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LOADING FIT MANUAL

REVISED EDITION

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LOADING PIT MANUALe.17  


## I CONSTRUCTION

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A. General Comments

This manual is a workable solution to the problem of construction, maintenance, and operation of a loading pit for use with a B-29.

It is not necessarily the only solution, and there are many instances where it is left to the discretion of the builder to vary the plans to suit the local terrain, climate, and soil conditions.

B. General Layout

The general layout of the loading pit is shown on Dwg. YS-12076D1. On this drawing are given the dimensions necessary for the location of the pit and the turntable. These dimensions must be held.

It is not necessary that the taxi strip and hard standing be made of concrete if the local soil conditions are such that, with a dust-laying treatment, the surface can be made to conform to the standards for B-29 taxi strips, as set up in TM 5-255. For a permanent base it is recommended that a concrete apron and taxi strip be used and that the taxi strip and apron conform to the specifications as set up in TM 5-255.

C. Loading Pit

The dimensions and general layout of the loading pit are shown on Dwg. YS-12076D2. Notice that no thickness of concrete is specified in this drawing. It is left to the discretion of the builder to design concrete strong enough to bear the loads, as stated in the notes on the drawing.

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Also notice that drainage must be provided for this pit. Here again it is left to the discretion of the builder as to whether gravity, a sump pump, or a sink well is used.

The following drawings give the details of the equipment which is installed in the loading pit:

- Dwg. YS-12076D3 - Joyce Cridland Casing
- " YS-12076D4 - Joyce Cridland Telescoping  
Jacking Assembly
- " YS-12076D5 - Air-Oil Tank for Joyce Cridland  
Hoist
- " YS-12076D6 - Joyce Cridland Hoist Assembly
- " YS-12076D7 - Pneumatic Control for Air-Oil  
Tank Operation
- " YS-12076D8 - Piping Diagram for Joyce Cridland  
Hoist.

#### D. Floodlight Installation

The general layout of the floodlight installation is given in Dwg. YS-12076D1. Details are shown in Dwg. YS-12076D9 and YS-12076D10.

If local power sources are available it is suggested that the floodlight installation be hooked in with the sources so as to provide lights immediately without starting the generator.

#### E. Compressor Building

This building may be constructed in conformance with Dwg. YS-12076C11. The concrete floor should be omitted until after the foundations of the air compressors and power generator have been poured. The only rigid building specification is that the top of the structure should be not over 10 feet above the apron surface, to allow ample clearance of the left wing of the plane while rotating the plane on the main turntable.

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F. Turntable Installation .

The turntable should be installed as shown on the general layout, Dwg. YS-12076D1. The turntable necessary is an Ideco Portable Aircraft ST-40 Turntable, 40-ton capacity, manufactured by International Stacy Corporation, Columbus, Ohio.

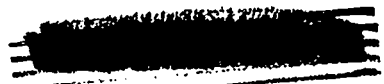
An ST-20 turntable may be used in place of the nose wheel plate Dwg. YS-12076C21. The turntable is also manufactured by the above-mentioned company. When a nose wheel turntable is used, it is substantially easier to straighten the nose wheel and it alleviates any possibility of strain on the B-29 caused by straightening the nose wheel, but the installation of such a turntable is not considered necessary for the successful operation of the pit.

## II OPERATION

A. Arrival at the Pit

Upon arrival at the pit, check to see if the unit is level as it sits on the trailer. The correct position for the F.M. is level across the transverse axis and 1° tail heavy. If the unit is not level, it may be re-leveled by using an "A" frame, crane, or heavy wrecker.

(If none are available, the bomb may be re-leveled by waiting until the bomb is in the pit and the plane over the pit. Then an improvised extension may be placed on the bomb release and the jacking unit raised until the extension can be hooked on the lug. The jacking unit is then lowered allowing the plane to take the load. The adjustable head is then moved, if necessary, so that the bomb will be in the proper position on the cradle for loading when the jacking unit is again raised.)

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(If an L.B. is to be loaded, a special elevated modification of the L.B. cradle (Dwg. Y-1884 ) must be used so as to raise the unit high enough to engage the bomb release. The height from the trailer platform to the lowest point on the curved surfaces on which the bomb rests should be approximately  $22\frac{1}{2}$  inches.)

While the position of the unit on the trailer is being checked, all other pit equipment should be checked for first echelon maintenance (gas, oil, tampering, damage, etc.). Also the pit and turntable covers (Dwg. YS-12076D12 and 15) are removed and carried a sufficient distance so that the propeller blast of the plane will not pick them up or damage them.

The compressors are then started and should run long enough to build up 150 lbs. pressure at the pit. In operation of the pit only one compressor need be used (if both are used the operation of the hoist is speeded up only slightly). The main purpose of more than one compressor is to provide standby air supply.

### B. Positioning the Trailer

While the compressors are building up pressure, the treadways (Dwg. Y-2446) should be moved into position, straddling the pit. If the towing vehicle for the trailer does not have dual tires, the treadways may be moved into such a position that the truck can be driven across the pit, as shown in Fig. 1. The truck is driven across, as shown in Fig. 2, stopping to unhook the trailer when the trailer's front wheels approach the edge of the pit, as shown in Fig. 3. Care should be taken that when the trailer approaches the pit it is perpendicular to the edge of the pit.

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When the truck is unhooked from the trailer, the truck continues across the

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pit. The treadways are then spread to accommodate the trailer by placing the treadways on the guide lines painted on the edge of the pit, and the trailer is then manhandled forward until it straddles the pit. The brakes on the trailer are set. This position is shown in Fig. 4.

C. Lowering the Trailer Into the Pit

By this time the compressors should have built up the required 150 lbs. at the pit air gage. The pit operator now takes his position on the edge of the pit with the remote controls in his hands. All personnel are cleared from the pit.

The pit operator presses the "up" valve of the remote controls and raises the jacking unit up to the bottom of the trailer. If necessary, the adjustable head of the jacking unit is moved so the head fits between the four cleats on the bottom of the trailer platform. Before raising the trailer, check to see if all safety pins are in place.

The trailer is then raised approximately 2", and the treadways removed; see Fig. 5. The trailer is then rotated 90° so that the back end of the trailer is toward the air-oil tank. This is shown in Fig. 6.

The operator then presses the "down" valve of the remote controls and allows the trailer to sink into the pit until the wheels come to rest on the concrete blocks on the floor of the pit. While the unit is being lowered into the pit, check to see if the platform is centered on the adjustable head. If it is not, center it. This is necessary to insure that the adjusting screws on the adjustable head clear the trailer frame. To lower the trailer into the pit the trailer yoke must be pushed up perpendicular, and the safety chain wrapped around it several times to hold it in place.

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The security frame (Dwg. YS-12124) is then removed from the trailer, and, if any auxiliary cover is used, the cover is checked to make certain it will not be picked up by the plane's propeller. The bomb is shown at this stage in Fig. 7. All personnel are then removed from the pit area with the exception of the aircraft spotter who takes his position over the nose wheel guide line.

