CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

SECRET
SECURITY INFORMATION

25X1A

COUNTRY	USSR (Kalinin Oblast)	REPORT NO.	[redacted]
SUBJECT	Development Project at Zavod No 1 in Podberezye	DATE DISTR.	4 June 1953
	25X1C	NO. OF PAGES	24
DATE OF INFO	[redacted]	REQUIREMENT NO.	[redacted]
PLACE ACQUIRED	[redacted] 25X1A	REFERENCES	

25X1A

25X1X

[redacted]

General

1. There were two groups at Zavod No 1, Podberezye, USSR. OKB-1 (Junkers people) was primarily concerned with the design and construction of medium bombers such as the EF-150. The Siebel Group (OKB-2) was employed to design and build high-speed fighters. [redacted] for information regarding the organization and operational procedures of OKB-2.7 In September 1951, all of the projects of the Siebel Group were stopped. The technicians were either sent to Germany (January 1952) or left waiting to go home presumably in June 1952. Except for tool designers, no Siebel engineers worked for OKB-1 between September 1951 and January 1952. The reason for dropping the projects and keeping idle technicians on the payroll was that, the longer the remaining technicians sat around, the less they would remember, particularly since project 478 was only in the latter stages of preliminary design. When and if they returned, they would be of less use to the West. I think it is possible that the remain-

25X1X

25X1A

SECRET

STATE	#x	ARMY	#x	NAVY	#x	AIR	#x	FBI	AEC

(Note: Washington Distribution Indicated By "X"; Field Distribution By "#".)

ing Germans might be allowed to return to East Germany to work in some place like Pirna (southeast of Dresden). Later, when the Soviets have more complete control over the East Zone, the technicians could be gathered up and taken back to the USSR to work on supersonic aircraft such as the 478. I do not thinkthat the Soviets have the technical skills necessary to build such an airplane without help.

2. Concerning the Pirna operation, because of the high salaries offered, it is my opinion that it is primarily a denial program, although I was told that a light airplane was to be built. [redacted] for further details.7 25X1A

The 301

3. This was a glider prototype of the 346. It had a metal fuselage and wooden wing. Work was started in Halle in January 1946 and finished in March of that year.

The 346

4. This was a supersonic research airplane with a crew of one riding in the prone position. I believe that the Americans obtained a partially completed airplane and/or drawings from the factory at Halle in 1945.

5. The 346 was of metal construction except for the plywood cabin. It measured approximately 13.5 m in length, and had a span of approximately 9.5 m. All flight surfaces were swept approximately 45 degrees, measured at the leading edge. /Source originally said that the wing was 16% thick, measured parallel to the line of flight, and 12% perpendicular to the leading edge. This did not check and source later said that he must have had his figures reversed.7 After considering the wing configuration, I believe that the 346 wing was actually 12% thick, with the chord taken parallel to the line of flight. There were no landing flaps or slots. A flow control fence was located on each wing approximately 1 m from the fuselage. Between the fuselage and the fence, the leading edge of the wing was a blunt wedge instead of a radius.

6. The empennage was redsigned as a result of wind tunnel tests run at TsAGI. The new tail was made in a "T" configuration. Sweep angle was 45 degrees (measured at the LE). The thickness was 12% measured in the direction of flight.

7. The 346 had two "Walther Ofen" liquid rocket engines, using "T-Stoff" and "C-Stoff" for fuel. The "T-Stoff" was 80% hydrogen peroxide, although the concentration was sometimes as high as 98%. Except for improvements noted below, the engines were the same as originally designed in Germany. With these improvements, each rocket had a theoretical thrust of two metric tons. I do not know the combustion chamber temperature, but think that the pressure was 30 atmospheres. The following changes in engine components were made:

   a. A new, slightly larger, and faster fuel pump was incorporated. The new pump operated at a speed range of 13,000 up to 18,000 RPM maximum.

   b. The starter-vaporizer (Fallanlasser) was improved to provide a better vaporization of fuel during starting. I have only a general knowledge of the operating principles of the Fallanlasser. Steam, or possibly some other gas, was produced in a spherical tank. This gas, under its own pressure, passed over a solid catalyst, dissolving some of the catalyst, and then passed on to a rotary sleeve valve (Schiebeventil). This valve, when mechanically rotated by the pilot, distributed the catalyst and gas into the fuel. I believe that the catalyst was injected directly and simultaneously into each fuel injector nozzle, but it might have been introduced into each fuel line before reaching the nozzle. I think the vaporizor catalyst was mixed with both the fuel and oxidizer.

   c. German V-2A steel (stainless) was used for all fuel lines.

8. Three flight tests were conducted at Teplistan. On none of the flights were both engines used simultaneously. The 346 was carried up to 9,000-10,000 m by a TU-4 bomber modified for the purpose. During the first flight, the pilot, Dipl Ingr Ziese, did not exceed 10,000 m. Other performance figures are not known to me. On the second flight, Ziese flew 1200 km/hr at 14,000 m. He encountered flutter at approximately 1100 to 1200 km/hr. On the third and last flight, in early September 1951, the plane was released at 10,000 m. The pilot took the plane into a dive to 6500 m and then zoomed up to slow down and steady the plane before starting the rocket. After flutter was encountered (presumably at the same speed as on the second flight), the airplane no longer responded to the controls. The empennage could not be seen from the cockpit, so it was not known where the failure occurred. Ziese bailed out, but broke a leg on landing. Flight test recording instruments were lost when the airplane crashed and, therefore, no performance data were known.

9. The jettisonable cabin section of the 346 was made of double-walled plywood, filled with a metal foil insulation. The nose was made of plexiglass. The cabin was pressurized from air stored in bottles and remained so even after the cabin was jettisoned. The following steps required to escape could be accomplished manually or automatically once started:

   a. The cabin section was separated from the airplane by means of four explosive bolts. The flight control rods were so designed that loads were transmitted across the plane of separation by means of compression blocks only; hence, separation of the control rods was no problem.

   b. The capsule (pressurized cabin) dropped to approximately 3000 m on a 10 m diameter ribbon chute, where the plexiglass nose was jettisoned and the prone position bed ejected automatically if the controls were set for automatic operation. (Ziese actually used this automatic feature.)

   c. After ejection, the pilot used an ordinary parachute for the rest of the descent.

10. I do not believe that any series production of the 346 was being carried out, since it was only a research airplane and, also, the plywood construction was too expensive and the airfoil too thick. The Soviets might use some of the information to build a high speed airplane.

<u>The 446</u>

11. This was a preliminary design project worked on in 1947. It was for a twin turbojet fighter, conventional in design except for a two-element V-shaped empennage.

<u>The 466</u>

12. The 466 was an unpowered research glider made of wood. At first it was designed with two vertical stabilizers, but this was later changed to one. It was similar to the 478, but smaller in size. In my opinion it therefore was not a prototype of the 478. The airfoil was the same as the 478 as near as I can recall. It was built and tested in a wind tunnel at TsAGI but not flown.

<u>The 478</u>

13. [See Paragraph 23 for a detailed description.]

<u>The M-1 and M-100</u>

14. These were pilotless test missiles that the Siebel Group worked on in 1949-50. The drawings were taken away by the Soviets but, to my knowledge, neither was ever built. The M-1 was powered by a solid and the M-100 by a liquid propellent rocket motor.

 [redacted] 25X1A

ACTIVITIES OF OTHER GROUPS

OKB-1

25X1A

15. [redacted] Comment: Activities of the Junkers Group have been previously reported by sources from that organization; hence, the only questions asked were those concerning Source's knowledge of the 150.7 The 150 is a swept-wing, twin-jet, medium bomber with an estimated weight of 50 T. By adding a bomb bay fuel tank, it could also be used for reconnaissance. The wing span and overall length were each about 30 m. The angle of sweep was less than 40°. I estimate the wing thickness at 10%. The wing structure was of unusual design, having a double skin separated by and riveted to a corrugated sheet. Although there were two spars, the sandwich type skin carried most of the load. Loads were carried through the fuselage by means of a center section similar in construction to the outboard wing sections. Each wing was attached to the center section by 80 to 100 screws. /Source was asked if this design would not reduce either the bomb bay or fuselage fuel tank capacity. Source thought not and added that almost the entire wing including the center section consisted of fuel tanks.7 The wing fuel tanks were thin bladder type cells backed by a solidified foam, presumably acetate (Schaumstoff, made from a cellulose material), to provide a smooth surface for supporting the cells.

16. The empennage had the horizontal stabilizer rigidly (not adjustable) mounted on top of the vertical.

17. The 150 had a crew of either 4 or 5 in the forward compartment. /Pilot, bombardier, gunner, and radio man were listed by Source without hesitation, but he was not too sure that there was a co-pilot.7 The gunner had a 2-gun turret that was faired into the aft end of the cockpit canopy. Another man operated a turret in the tail that I think had four guns. I can not recall any forward firing guns except for possibly a flexibly mounted gun in the right side of the windshield.

18. Landing gear was of the bicycle-type with the outrigger gear in pods on the wing tip. These tip pods also contained landing and clearance lights. The aft section of each pod was of wood and may have housed an antenna. Another antenna was probably installed in a streamlined fairing located at the intersection of the horizontal and vertical stabilizers and extending 10 or 12 cm fore and aft of the stabilizers. Still another antenna, probably radar, was located in a plastic fairing under the front part of the fuselage.

