

ITEM No. 4  
FILE No V-7

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COPY No. 28

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PICTORIAL REPORT  
V-1 LAUNCHING SYSTEM

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**Hq. ASF.**  
**CLASSIFICATION CANCELED**

BY AUTHORITY OF THE CG, ASF  
Name **HERBERT G. KING**  
Rank Lt. Colonel  
Office **Intelligence Div., ASF**  
Date .....

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COMBINED INTELLIGENCE OBJECTIVES  
SUB COMMITTEE

- CERTIFICATE -

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Item 4 File V-7

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PICTORIAL REPORT  
V-1 LAUNCHING SYSTEM

18 September, 1944

Report by

Dr. C.N. HICKMAN  
ALSOS MISSION

CIOS Black List Item - 4  
rockets

COMBINED INTELLIGENCE OBJECTIVES  
SUB-COMMITTEE  
G-2 DIVISION, SHAEF (Rear) APO-413

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PERSONNEL OF INSPECTION TEAM

Dr. C.N. HICKMAN (U.S.) ALSOS Mission  
Chairman

Dr. LAURITSEN (U.S.) ALSOS Mission  
Squadron Leader S.L. BALLARD (Br.) TAF  
Captain CHROMARTIE (U.S.) ALSOS Mission

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I-INTRODUCTION

In a previous report dated Sept. 12, a chronological record was given of a six-day expedition to V-1 launching sites in France. Squadron Leader S. L. Ballard of the British TAF joined the ALSOS group on this expedition. Dr. Lauritsen, Capt, Chromartie and C. N. Hickman represented the ALSOS Mission.

Of the 21 sites inspected there were four of special interest. In the order in which they were visited, these were Nos. 15, 17, 18 and 21. In this report these numbers will be used when referring to the location of the equipment photographed. The locations and nearest villages to these sites are as follows:-

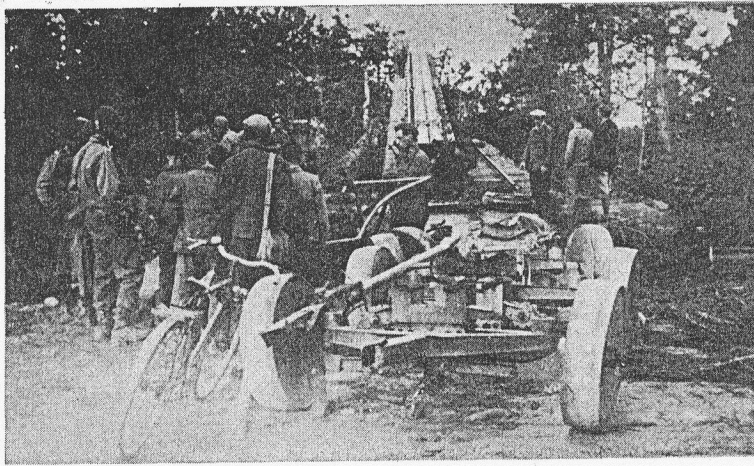
Site 15,	Coordinates,	M 660-530,	near Coquireaux.
Site 17,	"	N 010-680,	between La Chaussee-Tirancourt and Vignacourt.
Site 18,	"	N 010-805,	near Berneuil.
Site 21,	"	N 055-960,	near Villers l'Hopital.

The photographs are numbered and the discription or title follows the corresponding number.

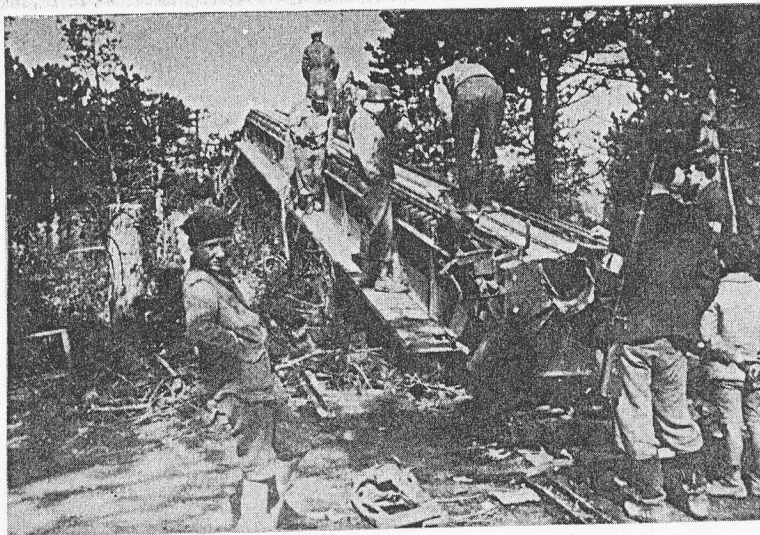
It may be stated here that the V-1 Robots are launched by a fin attached to a piston which is fired from a long gun. The gun tube has a slit running the entire length through which the fin projects. The slit is closed by a small pipe which also extends the full length of the gun. The fuel used is hydrogen peroxide and potassium permanganate. The combustion takes place in a chamber that is attached to the breech end of the gun tube by an interrupted flange and corresponding collar. More details will be found in the Agenda following the photographs.

