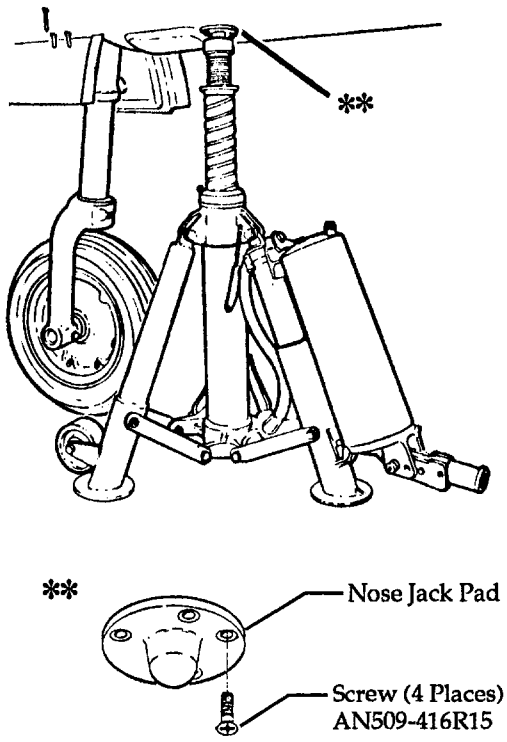
(6) Simultaneously raise wings and fuselage jacks to prevent side loads on structure and jacks.