19. The engine designation is not known to me; people in the shop called it a "Rolls-Royce Nene". They once dropped an engine by not having it properly balanced on the hoist. This engine was about 1 m in diameter and had an overall length of over 3 m. I believe this length included the tail pipe, but do not recall the tail pipe length. I think it was a centrifugal engine, but the combustion cans were covered.

20. I once worked on the design of the pressurized cabin. /Detailed interrogation disclosed that this comprised no more than work on cabin sealing and minor structural details. He had no knowledge about the source or amount of air supplied. The cabin pressure was about the same as the 478 (paragraph 27.7

V-1 Type Missile

21. A number of missiles similar to the wartime German V-1 "buzz bomb" were built by a section of German and Soviet laborers. No German engineer had a hand in the design or construction. The main difference between this and the original V-1 was that this missile had two Argus pulse jet engines. These were mounted on the ends of V-tail surfaces, each angled 45° above horizontal.

SECRET

Other Production

22. I do not know of any other work at Zavod No 1, but there were shops to which I did not have access.

478 AIRPLANE

General

23. The latest project worked on by the Siebel Group (OKB-2) was a delta-wing intercepter known as the "478". /See pages 13, 14, and 15 for three-view drawings. This airplane was previously reported as "468", but this source states most emphatically that the only number used was "478"./ The project was dropped in September 1951, although the design was not entirely complete and no airframe parts had been made. Landing gear shock struts were the only items that had been tested. As customary, practically no help was received from the Soviets in the design of the "478". As a result, design proposals of alternate configurations were made. One version was what the designers were reasonably sure could be made with the materials and machines available at Zavod No 1 and no help from any outside source.

Performance

24. Speed - Mach 2 at approx 6000 m. Landing speed - 260-280 km/hr.
Service Ceiling - Oxygen and aerodynamic limits unknown to me. No limit on engines except quantity of fuel.
Climb - 2-3 minutes to 10,000 m. Theoretically 90° angle of climb possible, but 80° was considered to be the best or "tactical" angle.
Take-Off - From rocket-propelled cart on tracks. Distance - 400-500 m plus 500 m to stop cart.
Duration of Flight - 30 minutes or less, depending on mission.

(The 478 had a design dry weight of approximately 4 tons. The take-off weight was approximately 7 tons.)

Engines

25. Their designation is not known to me, but fuel tanks were designed for "Petroleum und Salbei" (kerosene and nitric acid). /Page 16 shows a diagram of the tank installation./ The tanks were pressurized at 0.3-0.4 atmospheres to force fuel to the engines. Although I have no knowledge of the engines, pumps would presumably be used to boost the fuel pressure still higher. Tanks and pressure bottles located in the vertical fin were installed to provide a small supply of "T&C Stoff" (methyl alcohol and hydrogen peroxide). The tanks were compartmented to prevent sloshing and rapid cg shift. The tanks were filled from the bottom through fittings in each of the two emergency fuel dumping valves. During filling, caps in the top of the tanks were removed to let out trapped air. There were supposed to be two 2-ton, one 1-ton, and one 3-ton individually controlled rocket motors (all figures approximate).

Landing Gear

26. The landing gear consisted of two tandem main skids that retracted into the fuselage. /Landing angles are shown on page 13./ Retractable wing tip skids were also to be installed under the wing tips. Siebel engineers hoped the outrigger skids would not be necessary except on test and training aircraft. All skids were actuated by hydraulic cylinders. The front main shock strut was a three-chambered telescoping design. I am not sure whether the strut could be serviced after assembly or not. Both front and rear skids pivoted 10°. The design of steering and/or damping of the skids had been

 25X1A

given a low priority and was not complete when the project was dropped, September 1951. I did not work on the landing gear and do not remember any other details.

Cockpit

27. The pilot sat in an upright position and was provided with an upward firing ejection seat. [See page 17.] The seat was fired by a single electrically-ignited powder charge. The trigger was on the seat handgrip [not shown]. Maximum "g" loading during ejection was about 6-8, but the structure was designed for 14 g's. Prior to firing the seat, the canopy was opened and slid back in the normal manner, where the front rollers were held by a catch. The seat could not be fired with the canopy closed, but there was nothing to prevent firing when the pilot's feet were not on the rest.

28. Capsule ejection (like the 346) was not utilized because the German engineers considered the strength of Soviet materials not uniform enough to be relied on for making explosive bolts. Tests in a tensile testing machine supported this belief.

29. The cabin was pressurized from compressed air and oxygen stored in bottles, some at 200 atm and others at 100. (No compressors were available.) I do not know what the cabin pressure-altitude schedule was, but remember that the pressure to be used in the static test was 0.9 atm gage. Only in an emergency due to loss of cabin pressure was an oxygen mask necessary. Due to lack of equipment, the problem of cooling the cockpit was not tackled, although the engineers were aware of the need. Calculated maximum temperature of the windshield was 120°C. (The 346 cabin air temperature got up to 45°C during flight tests.)

30. Cabin sealing was accomplished by means of rubber tubes that could be expanded with air pressure. [Details of the canopy attachment and seal can be seen on page 18.] Leakage was calculated to be 10 liters/min measured at sea level pressure. (The 346 V-3 lost only 6 liters/min during a test.) With the seals deflated, the canopy was unlocked by pulling on a lever. This lever was connected through a mechanical linkage to channel-shaped rail on each side of the cockpit. Pulling the lever further back raised the tracks and consequently the canopy. The canopy could then be slid back. There was a groove in each side of the fuselage for the aft rollers to ride.

31. The usual flight instruments were provided but, due to the 478's high performance, many had to be specially designed. I do not remember the exact layout of the instrument panel.

32. Strain gages and an oscillograph were to be used to measure forces required to actuate the control surfaces. A boom in the nose contained airspeed, pitch, and yaw indicators. [Source was asked if he didn't think that the boom would interfere with the operation of the radar set.] I do not know if the boom can be "insulated" or not. I think it might have to be moved to the wing for the production version of the 478 .

33. Regarding the possibility of using a photo recorder for tests, I know that one had been used in the 346 and presume that it would also be used in the 478 if they could find room to install it.

Flight Control System

34. The 478 used a hydraulic servomechanism for all three axes. It was a "pure power" type system but with built-in "feel" only on the pitch and roll axes. Each servo valve and actuating cylinder was as close together and as close to their respective flight surface as possible. They were not

made in one unit, due to the fact that forgings were not readily available and the housings would have to be machined from solid stock. The thinness of the flight surfaces made installation of the servo units extremely difficult; hence, two design proposals were made. If possible, one servo unit would be used per control surface; if not, two would be installed. The schematic sketch of the rudder system /page 19/ shows both proposals. Although only one design is shown on the diagram of the elevator and wing systems /page 20/, the two proposals shown on the sketch of the rudder system /page 19/ also apply. Power was to be supplied by an electrically driven hydraulic pump at a pressure unknown to me. Neither the pump nor hydraulic lines are shown on the sketches.

35. Two proposals were also made concerning the linkage between the actuating cylinders and the flight surfaces /as shown on page 21/. The bottom view, proposal A, with the weight damper, was planned for use on the first airplane. This decision was based on calculations and wind tunnel tests. /See paragraph 46 b.1./ Proposal B was designed to eliminate backlash by using prestressed tension rods instead of the one push-pull rod of the other design.

36. The possibility of combining the elevator and aileron systems was also discussed, but this would have to wait until the airplane was flown and its characteristics determined.

37. Push-pull rods of Duralumin connected the servo valves with the controls in the cockpit. Rubber bellows were used for cabin air seals, with one end of each bellows clamped to the rod and the other attached to the pressure bulkhead.

38. In the event of failure or damage to the mechanical linkage between the rudder or aileron servo valves and the stick in the cockpit, an emergency system was provided /as shown on page 20/. There was no emergency system provided for the rudder. This emergency system was designed simply to actuate the normal servo valves hydraulically instead of mechanically. A high-pressure air bottle was used to force oil out of the emergency oil reservoir to the proper servo valve as directed by the opening or closing of solenoid valves. Two sliding on-off-on switches in the cockpit were used to control these solenoid valves. The switches were originally located on the top of the stick, but were later removed. I do not know where they were located in the final configuration.

39. For flight controls the "478" was provided with stick and rudders. /A sketch of the stick grip is shown on page 22/. The grip had four buttons, two for radio and two for guns or rockets. It was to be decided after flight test which would be on top and which would be on the front of the grip. (This grip was also to be used on the Junkers 150 bomber.)

Electrical System

40. /Source sketched the location of the electrical units in dotted lines on page 20/. I know that there was to be a battery and an inverter for instruments, but do not know whether any means of charging the battery in flight were to be provided or not.

Air Foils

41. /The general configuration of the wing can be seen on the diagrams on pages 13-14./ I do not remember the exact coordinates of the airfoil, but recall that it had a maximum thickness of 5% at approximately 37% chord (measured parallel to the line of flight). The airfoil was symmetrical, had a radius at the nose, followed by a parabola to approximately 63%, and from there to the trailing edge was straight. The root chord radius (at the airplane centerline) was approximately 56 mm. The minimum radius (at the tip) was about 6-8 mm. The same airfoil was used for the wings and rudder at all stations.

