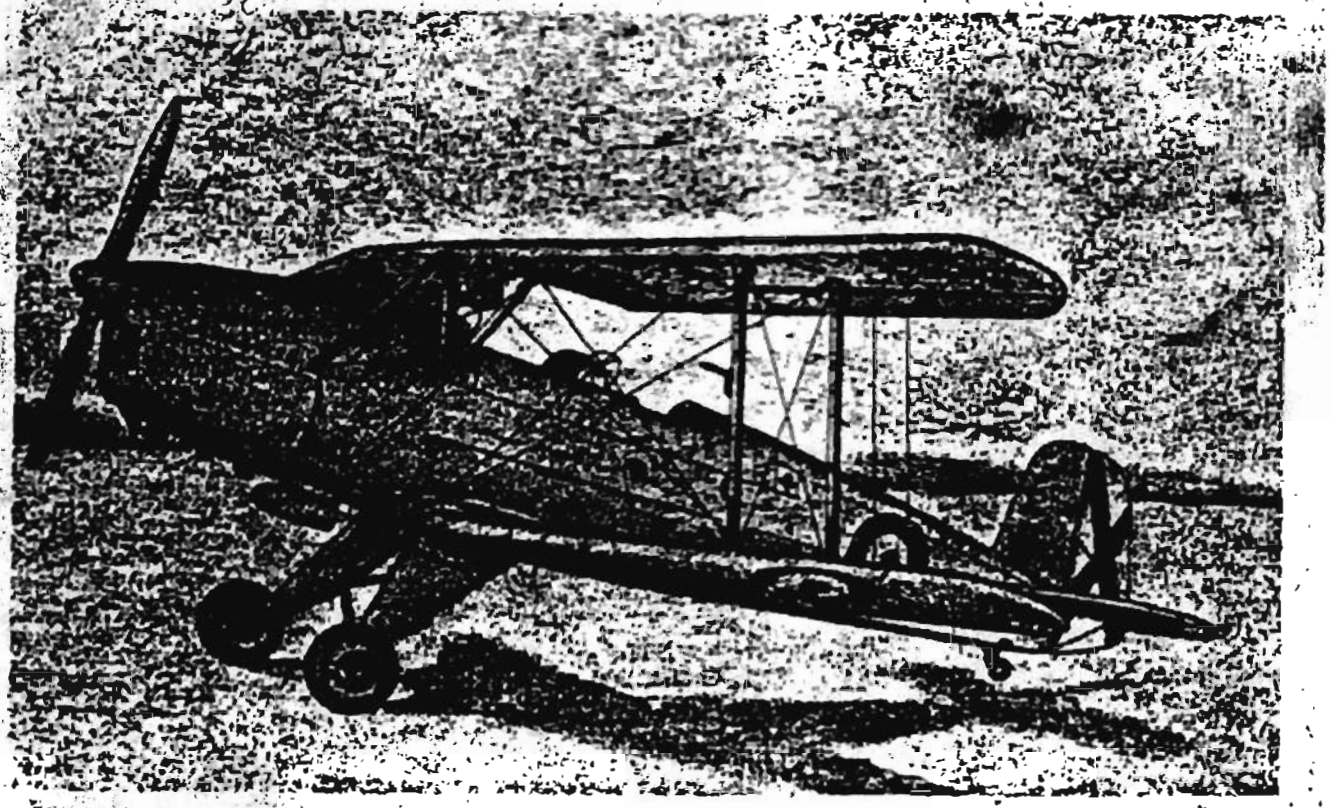
BUCKER BU-131 JUNGMANN

C.A.S.A. 1.131-E

AIRFRAME MANUAL



Martin Aero Products, Inc., P.O. Box 4666, Newark, Delaware 19711

BUCKER BU-131 JUNGMANN

C.A.S.A. 1.131-E

AIRFRAME MANUAL

INDEX

PART I

DESCRIPTION OF THE AIRPLANE AND ITS COMPONENTS

PART II

FLIGHT MANUAL

PART III

MAINTENANCE STANDARDS

PART IV

ASSEMBLY AND DISASSEMBLY OF THE AIRPLANE

FIGURES

BUCKER BU-131 JUNGMANN

C.A.S.A. 1.131-E

PART I

DESCRIPTION OF THE AIRPLANE AND ITS COMPONENTS

I. GENERALITIES

The C.A.S.A. 1.131-E is a single engine, two place tandem, dual control bi-plane with swept-back wings and equipped with a HIRTH "Tigre" G-IV-A or G-IV-B engine.

There are two different series of this airplane, designated as Series 1,000 and Series 2,000. The first includes the airplanes with the numbers 1,001 to 1,100, and the second includes the airplanes with the numbers 2,001 and up. Each airplane carries a plate located in the cockpit which shows the serial number and the imposed limitations of use of each airplane.

The fundamental difference between the two series is that the Series 2,000 has a reinforced fuselage, which permits greater usage.

II. FUSELAGE AND ENGINE MOUNT

The structure of the fuselage is composed of welded Cr-Mo steel tubing; the lower part composed of two longerons of the same material to allow for the pivoting of the lower wing panels. The forward section of the fuselage is covered with aluminum cowlings which are attached with quick fasteners and can be easily opened and closed. The rest of the covering is fabric and is provided with triangular, zippered openings at the rear of the fuselage, and on the underside, a laced opening permits the inspection of the interior of the fuselage. The floor of the baggage compartment is removable and this, also, makes it possible to inspect the interior of the fuselage.

The fuselage of the Series 2,000 is reinforced with 1mm wall tubing.

The engine mount is formed by two beams of Cr-Mo tubing, which contain the attachments for the engine mounts, which are equipped with vibration dampeners.

III. WINGS

The upper and lower wing panels have the same span; the upper being made in three parts: the center section and two wing panels. The lower two wing panels are attached to the fusel by means of steel fittings situated at the ends of the wing spars. The upper and lower wing panels are interchangeable, and consist of two wooden spars with an H cross section and wooden ribs, internally reinforced by steel diagonals and aluminum alloy tubing. The center section is composed of spars of Cr-Mo tubing, wooden ribs and is internally reinforced in the same manner as the wing panels. The wing panels are externally supported by Cr-Mo steel struts and flying wires.

IV. EMPANAGE

The empanage is constructed of welded steel tubing with fabric covering. The horizontal stablizer and the vertical fin are attached to the fuselage with pins and are externally stressed by means of flying wires. The elevator is aerodynamically balanced. To balance the aerodynamic pressure over the pitch control, both elevators have trim tabs controlled by the pilot in the rear cockpit. The rudder has a ground adjustable trim tab. All aerodynamic surfaces are mounted on ball bearings.

V. LANDING GEAR

The landing gear is constructed of Cr-Mo tubing and consists of independent, low pressure wheels, with dimensions of 420 x 150. It has oleo-mechanical shock absorbers. The travel of the shock absorber system is approximately 190mm. The wheels have SERVO self-aligning, mechanical brakes that can be activated independantly by means of a brake pedal mounted on each rear cockpit rudder pedal. The tail wheel, mounted on ball bearings, also has an oleo-mechanical shock absorber system. It can be controlled, either by activating the rudder or the free swivel. The landing gear has grease fittings for pressurized lubrication.

To facilitate the take-off and leanding on snow, the airplane can be equipped with skiis. After removing the wheels and the brake assembly, the skiis can be easily attached to the wheel axel of the landing gear. The skiis are mounted by means of springs in the proper angle of inclination which make possible take-offs and landings without difficulty. The tail wheel is also replaced by a governable ski, by which the airplane can be controlled on the ground without difficulty.

VI. ENGINE AND PROPELLER

The C.A.S.A. 1.131-E is equipped with a HIRTH "Tigre" G-IV-A engine, with maximum power of 125 HP at 2,000 rpm. The engine is controlled by means of control levers located at the left of both cockpits. The throttle in the front cockpit is easily removed and the one in the rear cockpit is equipped with a mixture control. The ignition system is composed of dual magnetos FEMSA MVE4. The ground contacts of the magnetos are equipped with corresponding switches on the instrument panel. The grounding and ungrounding of the magnetos can be made from either cockpit. The fixed, two bladed, wooden propeller is of composite construction, provided with metal leading edges and fiber coating, (Hoffman Patent).

VIII. FUEL AND OIL SYSTEMS

The airplane is equipped with an 82 liter fuel tank and an 8 liter oil tank. The gasoline tank is located in the upper part of the forward section of the fuselage and in the area of the cabane structure. The oil tank is located in front of the fire wall, at the lower right side. The gas tank has two openings which correspond to the "open" and "reserve" positions of the fuel selector valve. The gasoline intake to the carburetor, when the valve is in the "open" position is connected to the flapper tube fitting on the inside of the fuel tank. It is also connected to the engine driven fuel pump. This assures the feeding of fuel to the carburetor in any

upper part of the
[illegible], which is easily seen by the pilot. The oil level is checked by means of a cap provided with an oil indicator rod adjacent to the oil filler cap.

VIII. COCKPIT AND INSTRUMENTATION

The following instruments are installed in both cockpits:

2 Altimeters
2 Air Speed Indicators
2 Tachometers
1 Pitot Tube
1 Compass
1 Fuel Indicator Gauge (in the fuel tank)
1 Dual Gauge, Fuel and Oil, Pressure Indicator
1 Oil Temperature Indicator
1 Fire Extinguisher System
1 Cylinder Priming Pump
1 Wobble Pump

IX. FLIGHT CONTROLS

The roll and pitch controls are accomplished by two interconnected control sticks installed in each cockpit. Each of them can be easily removed. All the control actuators are mounted on ball bearings. The elevator control consists of a combination of actuator rods and flying wires located inside the fuselage. The trim tabs are activated by means of control levers and control cables. These levers can be controlled by a friction lock located in the rear cockpit. The rudder control consists of rudder pedals and rudder cables. The rudder pedals are adjustable. The aileron actuator rods are mounted on roller pulleys.

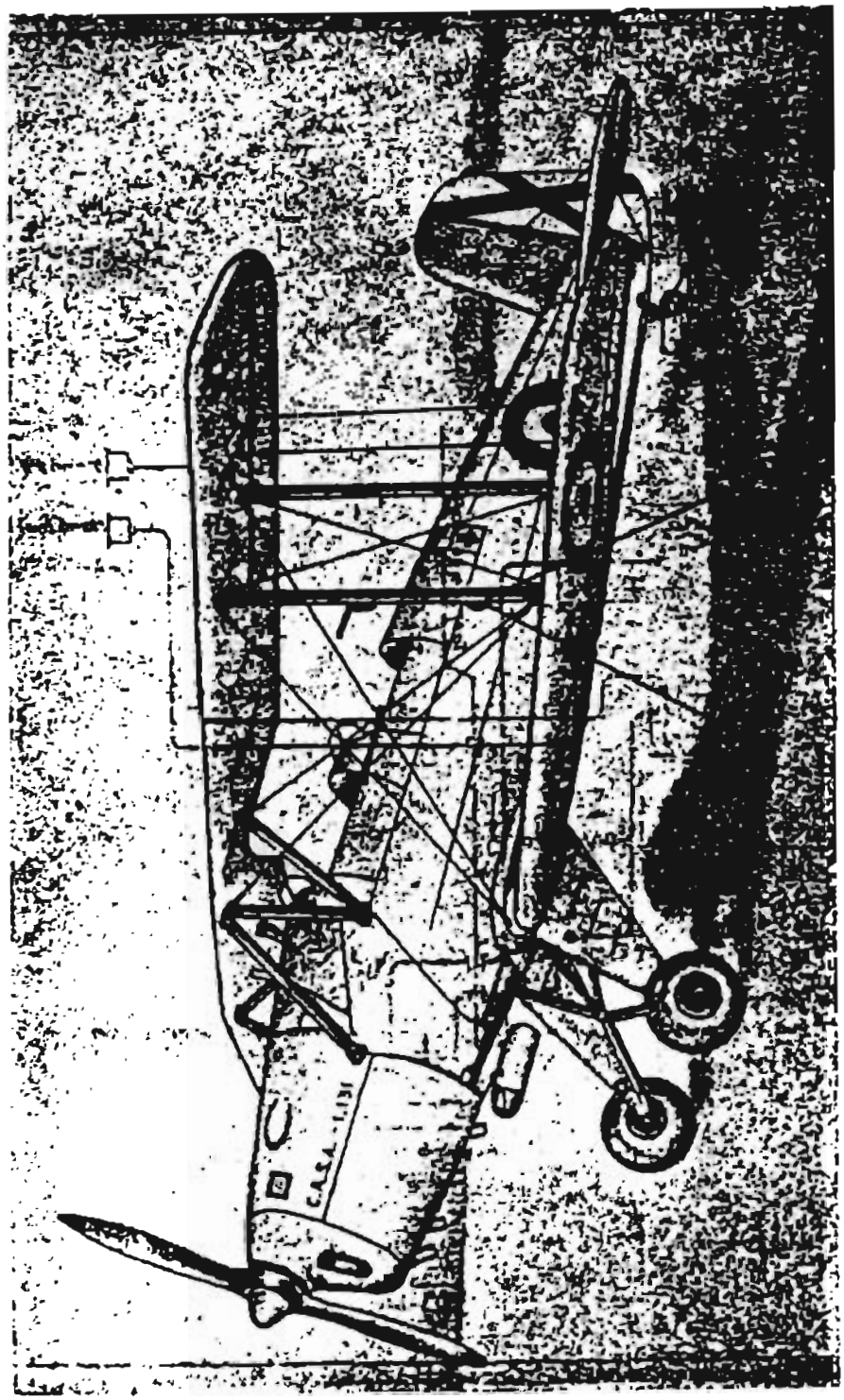


Figura num. 22

PART II

FLIGHT MANUAL

I. GENERAL INFORMATION

The principal applications of the airplane are: flight school, elementary instruction, aerobatics and touring, with the following limitations:

AIRPLANES - SERIES 2,000

With a gross weight of 720 kgs., corresponding to a useful load of 270 kgs., the airplane is classified in group 4, with the following aerobatic capabilities:

a. Rolls
b. Loops
c. Slips
d. Spins
e. Combination of all above aerobatic maneuvers

The maximum landing weight is 720 kgs.

With a gross weight of 585 kgs., or 135 kgs. of useful load, the airplane is classified in group 5, being able to perform all the aerobatic maneuvers corresponding to this group, except for the limitations imposed by the engine.

The never to exceed dive speed is 380 km/h.

The certificated maximum gross weight performance is as follows:

Maximum horizontal speed	195 km/h.
Cruising speed (at 1,850 rpm - 125 HP)	180 km/h.
Landing speed	82 km/h.
Ceiling	4,500 m.
Range (at 1,850 rpm - 125 HP)	360km

Rate of climb:

1,000 m	5 min.
2,000 m	12 min.
3,000 m	23 min.
4,000 m	45 min.

Range (at 1,850 rpm - 125 HP) . . . . . 2 hrs.

II. PRE-FLIGHT

a. General preparations and pre-flight inspections.