AIRCRAFT JACKPOINTS

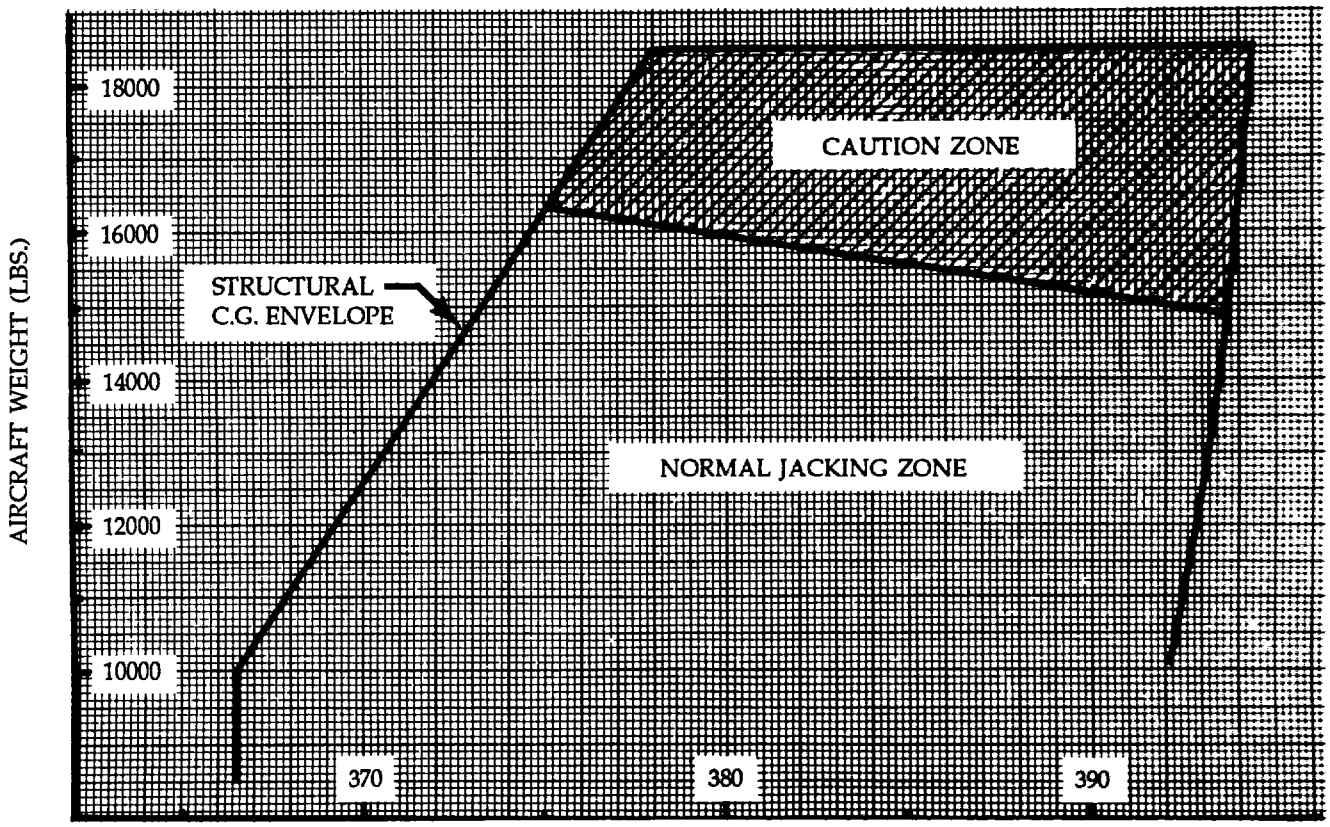


WING JACKPOINT



NOSE JACKPOINT

Aircraft Jacking Provisions (Tripod Jacks)
Figure 201



Structural Limits for Aircraft Jacking
Figure 202

B. Removing Aircraft from Jacks (Tripod Jack Method) (See Figure 201.)
   (1) Simultaneously lower wing and fuselage jacks until aircraft rests on gear.
   (2) Remove jack pads from aircraft and stow in loose equipment kit.
   (3) Install previously removed screws where jack pads were installed.
   (4) Remove tail stand, if required.

C. Jacking the Main Landing Gear (20 Ton Axle Jack Method) *(On Aircraft modified per SB 35/36-32-7, "Installation of Main Landing Gear Lower Torque Arms with Jacking Provision".)* (See Figure 203.)

CAUTION: THE AXLE JACK METHOD OF LIFTING THE AIRCRAFT IS FOR TIRE AND BRAKE CHANGE ONLY.

(1) Acquire necessary tools and equipment.

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Axle Jack (20 Ton)	7818-0110	Tronair Inc. Holland, OH	Jack aircraft.
Main Adapter Weldment	Z-2639	Tronair Inc. Holland, OH	Jack main landing gear.

(2) Attach electrical grounds to aircraft.
(3) Attach tail stand to ventral fin.
(4) Make sure that opposite wheels are chocked.
(5) Bottom out axle jack.
(6) Place main landing gear adapter over jack assembly.
(7) Place jack under main landing gear and align jack adapter with groove in bottom of main landing gear strut lower torque arm.
(8) Slowly raise jack until adapter contacts lower torque arm and make sure adapter is properly seated in groove of lower torque arm.

CAUTION: DO NOT RAISE AIRCRAFT MORE THAN REQUIRED TO PERFORM MAINTENANCE.

(9) Raise jack until tire clears ground.
(10) Lock jack in place to prevent inadvertent slipping.

D. Removing Jack from Main Landing Gear (20 Ton Axle Jack Method) *(On Aircraft modified per SB 35/36-32-7, "Installation of Main Landing Gear Lower Torque Arms with Jacking Provision".)* (See Figure 203.)
   (1) Unlock and slowly lower jack until aircraft rests on floor.
   (2) Bottom out axle jack and remove from under main landing gear strut lower torque arm.
   (3) Remove main landing gear adapter from jack.
   (4) Chock wheels.
   (5) Stow jack and adapter.

E. Jacking the Nose Landing Gear (20 Ton Axle Jack Method) (See Figure 203.)

CAUTION: THE AXLE JACK METHOD OF LIFTING THE AIRCRAFT IS FOR TIRE CHANGE ONLY.

(1) Acquire necessary tools and equipment.

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Axle Jack (20 Ton)	7818-0110	Tronair Inc. Holland, OH	Jack aircraft.
Nose Adapter Assembly	Z-2641	Tronair Inc. Holland, OH	Jack nose landing gear.
Hardwood Ramp	Fabricate		Raise Aircraft.

(2) Attach electrical grounds to aircraft.
(3) Attach tail stand to ventral fin.
(4) Make sure that main landing gear wheels are properly chocked.
(5) Place nose landing gear jack adapter in nose landing gear axle and position groove of adapter over axle retainer bolt.
(6) Align axle jack under adapter.
(7) Slowly raise jack until adapter seats properly on jack.

CAUTION: DO NOT RAISE AIRCRAFT MORE THAN REQUIRED TO PERFORM MAINTENANCE.

(8) Raise jack until tire clears ground.
(9) Lock jack in place to prevent inadvertent slipping.

F. Removing Jack from Nose Landing Gear (20 Ton Axle Jack Method) (See Figure 203.)
(1) Unlock and slowly lower jack until aircraft rests on floor.
(2) Bottom out axle jack and remove from aircraft.
(3) Remove jack adapter from nose landing gear.
(4) Stow jack and adapter.

