CHAPTER

8

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CHAPTER 8

LEVELING AND WEIGHING

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LEVELING

1. General

   A. The airplane can be leveled by using a plumb bob, attitude gage or a transit. For general leveling of the airplane such as when the airplane is to be weighed, the plumb bob or attitude gage can be used. For an alignment check of the airplane structure, a more accurate method using an engineer's transit must be used.

2. Level Airplane Using Plumb Bob or Attitude Gage

   A. Equipment and Materials

      (1) Jacks and jack pad adapters for raising the airplane. See Chapter 7, Airplane Jacking.

      (2) Airplane attitude gage, F70043 or equivalent.

      (3) Plumb bob and cord.

   B. Level Airplane using Plumb Bob

      (1) Park airplane in as level a spot as is available.

      (2) Hang a plumb bob from hook in left main wheel well. The hook is located on keel beam upper structure directly above the level scale attached to keel beam. (See figure 201.)

      (3) Check position of plumb bob when it has stopped swinging. If plumb bob is not over zero on the level scale, the airplane must be adjusted by jacking or oleo inflation until plumb bob is zeroed.

         (a) For minor leveling adjustments, the main and nose landing gear shock struts can be extended or retracted by inflation or deflation as required.

            WARNING: SHOCK STRUTS MUST NOT BE PRESSURIZED BEYOND NORMAL SERVICING LEVELS. TO DO SO CAN RESULT IN OVERPRESSURIZATION AND POSSIBLE INJURY TO PERSONNEL AND SERIOUS SHOCK STRUT DAMAGE. WITH SHOCK STRUT FULLY EXTENDED PRESSURE MUST NOT EXCEED 300 PSI IN MAIN GEAR, OR 250 PSI IN NOSE GEAR.

         (b) For greater leveling corrections, place appropriate jack pad adapters and jacks at jack points C and G. See Chapter 7, Airplane Jacking.

            CAUTION: ALL JACKS MUST BE EQUIPPED WITH LOAD OR PRESSURE GAGES AND JACK POINT LOAD LIMITS MUST NOT BE EXCEEDED.

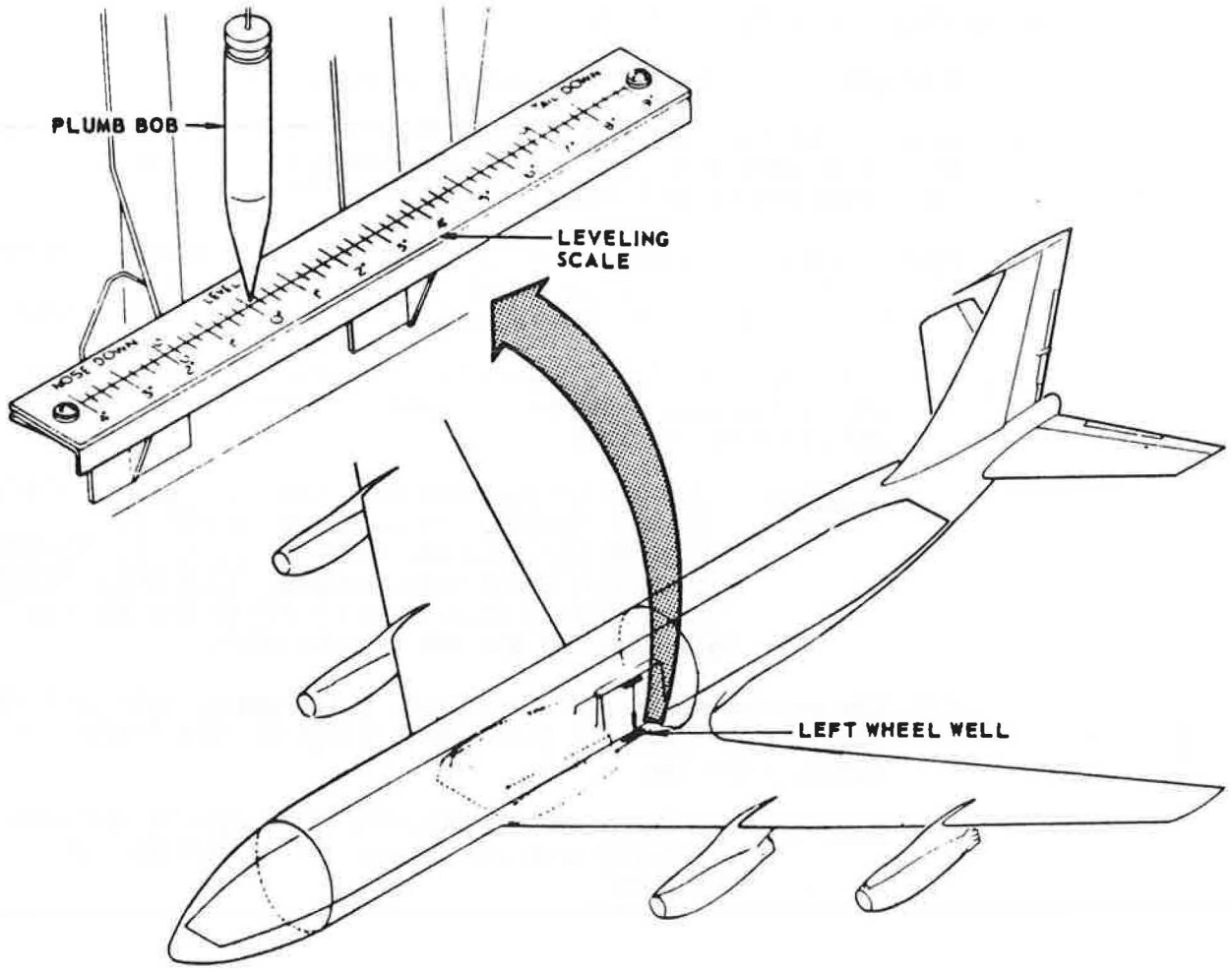
(c) Raise or lower appropriate jacks until plumb bob is centered over zero on leveling scale.