1. Make sure that the magneto switches are in the grounded position.
2. Remove tie-downs and control locks.
3. Check the tail wheel control and leave it in the free position, moving the lever to the "Loca" position (free swivel).
4. Orient the airplane into the wind.
5. Make sure the windshields are clean.
6. See that the tires are in good condition and that the pressure is that indicated on the placard located on the wheel cover.
7. Verify the proper functioning of the shock absorbers by applying force over the inter-plane struts. See that both shock absorbers are equally extended and check the level of oil through the oil filler cap located on the leading edge of the landing gear leg.
8. Check the brakes.
9. See that all the cowls, plugs, and other closures are in airworthy condition.
10. Check the harnesses, making sure they will not interfere with the flight controls.
11. Check the propeller hub bolts, making sure they are properly tightened and saftied.
12. Check that the throttle and mixture controls are working properly.
13. Check the carburetor heat control for proper functioning.
14. Check that the wobble pump is functioning properly by rapidly obtaining fuel pressure. To do this, the fuel selector valve should be in the "Reserva" position and the wobble pump should be in the "open" position.
15. Check the priming pump.
16. Check the fuel and oil lines.
17. Check for proper fuel and oil levels in the respective tanks, making sure both tanks are properly closed.
18. Check that the excess and bleed fuel lines are clean.
19. Check that the fire extinguisher gauge marks 6/kg/cm^2.

b. Starting the engine

1. Place the fuel selector valve in the "Reserva" position.

2. Open the wobble pump, pumping to pressurize the whole system (lines, filter, pump, etc.) not exceeding 250 gr/cm^2 on the fuel pressure gauge.
3. Prime the engine. There is a priming pump that takes fuel from a small tank located aft of the rear cockpit and injects it into the intake manifold through a spring nozzle.
4. If necessary, the prime pump can be by-passed by actuating the throttle control slowly, two or three times.
5. In cold weather, it is necessary to intensify the priming. When the engine is hot, it is not necessary to prime it. An excess of priming is always damaging to the engine and does not help to start it.
6. To facilitate the suction of the fuel mixture, by the pistons, turn the propeller a few revolutions in the normal direction of rotation. This can be done by using the engine starting crank or by rotating the propeller itself. During this operation, make certain that the contacts are OFF and that the throttle is closed.
7. THE PROPELLER SHOULD NEVER BE ROTATED BY HAND WHEN THE ENGINE IS HOT. In such case, go from #3 to #8 on this list.
8. Activate the throttle near the closed position, the mixture control in the rich position, the magneto switch to the on position and rotate the engine starting crank as rapidly as possible.
9. As soon as the engine fires, slowly open the throttle until the tachometer indicates 600 rpm. If after 4 or 5 attempts the engine will not start, slowly prime the engine according to #3 and repeat the operation.

When the engine does not start due to flooding, rotate the propeller in the direction OPPOSITE to normal rotation, with the magneto switches in the OFF position and the throttle control in the full open position. This will remove all excess of fuel and will put the engine in starting condition.

Once the engine has started, establish its speed at 600 to 800 rpm and follow the instructions given for the warm-up and operation of the engine on the ground as follows in Part C.

When the weather is excessively cold (Temp. below 0°C.), it is recommended to pre-heat the engine. During this heating, it is a good idea to cover the front of the oil cooler, not forgetting to uncover it later.

c. Engine Warm-Up

When the engine is running, open the throttle to 600 to 800 rpm and check the indications on the oil pressure gauge. If in 30 seconds, the gauge does not indicate pressure, stop the engine and investigate its cause. It is possible that it could be caused by the depriming of the oil line between the oil tank and the oil pump, especially when the engine has been standing for some time without use. There is a check valve at the output of the oil tank to prevent this condition. If such is the case, however, it is necessary to prime the installation by disassembling the line which contains the oil by-pass valve and pouring oil through this line. To obtain oil flow through the oil pump, it will be necessary to rotate the propeller a few revolutions in the direction OPPOSITE to normal direction of rotation. The priming operation must be done every time a new engine is installed in the airplane.*

Once the oil pressure indicator shows normal pressure, actuate the throttle to obtain 600 to 800 rpm and keep it there until the pressure indicates from 2.5 to 3.5 kg/cm^2.

Choose an rpm setting that will be free of engine vibration. The engine should run at these rpm for no less than 5 minutes, after which, the revolutions can be raised to 900 rpm. It is not good to warm the engine up at higher revolutions, nor should it ever exceed 1,000 rpm, often than to test the engine and for very short periods of time.

The engine is considred warm and in the proper condition to be accelerated when the oil temperature reaches 40°C.

III. IN FLIGHT

a. Take-off preparations

1. The student, or passenger, occupies the front cockpit and is properly strapped in. If the front cockpit is unoccupied, make sure that the harness is properly secured.
2. The pilot occupies the rear cockpit and straps himself in.
3. Make absolutely sure that the tail wheel is in the locked "FIJA" position.
4. Check that the controls are free.
5. Check that the elevator trim control is in the normal position.

*Remove pressure relief valve to allow oil flow to engine.

6. Check fuel and oil temperature and pressure indications.
7. Check the magnetos.

b. Taxi

1. Remove chocks.
2. Check that the taxi-way is clear and there are no obstacles in your way.
3. Check the direction of the wind in order to orient yourself.
4. Slowly accelerate the engine until the airplane begins to roll.
5. Check the brakes by smoothly actuating both brake pedals.
6. Taxi slowly to the take-off point, following the procedures of each airport. During taxi, the stick should be in the full back position if there is a head wind and forward if there is a tail wind. With a cross-wind, the stick should point to the side with the wind.
7. To make a taxi turn, always try to make it slowly TOWARD the wind, using the brakes as an aid.

c. Take-Off

1. Heading into the wind, before opening the throttle, make a final check of all engine indications.
2. Open the throttle smoothly and fully.
3. Maintain directional control.
4. Push the stick lightly forward until the airplane is in line of flight.
5. Pull smoothly back on the stick and wait until the airplane reaches take-off velocity and takes-off.

d. Climb

1. As soon as the airplane leaves the ground and is in ground effect, smoothly push the stick until the airplane reaches normal line of flight. Allow the airplane to accelerate to maximum rate of climb speed (130 km/h).
2. Having reached this speed, continue until reaching 100 meters of altitude. Then reduce to climb to cruise power and maintain maximum rate of climb.
3. Mixture control should be used for altitudes over 2,000 meters by observing the tachometer and the engine noise. Lean the mixture to maximum rpm and adjust the throttle to desired rpm.
4. In cold weather, or at very high altitudes, activate the carburetor heat.

e. Cruise

1. Once the desired altitude is reached, reduce power and maintain a velocity of 140 to 160 km/h.

f. Decent

1. Reduce power and gradually enrich the mixture by observing the tachometer.
2. Enrich the mixture as the altitude decreases.
3. During decent, maintain best glide speed, 130 km/h.
4. In cold weather, do not keep the throttle closed for long periods of time. Open the throttle occasionally.

g. Glide

1. Best glide speed is 130 km/h. with the throttle closed.
2. The elevator trim control should be gradually adjusted to help in the landing. In level flight, it should be placed in the position in which the airplane will maintain level flight.

h. Landing

1. Without Wind (Three Point Landing)
   Approach the ground at best glide speed, flare at approximately 15 meters of height, maintain a line of flight parallel to the runway, continuing to pull smoothly on the stick while the airplane is decelerating, at which time the main landing gear should touch the runway.

   Maintain directional control, the stick hard back and roll while decelerating to a stop, using the breaks only if necessary, with both wheels or with one is any loss of directional control is experienced.
2. With Wind (Wheel Landing)
   Descend to runway at best glide speed and when close to the ground, increase the speed, slightly maneuvering the airplane so that the main landing gear touches the ground before aerodynamic stall.

   The rest of the maneuver is the same as for wheel landings, emphasising the precaution in the roll out and deceleration to a stop.

   Leave the active runway and taxi to the ramp, following the procedure of each airport.

i. Stop the engine

1. Close the throttle to 600 rpm and maintain at 600 rpm for one or two minutes.
2. Lose the throttle to idle speed and maintain idle speed for one or two minutes
3. Increase rpm from 600 to 800 for 4 to 8 seconds and turn magneto switch to OFF position, simultaneously, fully opening the throttle.

IV. Post Flight

a. Care of the airplane

1. The tail wheel control is placed in the "Loca" (Free Swivel) position. The airplane will roll backwards, pushing it by the inter-plane struts. The hand-holds on the lower wing are a help.
2. If it is necessary to raise the tail, it should be done by lifting the fuselage at the indicated points at the tail.

b. Parking and tie-down

1. The tail wheel must be locked by placing the corresponding lever in the "Fi ja" (Fixed) position.
2. The controls should be locked by using the front cockpit harness, as well as tying down the right front rudder pedal to the fire wall.
3. When the airplane is parked in the open, it should be tied-down as shown in Fig. 22.
4. To avoid engine cylinder corrosion when the engine has not been operated for more than six days, rotate the propeller through twelve blades.
5. For long term storage of the engine, it must be prepared as follows:
   The cylinder walls should be washed with unleaded gasoline by pouring the gasoline through the spark-plug openings (pistons should be in TDCE--Top Dead Center Explosion Cycle). Turn the propeller several revolutions so that the cleaning of the cylinder walls is complete. Pour 50 to 70 grams of engine oil into the valve housings. Pour approximately 60 grams of engine oil in each cylinder through the spark plug openings, capping them with threaded caps in place of the spark plugs. Pour 50 to 70 grams of engine oil into the accessory section through the cap or breather line located on top of the accessory section housing, between the magneto drive. Empty the carburetor and fill it with very low density engine oil.

Tag the engine against propeller rotation.
To depickle the engine, follow Engine Depickling Instructions.

PART III

MAINTENANCE STANDARDS

I. GENERAL INSTRUCTIONS

a. Safetying Pivot Points, etc.

All castlelated nuts must be safetied, either by means of a cotter pin or safety wire. Non-castlelated nuts must be secured with lock washers and the propeller hub bolts must be secured with safety wire. All the turn-buckles must be secured using safety wire and following the appropriate aircraft maintenance procedure. Generally speaking, all the screws, bolts, and pins must be installed with the heads in the direction of flight or heads up. Where universal joints are found, precaution must be taken; so when, after torquing the fasteners, the universal joint remains fully operational.

b. Flying Wire Fittings

When adjusting the length of the flying wire to obtain proper aircraft rigging, the following precaution must be taken:

Introduce a piece of safety wire through the small orifice located on each flying wire fitting. Safety wire must bottom out against the threaded segment of the flying wire. This will assure adequate length of engagement.

c. Inspection Covers

The forward fuselage cowls, located on either side of the airplane, are equipped with quick fasteners. Make sure that the screw slots align with the red mark when properly secured for flight. All other inspection covers are provided with zippers, with the following exceptions:

The bottom of the fuselage is provided with lacing and wooden inspection covers to give access to the aileron bellcrank actuator, located under the lower wing panel. These wooden inspection covers lock by rotating 1/4 turn.

d. Color Coding

All hoses must be painted according to the following code:

Fuel	Yellow
Oil	Brown
Fire Extinguisher System	Red
Instrument Air	Blue

II. Re-fueling the Airplane

a. Fuel

Open the fuel tank cap and fill the fuel tank with the proper aviation grade fuel.* Check the fuel indicator gauge to avoid over-filling the tank and spilling fuel.

In addition to the main fuel tank there is another small tank (1 liter) for the priming system. This fuel tank must be filled very slowly until the fuel comes out of the bleed tube, located on the underside of the fuselage.

b. Oil

Avoid mixing different brand names of oil. Make sure the oil is clean, even if the oil tank cap is provided with a filter.**

c. Fire Extinguisher System

The fire extinguisher in this installation is charged with carbon tetrachloride. If refilling is necessary, the following procedure should be observed:

Close the liquid level indicator valve and the discharge valve on the fire extinguisher. Fill the tank with 650 cm^3 of carbon tetrachloride through the filler cap, located at the top of the tank. Once the tank is filled, loosely close the cap, about a half turn. Inject air pressure until the pressure indicator gauge, located on the panel, indicates 6/kg/cm^2, at which time, the cap should be tightened securely. Tighten all other fasteners securely

* 80 Oct. or 100 LL

** Aeroshell 120 (SAE 60) Non-detergent for summer
Aeroshell 100 (SAE 50) Non-detergent for Winter

III. Lubrication of the Airplane

It is of major importance for the operation and conservation of the airplane that maximum care be given to the lubrication of all fittings as per following instructions:

All points equipped with "Alemite" type grease fittings should be lubricated with a suitable grease gun.

In fig. 18, the location of all the grease fittings as well as all elements that should be lubricated with oil are shown. Also shown are the ball bearings that must be lubricated with a good quality lithium grease (Wolfshead Super Duty and Wheel Bearing Grease).

Do not lubricate the airplane components that are exposed to dust and dirt, as this contamination may cause excessive wear.

The flying, landing, and reinforcing wires should be lightly coated with Vaseline.

IV. Periodical Maintenance

a. Partial Inspection

1. Fuselage

In the event of an excessive landing load, the following airplane elements should be inspected:

Main Landing Gear Attachment Points
Tail Wheel Attachment Points
Main Landing Gear Components
Tail Wheel Components

Inspect for cracks or for structural deformation. Also, carefully inspect the underside of the fuselage for deterioration of paint, cracks, or structural deformation, which should be repaired immediately if found.

2. Landing Gear

During pre-flight, or, on a weekly basis, inspect the air pressure in the tires, which should be 18 to 21 PSI. If the airplane is used in flight school, making from 30 to 50 take-offs and landings daily, it will be necessary to

lubricate all grease fittings on the Main Landing Gear and Tail Wheel daily; otherwise, every 50 hours.

During the lubrication of the main wheel bearings, care will have to be taken not to contaminate the brake assembly with grease. The leather landing gear strut covers must always be filled with Vaseline, making sure that the covers are undamaged to prevent contamination of the landing gear struts. In the event of loss of oil in the landing gear struts, the landing characteristics of the airplane will be affected, but are not considered dangerous. If there is loss of oil through the landing gear strut seals, the leather strut covers will be soaked with oil. Tighten the landing gear strut seals and refill the strut with oil to the proper level. Check the oil level of the landing gear struts every 100 hours. To refill the landing gear struts with oil, the airplane must be supported by the three points of the landing gear. Noises coming from the landing gear struts when pressing down on the wing panels come from the compression springs inside the struts. During the 50 hour inspection, check that the bushing # 25 (Fig. 6) on the tail wheel does not interfere with the oleo strut, maintaining clearance of .1 to .3 mm. The inspection must be done by supporting the tail of the airplane by the skid, placing the tail wheel control in the Free (Loca) position and rotating the strut about its longitudinal axis.

3. Empanage

The underside of the horizontal stabilizer and the elevator must be inspected during pre-flight for fabric damage. Also, inspect all pivot points and safetying.

4. Controls

The ball bearings of the elevator, ailerons and rudder do not need special attention. Every 400 hours, these ball bearings should be disassembled, washed with gasoline, blown dry with air pressure (40 PSI) and repacked with grease. The aileron control linkages, located in the lower wing panel, and their guides, do not need special attention. This is why they are not accessible from the outside. The aileron control mechanism within the fuselage should be inspected every 100 hours or during annual inspection. If it would be necessary to inspect the aileron bell crank actuator, open the inspection cover on the underside of the wing panels.

5. Airframe

All pivot points and safetying should be inspected regularly. All exterior reinforcing wires should be inspected for proper tension every 25 hours if the airplane is used in flight school or every 50 hours otherwise.

b. General Inspection

There are two different types of inspection for this airplane; one being a partial inspection every 300 hours, or at the end of each training course if the 300 hours are not exceeded. This 300 hour inspection should be done without fabric tear-down. The other type of inspection of the airplane is total inspection, including fabric tear-down.