G. Jacking the Main Landing Gear (Alternate Ramp Method) (See Figure 204.)

CAUTION: THE FOLLOWING RAMP PROCEDURES SHOULD ONLY BE USED IF APPROPRIATE JACKS ARE NOT AVAILABLE TO RAISE THE MAIN LANDING GEAR FOR A TIRE CHANGE.

THIS METHOD MUST BE USED ON LEVEL PAVED SURFACES ONLY.

(1) Install tail stand on aircraft.
(2) Close the fuel crossflow valve.
(3) Disconnect electrical power from the aircraft. (Refer to Chapter 24.)
(4) Make sure the tire to be ramped is properly inflated. (Refer to Chapter 12.)
(5) Connect the towbarless towing cart to the aircraft. (Refer to Chapter 9.)

NOTE: Any of the approved tow bars may be used to pull the aircraft on to ramp.

(6) Put the aircraft on a level paved surface.

NOTE: Fabricated in accordance with Figure 204.

(7) Set the ramp approximately ten (10) inches [25.4 cm] in front of the tire to be ramped.

WARNING: MAKE SURE THE RAMP IS SOLIDLY POSITIONED UNDER THE TIRE AND THAT THE AIRCRAFT IS FIRMLY SECURED TO PREVENT ANY ROLLING PRIOR TO PERFORMING MAINTENANCE.

(8) Slowly pull the aircraft up the ramp until the tire contacts the ramp stop.
(9) Make sure the ramp is correctly positioned under the tire.
(10) Set the parking brake.
(11) Install wheel chocks on the opposite side main gear tires.

CAUTION: IF THE TOWBARLESS TOWING CART IS USED TO PULL THE AIRCRAFT ON TO THE RAMP, LEAVE IT ATTACHED TO THE AIRCRAFT TO PREVENT THE AIRCRAFT FROM ACCIDENTALLY ROLLING BACKWARD OFF THE RAMP.

IF A TOWBARLESS TOWING CART WAS NOT USED, WHEEL CHOCKS MUST BE PLACED AT THE NOSE WHEEL TIRE.

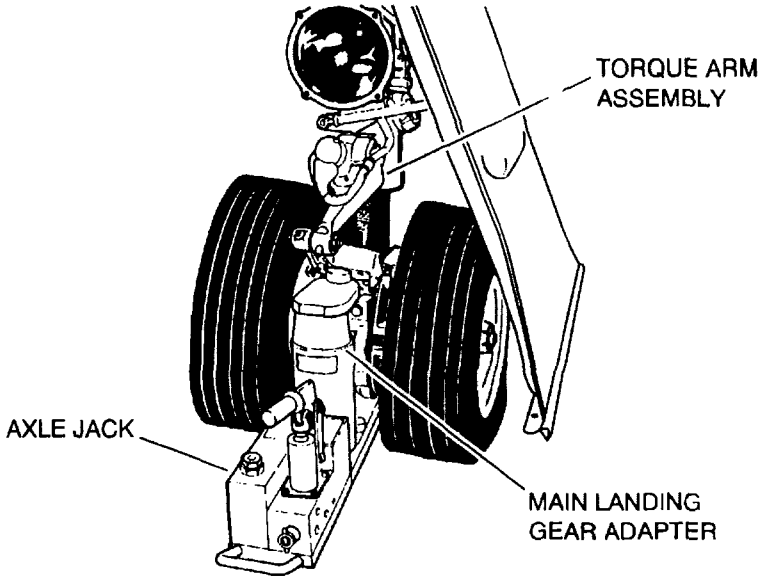
(12) If the towbarless towing cart was used, leave it connected to the aircraft.
(13) If another tow bar was used, install wheel chocks on the nose wheel tire.