Armament

42. There were two cannons in each wing, and two on each side of the fuselage. We Germans were not told the type and caliber of the guns to be used. The gun ports in the wings were covered with doors which slid aside whenever the trigger was depressed. One preliminary design proposal had four 60-80 mm rockets in each side of the fuselage instead of cannons. An optical sight was included in the original plans, but it interfered with ejection of the seat. It had not been decided whether to build the sight so that it could be swung out of the way or remove the sight and rely on radar entirely.

43. No details of the radar are known to me. The design engineers more or less guessed at the space requirements, using wartime German sets and pictures in foreign magazines as a guide.

44. Armor plate was provided as shown on the sketch [page 17]. The flat piece of armor glass was mounted just inside the windshield. The windshield was made of curved glass, since the calculated temperatures (up to 120°C) were too high for plexiglass and the Siebel designers did not think that they could make curved bullet-proof glass.

Dive Brakes

45. Hydraulically actuated dive brakes of 0.5M^2 area each were provided. [See diagrams on 13 for their location and page 23 for a detailed sketch of the installation.]

WIND TUNNEL MODELS

46. In conjunction with the design of the 466 and the 478 airplanes, three different wind tunnel models were built as described below:

a. Subsonic Model. A steel and wood model of the 466 was built to a scale of 1:5.346. This scale was designated by the Soviets and no reason was given for the odd ratio. The model was tested in a low speed tunnel at TsAGI but no German witnessed the tests and results were simply reported as "satisfactory". The first version of this model had two rudders [shown in the diagrams on pages 13, 14, and 15].

b. Vibration Research Model. During the final stages of the 466 and the beginning of the 478 designs, the designers were worried about the vibrations calculations. No high-speed wind tunnel or flight test data had been or were likely to be made available by the Soviets to support the German calculations. The German engineers had to consider the following possibilities:

(1) That the 478 would not be built at Zavod No 1. In this case, the engineers would like to have some data for their own information.

(2) That the airplane would be built at Zavod No 1 and be ready for flight before vibration tests could be conducted and necessary changes incorporated. In this case, any advance information would be of help in design work.

The only choice seemed to be to try to duplicate as nearly as possible the 478 structure and aerodynamics in a wind tunnel model. A 1:20 scale model was made to be tested in the small tunnel at Podberezye. The model was to be mounted in the floor of the tunnel like a half-span model. At the time the project was started, the wing structure of the 478 was not definitely determined; hence, the model consisted of the rudder and fuselage. The fuselage was made of solid wood supported by bearings at the longitudinal centerline so that it could roll but not pitch or yaw. The fuselage centerline lay in the inner surface of the tunnel in the same direction as the airflow. The rudder structure lay in the airstream and, on the opposite side of the fuselage, was balanced (approximately) by a copper weight. Springs were used to oppose rolling forces. Electro-magnets using the copper weight as an armature dampened the oscillations. Various spring rates and damping forces were used to obtain different frequencies and amplitudes.

The rudder itself was made of wood, cork, and rubber membrane. A sketch /see page 24/ shows a typical rib, located approximately halfway between the fuselage centerline and the rudder tip. The wooden center piece was tapered in both dimensions of the cross section to simulate deflection calculations and tests were made on each part as well as the assembly. The cork formers were cut out of champagne corks (natural cork stock was unavailable) and glued onto the wood center piece. A space was left between each cork block to allow the rib to flex. The leading and trailing edges of the rudder were constructed in a similar manner. At the spar and rib intersections, various attachment methods were employed, depending on the degree of rigidity required. For the leading and trailing edges and the front spar, a gusset of veneer wood was used as shown on the sketch. The other two spars, being less rigid in the airplane, were joined to the ribs /as shown on page 16/. In each of these joints, the actual connection was a piece of wire knotted on either side of the spar and again (after assembly) on the outer sides of the rib splice. Small pieces of lead were used to simulate the weight of structural parts, as well as pieces of equipment.

A thin membrane of rubber was stretched over the entire rudder structure. Again the normal supply channels were unable to provide the required material, so it was necessary to fall back on the local economy. When I made the third large purchase, the druggist got suspicious and took my name and address. The splicing together of the individual pieces to make one rubber sheet also presented no small problem. A method was developed to prestretch and at the same time glue the seams. When stretched over the structure, the seams had approximately the same tension as a single thickness of rubber. The completed rudder, then, had a smooth profile in a chordwise direction but not spanwise, since no filler was used between the ribs. In actual operations, reduced pressures resulting from air flow over the model supported the membrane between the ribs so that a reasonably smooth surface was maintained. Between approximately 15% and 35% chord, the membrane sagged below the rib contour. Between 35% and the rudder hinge line it ballooned out. I remember this because the engineers were somewhat surprised that the membrane did not balloon out more than it did between the 15% and 35% stations.

The fin was attached to the fuselage by means of the two simulated main spars only. There was actually an airspace between the fin and fuselage to allow the fin to flex. The completed rudder weighed 13 grams plus a little over 20 grams of lead weights.

Flat steel springs were used for rudder hinges to simulate control stiffness; models were tested both with and without vibration damper weights on the rudder. Weights were simulated by brass balls threaded onto steel wire supports /as shown on page 24/.

The model was tested in the wind tunnel at Podberezhe. Critical vibration was encountered at approximately 1100 km/hr. Other less critical vibration speeds occurred at lower and also at slightly higher air speeds, but I have forgotten the exact velocities.

The small wind tunnel used in these tests was powered by a JU 004 engine. The working section was mounted in a duct leading to the engine air intake. I think the tunnel was of the recirculating type. I do not know what the maximum velocity of the tunnel was, but it could be operated continuously at transonic and slightly supersonic speeds. I witnessed some tests in this tunnel.

c. Supersonic Model. A 1:20 solid steel model of the 478 was also made for supersonic tests in wind tunnel at TsAGI. No German saw these tests, but the results were reported by the Soviets to be satisfactory. The model had elevators and ailerons that could be removed and replaced by others to simulate up deflections of 10 and 20 degrees and down deflections of 5, 10, and 25 degrees. The rudder had only one position of 0 degrees deflection.

MATERIALS

47. My information about Soviet materials was gotten from the materials manuals furnished by the Soviets and from hearsay knowledge of the Junkers Group's experience with the Soviet materials. The only Siebel airplane built used German materials. I did not have access to materials reports. The only tests run at Podberezye were to determine whether the materials received met their specifications and not to determine fatigue-resistant qualities.

Steel

48. In general, the Soviet steels were harder to work than the German. Warping due to stress relieving by machining was the major problem. I heard of boron being used as an element in steel alloys, but do not know if the Soviets were using it. I wish to describe the following steels:

a. 30KhGSA (30XГCA): This was the most commonly used aircraft structural steel. In the 478, the main wing spars were machined from this material. A canted fuselage former was also made of 30KhGSA. This particular former supported the wing and rudder aft main spars, the engines, the aft landing skid, and the dive brakes. Considering the loads, this does not appear to be an unusual application of steel like that seen in the MIG-15 spars.

As received, 30KhGSA had a yield strength of approximately 70 kg/mm^2 (100,000 PSI). It could be hardened to 150 kg/mm^2. At 110 it was tough, but not brittle, and could be drilled without too much difficulty.

b. 25 KhGSA (25XГCA): This steel was received with a strength of 80 to 100 kg/mm^2. It could be heat-treated to about the same degree as 30 KhGSA. Unlike the other steel, it was extremely difficult to weld and welded joints were not considered reliable.

c. A20, S20 (C20), S45 (C45): These were low-strength steels used for making simple non-critical parts. S45 was often used for making low-strength bolts and screws.

Aluminum

49. Mill tolerances were somewhat greater than with German aluminum but were acceptable. I recall the following kinds of aluminum.

a. D16T (Д16T): This was a room temperature age hardening aluminum used for aircraft structures. In the full hard condition, it had an ultimate tensile strength of approximately 35 to 38 kg/mm^2. It was not too difficult to work, but required larger bend radii than German materials of the same strength. For example, 2 mm sheet could be bent cold with a minimum bend radius of 4 mm.

Approved For Release 2004/02/10 : CIA-RDP80-00810A000900710009-5

b. V95 (B95): This was a new material first listed in the manual in early 1950. It had to be hardened at elevated temperatures. Fully hard, it had an ultimate tensile strength listed at 52 kg/mm^2 but the German engineers used 42 for design calculations since they were not familiar with it. This aluminum was brittle when hard and had a tendency to crack. It was extremely difficult to bend a part made of this material to take care of slight misalignments encountered during assembly. The material was not difficult to drill, however. The EF-150 was made of this material, and judging from the experience of the Junkers Group, there was no shortage.

Magnesium

50. This material was not intended to be used on the 478 with the possible exception of the control stick grip. Various parts of the EF-150, such as various housings and brackets of the servomechanism system, used magnesium, however.

Flexiglass

51. That received prior to 1950 was somewhat yellowish in color. The dimensional tolerances were all right, but could not be obtained in sheets larger than 60 cm per side. Plexiglass received later was quite good in all respects.