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II PICTORIAL SECTION

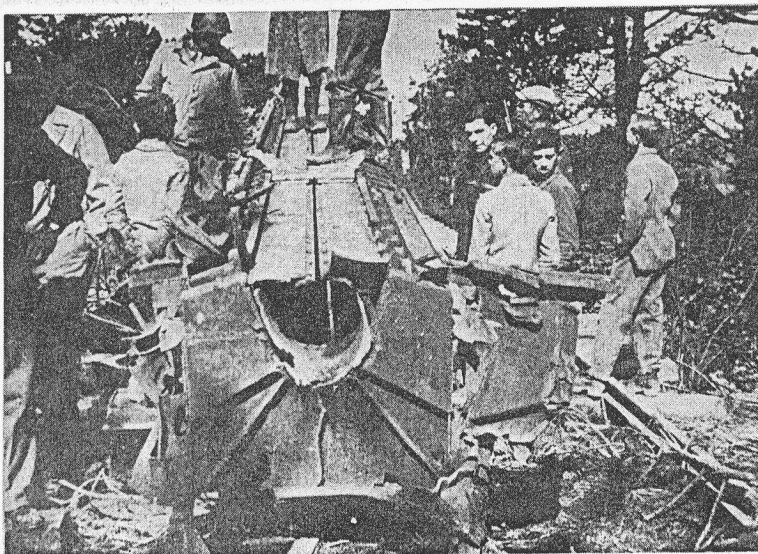


1. Breech view of wrecked ramp at site No. 17. Three road transportation cars are shown in the foreground.

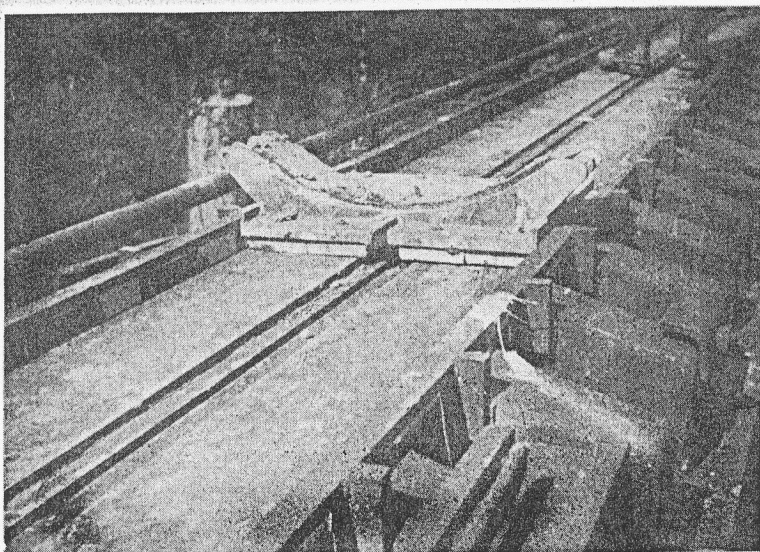


2. A closer view of the wrecked ramp at Sit No. 17. The elevation of all ramps measured was about 8.6 degrees. The cat walk at the left of the ramp is used by the crew in stringing the pipe valve along the slit. There is a hand rail along this side.

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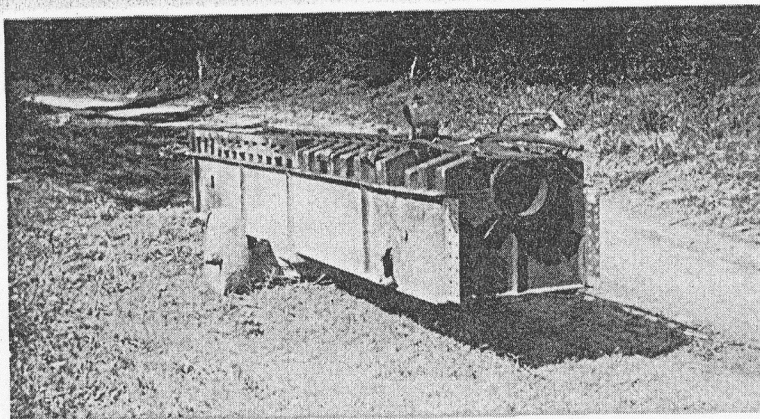


3. A still closer view of this ramp. The ribbed casting in the foreground is about 35" square and has a thickness of  $4\frac{3}{8}$ ". The split gun tube is welded in the "U" shaped part of the casting. The spacing between castings is  $10\frac{1}{8}$ ". These are welded together by the  $7\frac{1}{4}$  x  $\frac{3}{4}$ " plates at the top, by side plates and by "T" shaped members which have a screw that is attached to the top plates. Along the edges of the steel plates are two guide rails made of  $1\frac{1}{16}$  x  $\frac{5}{8}$ " strap steel. A saddle slides on the steel plates and is guided by these rails. A saddle may be seen on the ramp.

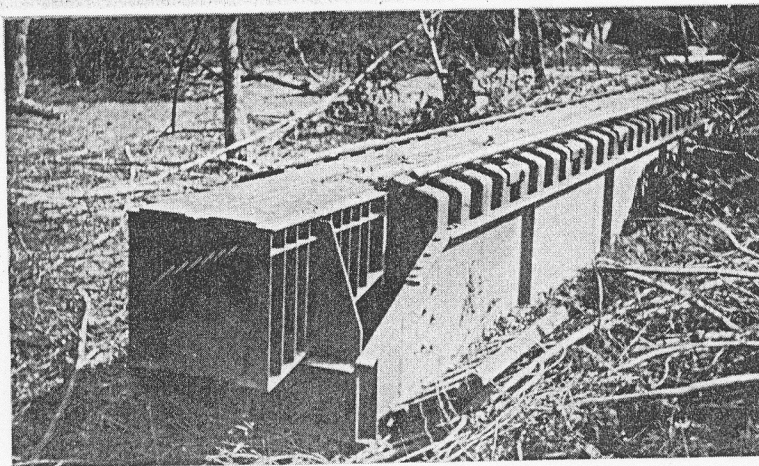


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4. Close view of the saddle. The hand rail may be seen at the left.