H. Removing the Main Landing Gear from Ramp (Alternate Ramp Method)

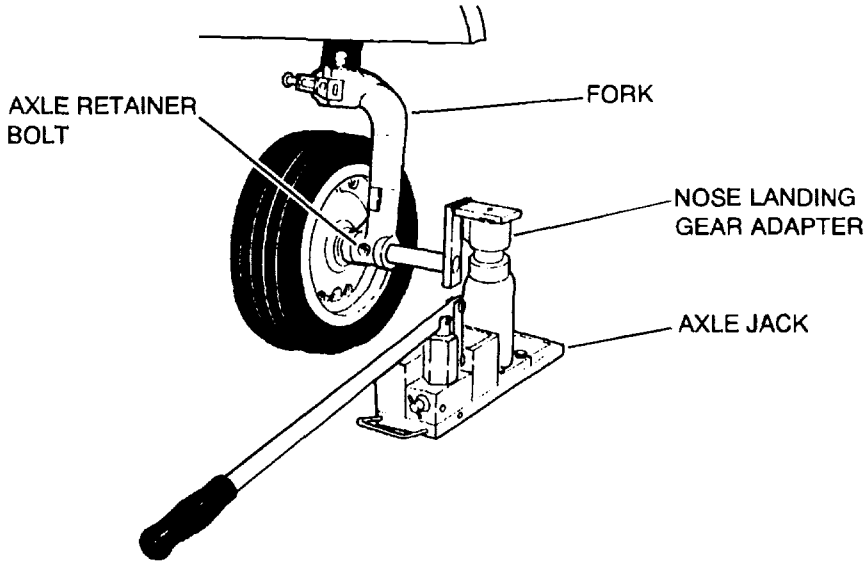
(1) If the towbarless towing cart was used, do the following:
  (a) Remove wheel chocks from the opposite main gear tires.
  (b) Release the parking brake.
  (c) Slowly push the aircraft backward off the ramp.
(2) If a tow bar other than the towbarless towing cart was used, do the following:
  (a) Remove wheel chocks from nose wheel and main gear wheels.

CAUTION: A MAINTENANCE PERSON MUST BE STATIONED IN THE COCKPIT TO APPLY THE BRAKES AND RELEASE THE PARKING BRAKE AS THE AIRCRAFT IS PUSHED OFF OF THE RAMP.

  (b) Apply brake pressure to the aircraft.
  (c) Release the parking brake.
  (d) Slowly push the aircraft backward off the ramp while using the brakes to control the roll off the ramp.
(3) Remove the tail stand from the aircraft.
(4) Remove the tow bar from the aircraft.



AIRCRAFT MODIFIED PER SB 35/36-32-7
(20-TON AXLE JACK WITH MAIN LANDING GEAR ADAPTER)



(20-TON AXLE JACK WITH NOSE LANDING GEAR ADAPTER)

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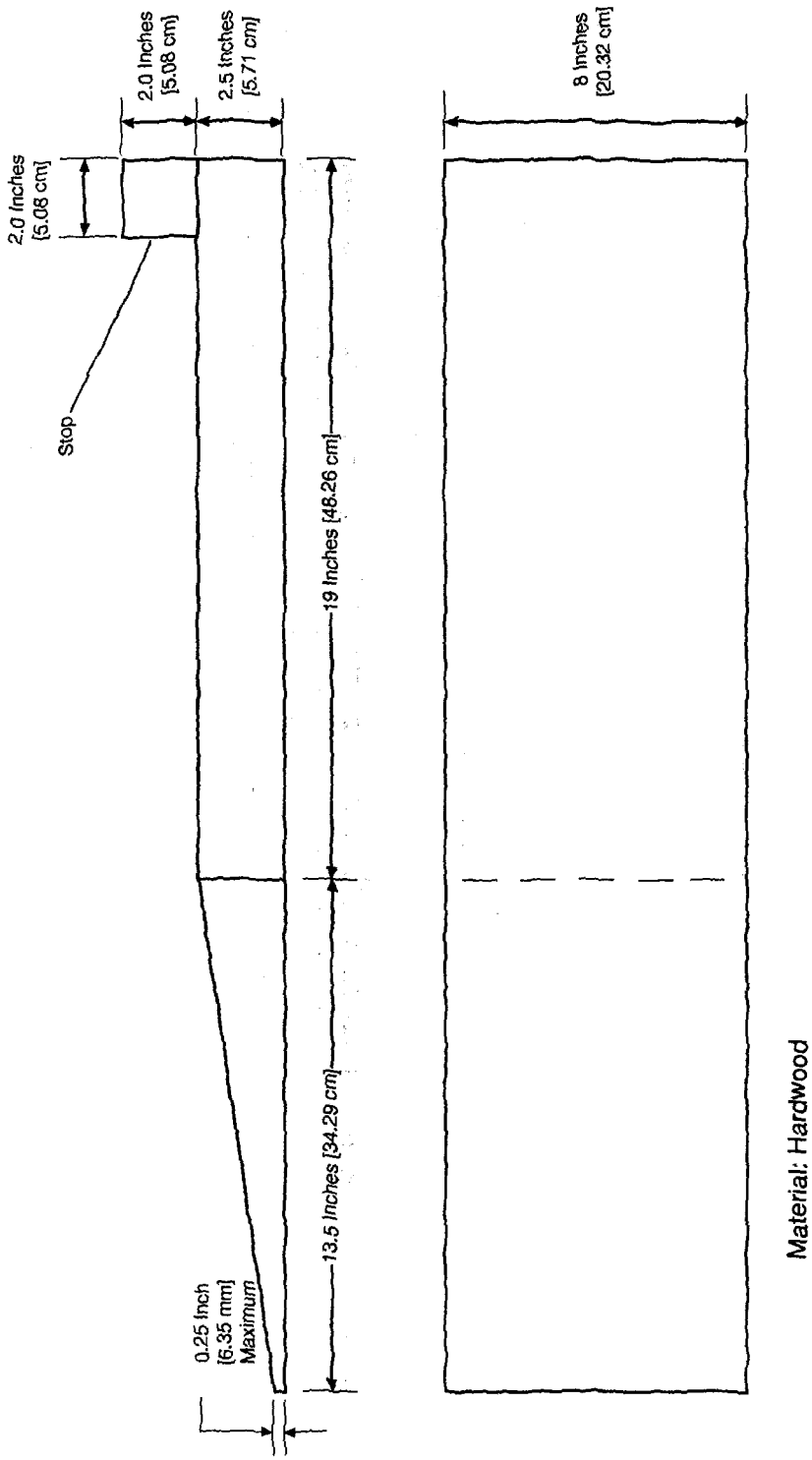
Aircraft Jacking Provisions (20 Ton Axle Jack)
Figure 203