Rubber

52. The surface of the tubing used for cabin seals was very rough. It was flexible down to -35° C but its condition at lower temperatures is unknown to me. Extruded rubber shapes were good, but I do not know if they were Soviet or not.

Wood

53. Good plywood for aircraft was very difficult to obtain.

[redacted] Comments: Although Source did not have an engineering degree, he could be adequately described by the often-used phrase "self-made man". He had gone to night school to study aircraft design and stress analysis while working at the Siebel Plant in Halle, Germany. He had an intense interest in engineering and mechanics and several times said that the only good thing about the five years spent in the USSR was that he was permitted to work in aircraft engineering. His interests and natural curiosity probably account for his extensive knowledge of the projects at Zavod No 1 in spite of the tight security imposed by the Soviets. At times, the amount of detail he gave seemed too good to be true, but he gave logical explanations as to why he believed something was true, probably true, or only a guess. He was quick to admit that he did not know something, but was willing to make sketches and try to figure out how it could have been. In technical matters outside of his own line of work, such as electronics or engines, he possessed no more than the general knowledge to be expected of an aircraft structural designer. He had absolutely no use for the Soviet system and was extremely, and, perhaps overly, critical of Soviet technical capabilities.7

Diagrams

Page 13 - Side view of 478 Interceptor

Page 14 - Top view of 478 Interceptor

Page 15 - Front view of 478 Interceptor

Page 16 - Diagram of Tank Installation of 478

Page 17 - Details of 478 Cockpit (Showing Ejection Seat)

Page 18 - Details of Canopy Seal on 478 (and attachment)

Page 19 - Diagram of Rudder Control of 478

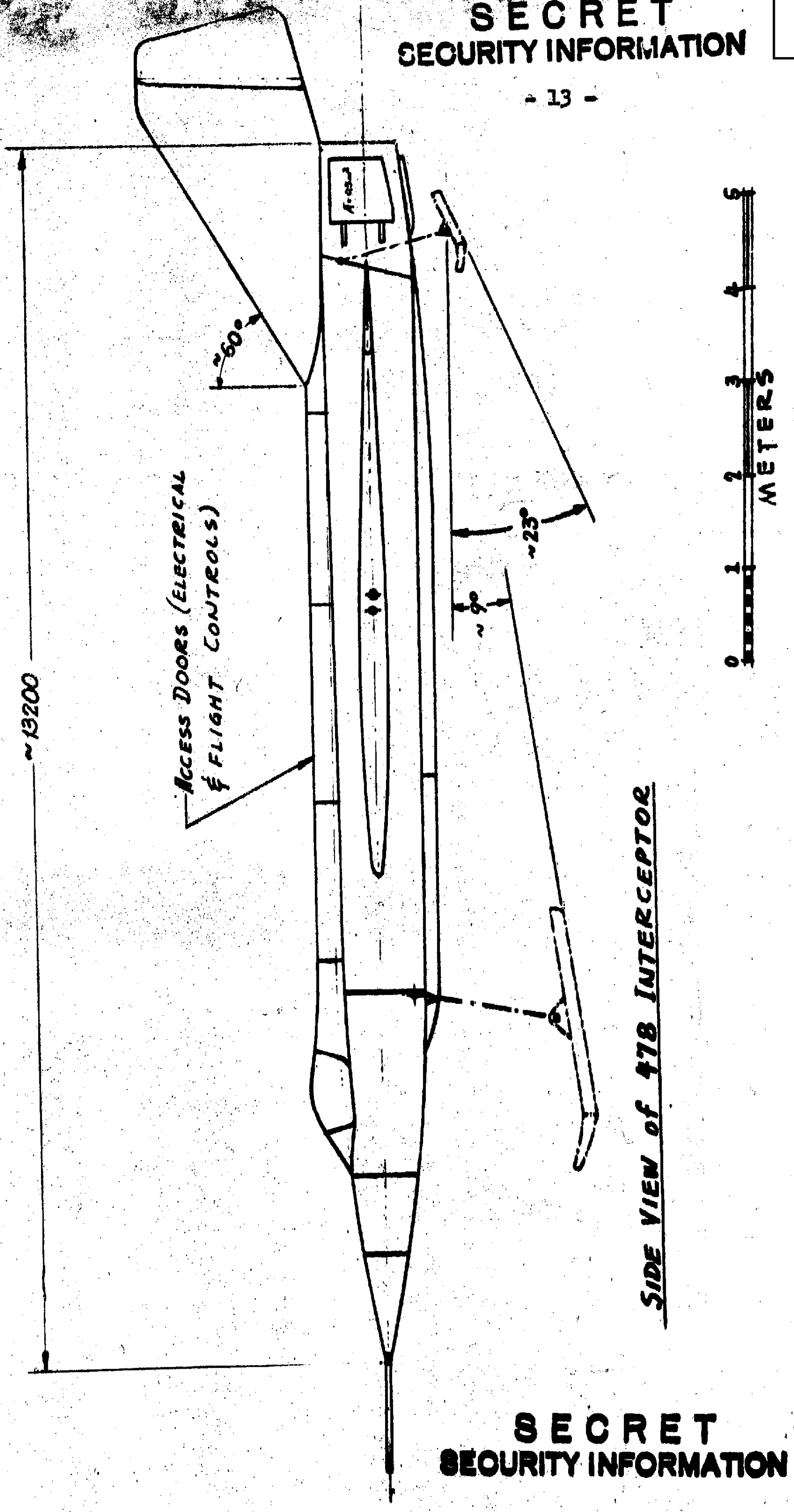
Page 20 - Diagram of Elevator and Aileron Control of 478

Page 21 - Details of Flight Surface Installation of 478

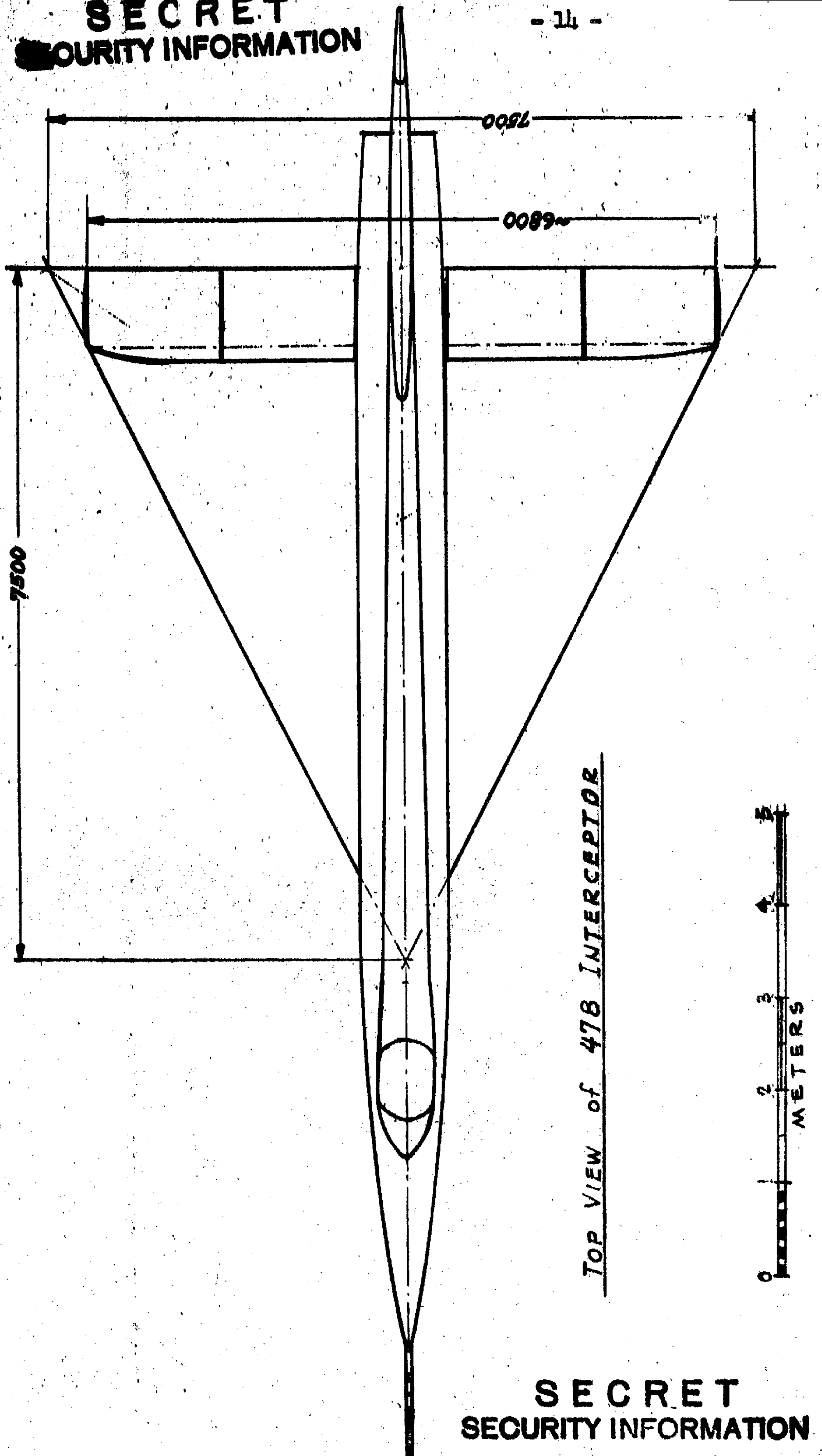
Page 22 - Sketch of Control Stick Grip of 478