C. Level Airplane Using Attitude Gage.

(1) The attitude gage, F70043 (figure 202) is an instrument with a spirit level. It was designed for placement against the lower side of the keel beam for determining the attitude of the airplane for correcting drip stick readings in fuel quantity measurements. The gage can also be used for leveling the airplane.

(a) Place the two probes of the gage against the bottom of the keel beam chord at either the left or right buttock line 11 between stations 620 to 820. This position of the gage is used for leveling the pitch axis of the airplane.

(b) Set adjuster screw on top of the gage until the pointer is on zero. If the spirit bubble is not centered in its vial the airplane must be raised correspondingly until the spirit bubble is centered. The spirit bubble tends to move toward the high end of the airplane.



Airplane Leveling Using Plumb Bob
Figure 201

(c) Correct the airplane attitude as in paragraph "B" proceeding until airplane pitch axis is level.

(d) Turn attitude gage so that one probe is on each of the keel beam chords, (gage is perpendicular to airplane vertical centerline plane). This position of gage is used to check lateral attitude of airplane.

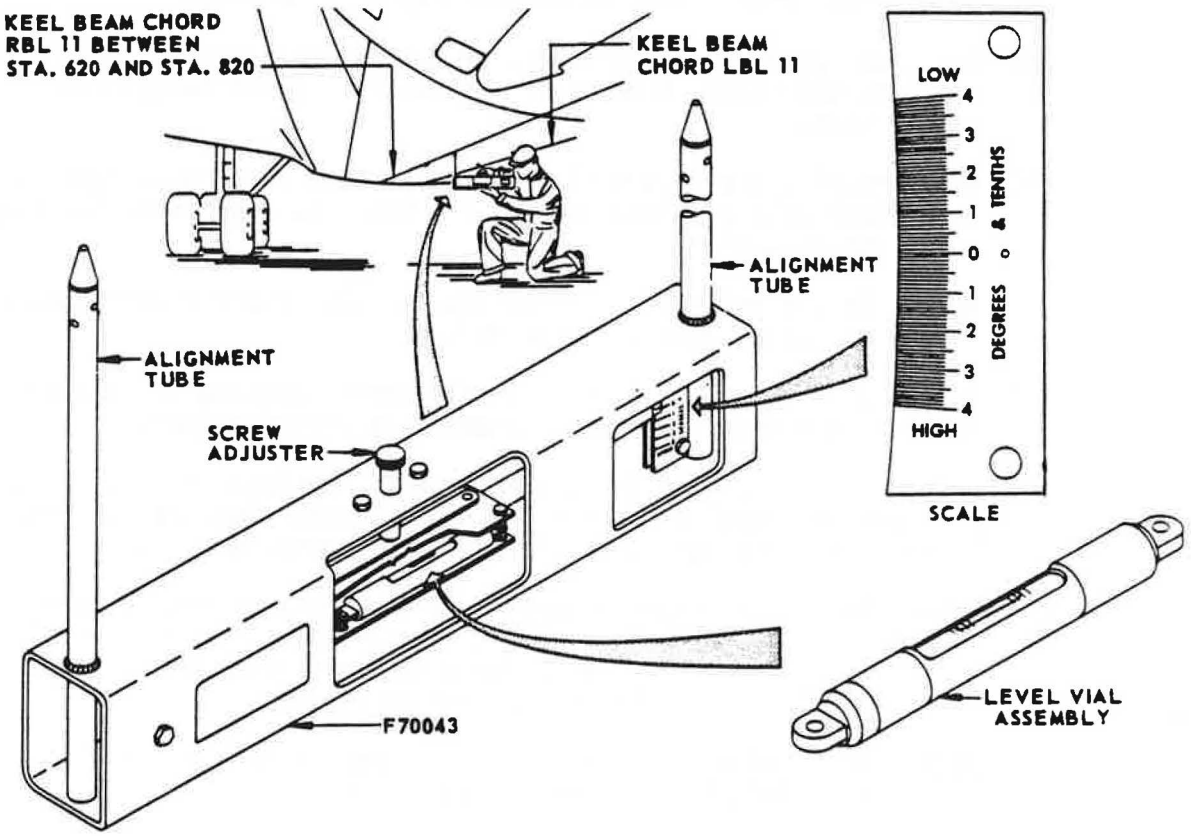
(e) With pointer on zero, raise airplane as in paragraph "B" until airplane is level laterally, (spirit bubble centered in vial).

(f) Repeat fore and aft and lateral leveling until no change occurs and airplane is level.

3. Level Airplane Using Transit

A. For alignment check of the airplane following repair or modification to structure the airplane must be accurately leveled.

NOTE: For further details on alignment checking, refer to Structural Repair Manual, Chapter 51, "Alignment Check Procedure."



Airplane Leveling Using Attitude Gage
Figure 202

B. Equipment and Materials

(1) Jacks and jack pad adapters for raising the airplane. See Chapter 7, Airplane Jacking.

(2) Engineer's transit.

(3) Six-foot scale.

(4) Nose and two main gear oleo locks, F70029 and F70027 or equivalent.

C. Level Airplane

(1) Install jack pad adapters and locate jacks at jack points C and G. See Chapter 7, Airplane Jacking.

(2) Station one man at each jack to operate the jack and ensure that jack load limits are not exceeded.

(3) Raise airplane until landing gear clears floor.

NOTE: If landing gear are not going to be operated, install the landing gear oleo locks so that airplane need not be raised so high to clear the floor.

(4) Locate and level a transit at point T, (figure 203).

(5) Open nose gear wheel well doors by pulling down and latching the door release handle located in the external power receptacle compartment.

(6) With transit, sight on a six-foot scale held vertically against nose wheel well leveling pad and the left and right wing leveling pads, one at a time.