1. Partial Inspection

Disassemble the wings, empanage, landing gear, engine mount, engine and flight controls; inspecting all these elements for cracks. Repair as necessary, replacing any parts or assemblies. Special care must be taken with the attachment points of the following elements:

Engine Mount
Cabane Supports
Landing Gear

for elongation of the reamed holes or excessive clearance of the attachment pins.

2. Total Inspection

Remove all fabric and inspect, repair, and refinish all systems and components as necessary (IRAN). Check all the internal drag wires for proper tension and security (wings and empanage - Fig. 21).

PART IV

ASSEMBLY AND DISASSEMBLY OF THE AIRPLANE

I. AIRPLANE - LIFTING AND SUPPORT

a. Jacking the Airplane

Use an approved jack of the type that has an adjustment screw at the load support point, and locate it under the welded support points at the bottom of the firewall and at either side of the fuselage.

The tail is lifted by hand, by holding the hand holds, located on either side of the fuselage tail section. The tail is supported by a saw horse, making contact on the tail skid, aft of the tail wheel.

To prevent the airplane from tipping over on the nose, a weight of 60 lbs. must be hung from the tail.

b. Leveling the Airplane With Line of Flight

The airplane is supported as per paragraph (a) (above). The horizontality of the traverse axis is found by acting on the adjustment screws of the jacks under the firewall. The horizontality of the longitudinal axis is found by shimming the distance between the saw horse and the tail skid. The rigging level is rested on the (3) pads located on top of the rear cockpit longerons.

c. Lifting Airplane Elements

With the wxception of the engine, all other elements are easily lifted by hand. To lift the engine, use a sling supporting the propeller shaft and the bottom of the starter.

d. Assembly and Disassembly

1. Wings

The cabane (upper wing center section) is supported

by the struts and the flying wires are used to properly allign it with the center line of the airplane. Once the cabane is rigged, the lower wings are assembled, keeping in mind that the support pins (L shaped) are installed forward on the front spar and backwards on the rear spar.

The wing pins are safetied by using cotter pins or safety wire over the safety support brackets. The lower wings are supported by the landing wires. The upper wings are installed following the same procedure as the lower wings, installing the wing struts and the flying wires, wing strut wires, etc. Before fastening the wing struts, slide the leather boots into position.

The rigging is done as per Fig. 20. The tension loads of all the wires are given in Fig. 21. The wires' fittings must be screwed at least up to the position of the control hole, located on all the fittings.

To compensate for "P" factor, the angle of incidence of the left wing is about $1/4^{\circ}$ to $1/2^{\circ}$ greater than the right wing. Before assembling the lower left wing, be careful with the pitot tube tubing; making sure the tubing connections are properly installed.

2. Engine Mount

The right and left engine mounts are fastened to the fire wall by means of shoulder screws and a short tension strut. The right and left engine cowls are fastened to the upper one by using a long hinge pin. When installing the upper cowl, make sure that it fits the front and back pins that locate the cowl in the proper position.

3. Engine and Propeller

Engine and Propeller controls are fastened to the engine as well as the oil and fuel lines.

To install the propeller, slide it in the hub and lightly tighten the propeller bolts, Then check the allignment by rotating it. The maximum allowable deviation is 3 mm between the tips of the blades. Torque the propeller bolts to 200 - 220 in. lb. Do not safety them.

After the first flight, check the torque, retighten, if necessary, and do all the safetying.

4. Landing Gear

To assemble and disassemble the landing gear strut, follow fig. 5.

The parts are:

1. Safety wire
2. Nut
3. Gasket
4. Intermediate part
5. Long spring
6. Short spring
7. Piston
8. Fluid
9. Stop Fastener
10. Bronze piston
11. Packing
12. Intermediate tube
13. Packing
14. "O" Ring
15. Bushing
16. Gasket
17. Nut
18. Safety wire
19. Boot
20. Gear leg
21. Strut housing
22. Filler Tube (with nut and gasket)

To disassemble the strut, remove the safety wire #1. Remove, through the upper section, parts #2 through #7. Then, through the bottom section, remove parts #8 through #19, eith the gear leg #20, after removing the nut #17 and safety wire #18. To assemble, the above procedure is reversed. Into each shock strut, and prior to the installation of piston #7, pour .4 liters of hydraulic fluid. The nut #2 will be tightened after the strut is installed on the fuselage. Then, safety wire the assembly.

The tail wheel is installed as in Fig. 6. To disassemble, remove screws #19 and #20, and , then, #22, together with cable guide #21. Then pull down and the tail wheel assembly will come out. To further disassemble the tail wheel strut, see Fig. 7. Pull nut #3 out of housing #1. With the piston, remove nut #3, gaskets #4 and #5, bushing #6, "O" ring #7, intermediate tube #8 and ring #9, with broze block #10. Then, remove the spring and the hydraulic fluid. To assemble, reverse the procedure. Install the spring #11 inside tube #1. Pour in hydraulic fluid until the spring is covered; then install piston #2, with all the other above mentioned parts. Then, with bushing #6 lifted, fill oil tube #1 with oil. Torque down nut #3 and safety wire the assembly.

To install the tail wheel in the fuselage, grease the housing surface and the piston end. Install the leather boot #23 (fig. 6) and half bushings #24 and #25 over the strut housing and piston end. Held with safety wire, the entire assembly is fed through the bottom of the fuselage.

The bushings are secured with screws #19 and #20. Install ring #21 to the housing and fasten with screw #22.

5. Horizontal Stabilizer

The angle of incidence of the horizontal stabilizer can be varied within the limits by means of fibre washers located on the front fasteners. Normal value is -2°.

6. Controls

The elevator control cables must have an initial tension of 100 to 200 lbs.

In the aileron control circuit, rig the actuators and bell cranks so that there are no interferences with the wing spar. The initial tension of the interaileron control wires must be 10 to 20 lbs. Make sure that they do not flutter and that they are properly aligned with line of flight.

The trim tab cables must have proper tension so they can transmit control signals to the trim tabs without backlash. The pitch trim control lever must be 5° forward of center position when the trim tabs are in the neutral position.

7. Fuel Tank

The four corners of the bottom of the fuel tank are supported by molded rubber pads held by brackets, welded to the fuselage. The hold down wires (2) that fasten the fuel tank to the fuselage, should be tightened lightly initially, until the front cowls, fire wall and front instrument panel are properly aligned and secured. Then properly tighten the hold down wires with nuts and lock nuts.

8. Oil Tank

The oil tank is located on the lower right side of the fire wall and is held into position with two flexible brackets and turnbuckles.

9. Pitot Tube Lines

The connection between hard tubing and rubber tubing must be done so they penetrate at least 20 mm. into the rubber tubing. They are held in place by a double turn of safety wire.

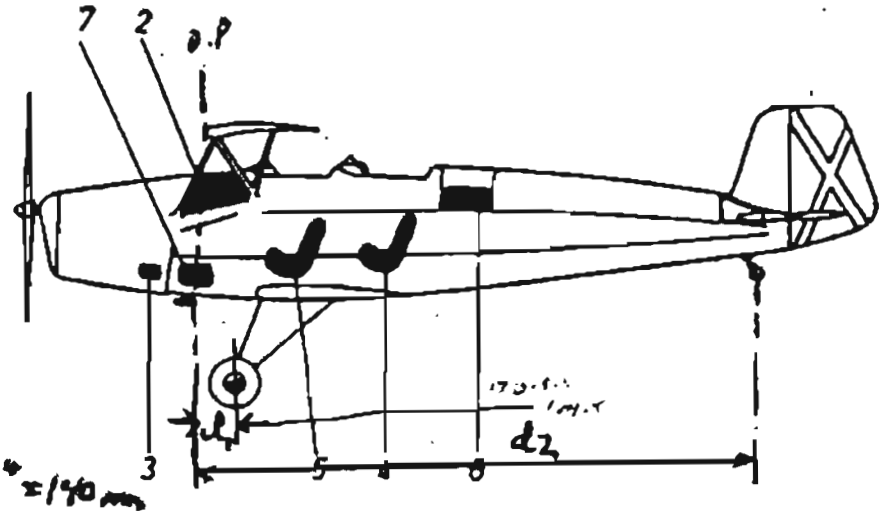
To test the installation, blow a little air into the pitot tube and see if the ASI needle moves to a higher speed.

II. RIGGING

Figures 20 and 21 give the rigging data and initial tensions of all the wires.

FIGURES

C.A.S.A. 1.131-E	DISTRIBUCION DE CARGAS LOAD DISTRIBUTION	



$d_1 = 5\frac{1}{2}" = 140$ mm

$d_2 = 169" = 4293$ mm

SERIES SERIE	1.000		2.000	
AEROBATIC CATEGORY GRUPO DE SOLICITACION	4	5	4	5
Partida	DESIGNACION	WEIGHT (KGS) PESO EN KGS.			
1	EMPTY WEIGHT Peso en vacío	450	450	450	450
2	FUEL Combustible	34	29	62	39
3	OIL Lubricante	6	6	6	6
4	PILOT WITH PARACHUTE Piloto con paracaídas	90	90	90	90
5	PASSENGER WITH PARACHUTE Pasajero con paracaídas	90	—	90	—
6	BAGGAGE + TOOLS Equipaje y herramientas	—	—	12	—
7	TOOL KIT Maletín	—	—	10	—
	WEIGHT IN FLIGHT PESO EN VUELO	670	575	720	585
DISTANCE FROM THE C.G. TO LEADING EDGE OF CABANE. EMPTY AIRPLANE. Distancia del centro de gravedad al borde de ataque de la cabaña con el avión vacío.		C.G. RANGE Zona admitida 440 - 470 455		

~ WEIGHT AND BALANCE FORM ~ EMPTY AIRPLANE ~

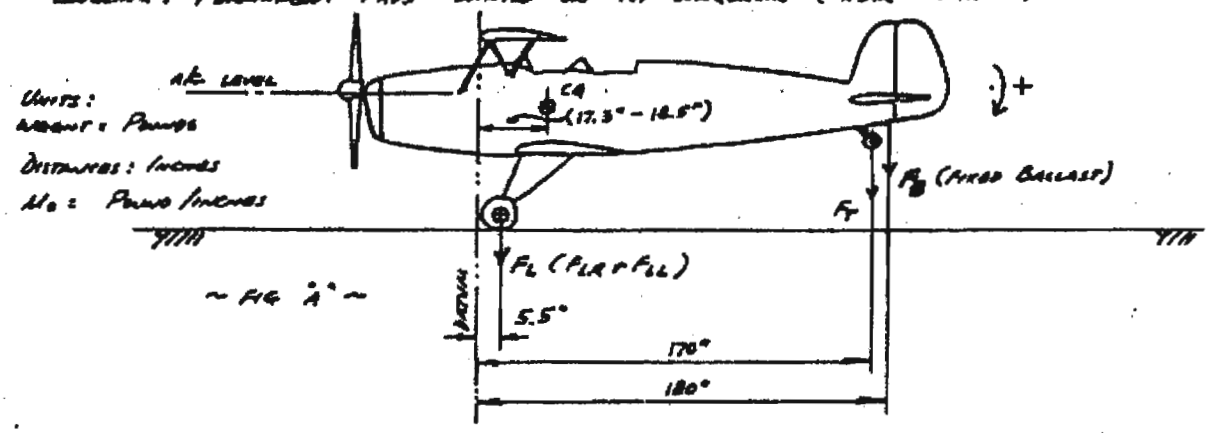
. CASA - 1.131.E (BU-131 JUNGMANN) S/N = E3B- _____ REGISTRATION NR - N- _____

OWNERS NAME : _____

ADDRESS : _____

DATUM : LEADING EDGE OF TOP WING CENTER SECTION

LEVELING : PERMANENT PADS LOCATED ON TIP LONGERONS (REAR CROSS PART)



UNITS:
WEIGHT = POUNDS
DISTANCES: INCHES
MO = POUND INCHES

~ FIG A ~

EMPTY WEIGHT CALCULATIONS

ITEM	SCALE READING (LB)	TARE (LB)	NET WEIGHT (LB)	ARM (IN)	MOMENT (LB-IN)
LEFT WHEEL (F_{LL})		—	=	x 5.5	=
RIGHT WHEEL (F_{LR})		—	=	x 5.5	=
TAIL WHEEL (F_T)		—	=	x 170	=
* FIXED BALLAST (F_B)		—	=	x 180	=
		—	=	x	=
		EMPTY WEIGHT:	=	TOTAL MOMENT:	=

* ADD UNTIL EMPTY WEIGHT CG LOCATION IS WITHIN ALLOWABLE RANGE F_B = _____

EMPTY WEIGHT C.G = $\frac{\text{TOTAL MOMENT}}{\text{EMPTY WEIGHT}}$ = _____ = _____ EMPTY WEIGHT CG LOCATION

EMPTY WEIGHT CG LIMITS ARE :

FORWARD LIMIT IS 17.3" AFT OF DATUM

REARWARD LIMIT IS 18.5" AFT OF DATUM

AIRPLANE EMPTY WEIGHT IS APPROX ≈ 1000 LBS

MAX CERTIFICATED TAKE-OFF GROSS WEIGHT IS ≈ 1600 LBS

AIRPLANE USEFUL LOAD IS ≈ 600 LBS.