D. Spotting the Plane

By this time the plane has taxied to the pit approach. Following the guide lines and the directions of the spotter, the plane is moved forward with the right wheel coming to rest against the chock (Dwg. YS-12076D20) on the turntable. A general view of this operation is shown in Fig. 8.

If an F.M. is being loaded, the wheel is positioned in the center of the turntable. If an L.B. is being loaded, the chocks are moved 11" toward the approach of the plane, in accordance with the guide lines for the L.B. painted on the turntable.

The motors on the right side are then shut off and the plane is turned, using the left motors until the nose wheel comes to rest in the center of the nose wheel plate, with the plane straddling the pit. Fig. 9 shows the plane almost into position over the pit. To make the straightening of the nose wheel easier, a thick soap solution may be put on the nose wheel plate before this operation. The nose wheel should be straightened before a loading operation or after an unloading operation.

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**E. Loading**

The pit operator then returns to his place beside the pit, and the locking pins are removed from the trailer platform so that the platform may be raised without raising the trailer frame, as shown in Fig. 10. The pit operator presses the "up" valve and the platform is raised out of the trailer frame. This operation should be performed carefully to make certain that the platform or the adjustable head does not hang on the trailer frame.

During this raising operation the bomb may be moved by means of the adjustable head so that the lug on the bomb is directly underneath the bomb release. The position of the bomb may be checked with a plumb bob. The bomb is raised until it engages the bomb release and held up until the bomb release is cocked.

During the raising operation, only the man who makes the adjustments on the adjustable head is allowed in the pit. When the bomb is engaged in the bomb release, all personnel are cleared from the pit, and the operator in the bomb bay presses the "down" valve on the remote controls. The cradle is lowered just enough so that the plane carries the entire load. Then the airplane sway bracing and micro-switches are adjusted. This is a safety precaution so that in case the bomb was accidentally released, the hoist would catch it without damage. The platform and cradle are lowered into the pit until the cradle is lower than any part of the plane, and the loading of the plane is complete.

**F. Departure of the Plane and Final Pit Operations**

The stop chocks are removed from the right main gear wheel, the brakes

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released, and the plane is then taxied or towed from its position over the pit to the flight line.

After the plane is removed, the pit operator lowers the platform completely into the trailer frame and has the locking pins replaced. The operator then presses the "up" valve on the remote control and raises the trailer out of the pit, rotates it 90°, and places it in position with its front and back wheels straddling the pit. The treadways are replaced and the tow vehicle is backed into position to remove the trailer. The jacking unit is lowered to the floor of the pit, the compressors (and generators, if used) are cut off, and the air in the compressors is drained to remove any accumulated moisture. The trailer is towed from the pit area, the pit and turntable covers replaced, and the operation is concluded.

#### G. Unloading

If an unloading operation is necessary, an empty trailer is placed in the pit and the loaded plane is spotted as if it were going to load. The jacking unit is raised until the cradle takes the full weight of the bomb, the sway bracing being retracted just prior to contact of bomb and cradle. Also check to make certain all safety plugs are in place and all arming wires unhooked and secured to the bomb. Then, opening the bomb release, the unit is lowered into the pit. The nose wheel of the plane is straightened and the plane taxied or towed from its position over the pit.

#### H. Operation of the Remote Controls

The present construction of the air-oil valve is such that if the hoist is being raised and it is desirable to lower it without raising it any more, the remote control must be operated in short bursts so as to bleed

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the air from the tank thru the exhaust without opening the oil valve. This operation requires skill and experience on the part of the operator. The fact that the air valve opens before the oil valve, makes this operation possible.

#### I. Security Precautions

If the loading pit is in such a locality that it is advisable to take security precautions, additional fences or movable frames may be used to enclose the pit while an operation is in progress. Such frames are shown in Fig. 11. It is the responsibility of the local security or intelligence officer to administer these precautions.

### III MAINTENANCE

#### A. Hydraulic Hoist

For use in the hydraulic hoist, the hydraulic fluid should be petroleum oil having a viscosity of 100 seconds at 100°F and a pour test of minus 30°F. A tank supplied with lift should be filled to within 3" from the top of the tank as measured at the filler hole. This is equivalent to a light engine oil SAE 10 or lighter. Be sure the tank has a capacity of 130 gallons of oil or greater.

The only maintenance required by the jacking unit (Dwg. YS-12076D4) is the addition of a light gun grease in the packing. If the large cylinder should stick, the situation can be corrected by backing out the packing gland ring screws one-quarter turn at a time and checking for sticking conditions.

Packing may be replaced without removal of the rams from their cylinder

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by merely removing the packing gland rings and pulling the old packings out. This should be done without pressure in the cylinder.

The only maintenance required on platforms will be an occasional cleaning and greasing of the transversing screws which move the platform.

For the maintenance of the air-oil tank and connected mechanism, Dwg. YS-12076D7, every 30 days the two hose connections on the air cylinder should be removed and a few drops of light oil squirted into the connection to lubricate the air cylinder packing piston rod. All toggle connections of the air and spring cylinders will be lubricated every 30 days by the addition of a few drops of oil. Every 30 days a light coating of grease should be applied to the cam surface of the combination air and oil valve. Should any leakage occur around the stem of this valve, the packing gland lock nut next to the knurled packing nut may be loosened and the knurled packing tightened, just tight enough to prevent leakage and still allow free movement of the valve stem under their own spring pressure. The lock nut should again be tightened.

If the pit installation is in such a locality that arctic temperatures may be expected, hydraulic fluid and lubrication system for corresponding temperatures must be used; otherwise the pit will not operate or will operate sluggishly.

Correspondingly, if excessive dust or moisture may be expected, additional precautions must be taken to insure smooth operation of all mechanical components. To illustrate, at an installation located in a dry, dusty climate, it was found necessary to dis-assemble and wash with kerosene

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at regular intervals the air-oil valve, spring return, and Hanna Air Cylinder to remove accumulated dust. Otherwise the dust acted as an abrasive to cause excessive wear in the above mentioned parts, or caused valves to stick and made the operation of the valves sluggish.

B. Air Compressors

The only maintenance usually required by compressors is the checking and maintenance of the oil in the crankcase. The compressor crankcase will be filled with SAE 20 high grade motor oil, and a sample will be taken every 100 hours of operation in order to determine its condition. If the oil level is low, oil will be added; if oil is dirty, the crankcase will be drained and fresh oil poured into the crankcase.

This compressor is powered by an air-cooled 4 cylinder gasoline engine. The maintenance of this engine should consist of checking the engine for sufficient gasoline before every use, and of setting the throttle for moderately high speed (2000- 2200 rpm) to avoid overheating. The engine consumes about 1 pt. of oil every 30 hours, so the oil should be checked every day. The crankcase should be filled to capacity and changed every 100 hours of operation. The oil bath air cleaner on the carburetor intake should be serviced every 12 hours of operation by removing and cleaning the oil cup and baffle. Replace the baffle and fill the oil cup to indicated level with SAE 20 oil. Inspect the gasket before reinstalling the oil cup, and run a heavy bent wire down the intake to be sure the air passage is not restricted by dirt in the backfire chamber.