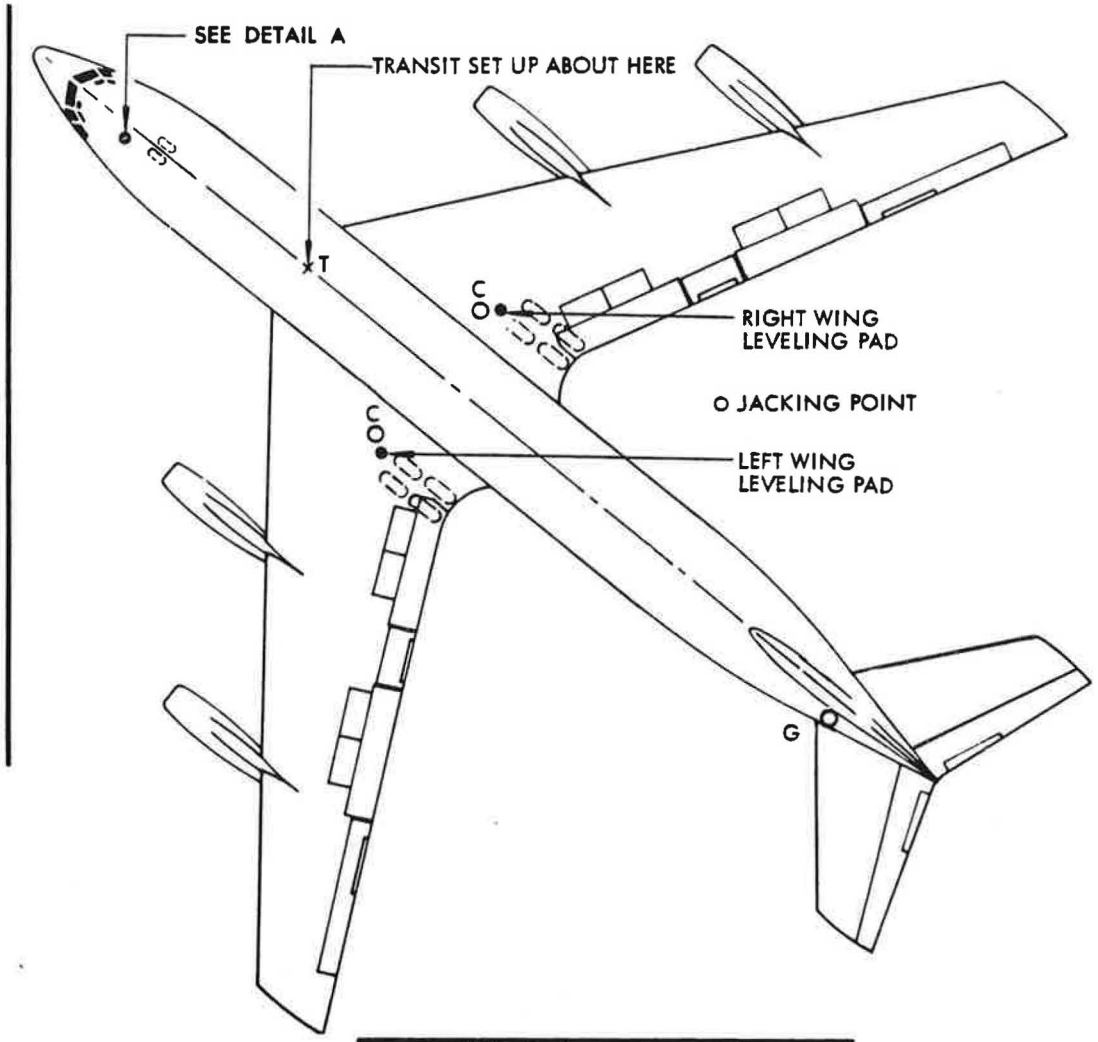
NOTE: Nose wheel well leveling pad is 6.99 inches higher than left and right wing leveling pads.

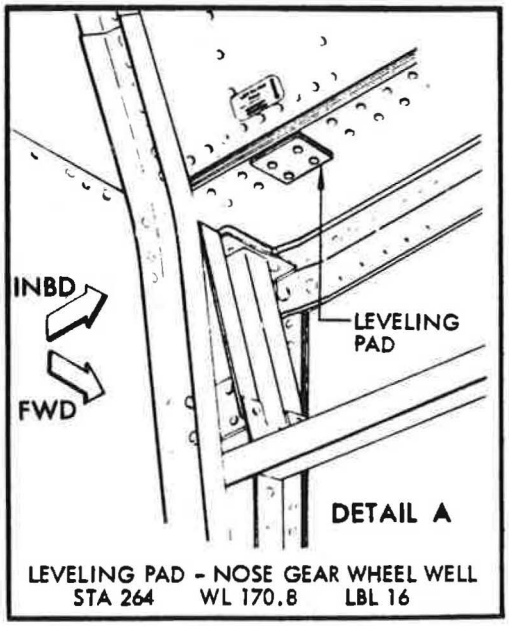
(7) Adjust jacks at jack points C until transit reading on six-foot scale is the same at left and right wing leveling pads.