NOTE:

CONSULT AIRPLANE MANUAL FOR FURTHER INFORMATION (FIG 1 PG. _)

JVM-10-2670 - REV 0

AIRCRAFT WEIGHTED & CALCULATED BY: _____

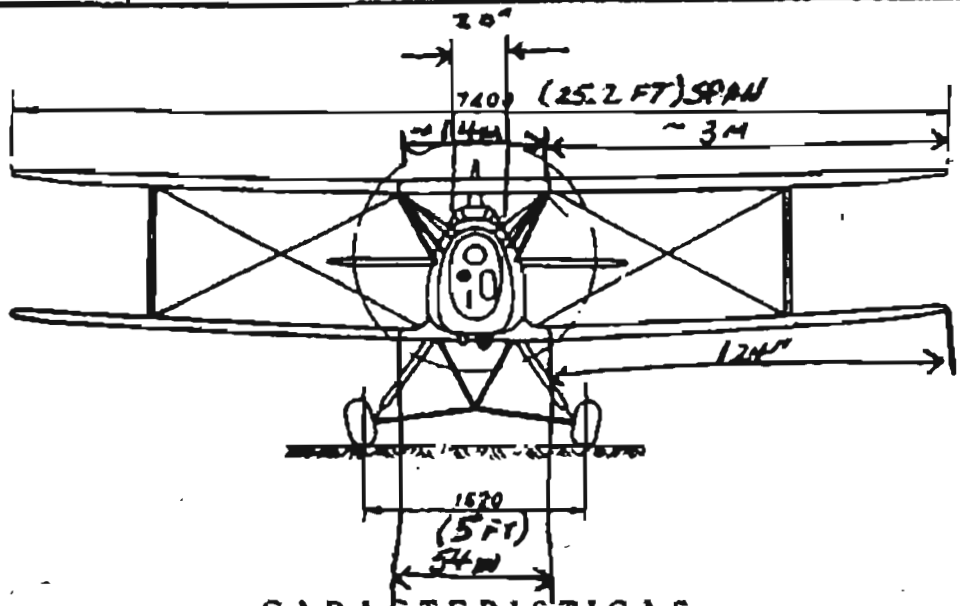
DATE OF WEIGHTING : _____

LOCATION : _____

TABLA DE CARACTERISTICAS

TABLE OF CHARACTERISTICS

C.A.S.A. 1.131-E



CARACTERISTICAS

Envergadura de ambas alas (SPAN)	7,40 m.
Longitud (LENGTH)	6,725 m.
Altura (HEIGHT)	2,25 m.
Superficie sustentadora (WING AREA)	13,50 m²
Angulo de incidencia, plano superior (ANGLE OF INCIDENCE, TOP WING)	1,5°
Angulo de incidencia, plano inferior (ANGLE OF INCIDENCE, LOWER WING)	0°
* Angulo diedro, plano superior (DIHEDRAL ANGLE, TOP WING)	1,5°
Angulo diedro, plano inferior (DIHEDRAL ANGLE, LOWER WING)	3,5°
Flecha (SWEPT BACK)	11°

* SEE PAG 20 FOR RIGGING INFO

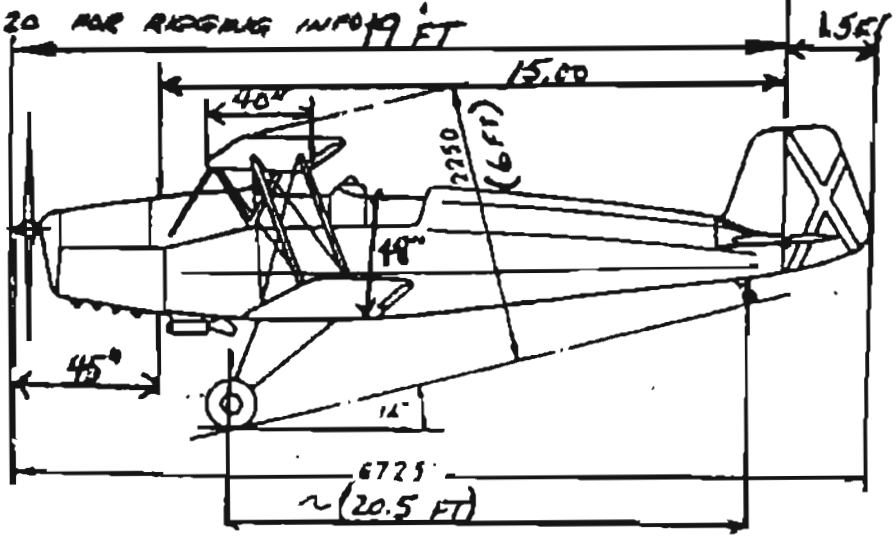


Figura núm. 2

C.A.S.A. 1.131-E

ESTRUCTURA DEL FUSELAJE

FUSELAGE STRUCTURE

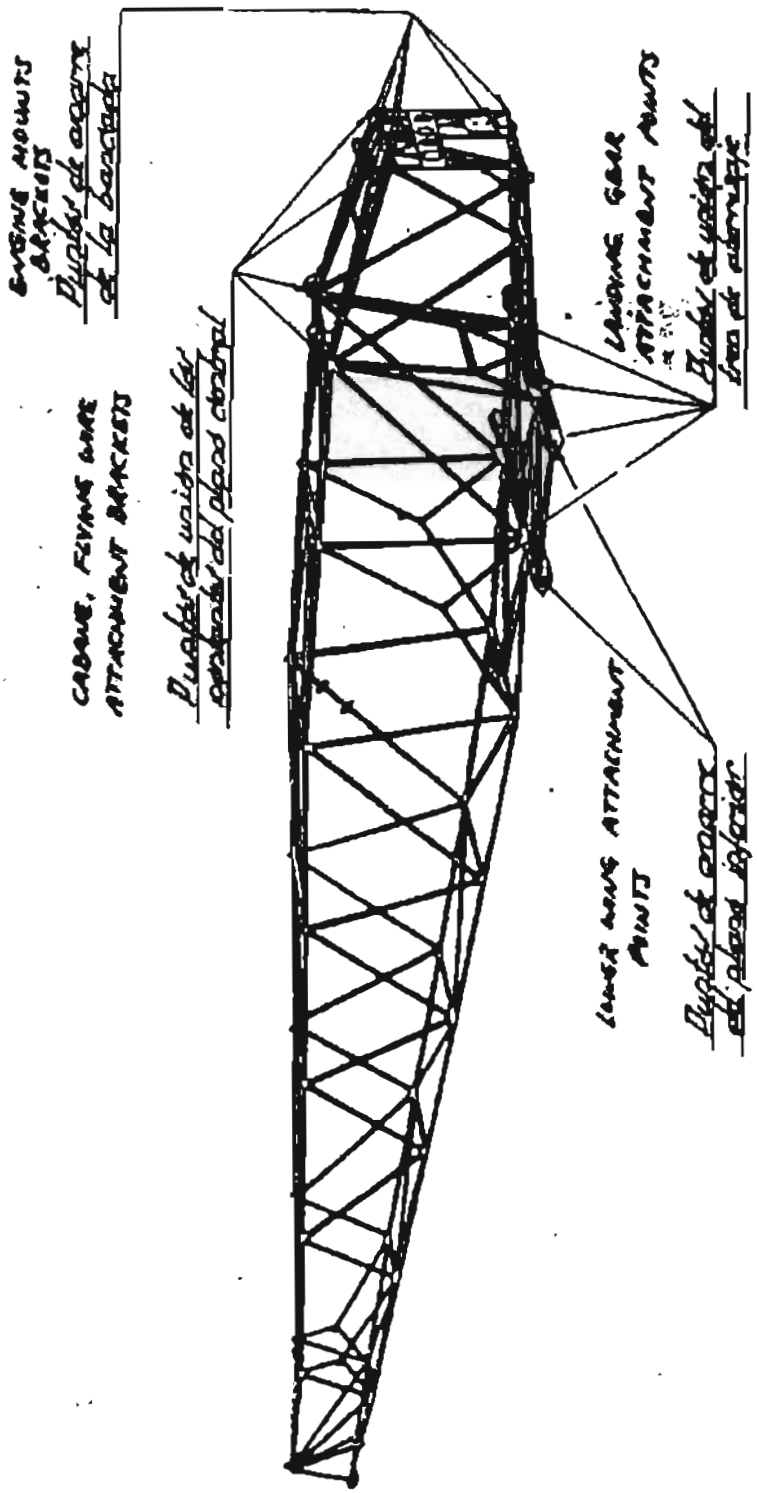
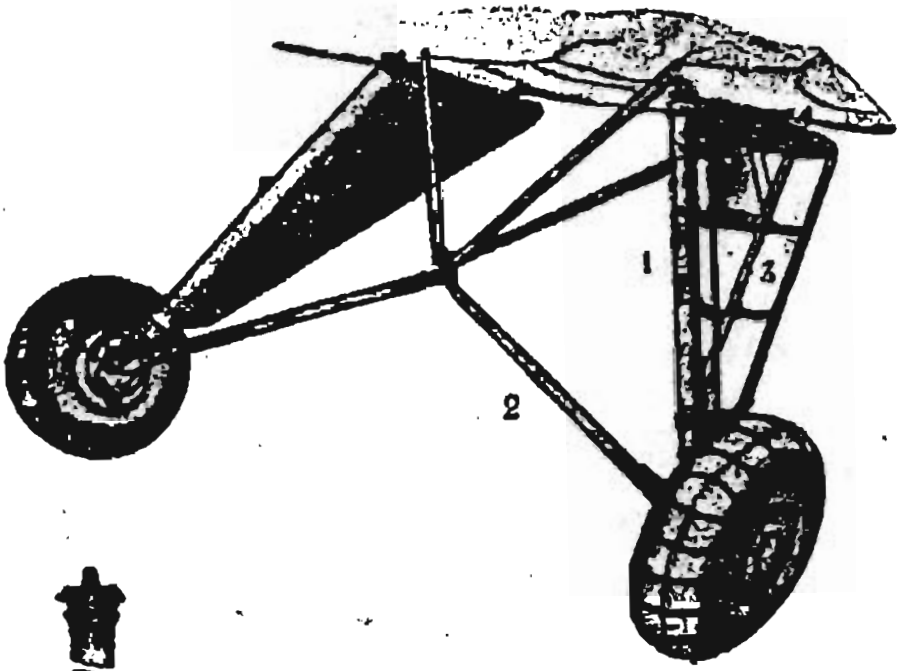


Figura núm. 3

TREN DE ATERRIZAJE

LANDING GEAR

C.A.S.A. 1.131-E



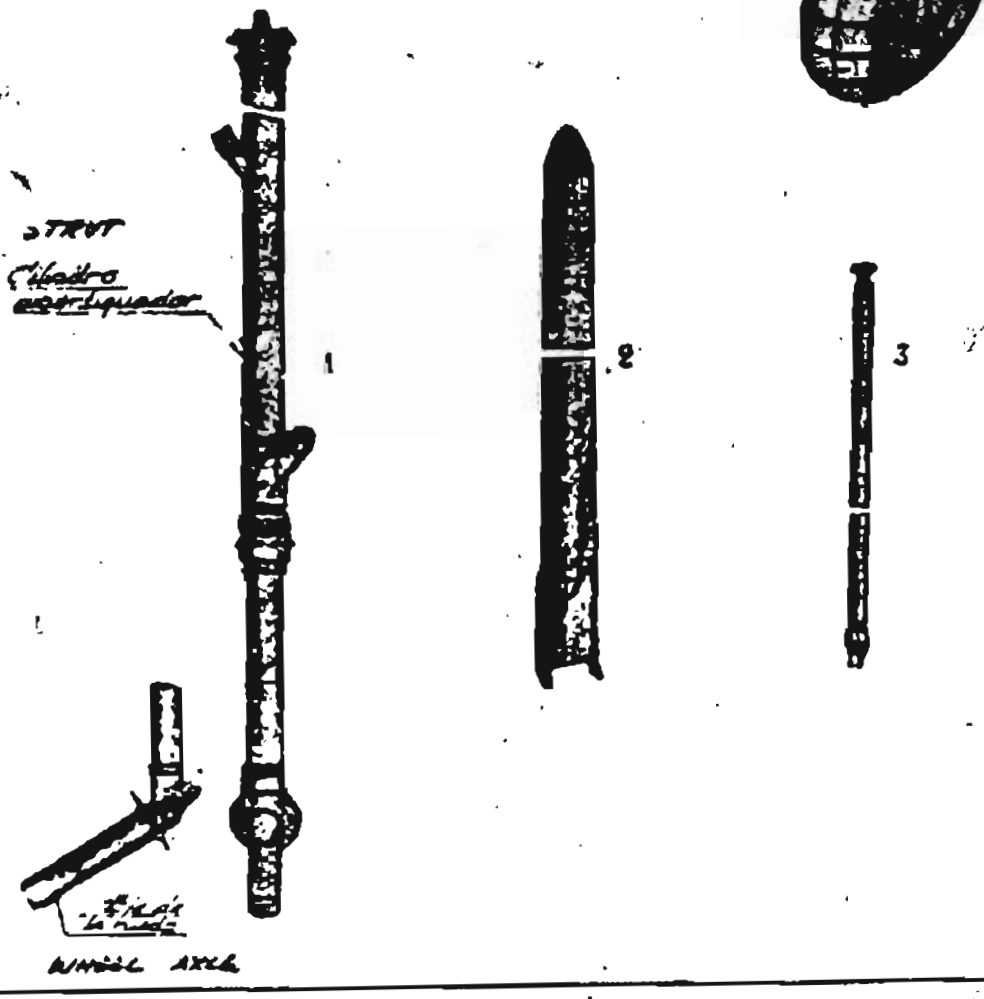


Figura núm. 4

C.A.S.A. 1.131-E

SHOCK STRUT, LANDING GEAR

PATA AMORTIGUADORA

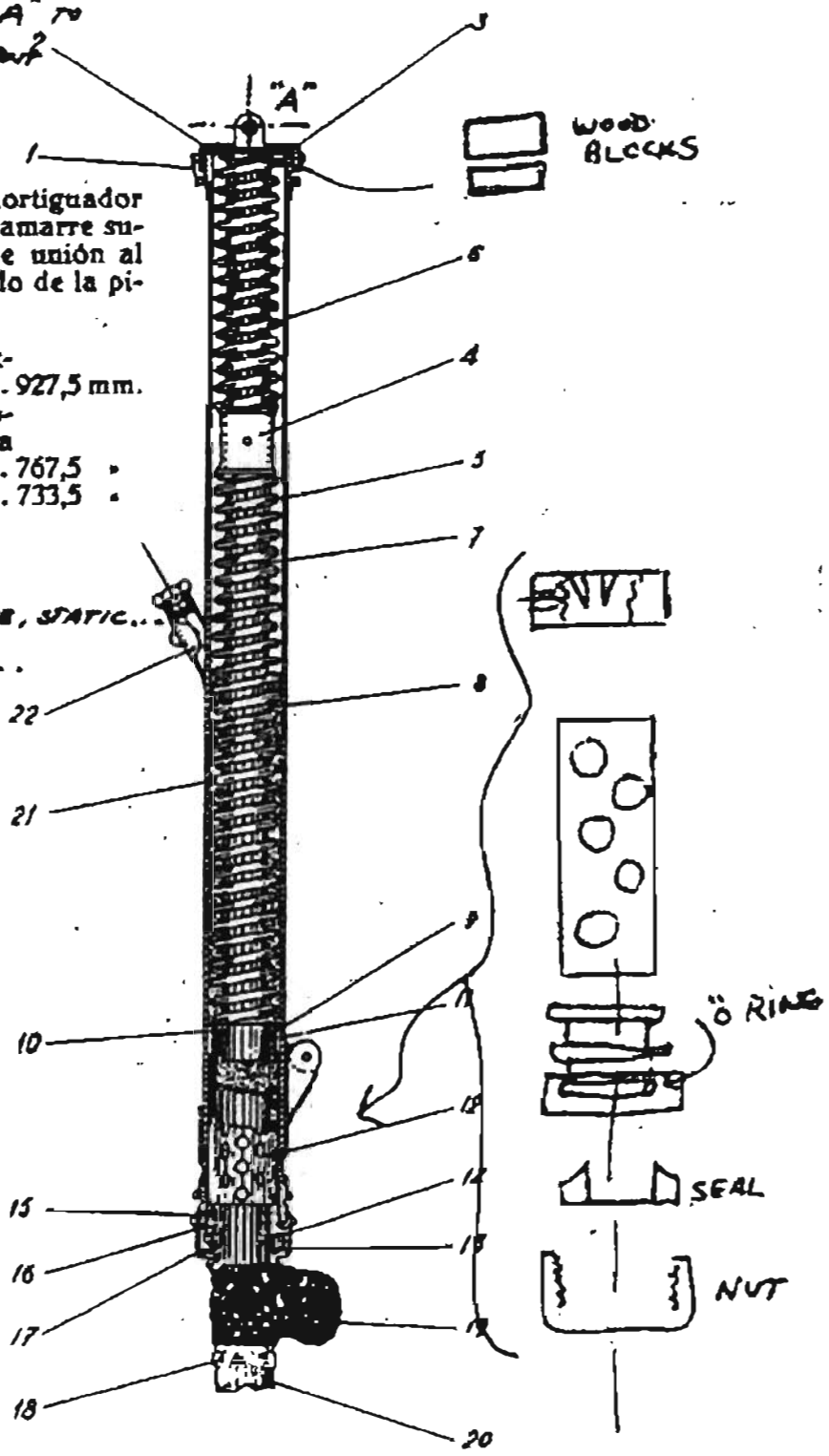
(Tren de aterrizaje)