C. The Electric Generating Unit

The generator has sealed ball bearings, so added lubrication is not

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necessary except on obvious rotating parts. The engine will have the same maintenance as the engine on the compressor.

D. Turntable

The complete turntable should be inspected every 30 days for general condition, cleanliness, and proper operation. Where unusual local weather and ground conditions prevail, the turntable will be inspected at such regular intervals as experience may indicate. The most important thing to assure proper performance is cleanliness, i.e., freedom from foreign matter such as dust, sand, grit, and water. A film of light lubricating oil (SAE-20) placed in the lower (base) bearing ball race is required to prevent rust and excessive wear.

E. Trailer

The special low bed trailer, Dwg. YS-12126, should have a care and maintenance which is normally given to other Army vehicles of the same type. This should include regular greasing, inspection, checking of the tires, etc.

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**UNCLASSIFIED**BILL OF MATERIALS**I MATERIALS NECESSARY FOR CONSTRUCTION OF ONE LOADING PIT****A. Materials Needed in General Layout of Loading Pit Not Called for in Detail Drawings**

1. Air compressors, composed of
  - a. 2 Westinghouse\* air compressors, receiver-mounted, two stage, Model 4YC, with
  - b. 2 pop-off valves set for 150 psi. and powered by
  - c. 2 Wisconsin air-cooled gasoline engines, Model VE-4, 4-cylinder, 3 x 3 $\frac{1}{2}$ , and
  - d. 2 air receivers with minimum capacity of 80 gals. or 11 cu. ft.

\*or Ingersoll-Rand Model H-64 x G2, Type 30, two stage, constant speed.
2. Generating Unit
  - a. 1 master electric generator with exciter; output, 110 v., a.c., single phase, 9.4 kva., powered by
  - b. 1 Wisconsin air-cooled type VF4-1 gasoline engine, 4 cylinder, 3 x 3 $\frac{1}{2}$
3. Turntable
  - a. 1 ST-40 turntable
4. Stabilized surface for taxiway and hard standing (either reinforced concrete or other suitable material).
5. Air line to pit (all extra heavy)
  - a. 100' - 1" pipe
  - b. 3 - 1" unions
  - c. 6 - 90° elbows
  - d. 2 - 45° elbows
  - e. 2 - 90° street elbows
  - f. 6 - 1" short nipples

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6. Electrical conduit and wire to pit and floodlights
  - a. 240' - 1½" rigid conduit
  - b. 360' - 1" rigid conduit
  - c. 500' - #4 wire, solid copper, insulated
  - d. 750' - #6 wire, solid copper, insulated
- B. Assemblies Called for by Detail Drawings
  1. One loading pit foundation complete with required concrete steel, steel angle, etc., per drawing YS-12076D2.
  2. One hoist assembly with piping, per drawings YS-12076D3, 4, 5, 6, 7, and 8.
  3. Four apron lighting sets as per drawing YS-12076D9.
  4. One pit lighting set as per drawing YS-12076D10.
  5. One nose wheel plate, YS-12076C21.
  6. Compressor building, YS-12076C11.

## II MATERIALS NECESSARY FOR OPERATION OF LOADING PIT

- A. 2 Treadways
- B. 2 Trailers Complete with Cradle Y-1883 Secured on Platform, and Security Frame Work, YS-12124, and Cover (Cradle Y-1884 should be used with L.B.)  
(Cradle should be positioned on trailer platform so that the center of gravity of the unit is directly above the center of the platform.)
- C. One Set of Pit and Turntable Covers, per Dwg. YS-12076D.
- D. One Turntable Spacer per Dwgs. YS-12076D16, 17, 18, and 19.
- E. One Chock Block per Dwg. YS-12076D20.

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The following drawings accompany the manual

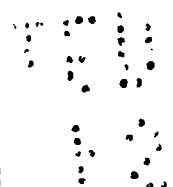
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	D3		C3
	D4		C4
	D5		B5
	D6		B6
	D7		B7
	D8		B8
	D9		B9
	D10		
	E11	YS - 12126	E1
	D12		D2
	D13		D3
	D14		D4
	D15		D5
	D16		D6
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	D19		D9
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	C21		C11

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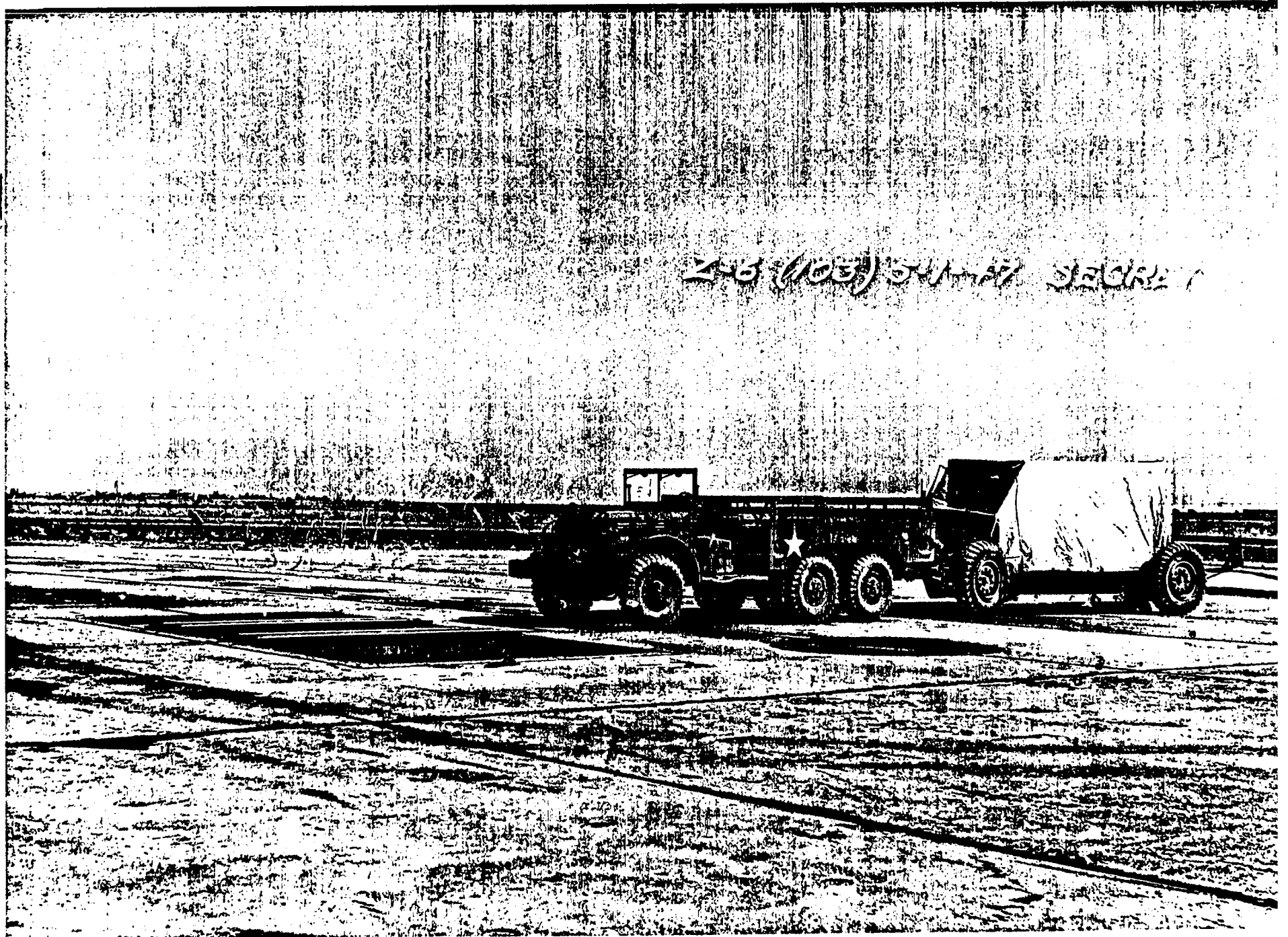