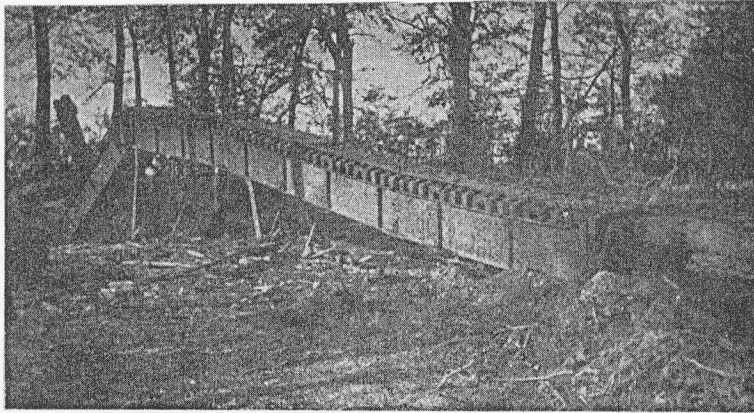


5. Breech section of a ramp loaded on a road cart at site No. 18. The breech of this section is on the far end and the flange portion of the tube was broken off. This section was probably going back for repair. The ramp is made in sections like this one. The length of a section is about 18 feet. The side plates are bolted together and the tube has flanges which are bolted together.



6. Muzzle end of wrecked ramp at site No. 18. The end of the ramp terminates in a muzzle break. This is probably used to vent the gun so that the robot will not be subject to the muzzle blast rather than to reduce recoil.



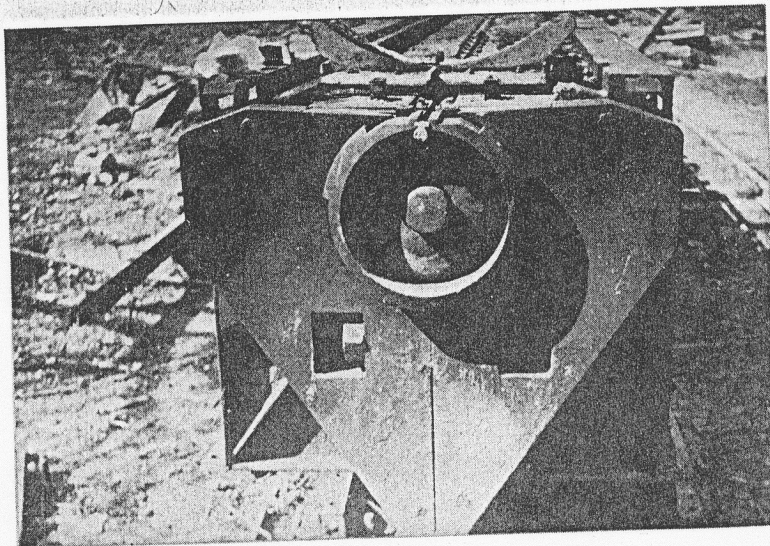


7. Portion of wrecked ramp at Site No. 21.

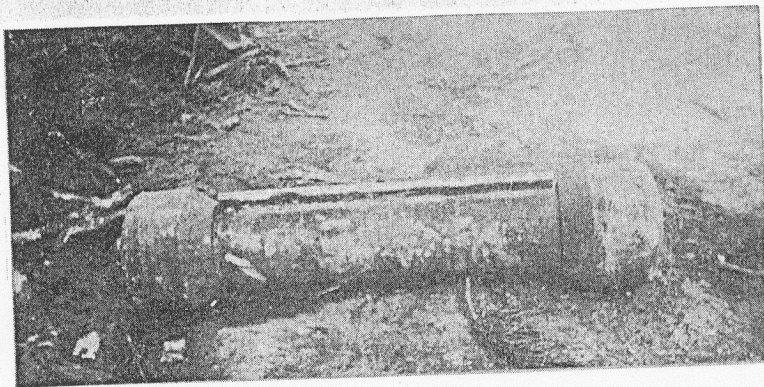


8. Breech end of wrecked ramp at Site No. 18. The end of this ramp shows the interrupted flange to which the combustion chamber is attached.

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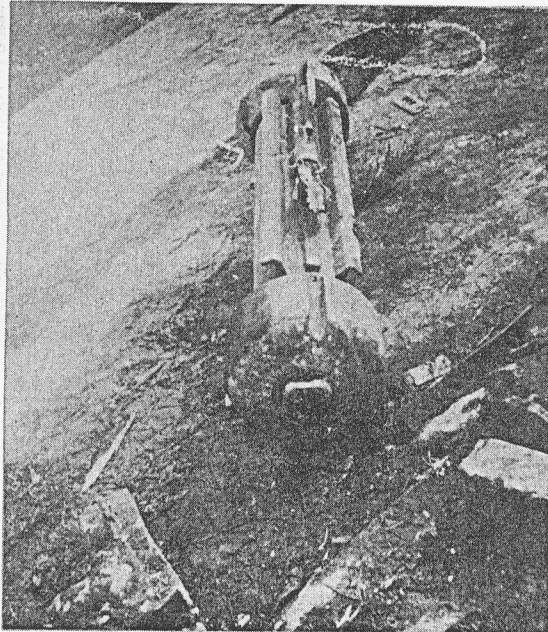


9. Close view of breech end of ramp at Site No. 18. The piston is in the split tube. Note the interrupted flange to which the combustion chamber is attached. A "T" shaped bolt may be seen in the tube slot. This bolt is screwed to the 1" diameter pipe valve that seals the slot. A saddle is shown on the runway of the ramp.