STRUT LENGTH FROM "A" TO SPREADER BAR ATTACHMENT POINT:

Longitud del amortiguador desde el punto de amarre superior al punto de unión al tubo que va al nudo de la pirámide central:

Completamente extendido ..... 927,5 mm.
Con el avión en posición estática (a plena carga) .... 767,5 "
A tope ..... 733,5 "

FULL EXTENSION - - -
FULLY LOADED AIRPLANE, STATIC...
FULLY COMPRESSED - - -



MONTAJE RUEDA DE COLA

TAIL WHEEL ASSEMBLY

C.A.S.A. 1.131-E

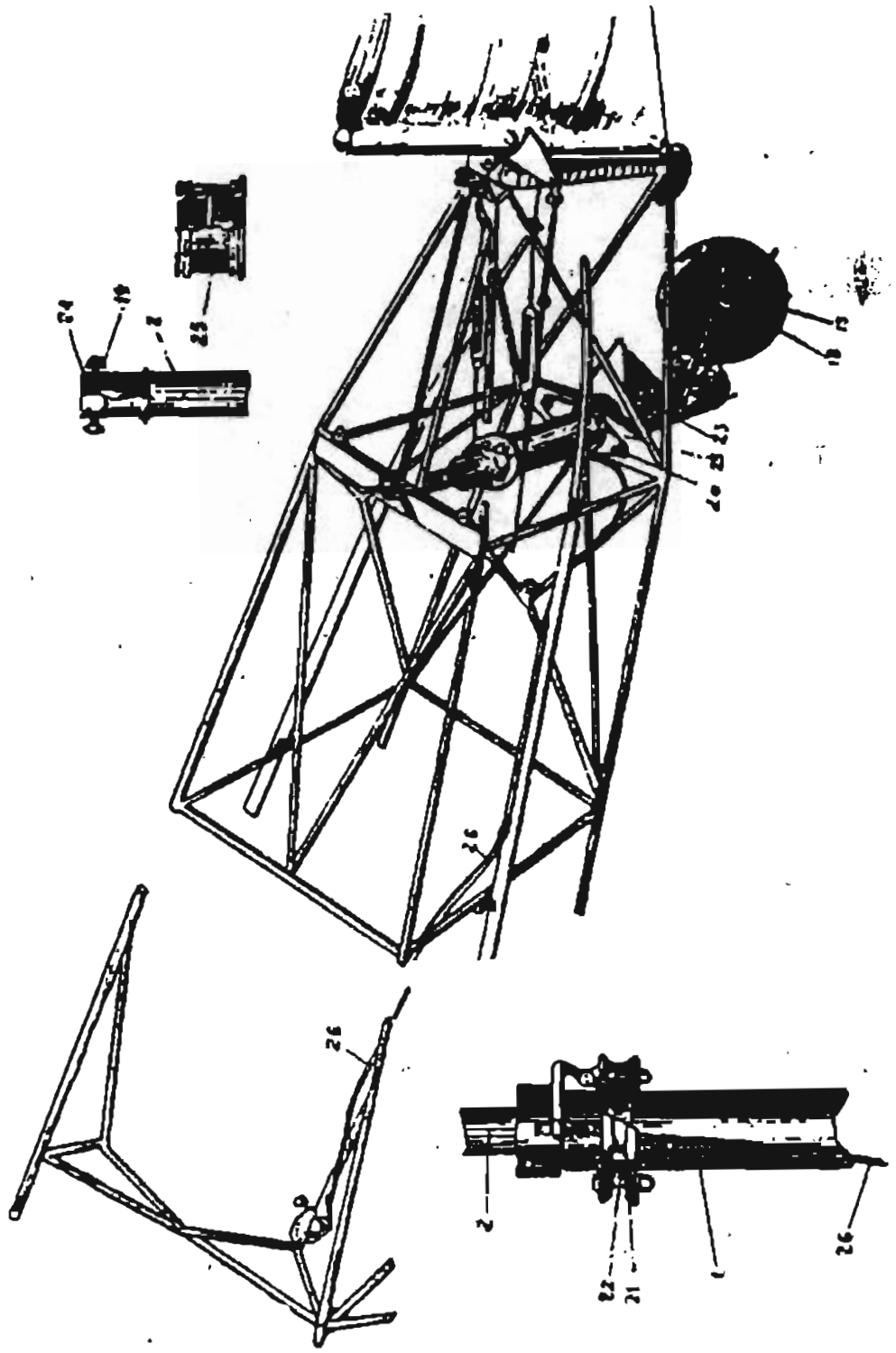


Figura núm. 6

RUEDA DE COLA

TAIL WHEEL

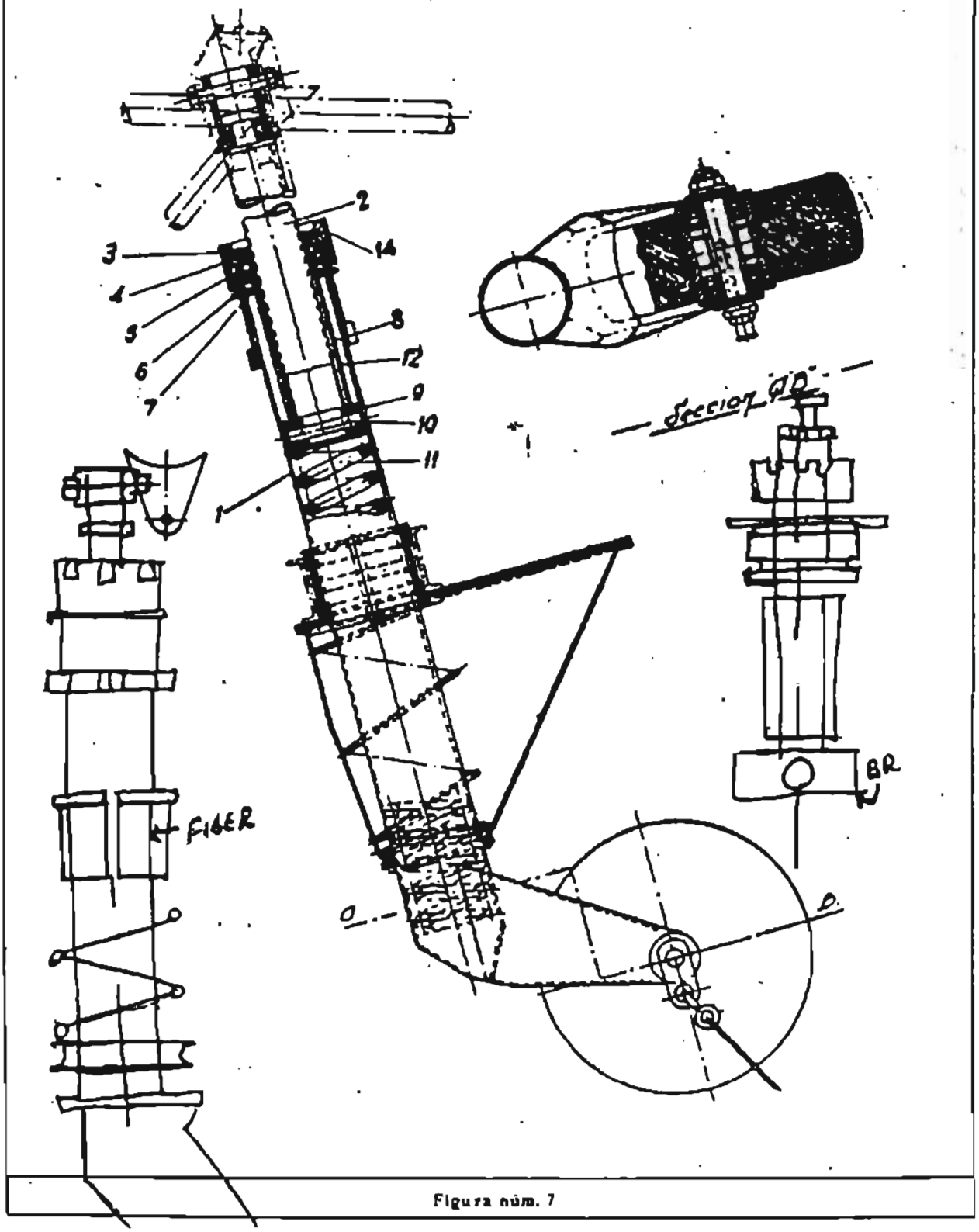
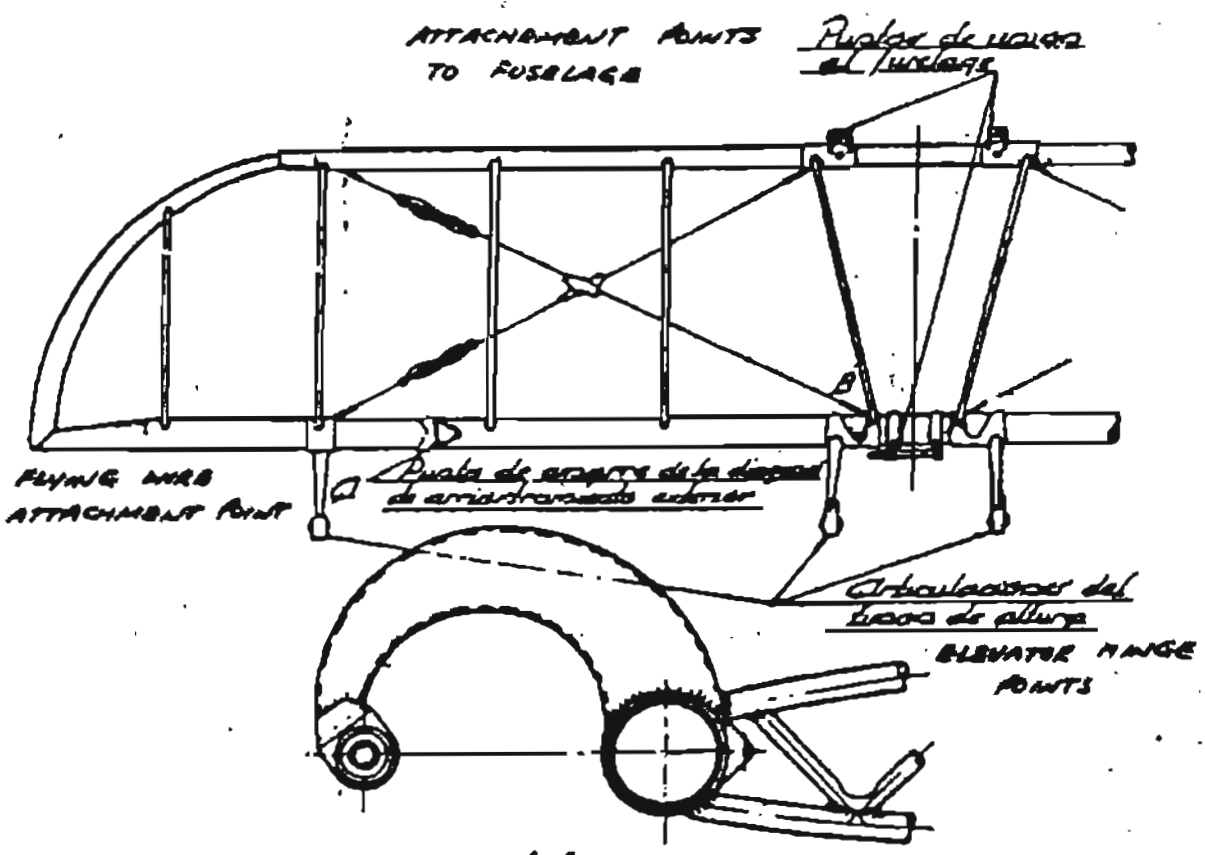


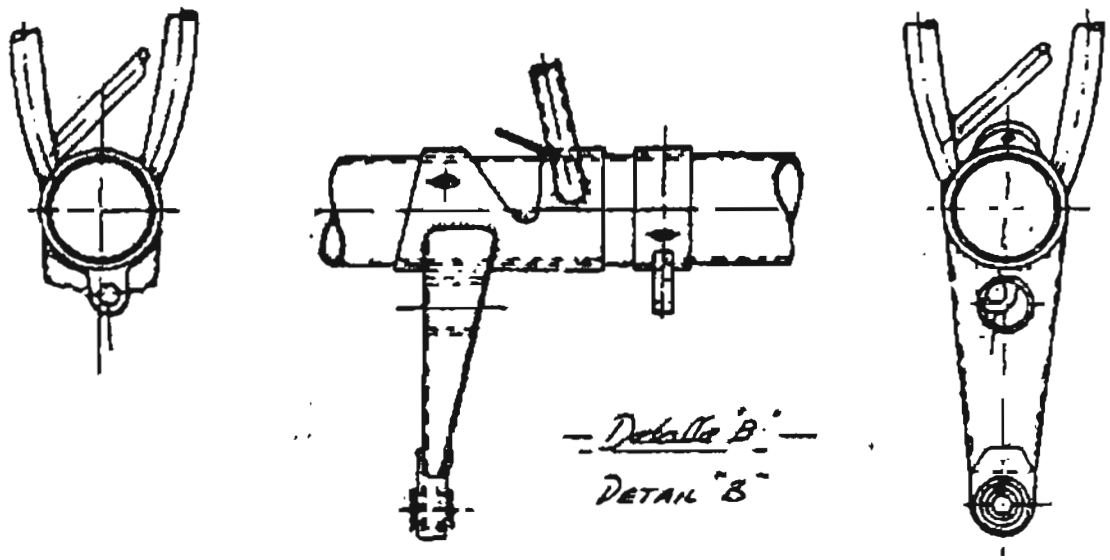
Figura núm. 7

PLANO FIJO HORIZONTAL
HORIZONTAL STABILIZER

C.A.S.A. 1.131-E



— Detalle 'C' —
DETAIL "C"

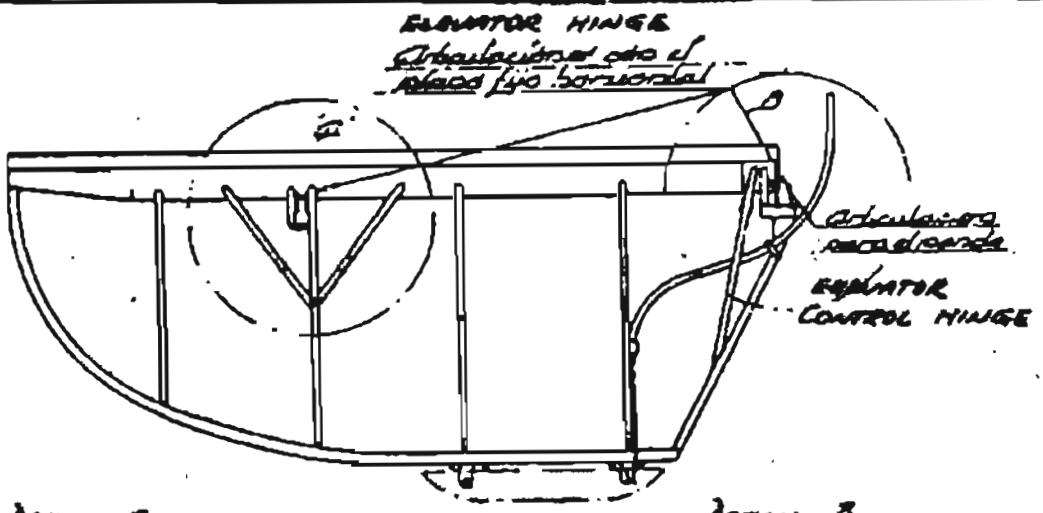


— Detalle 'B' —
DETAIL "B"