Main Gear Tire Ramp
Figure 204

EMERGENCY LIFTING - MAINTENANCE PRACTICES

1. Lifting Aircraft

NOTE: An aircraft that has belly-landed or one with collapsed landing gear can be lifted using a sling, or if sling is not available, pneumatic elements.

A. Sling Method of Lifting Aircraft (See Figure 201.)
(1) Acquire necessary tools and equipment.

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Sling	2671010-1	Bombardier Aerospace Learjet Inc. Wichita, KS	Lift aircraft.
Bolts	AN6-10A	Commercially Available	Attaching wing lugs to wing.

(2) Defuel aircraft. (Refer to Chapter 12.)
(3) Ensure that all luggage has been removed from the aircraft and that all passengers, crew members, and maintenance personnel have disembarked.
(4) Close and secure entrance door, emergency exit door, and all access doors.
(5) Make sure aircraft is approximately level.

NOTE: Aircraft should be level enough to attach chains to wing lifting lugs without lengthening or shorting chains.

(6) Using a large phillips head screwdriver, remove two bolts from wing at wing station 41.00 (inboard flap track).
(7) Attach wing lugs to wing using bolts P/N AN6-10A.

CAUTION: DO NOT ADJUST CHAIN LENGTH. IF CHAIN LENGTH IS ADJUSTED, THIS WILL CAUSE A BENDING LOAD ON THE WING LIFTING LUG AND COULD CAUSE A FAILURE IN THE LIFTING LUG.

(8) Attach chains to wing lugs and spreader bar.