(8) Adjust jack at jack point G until transit reading on scale held in nose wheel well is just 6.99 inches higher than transit readings on the scale held at left and right wing leveling pads.

(9) Check transit readings on scale held at leveling pads in nose wheel well and on left and right wings. The readings shall be within 0.02 inch of one another with the nose wheel well leveling pad reading corrected for being 6.99 inches higher.

NOTE: Make certain during final leveling operations that landing gear wheels clear the ground.





LEVELING PAD - NOSE GEAR WHEEL WELL
STA 264 WL 170.8 LBL 16

Airplane Leveling Using Transit
Figure 203

WEIGHING

1. General

A. The following is the recommended procedure for weighing 707 series airplanes with an electronic weighing unit, and will provide maximum safety and accuracy with a minimum expenditure of time. Normal precautions, consistent with good practices in the weighing procedure, such as checking for completeness of the aircraft and equipment, determining that fluids are properly accounted for, and that weighing is accomplished in an enclosed building (precluding the distrubance of air currents) will prevail.

NOTE: Detailed weighing instructions are included in the Weight and Balance Control and Loading Manual.

2. Equipment and Materials

A. Cox and Stevens electric weighing unit (or equivalent). (See figure 201.)

B. Main gear oleo lock, F70027-503, or equivalent, on turbojet airplanes, and F70147 or equivalent on turbofan airplanes. Two required.

C. Nose gear oleo lock, F70029 or equivalent.

D. Three jacks of suitable capacity and height that may be readily adapted to the electronic weighing cell. See Airplane Jacking, Chapter 7.

E. One set of adapters, Electronic weighing cell to jack. (See detail A, figure 201.)

F. Plumb bob and cord.

3. Weighing Procedure

CAUTION: FOLLOW OPERATING INSTRUCTIONS FURNISHED WITH ELECTRONIC WEIGHING UNIT.

A. Bleed all air from the three oleos and install oleo locks to prevent the struts from extending so airplane need not be raised so high.

B. Suspend a plumb bob from the hook located above the leveling plate located in the left main gear wheel well. Airplane level can then be controlled during the jacking operation.

C. Center the jacks with the weighing cells installed under inboard wing and tail jack cones. Raise the airplane evenly, (low point should be raised first) until wheels clear the floor. This will require a lift of approximately 4 to 5 inches.