Page 23 - Sketch of Dive Brakes of 478

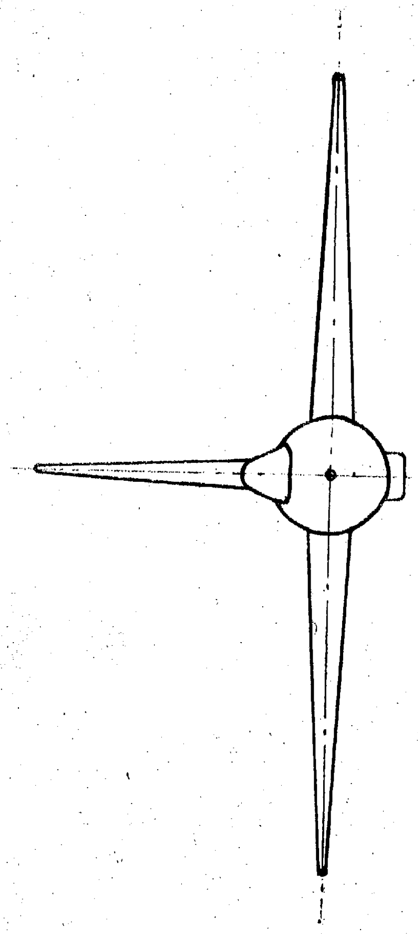
Page 24 - Details of Flutter Model -- Rib Between Fuselage Centerline and Rudder Tip of 478



SIDE VIEW of 478 INTERCEPTOR


7500
6800
7500
TOP VIEW of 478 INTERCEPTOR
0
1
2
3
4
5
METERS

25X1A



FRONT VIEW of 478 INTERCEPTOR

Scale = 1:50

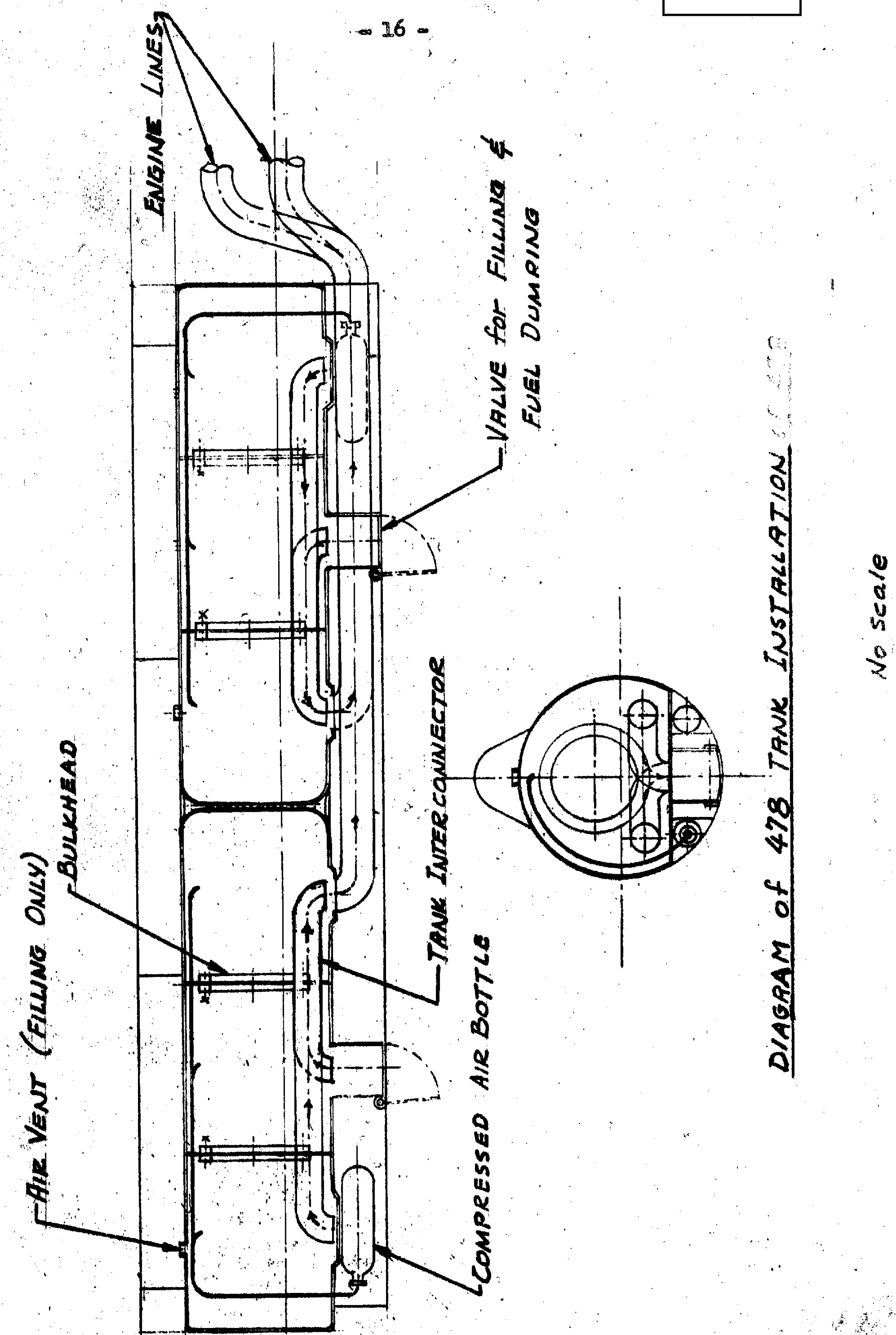
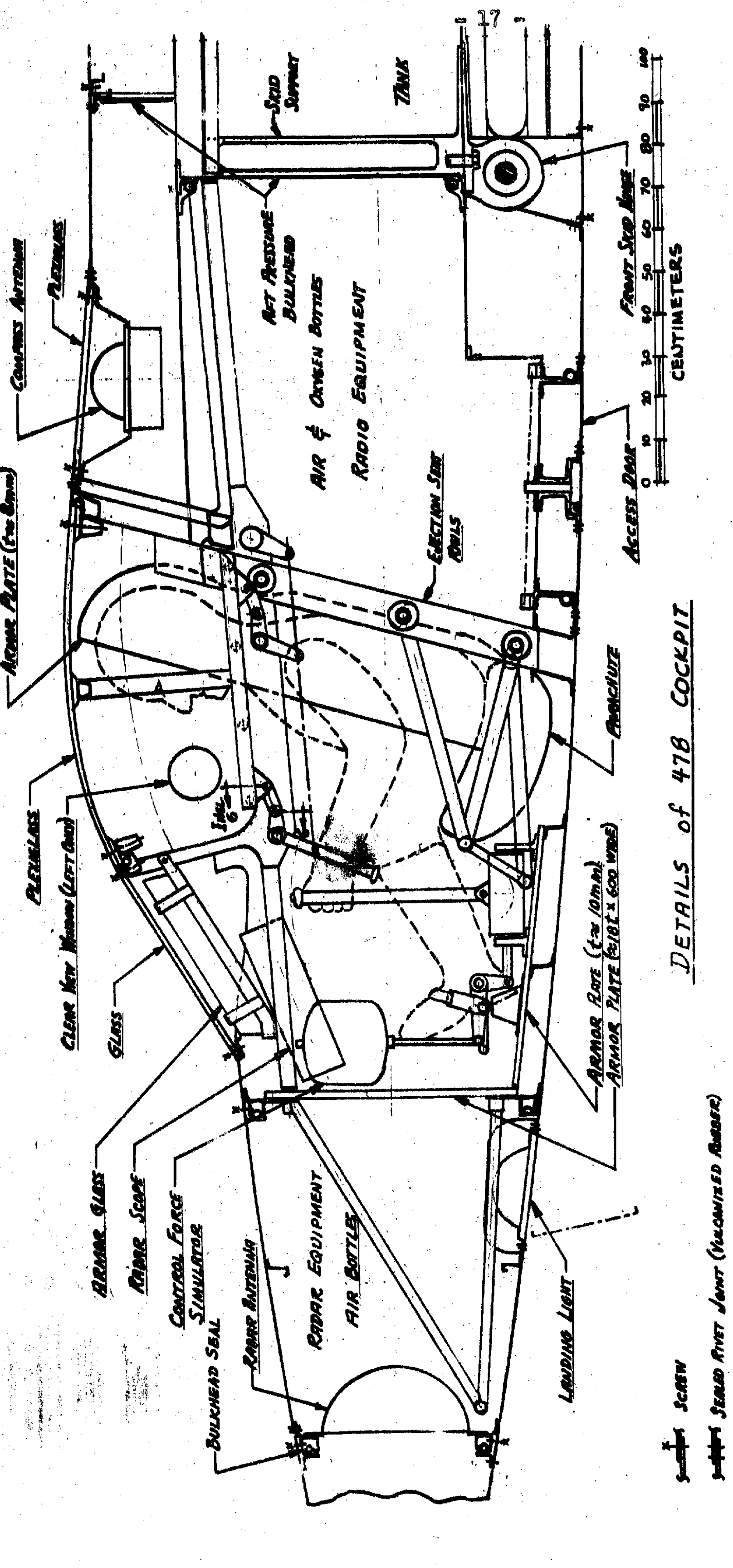