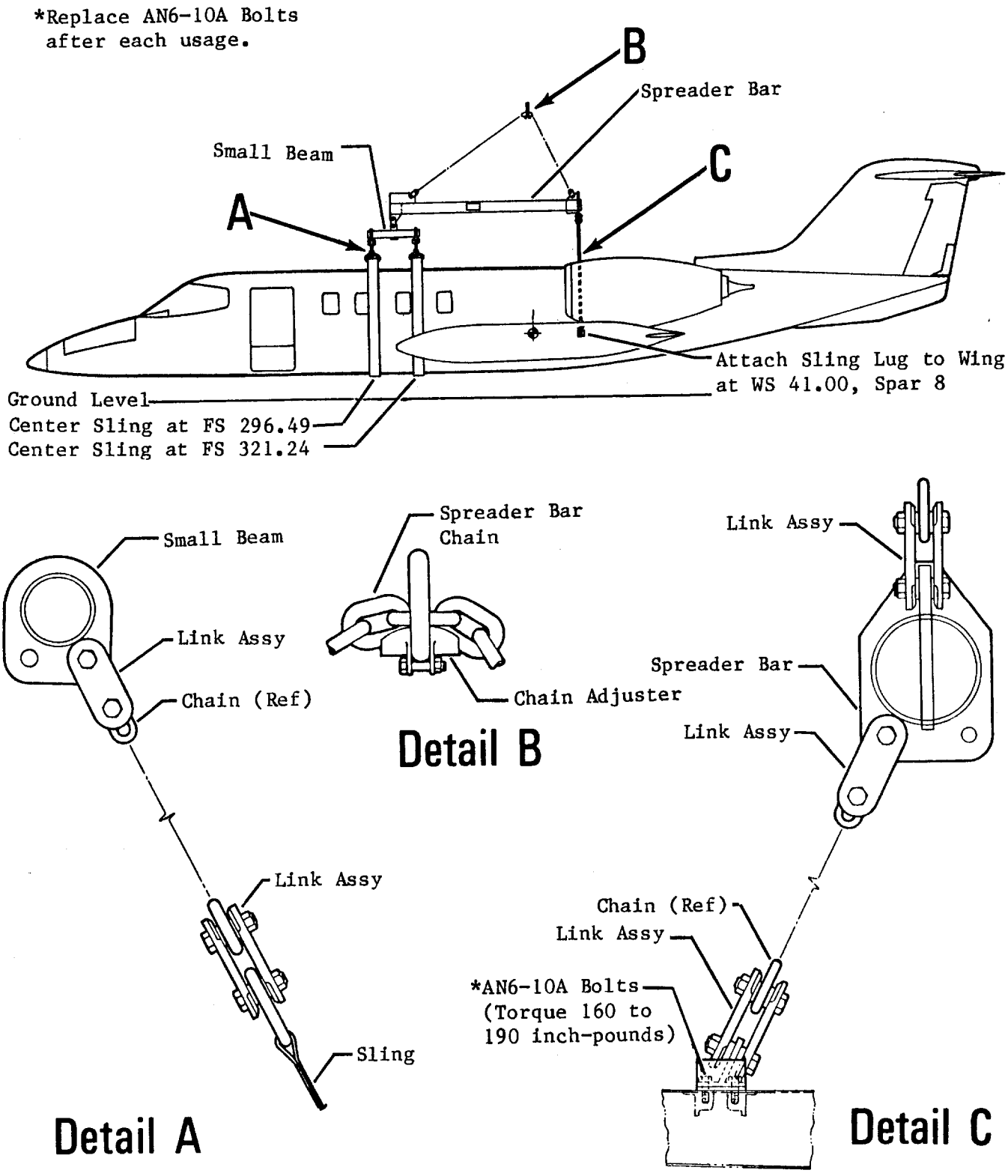
NOTE: Chain lengths shall be 100.0 (±2.0) inches [254 (±5.1) cm].

(9) Slip belts under aircraft to the position as shown and attach chains to belt and small beam assembly.
(10) Adjust chain ends to align spreader bar parallel with the aircraft Waterline (WL).

CAUTION: AVOID IMPACT LOADING DURING LIFTING. (AIRCRAFT MUST BE EMPTY.)

(11) Watch center of balance as aircraft is lifted.

NOTE: The chain adjuster may have to be repositioned to keep the aircraft from tipping.



Lifting Aircraft by Sling Method
Figure 201

(12) Attached stabilization ropes to each wing tip and either the nose or tailcone for guidance.

CAUTION: MAKE SURE ALL DOORS ARE CLOSED BEFORE TRANSPORTING.

(13) Transport aircraft as smoothly as possible to prevent further damage.

B. Pneumatic Method of Lifting Aircraft Forward Fuselage (See Figure 202.)

NOTE: The pneumatic method may be used when sling is not available.

(1) Acquire necessary tools and equipment.

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Pneumatic Element (Bag) (Three (3) Required)	5MA1142	SMR Technologies Sharon Center, OH	Lift aircraft.
Control Console	5MA180-1	SMR Technologies Sharon Center, OH	Supply air to pneumatic elements.
Pneumatic Hoses (Three (3) Required)	3MA1219	SMR Technologies Sharon Center, OH	Connect pneumatic elements to control console.

(2) Place three (3) pneumatic elements beneath aircraft just aft of fuselage jack point.
(3) Connect elements to control console.
(4) Slowly inflate elements until jack can be placed under fuselage.
(5) Raise jack until load is removed from elements and nose gear can be lowered.