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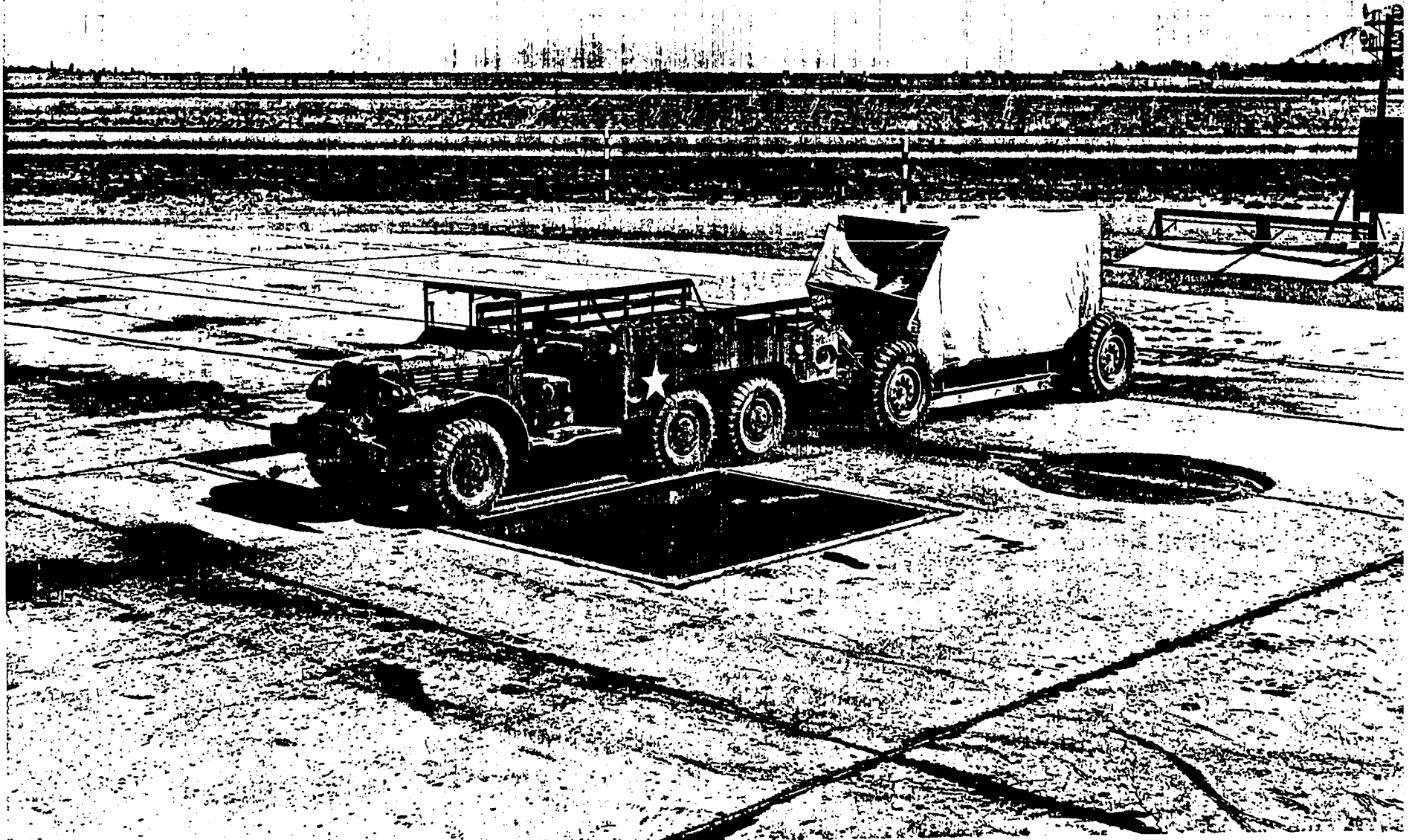
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Fig. 1

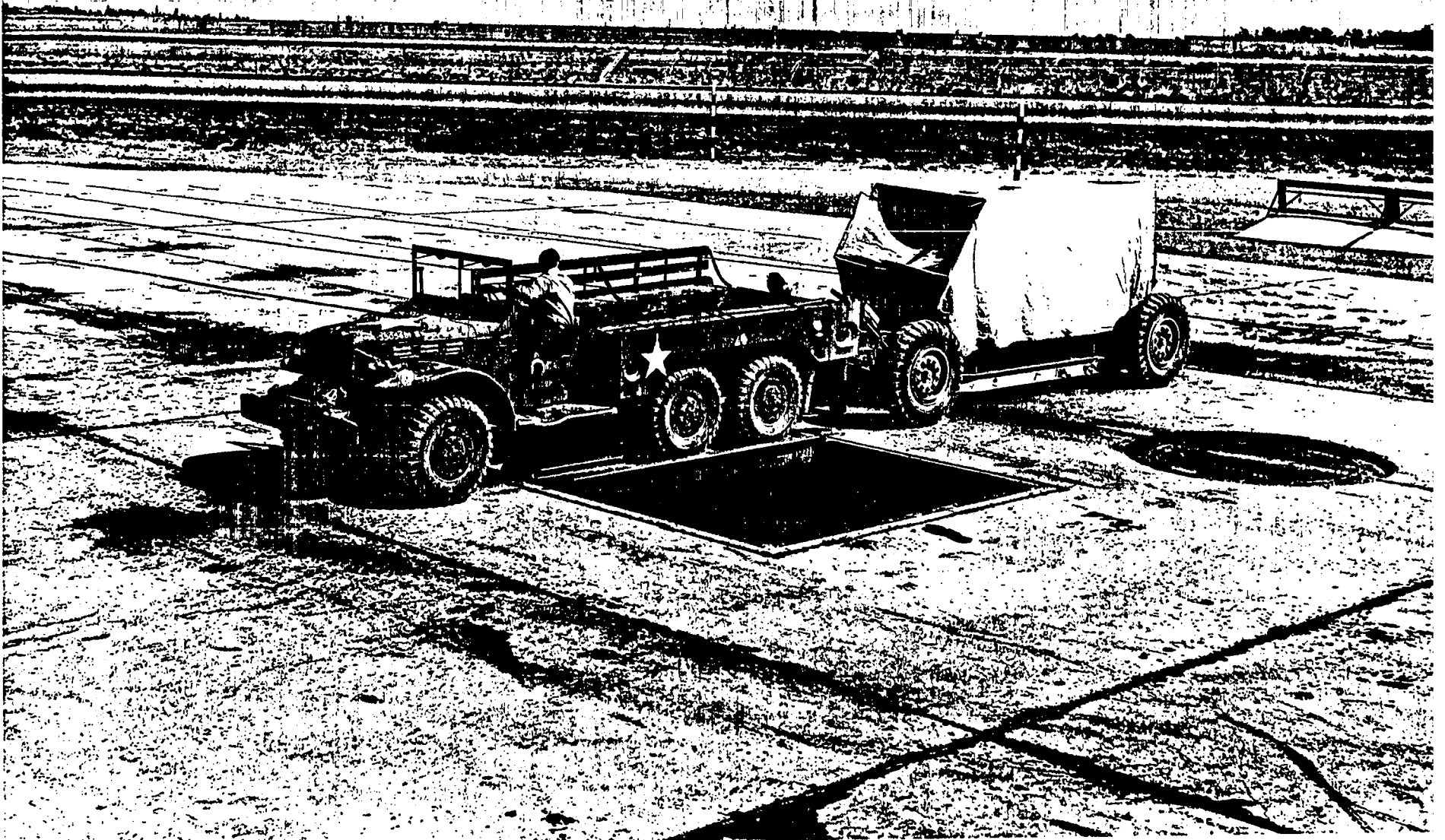
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Fig. 2