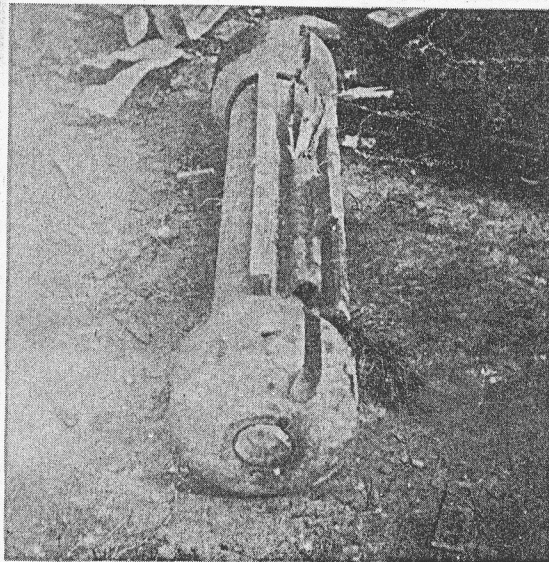


10. Side view of dumbbell shaped piston at Site No. 17. The length of the piston is 51 inches and the diameter of the end member is about  $11\frac{1}{2}$  inches. The middle pipe is  $7\frac{1}{4}$  inches in diameter. One of two shoes is shown in the picture. The piston weighs about 300 lbs.

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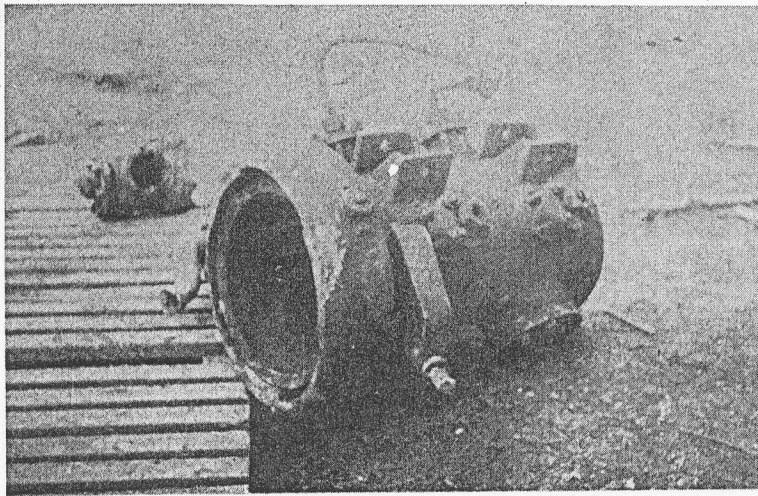
11. Rear view of the piston. Both shoes may be seen and the fin is at the far end. This fin is attached to a "U" shaped member through which the pipe valve passes. In this picture there is a piece of wood in the hole through which the pipe passes. It was wedged so tight that we could not remove it. The groove in the end portion of the piston is for the pipe valve.



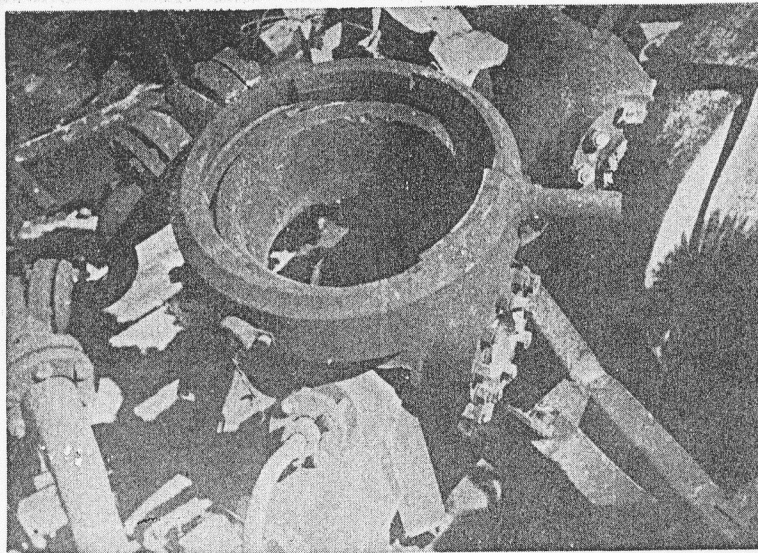
12. Front view of piston. This end also has a groove for the pipe

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valve. The fin and hole through the pipe valve passes may be seen.

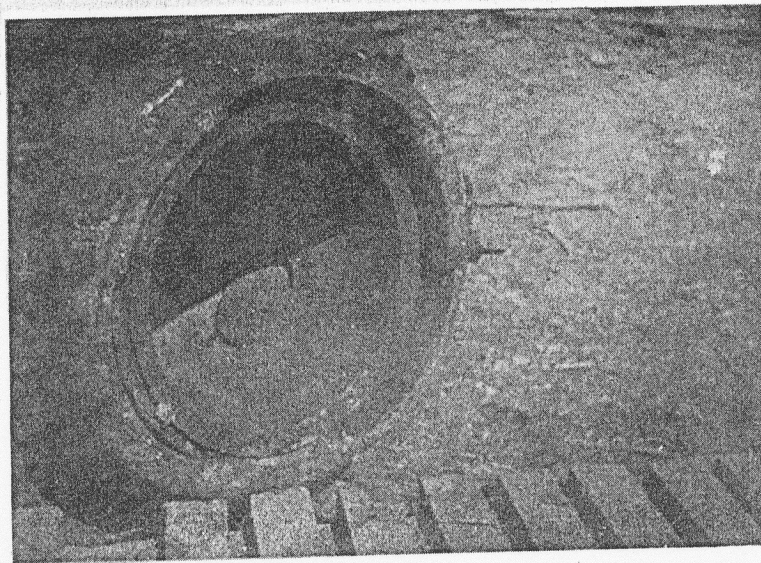


13. Combustion chamber at Site No. 17: These are 4 large aluminum tubes attached to this chamber which terminates in convex perforated discs. Hydrogen peroxide fuel is forced into the Chamber by compressed air. There are also 4 similar tubes and smaller perforated inlets for the potassium permanganate fuel. The combustion chamber, together with fuel tanks, compressed air cylinders and electromagnetic control valves are mounted on a four wheel car.