DIAGRAM of 478 TANK INSTALLATION

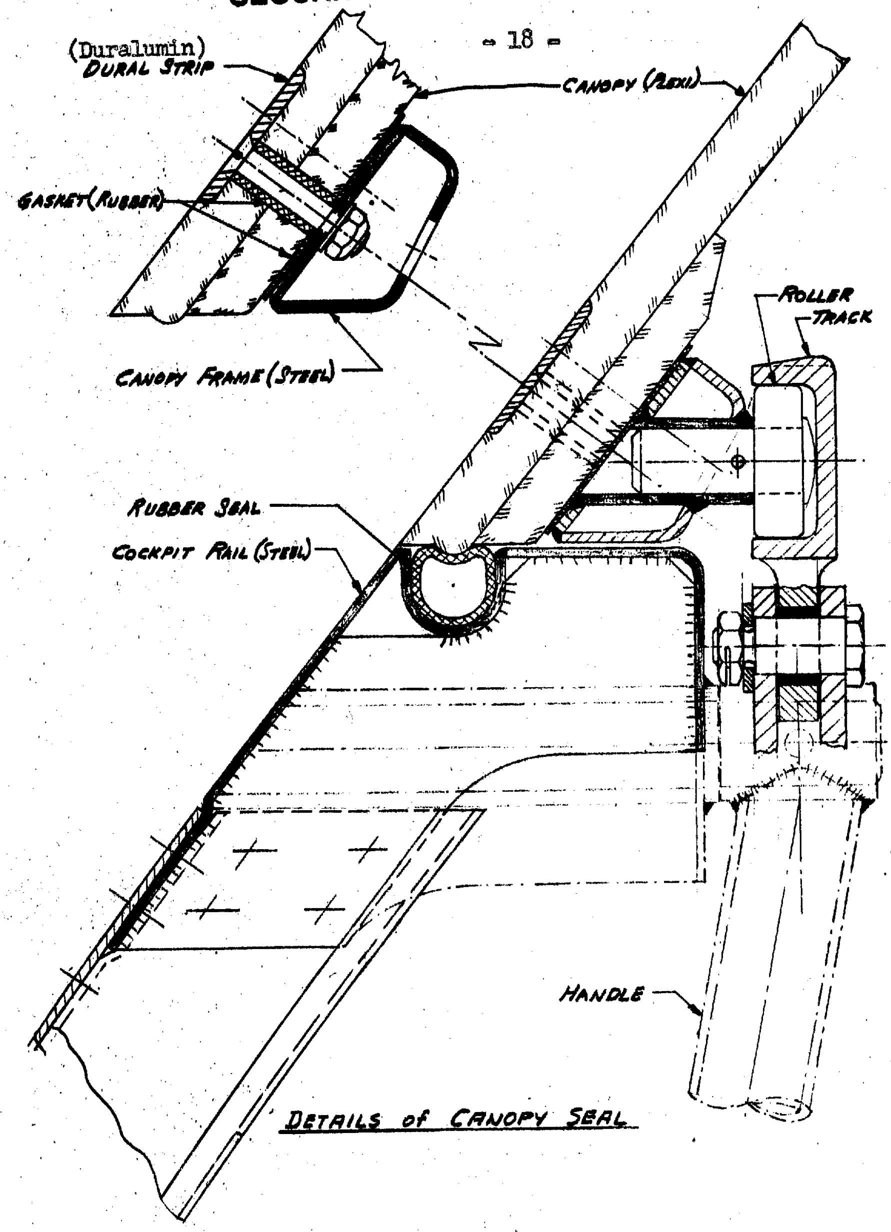
No Scale



DETAILS of 47B COCKPIT

25X1A

SECRET
SECURITY INFORMATION

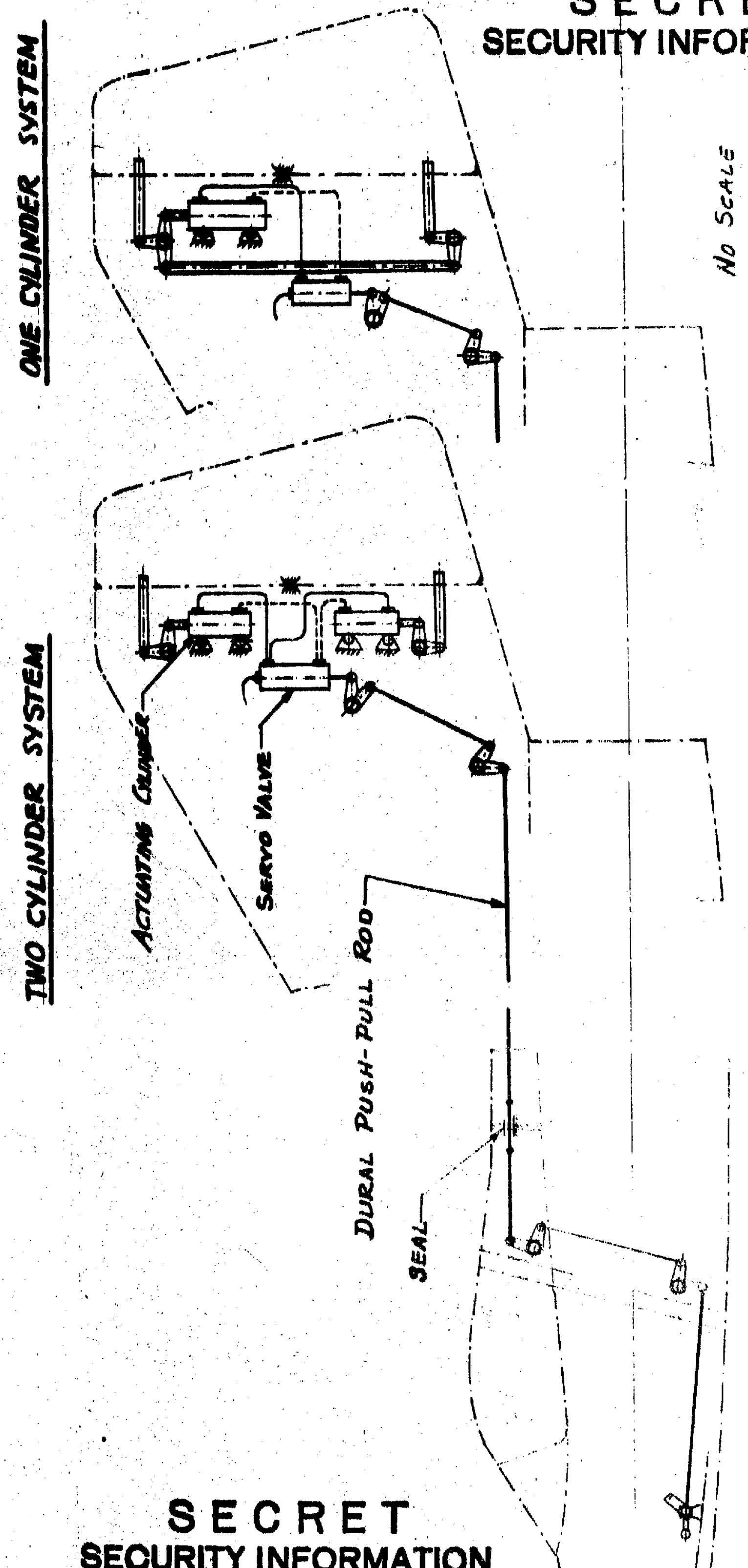


DETAILS of CANOPY SEAL

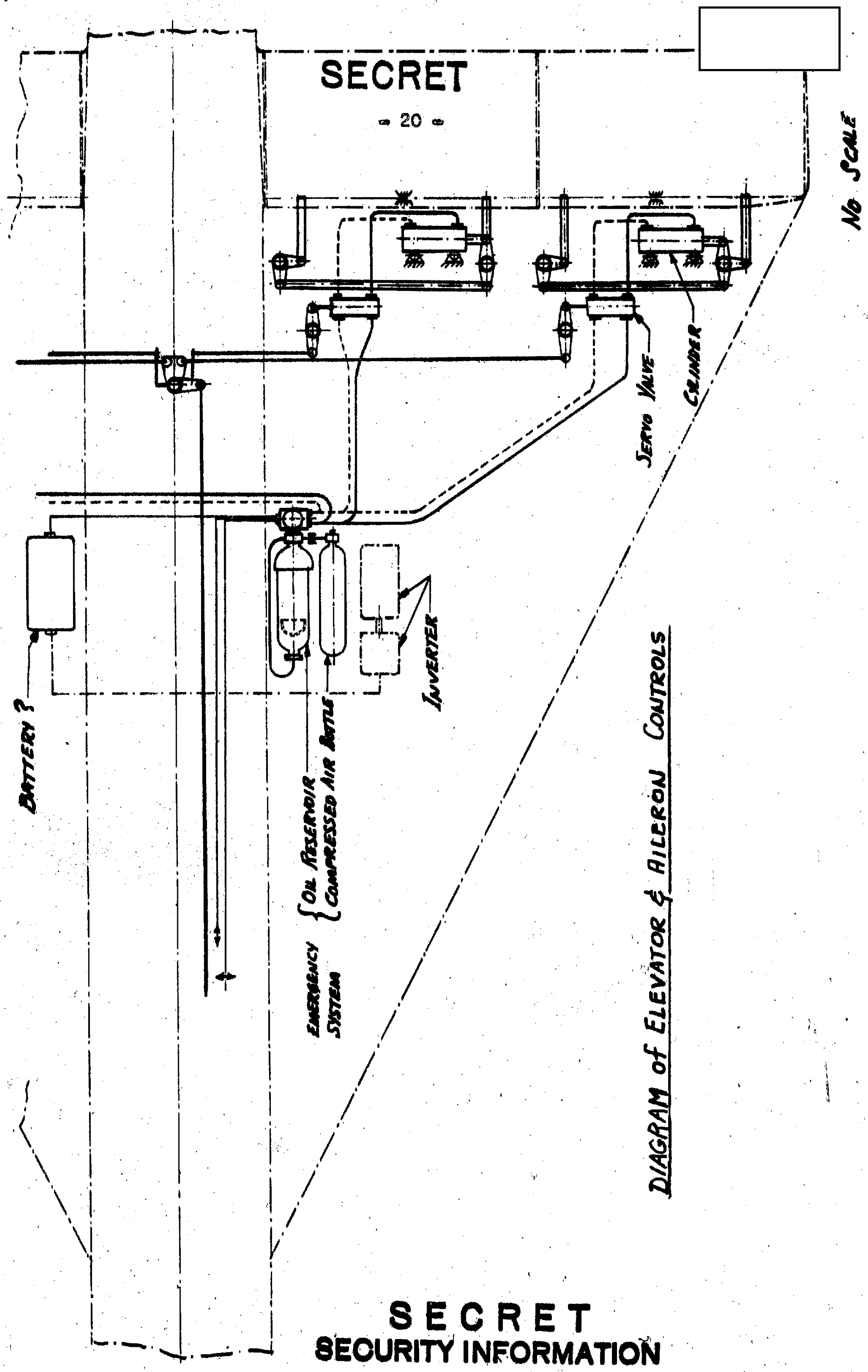
SECRET