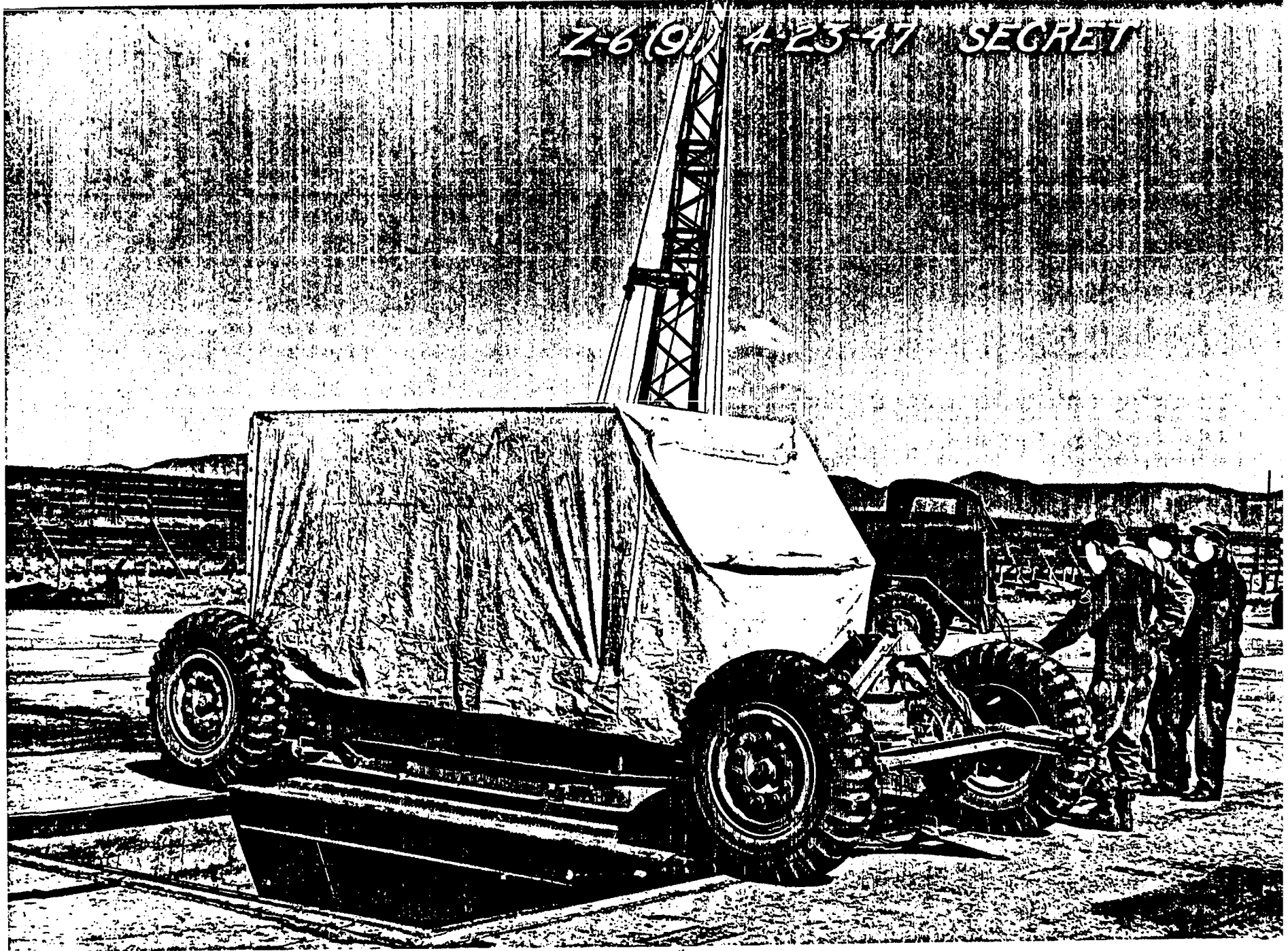
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Fig. 3