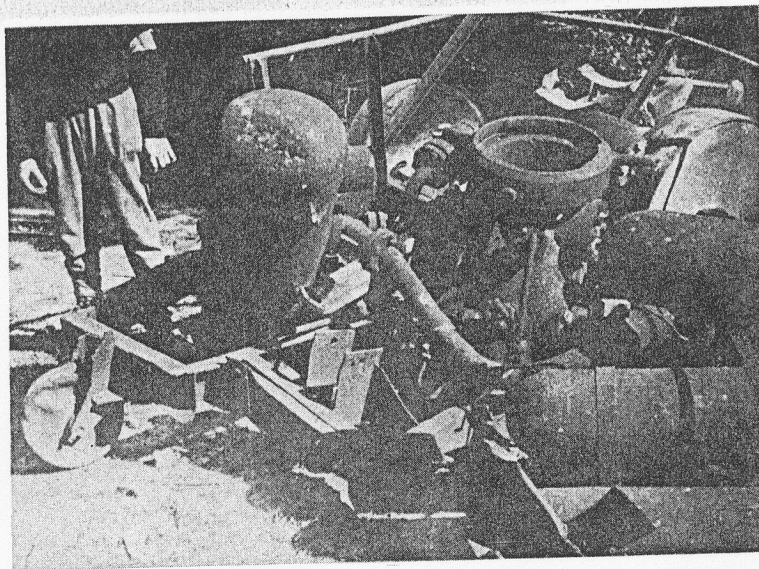


14. A close-up view of the combustion chamber showing the collar for attaching it to the launching tube.

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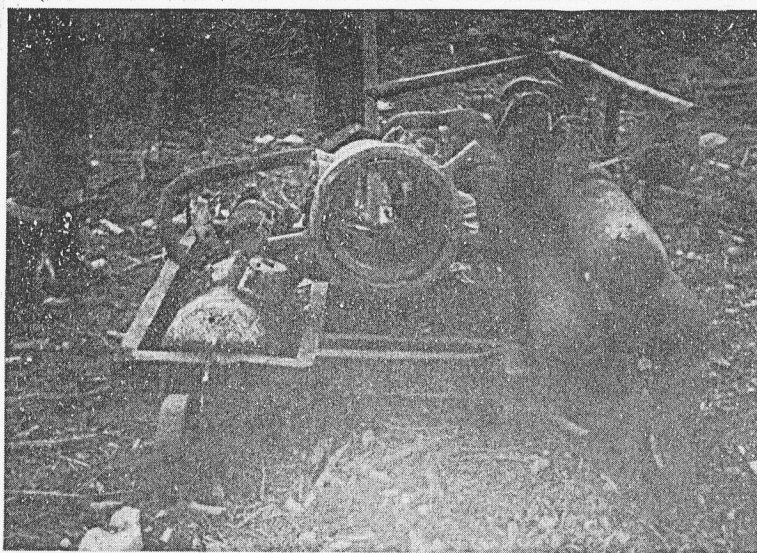
15. Interior of the combustion chamber showing one of the 4 inlets for the hydrogen peroxide fuel.



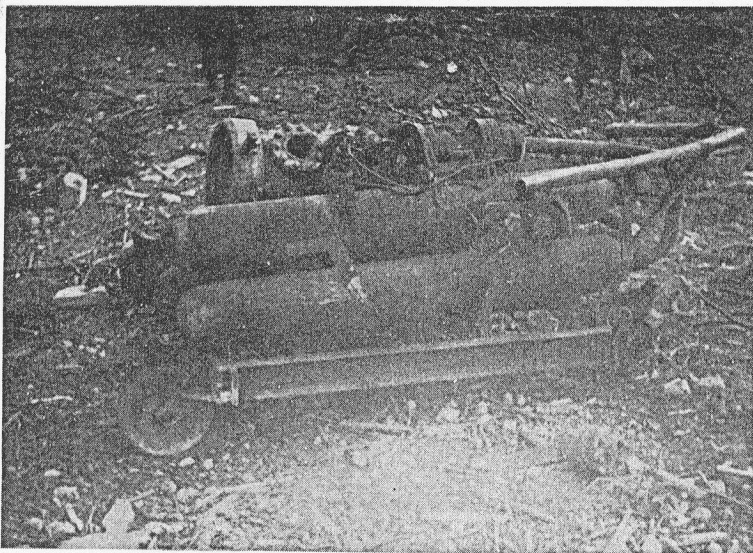
16. A wrecked breech car at Site No. 17, showing fuel cans, combustion chamber and compressed air cylinders.



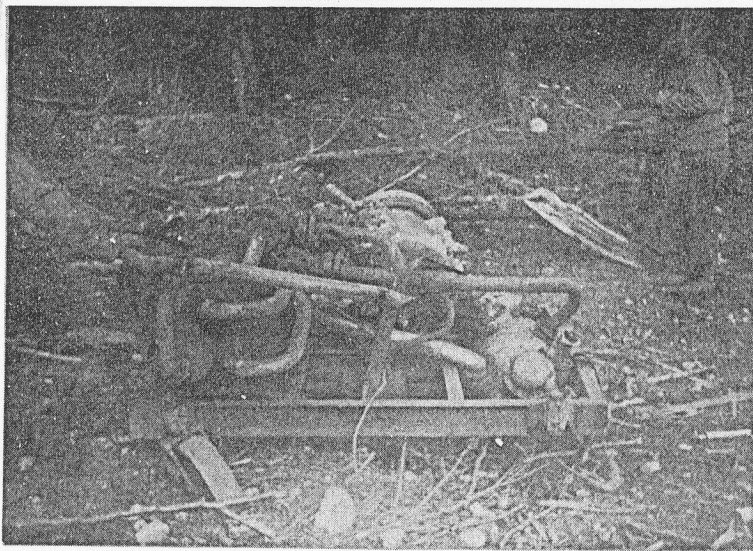
17. Wrecked breech car at Site No. 21. The car is upside down.