SECURITY INFORMATION

25X1A

SECRET
SECURITY INFORMATION

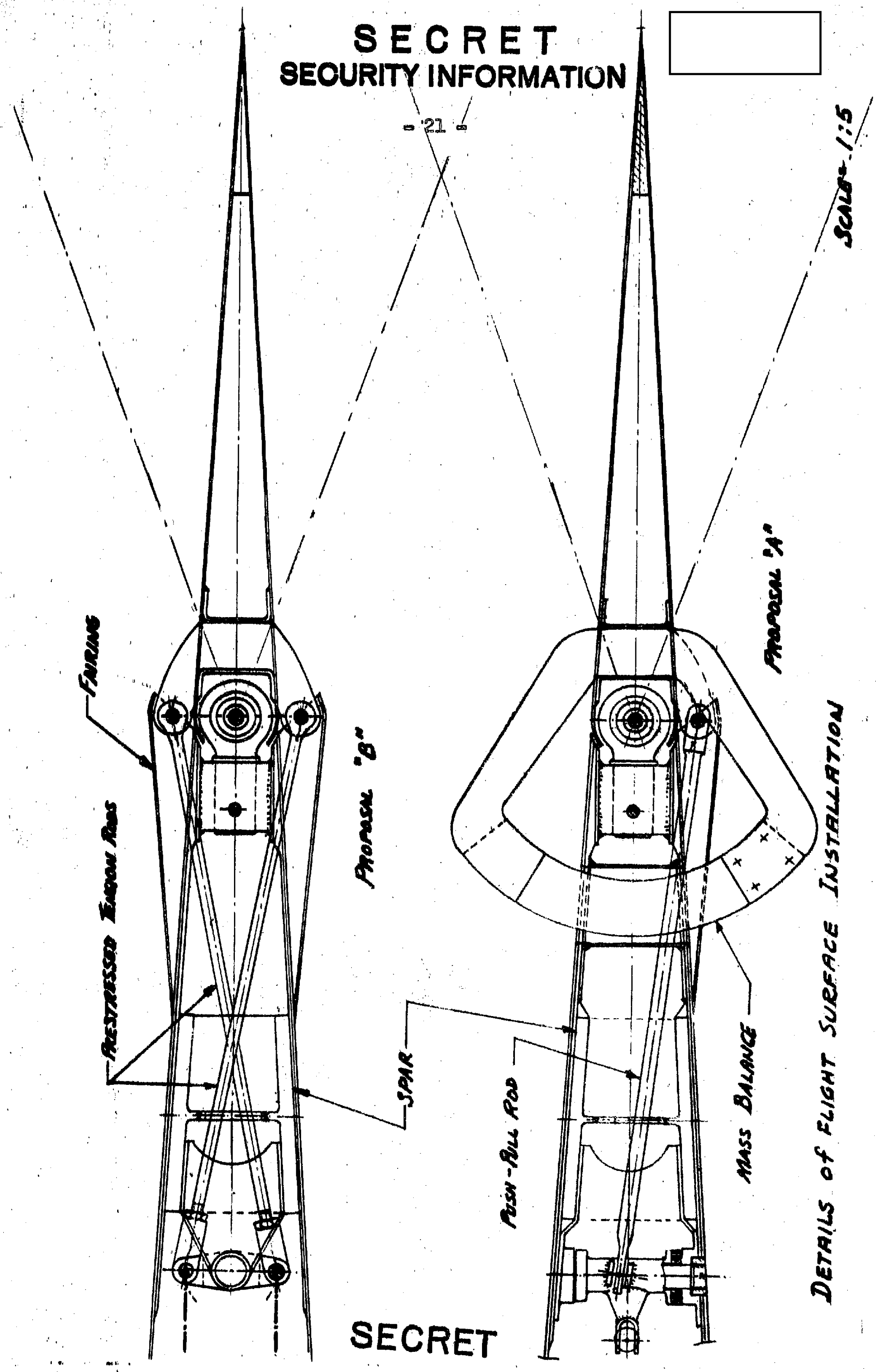


SECRET
SECURITY INFORMATION


No Scale
Servo Valve
Cylinder
Inverter
Battery ?
Oil Reservoir
Compressed Air Bottle
Emergency System
Diagram of Elevator & Aileron Controls