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Fig. 4

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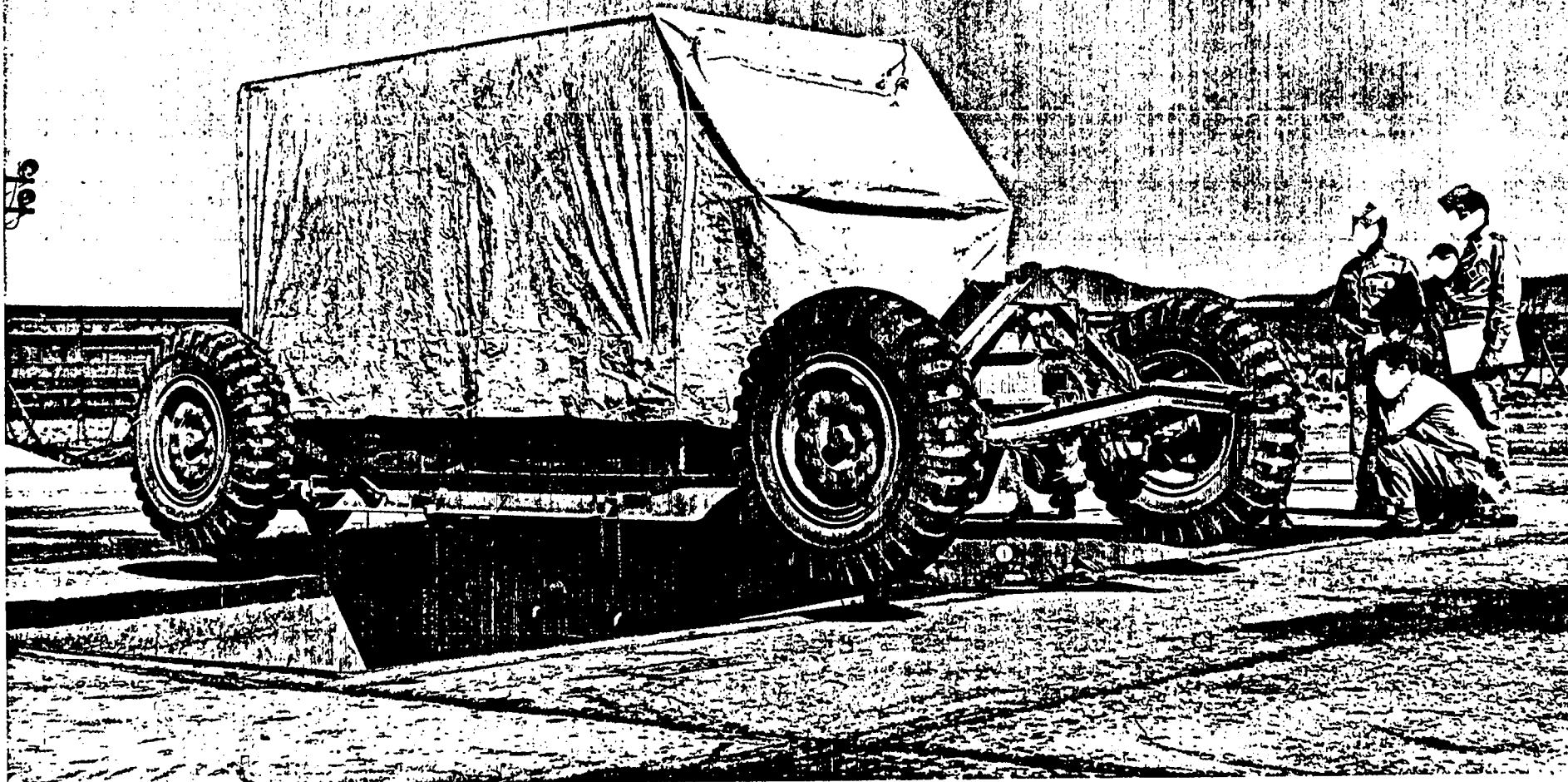


Fig 5

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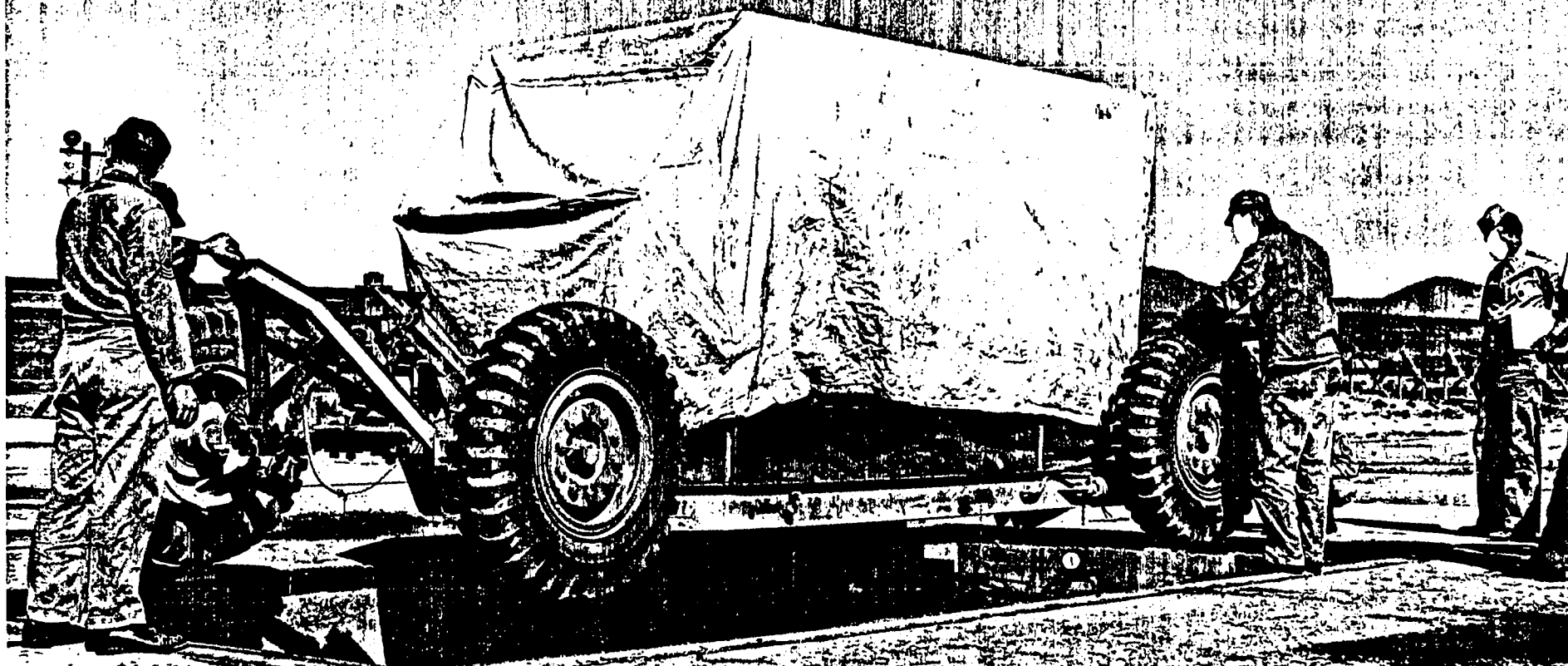
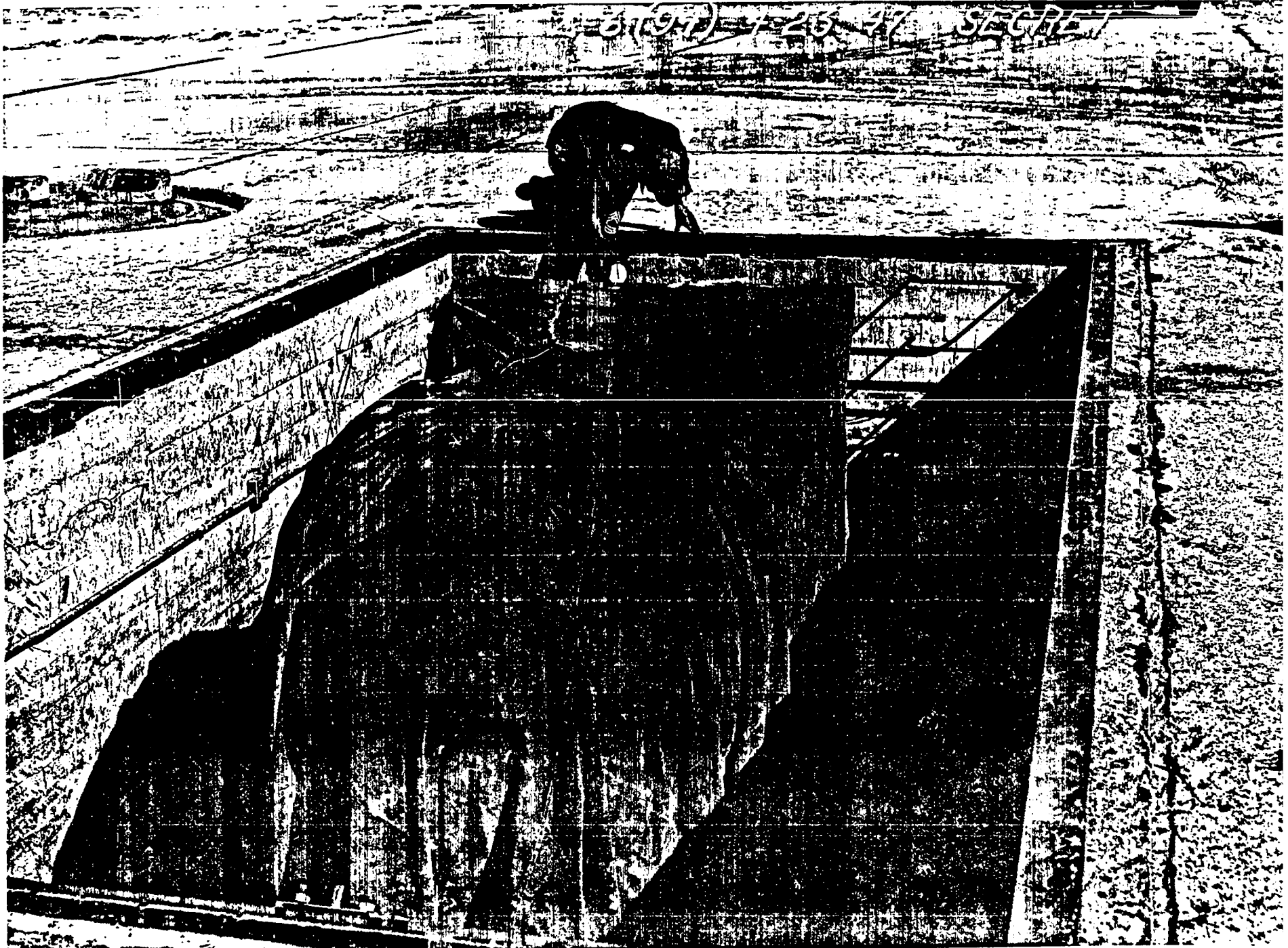