18. Front view of this car turned right side up. The hydrogen peroxide tank is on the left.

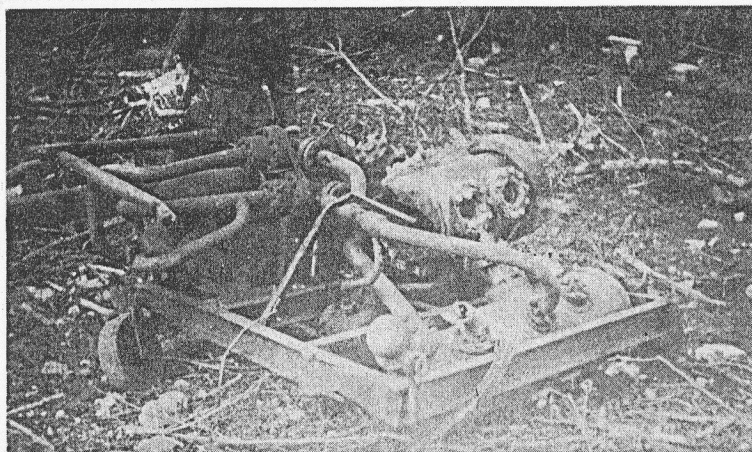


19. Side view of breech car. The compressed air cylinders are in the foreground.



20. Rear view of breech car.

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21. Diagonal view of breech car. This car is pushed up to the landing tube, the breech block chamber attached to the launching tube and by remote control the fuels are started. No spark is needed. It is assumed that the valve on the car increases the air pressure and thereby the quantity of fuel injected as the piston moves through the launching tube. In this manner constant pressure and constant acceleration may be obtained. At each site there is a house or wall provided with a large pipe passing through the wall. The breech car is pushed up to the pipe and the fuel tested. On the other side of the wall a drain ditch takes care of any excess fuel.



22. A potassium permanganate iron can at Site No. 18. This is probably a dose for one launching. The corresponding can for the hydrogen

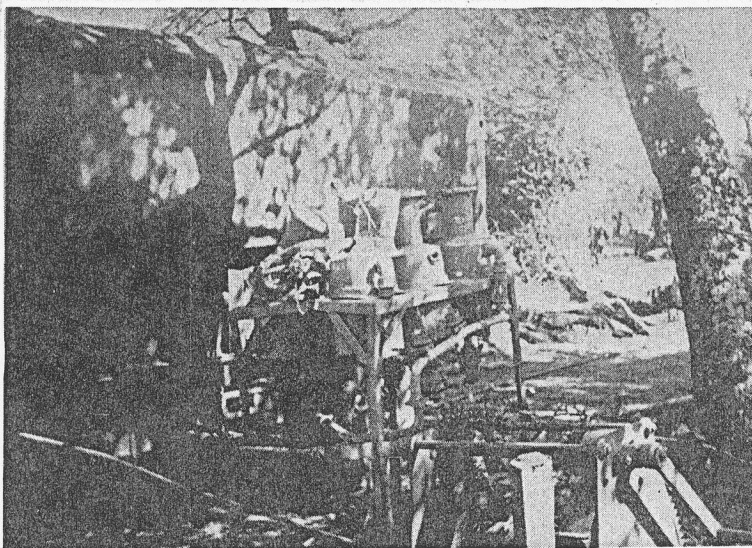


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peroxide fuel is made of aluminum and has a capacity of about 5 gallons. See double exposure picture No. 30 for outline of this can.

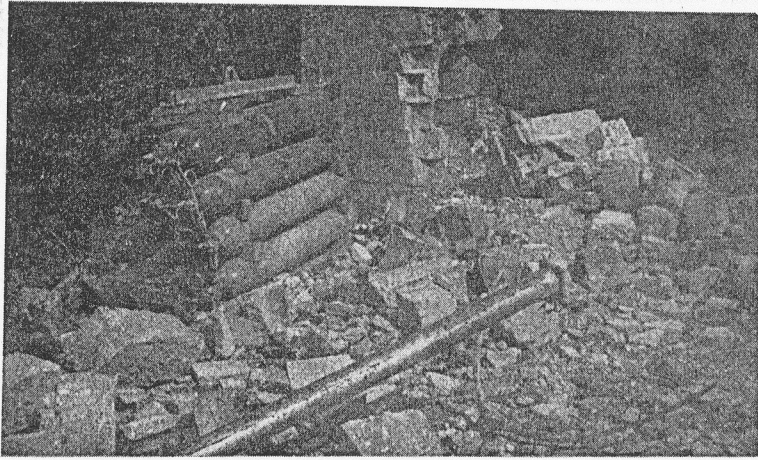


23. A wrecked aluminum storage can at Site No. 21. This can holds more than the other one.

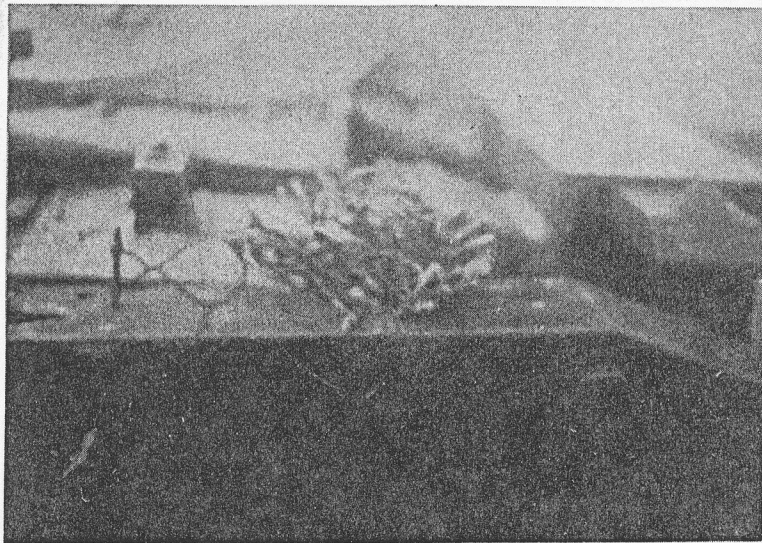


24. Filler system at Site No. 18. The purpose of this apparatus is not fully known. It is possible that the smaller "one dose cans" are filled here.