C. Pneumatic Method of Lifting Aircraft Wing (See Figure 202.)

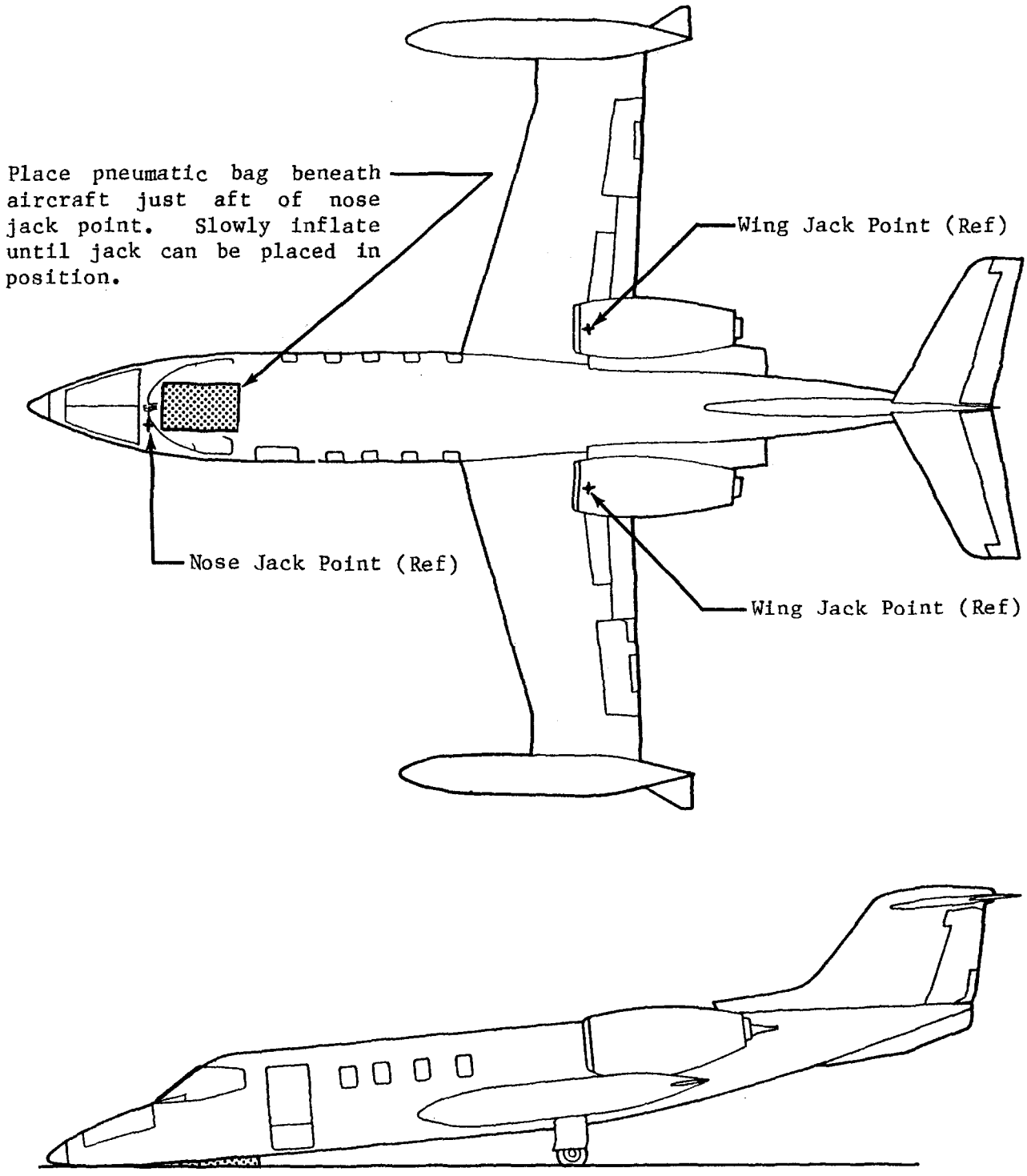
NOTE: The pneumatic method may be used when sling is not available.

The following procedure may be used to raise either wing or both wings.