Fig. 6

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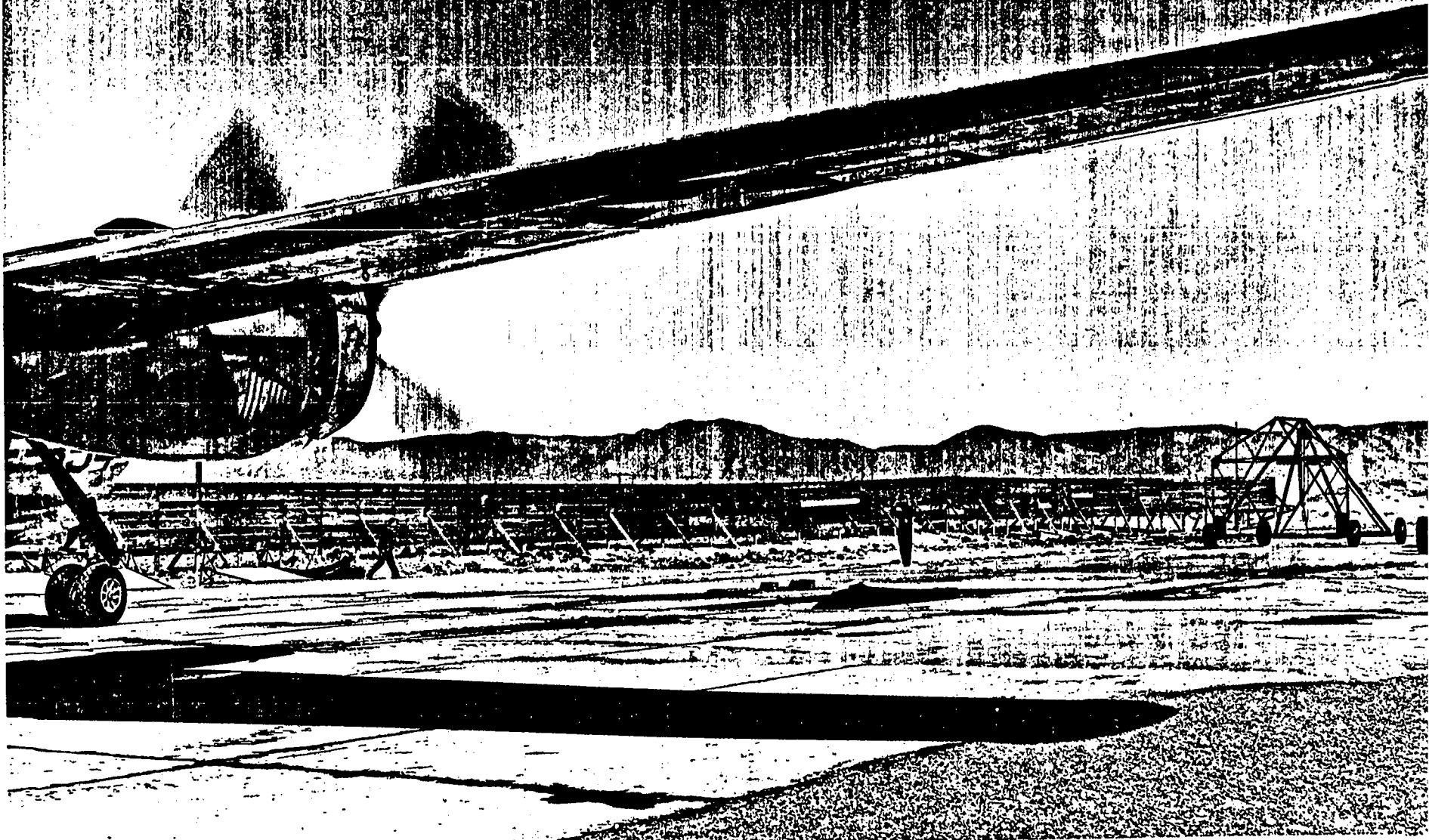
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Fig. 7