C.A.S.A. 1.131-E

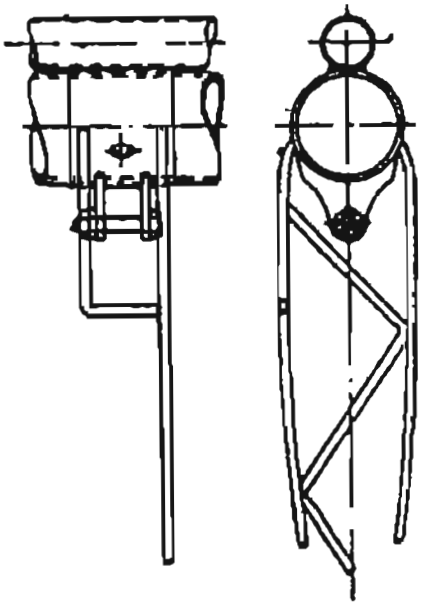
TIMON DE ALTURA IZQUIERDO

LEFT ELEVATOR



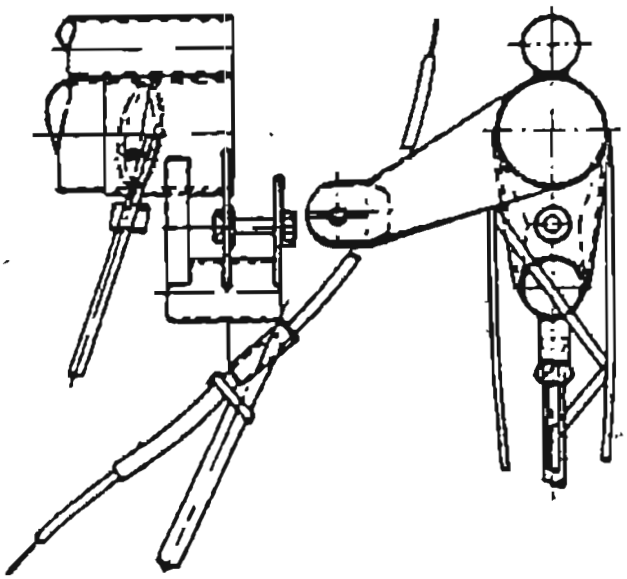
DETAIL C

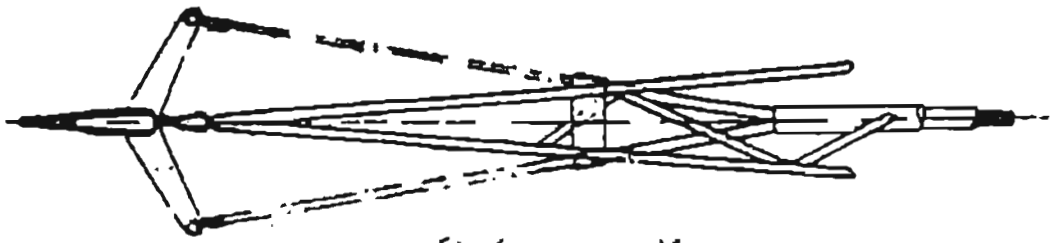
— Detalle C —



DETAIL B

— Detalle B —





— Vista según CD —

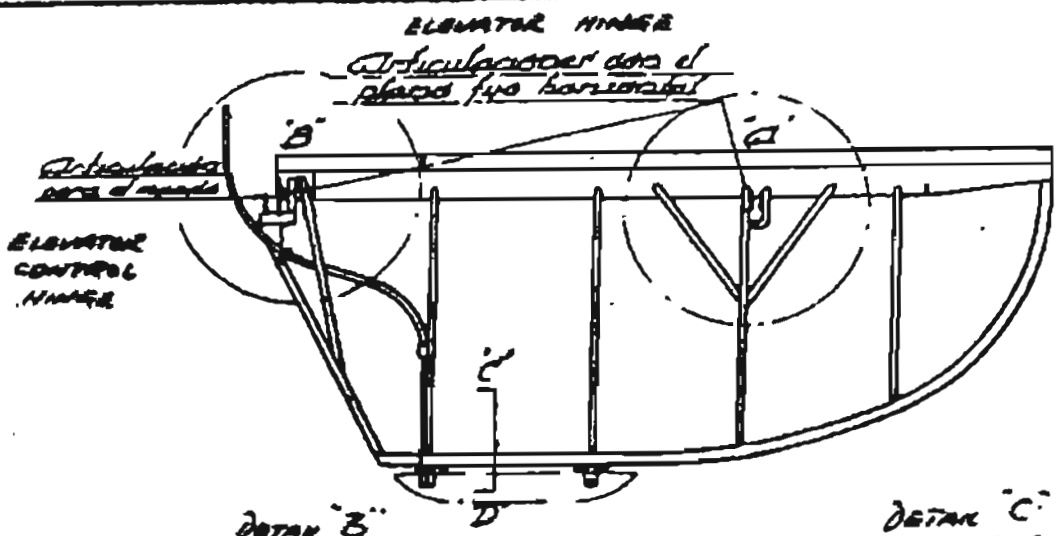
VIEW CD (FIG 10)

Figura núm. 9

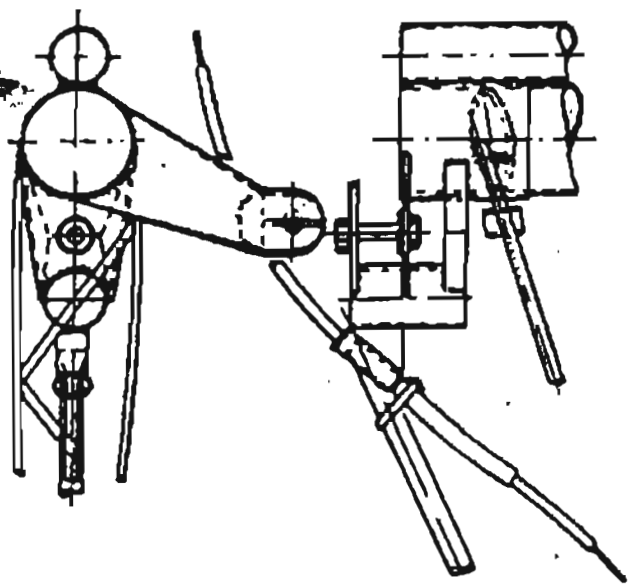
TIMON DE ALTURA DERECHO

RIGHT ELEVATOR

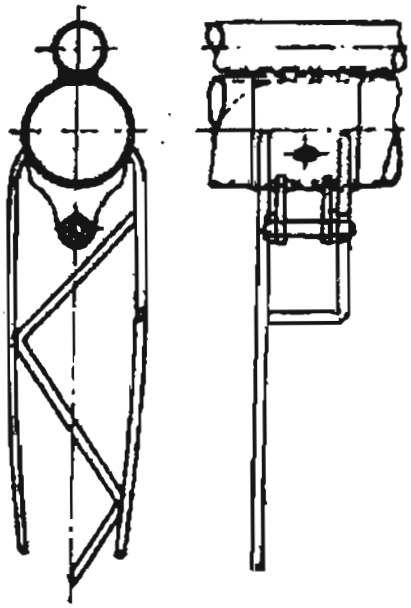
C. A. S. A. 1.131-E

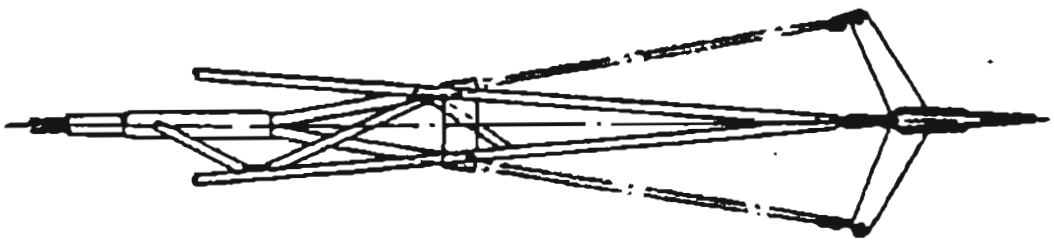


DETAIL "B"
— Detalle "B" —



DETAIL "C"
— Detalle "C" —





— Vista según "D" —
VIEW "D"

Figura núm. 10

C.A.S.A. 1.131-E

PLANO DE DERIVA

VERTICAL FIN

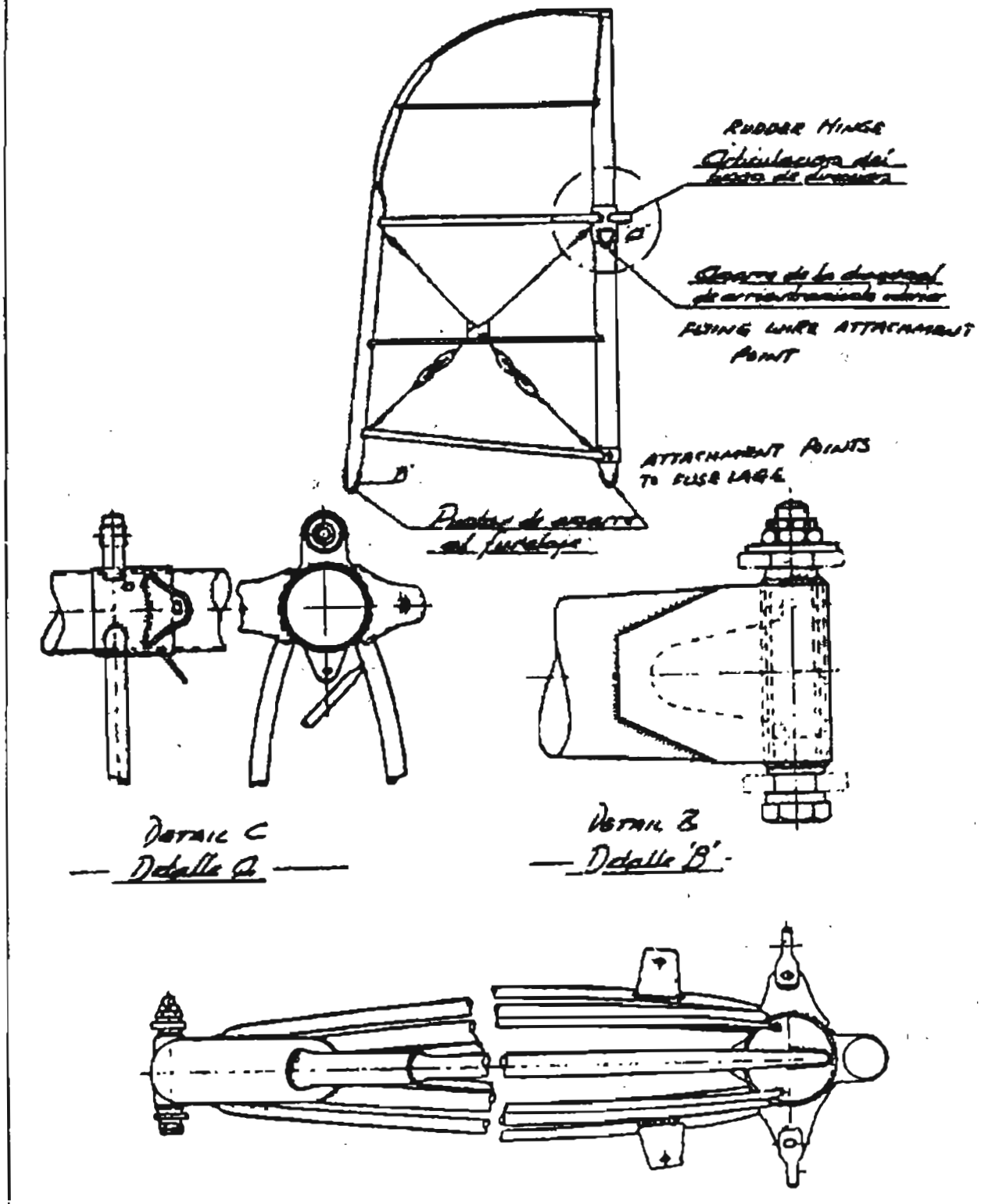
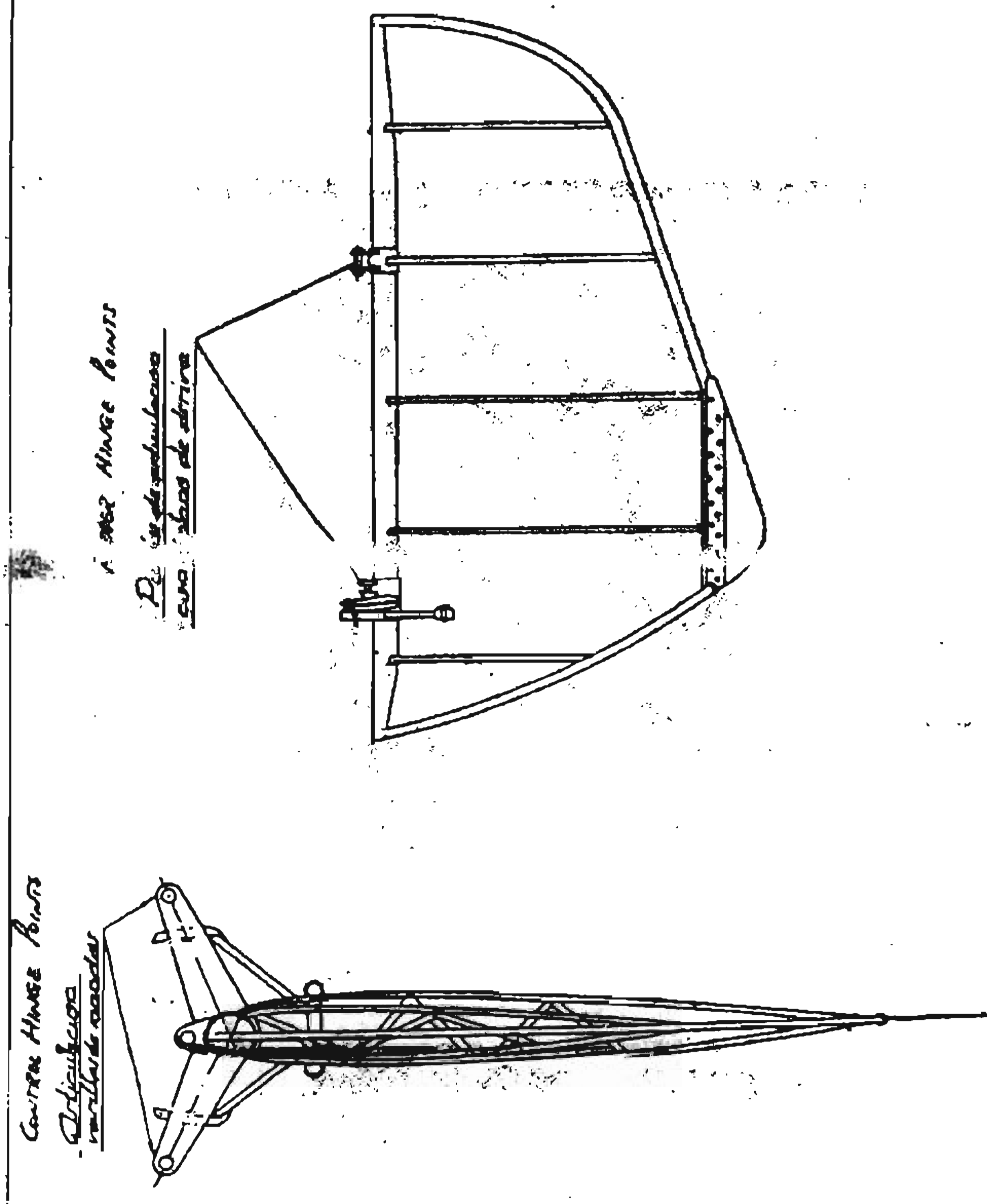