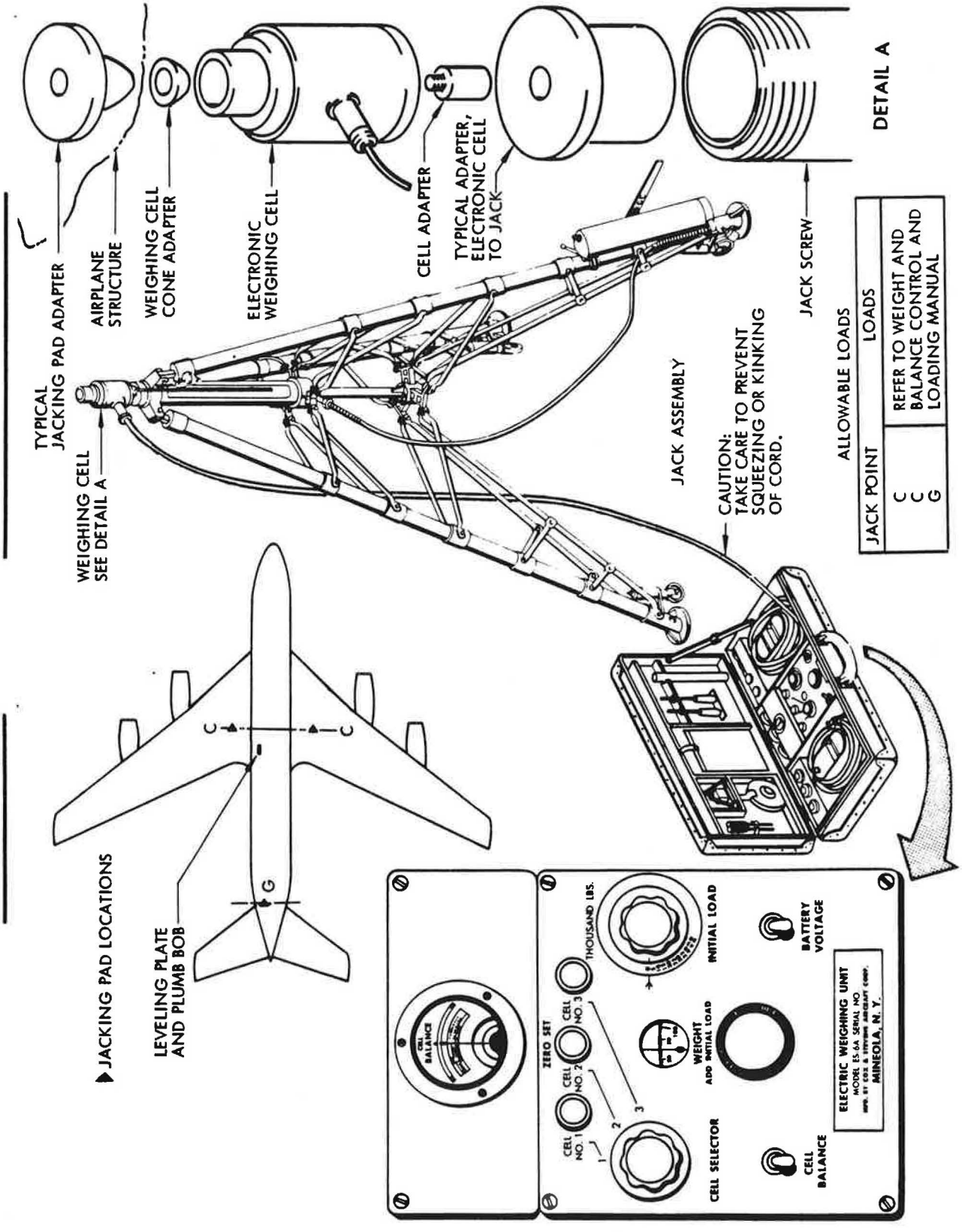
CAUTION: PROPER JACK ALIGNMENT, AND AN EVEN RATE OF JACKING AT ALL POINTS ARE NECESSARY IN ORDER TO AVOID SIDE LOADS ON THE WEIGHING CELLS.

D. Check airplane for level attitude and record loads obtained at airplane weighing points.

E. Lower airplane evenly to the floor from all three points.

F. Check weighing cell zero and repeat steps C., D., and E.

G. The total of these two weighings and the CG location shall be in reasonable agreement or a second pair of weighings to check weight, CG and cell accuracy will be required. This may be accomplished either by using another weighing unit, or by rotating the weighing cells of the unit used.


TYPICAL JACKING PAD ADAPTER
AIRPLANE STRUCTURE
WEIGHING CELL CONE ADAPTER
ELECTRONIC WEIGHING CELL
CELL ADAPTER
TYPICAL ADAPTER, ELECTRONIC CELL TO JACK
JACK SCREW
DETAIL A
WEIGHING CELL SEE DETAIL A
JACK ASSEMBLY
CAUTION: TAKE CARE TO PREVENT SQUEEZING OR KINKING OF CORD.
ALLOWABLE LOADS
JACK POINT
LOADS
C
C
G
REFER TO WEIGHT AND BALANCE CONTROL AND LOADING MANUAL
▶JACKING PAD LOCATIONS
LEVELING PLATE AND PLUMB BOB
CELL BALANCE
ZERO SET
CEL NO. 1
CEL NO. 2
CEL NO. 3
THOUSAND LBS.
INITIAL LOAD
BATTERY VOLTAGE
WEIGHT ADD INITIAL LOAD
CELL SELECTOR
CELL BALANCE
ELECTRIC WEIGHING UNIT
MINEOLA, N.Y.