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Fig. 8



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Fig. 9

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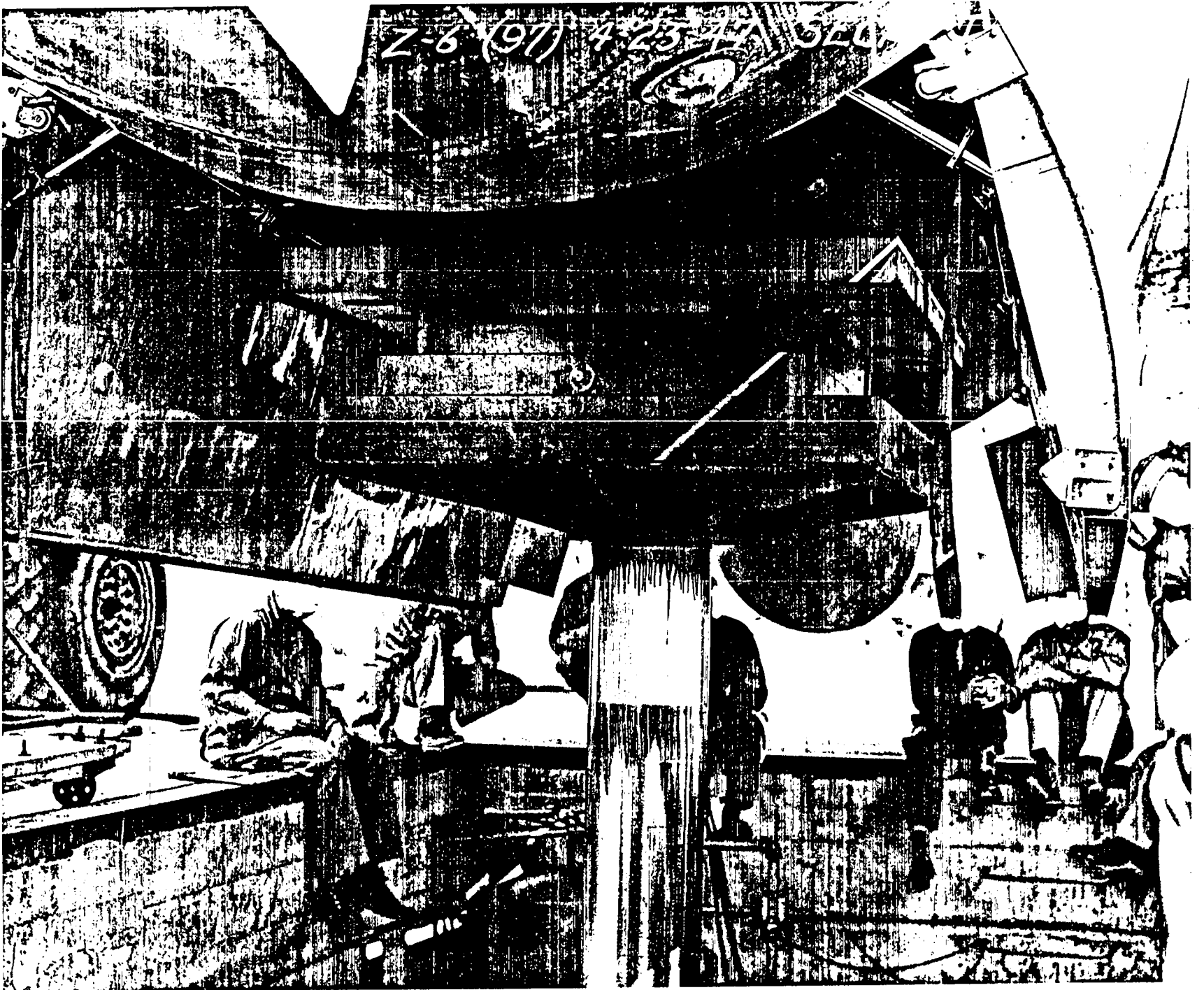


Fig. 10

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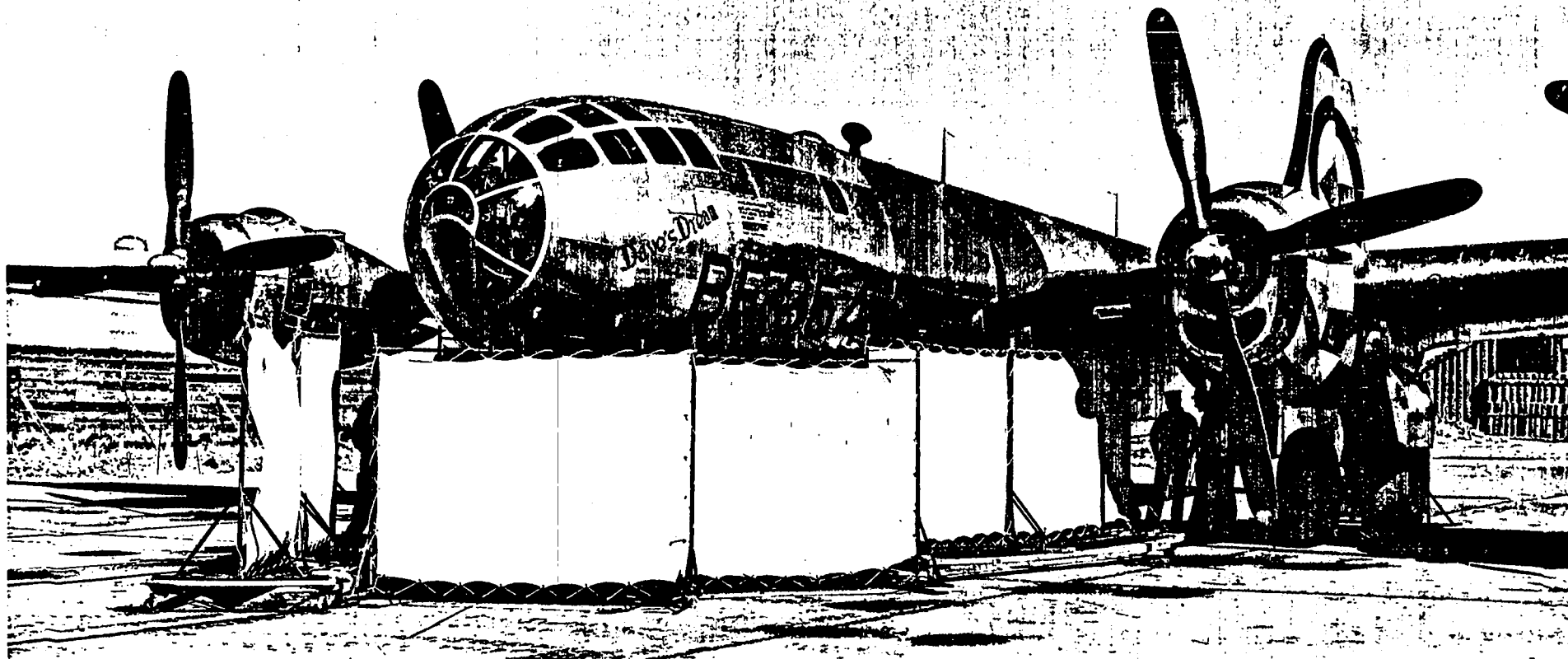


Fig 11

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