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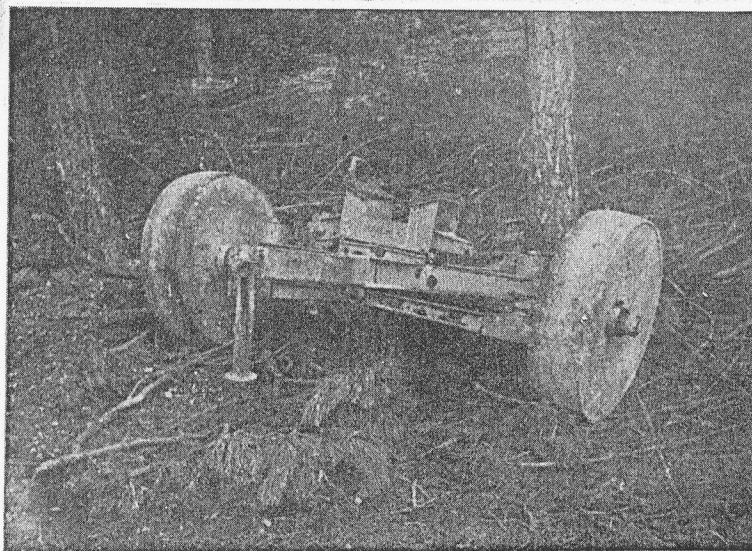
25. Nest of compressed air cylinders. This apparatus may be part of a system for recharging the air cylinders.



26. Bundle of wire suspension loops for holding the pipe valve adjacent to the slit in the tube. As the piston moves through the tube these loops are scraped off. It is necessary for the crew to suspend the pipe valve with these wire loops after every launching. A single loop from the bundle is shown at the left. Each time a robot is launched the piston falls at a distance of from one to two kilometers from the site. It is retrieved and used again. Due to its light weight, the saddle only goes a distance of from 100 to 200 meters.

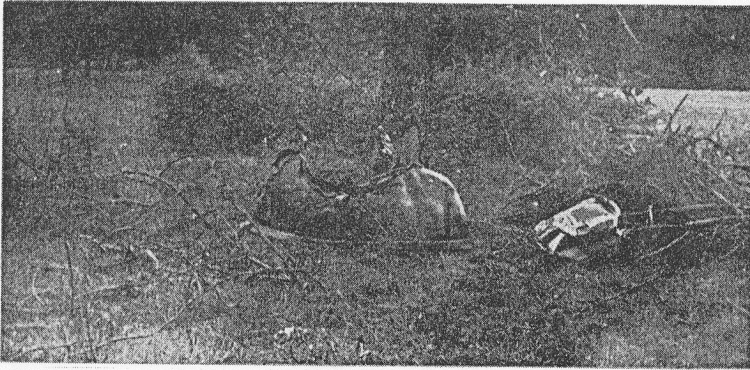


27. Abandoned German anti-aircraft gun at site No. 18. The French say that the Germans only had about two hours in which to leave sites 17 and 18. They made frantic efforts to hide or destroy the equipment but could not do much in such a short time. There was a large store of anti-aircraft ammunition on the site. Anti-aircraft guns were also left at site No. 17.