Figura num. 11

TIMON DE DIRECCION

Rudder

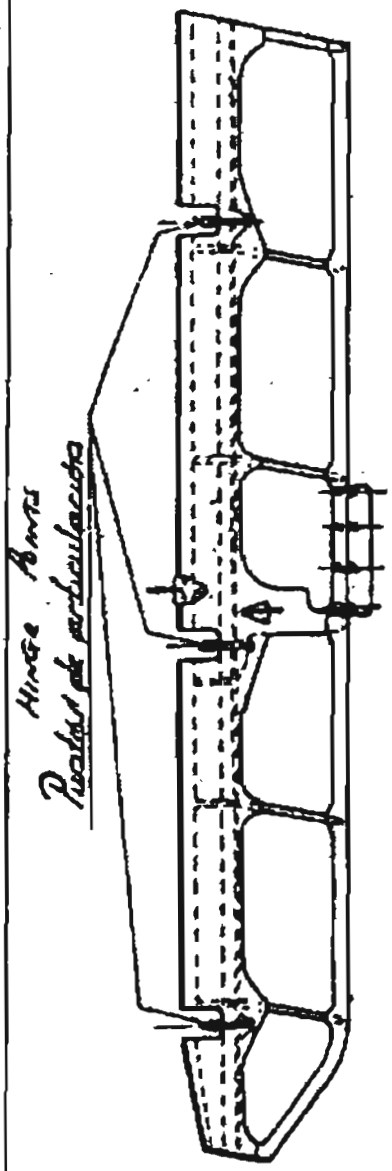
C.A.S.A. 1.131-E



C.A.S.A. 1.131-E

ALERON SUPERIOR IZQUIERDO

LEFT TOP AILERON



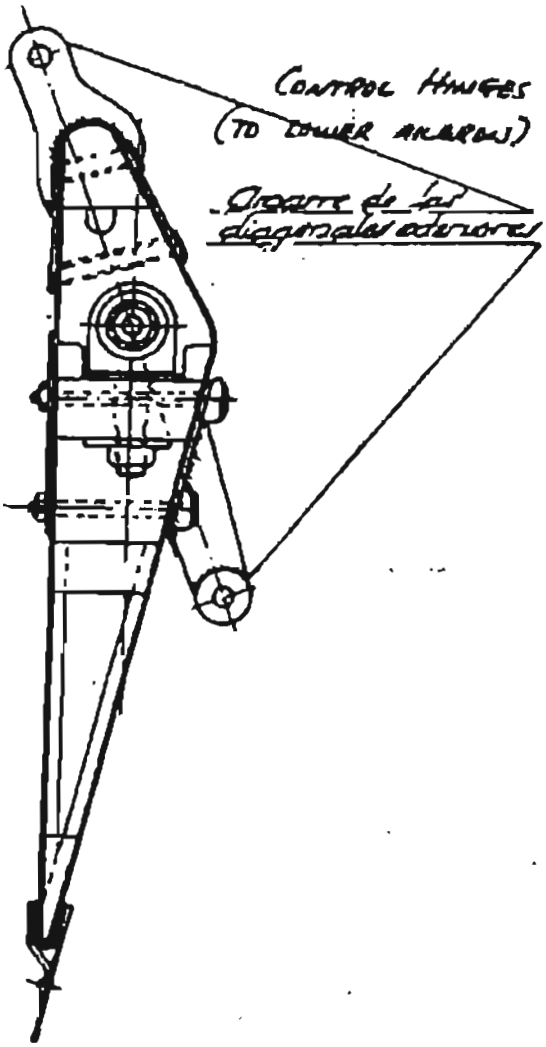
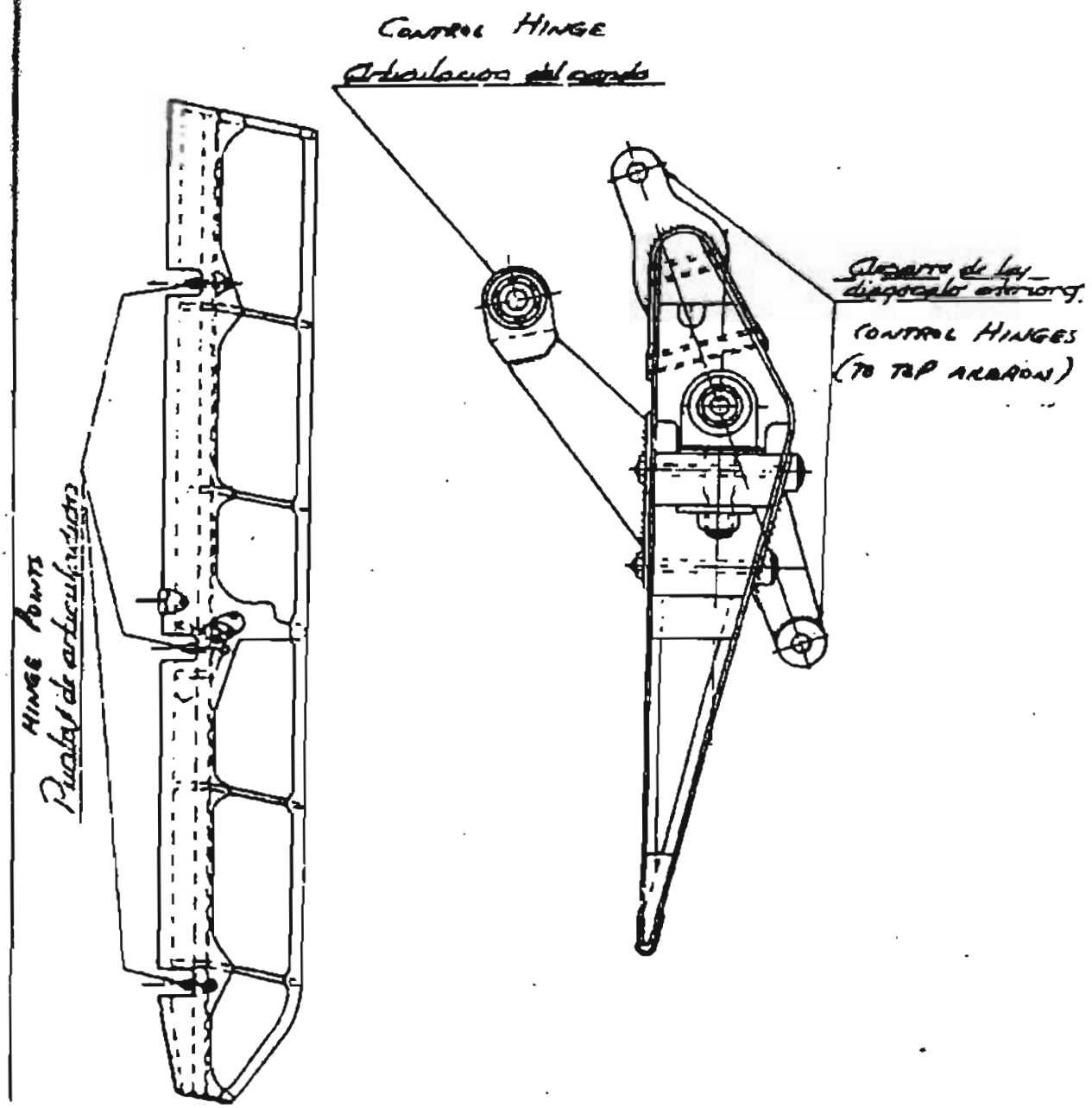


Figura núm. 13

ALERON INFERIOR IZQUIERDO
Lower Left Aileron

C. A. S. A. 1.131-E



PLANO SUPERIOR DERECHO

TOP RIGHT WING PANEL

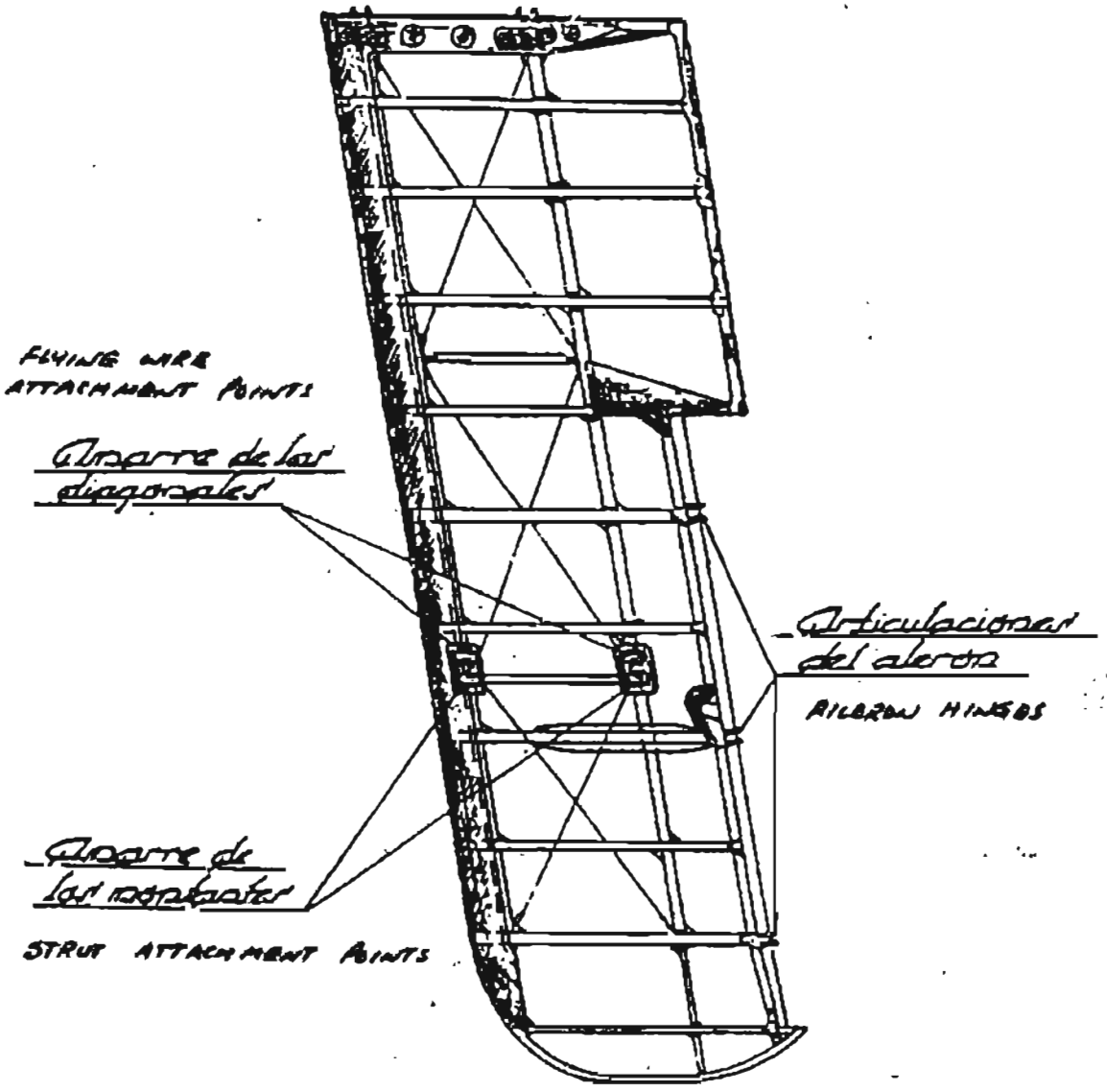
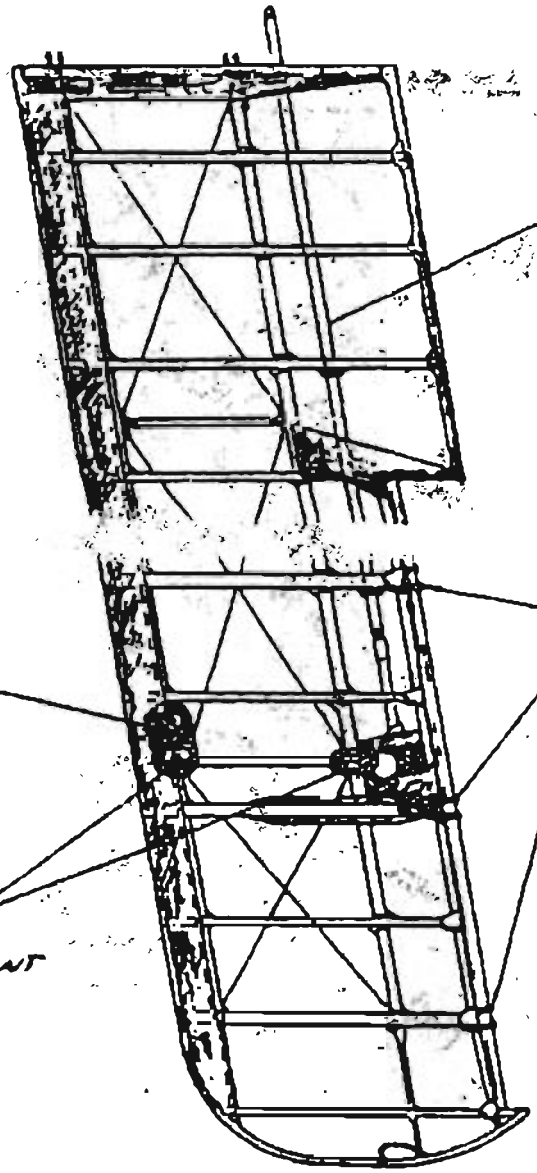