25X1A

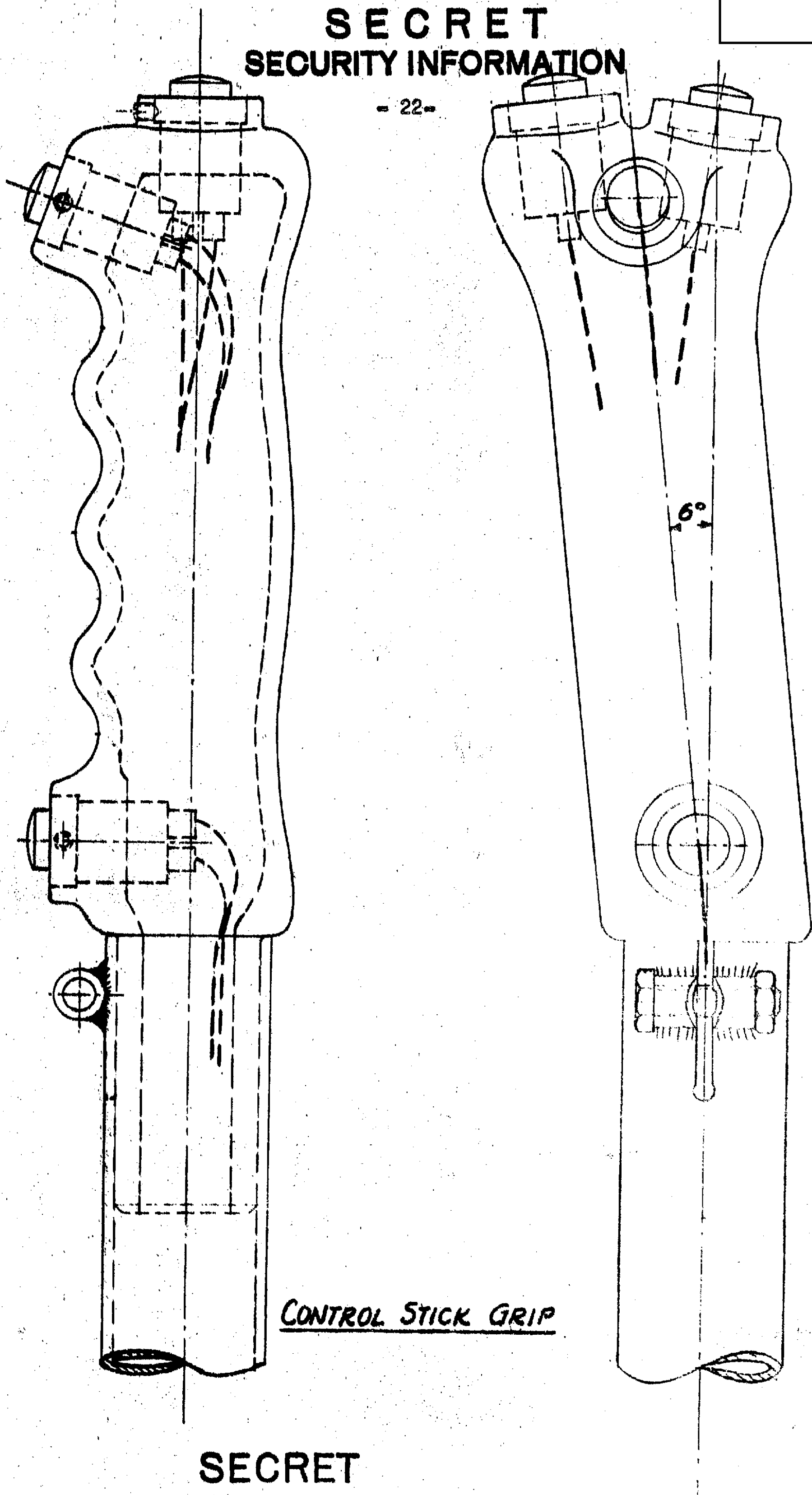
SECRET
SECURITY INFORMATION



SECRET

25X1A

SECRET
SECURITY INFORMATION

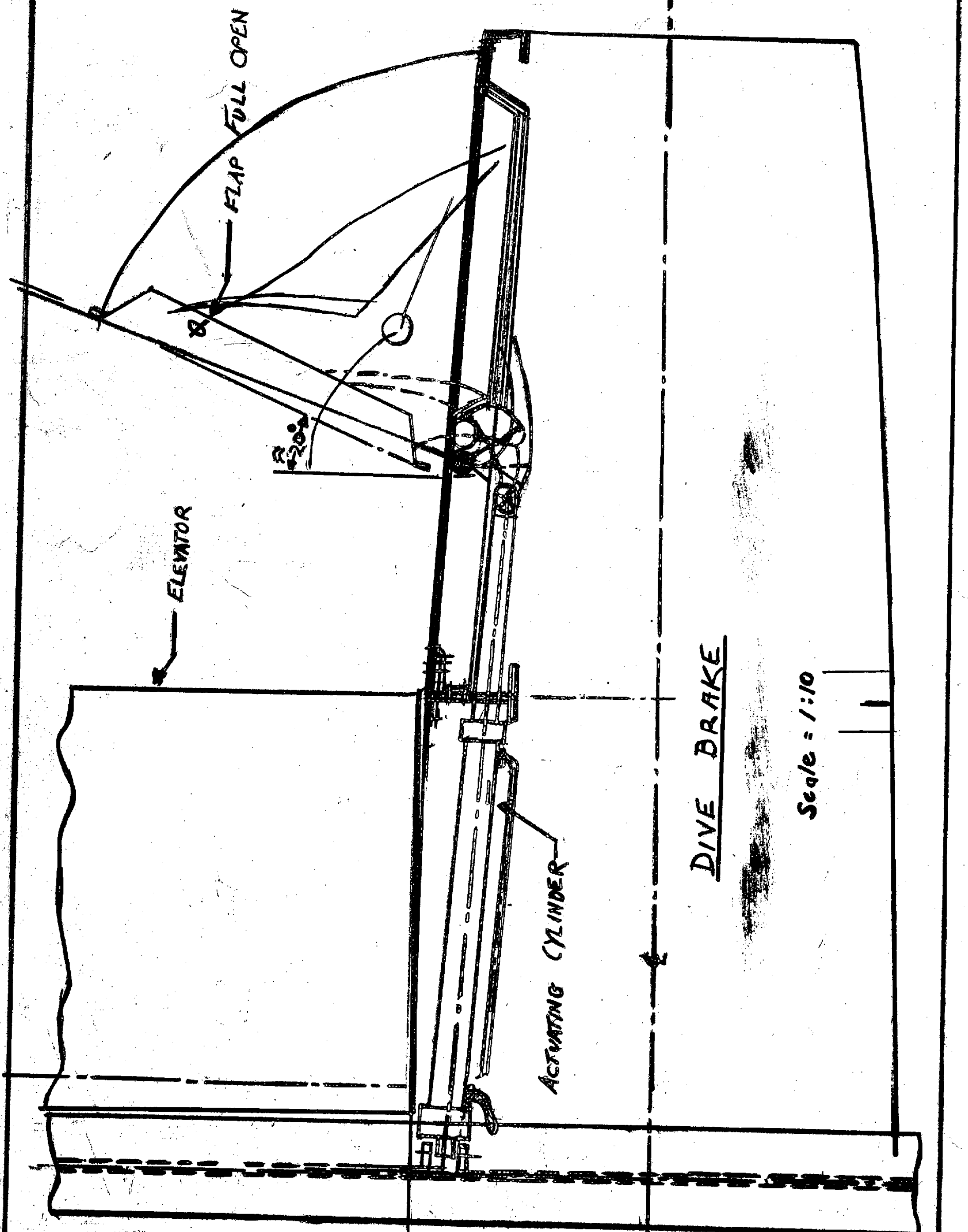


CONTROL STICK GRIP

SECRET

25X1A

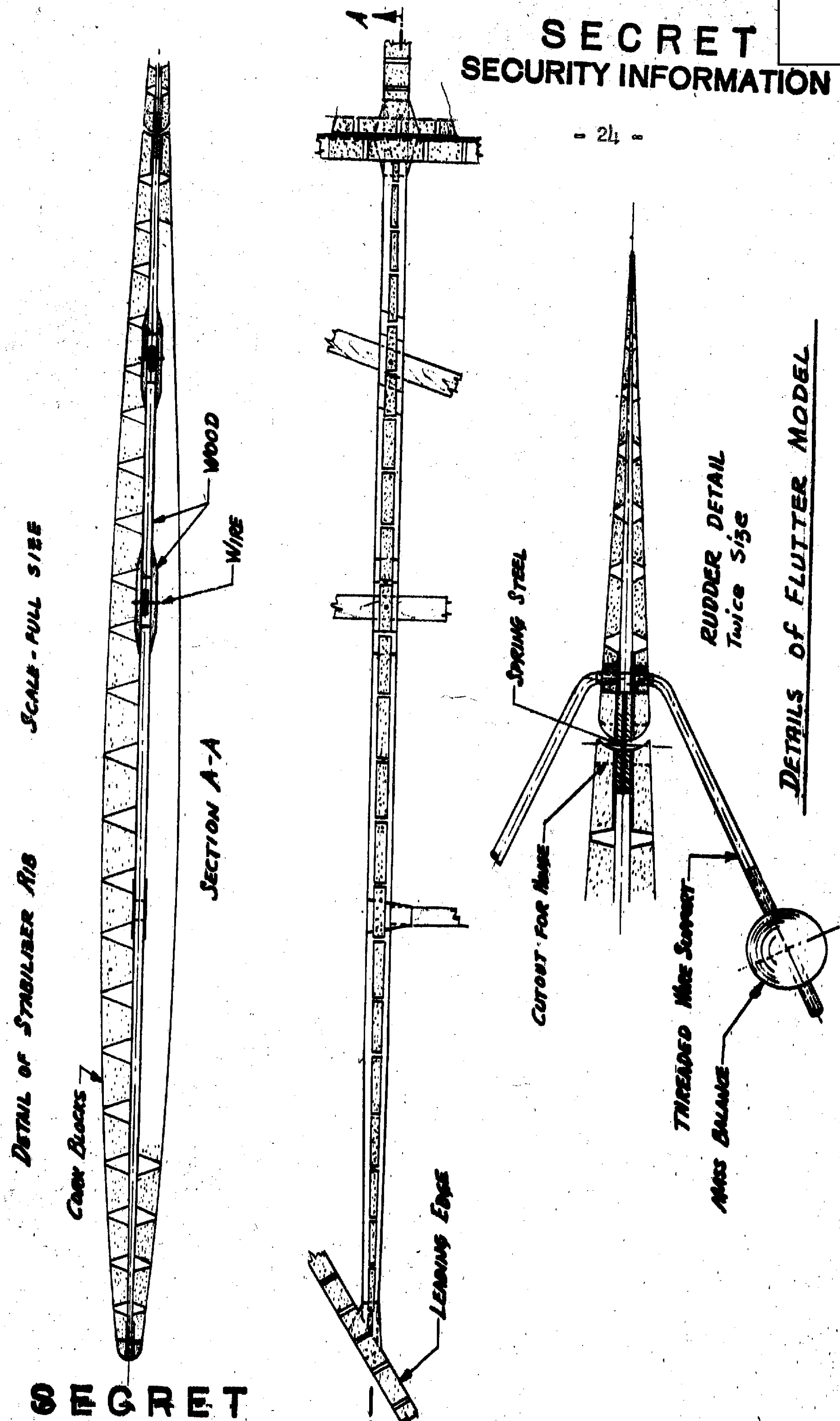
SECRET
SECURITY INFORMATION



SECRET
SECURITY INFORMATION

25X1A

SECRET
SECURITY INFORMATION



SECRET
SECURITY INFORMATION