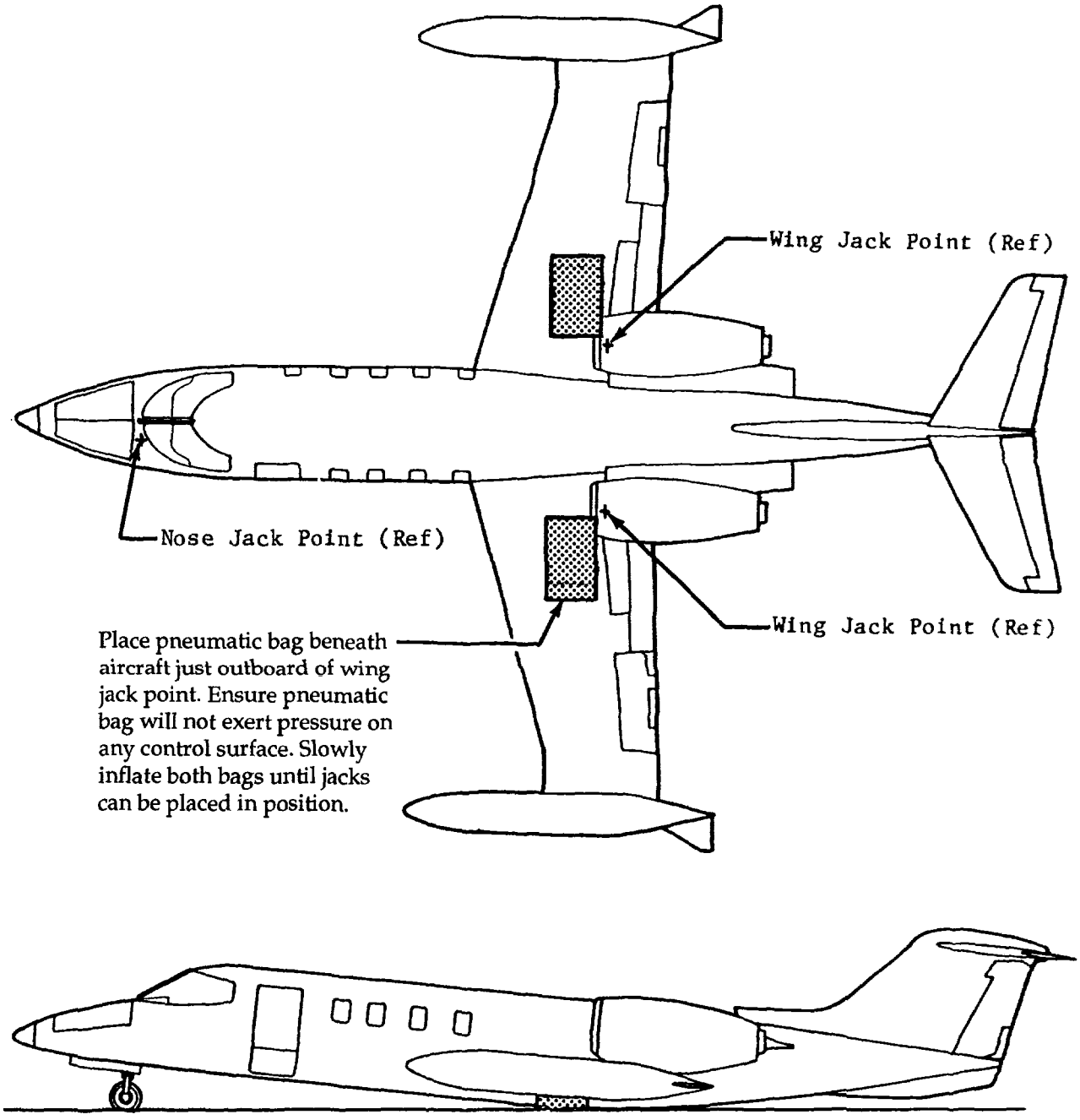
(1) Acquire necessary tools and equipment.

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Pneumatic Element (Bag) (Six (6) or 12 Required)	5MA1142	SMR Technologies Sharon Center, OH	Lift aircraft.
Control Console	5MA180-1	SMR Technologies Sharon Center, OH	Supply air to pneumatic elements.
Pneumatic Hoses (Six (6) or 12 Required)	3MA1219	SMR Technologies Sharon Center, OH	Connect pneumatic elements to control console.



Lifting Aircraft by Pneumatic Bag
Figure 202 (Sheet 1 of 2)



Lifting Aircraft by Pneumatic Bag
Figure 202 (Sheet 2 of 2)

CAUTION: MAKE SURE PNEUMATIC ELEMENTS DO NOT EXERT PRESSURE ON ANY CONTROL SURFACE.

(2) Place six (6) pneumatic elements beneath wing just outboard of main gear and just forward of jack point.
(3) Connect elements to control console.
(4) Slowly inflate elements until jack can be placed beneath the wing.
(5) Raise jack until load is removed from pneumatic elements and main gear can be lowered.