Figura núm. 15

PLANO INFERIOR IZQUIERDO

BOTTOM LEFT WING PANEL

C. A. S. A. 1.131-E



Barra de mando de alerones

AILERON CONTROL TUBE

ATTACHMENT POINTS

Apoyos de los largueros

Articulaciones del aleron

AILERON HINGES

Apoyos de los montantes

STRUT ATTACHMENT POINTS

1.131-E

ESQUEMA DE LA INSTALACION DE MANDO

FLIGHT CONTROL SCHEMATIC

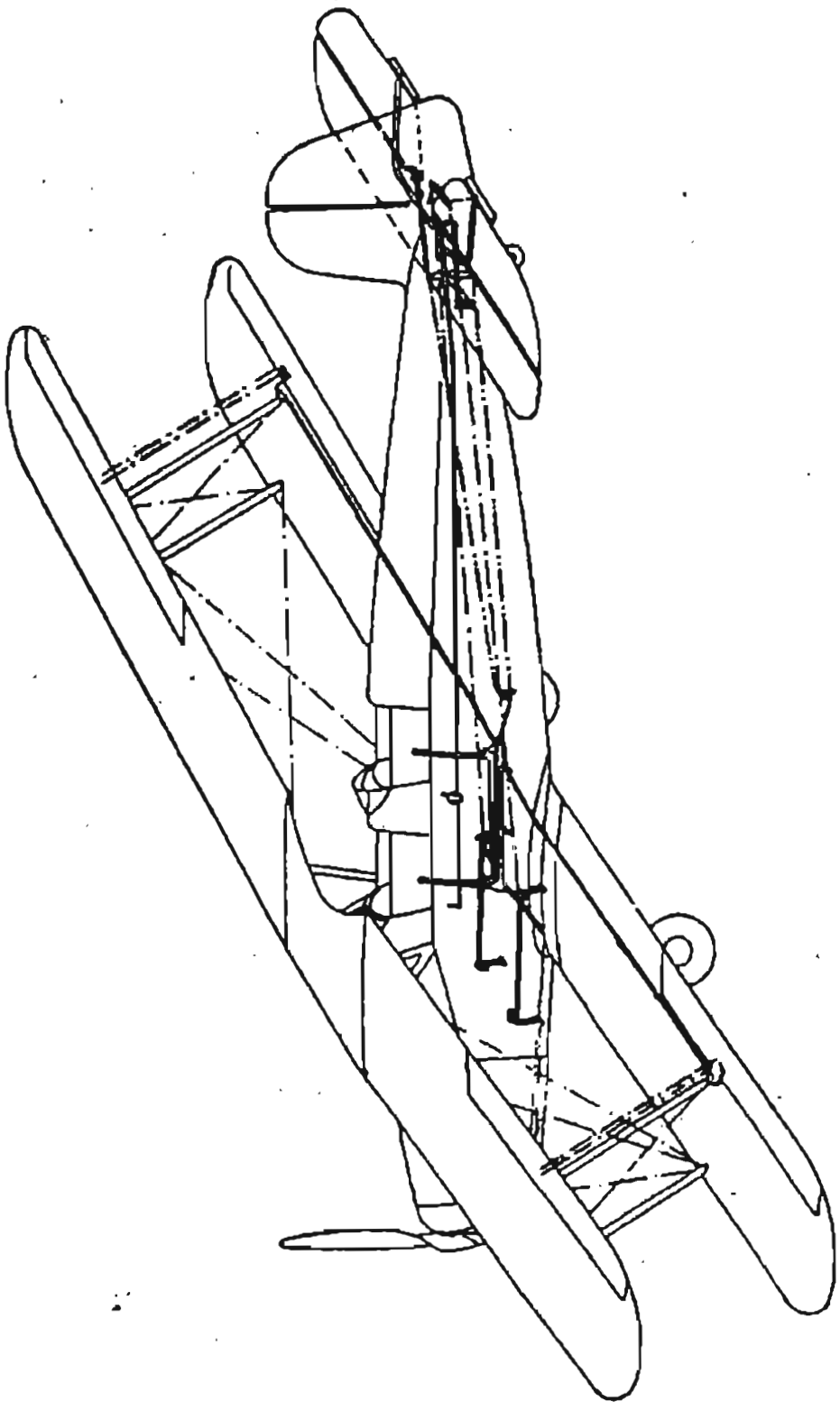
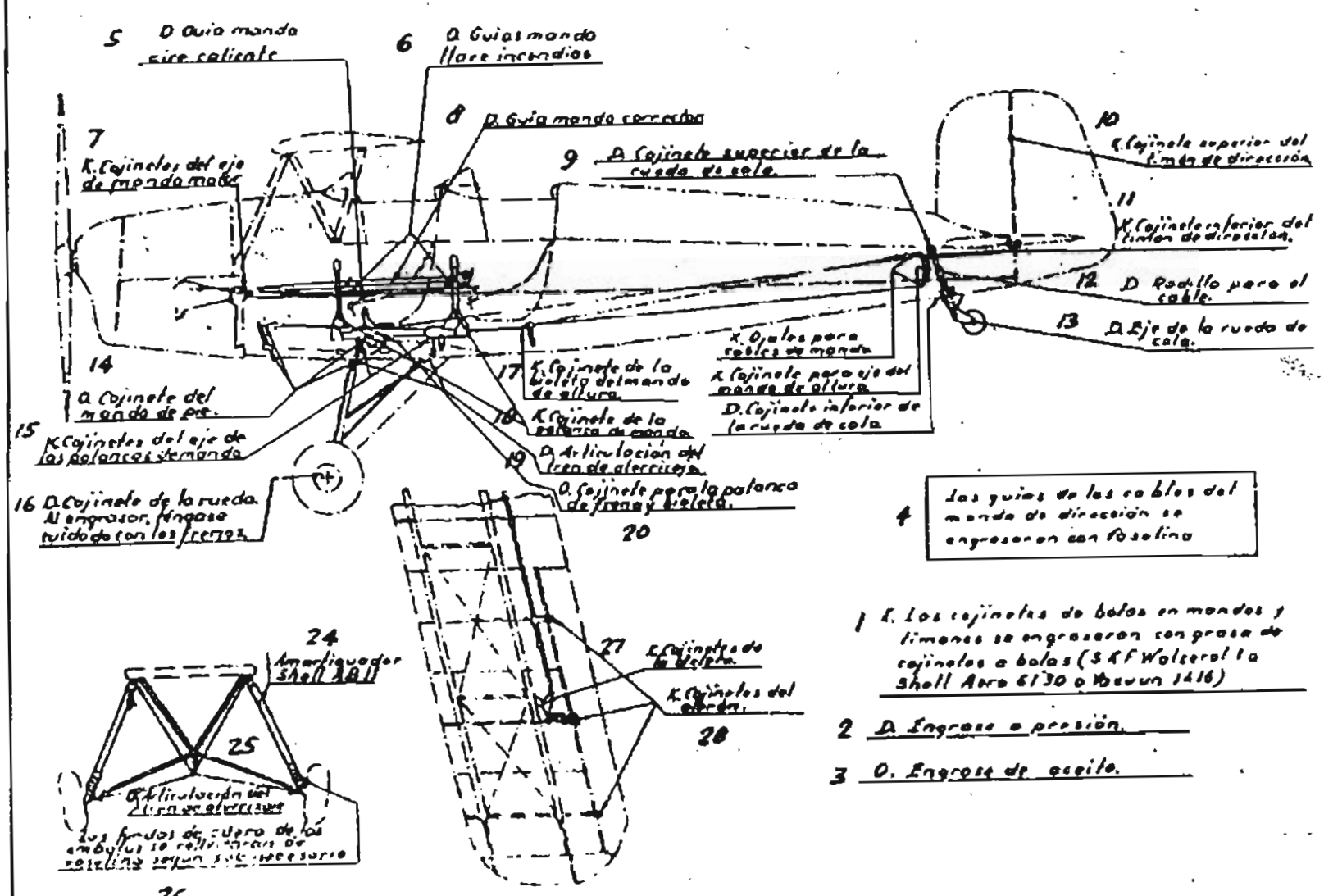


Figura núm. 17



4 Los guias de los cables del mando de direccion se engrasaran con gasolina

1 K. Los cojinetes de bolas en mandos y timones se engrasaran con grasa de cojinetes a bolas (S.K.F. Wolcerol la Shell Aero 6130 o Vacuum 1416)

2 D. Engrase a presión.

3 O. Engrase de aceite.

(SEE TRANSLATION SHEET)

ESQUEMA DE ENGRASE.

LUBRICATION SCHEMATIC

C.A.S.

	ESQUEMA DE ANCLAJE TIE DOWN SCHEMATIC	C.A.S.A. 1.131-E

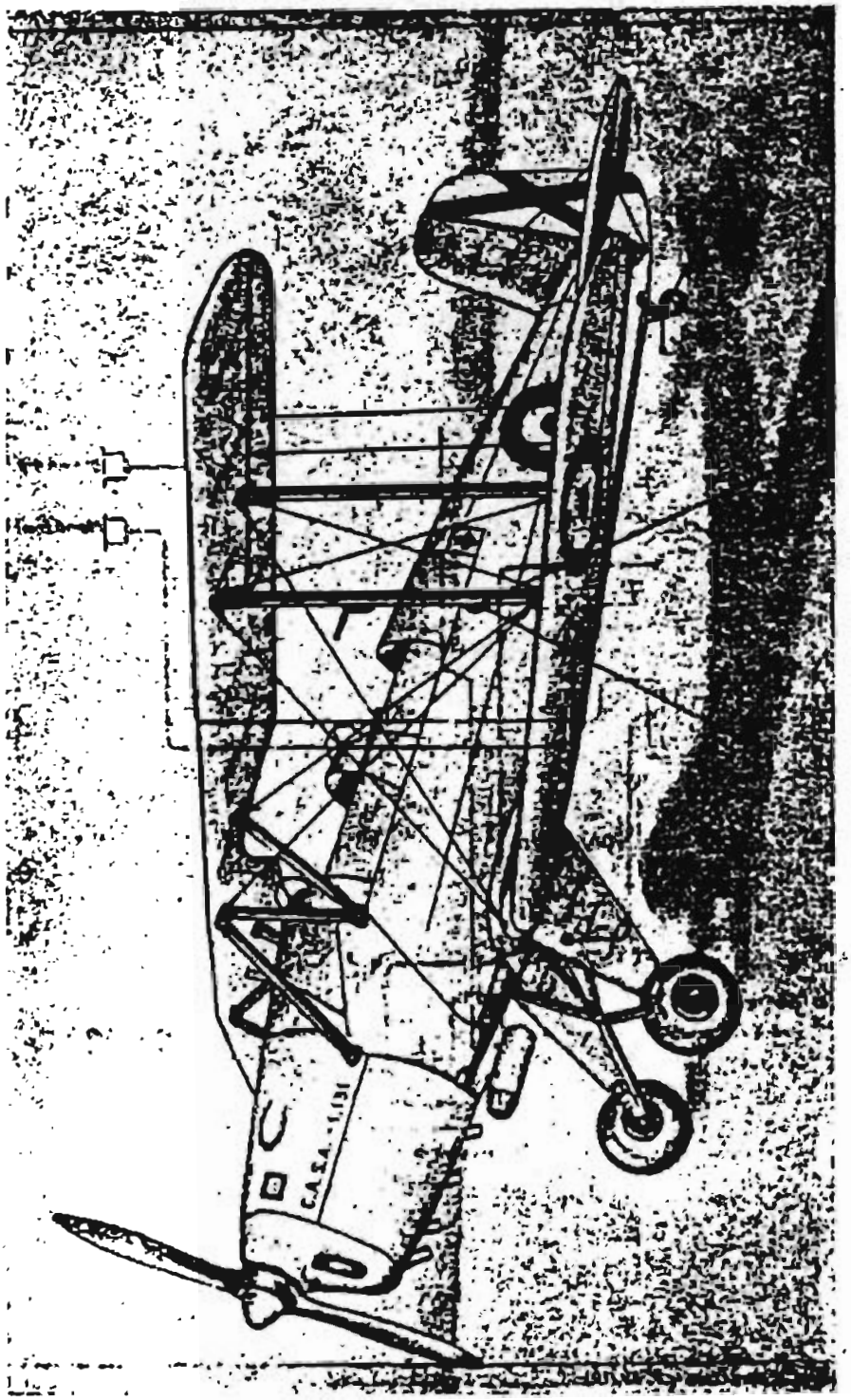


Figura núm. 11

C.A.S.A. 1.131-E

ESQUEMA DE CONDUCCIONES DE LUBRICANTE

LUBRICATION SCHEMATIC

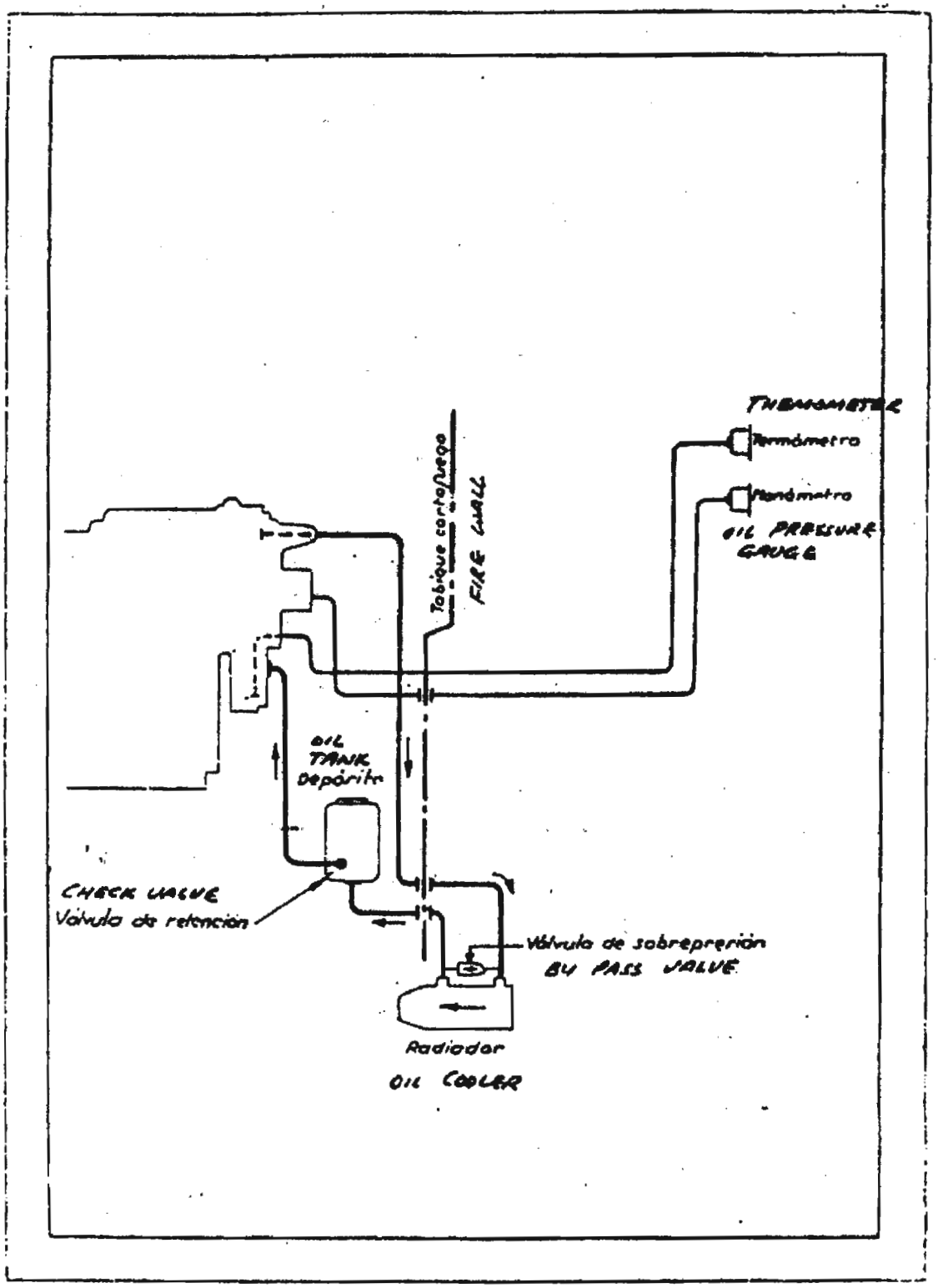


Figura núm 27