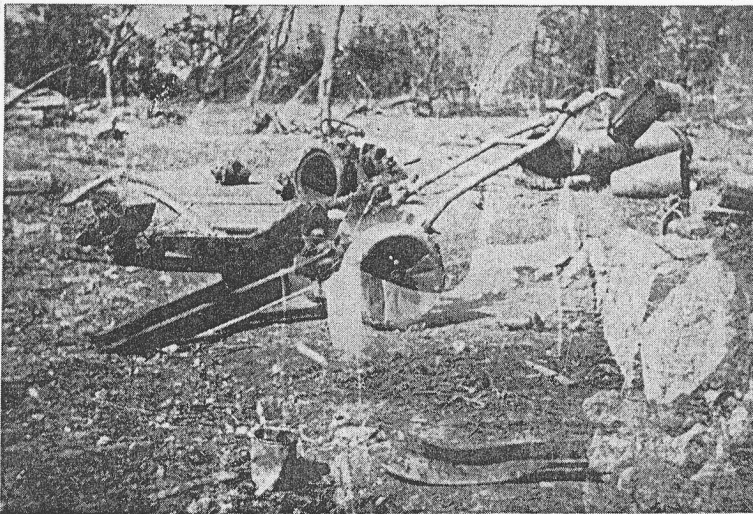


28. One of the road carts used in transporting the robots and gun sections at site No. 17.

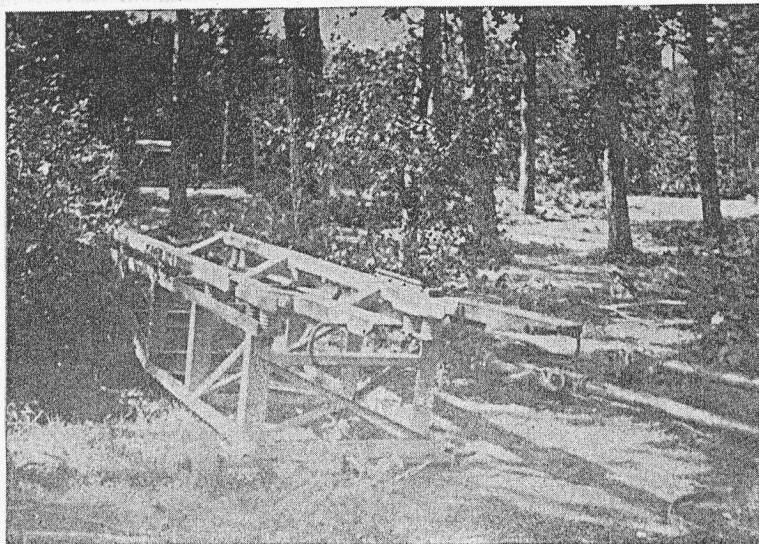
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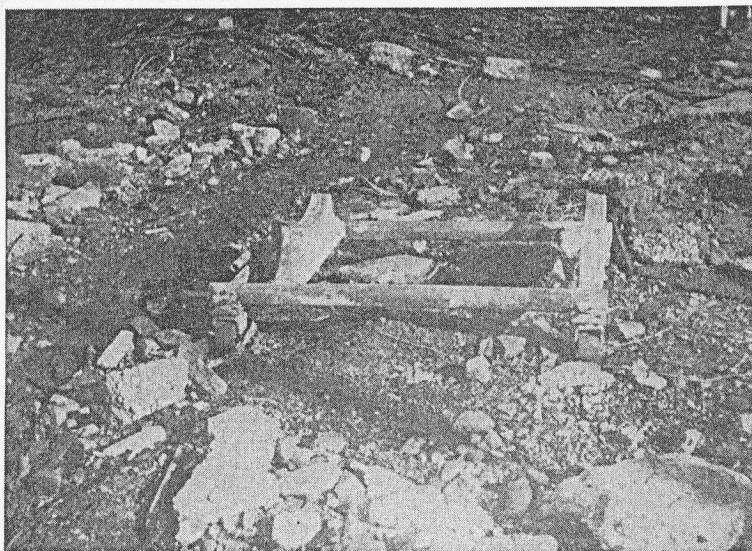
29. Wreckage of a V-1 at Site No. 3: Near all sites which had been used, there were wrecks of V-1s. The French say that  $\frac{1}{3}$  of all robots launched failed to fly properly. They say that often the fuel tanks fail and the robot burns. In some cases the robot turned 180 degrees and landed behind the site.



30. V-1 wreck at Site No. 18. This is a double exposure. The faint outline of an aluminum can for hydrogen peroxide may be seen in this picture.



31. Loading truck for placing robots on the ramp. The extensions in the foreground are adjustable to correspond to the height of the ramp.

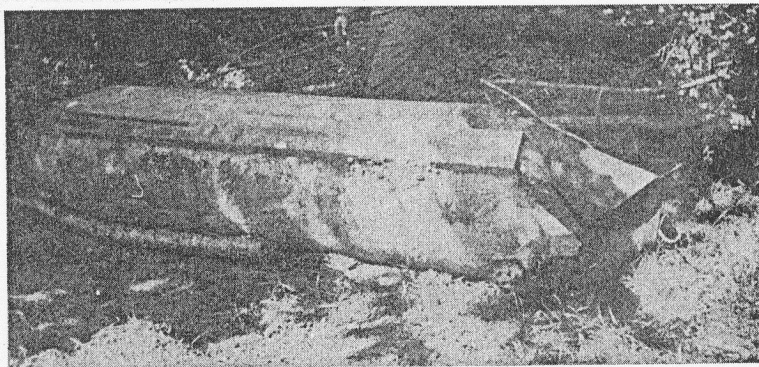


32. A small truck at Site No. 21. The purpose of this truck is not known.

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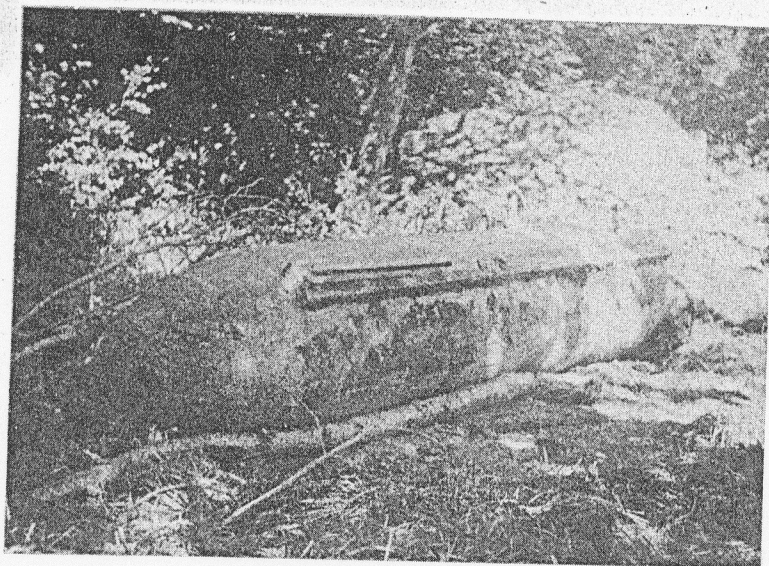


33. Wench for large crane hoist. At each site there was a large crane which runs on rails spaced about 14 feet apart. These rails extend the full length of the ramp and the crane is high enough to use at the muzzle end. Some cranes were made of steel and some of wood. The crane was used in construction and repairs. Note the piston lying in the foreground.



34. Rear view of practice projectile at Site No. 18. Note groove for the piston fin. This is the same type of groove as on the robot. It is assumed that the projectile had the same weight as the robot and that it was used to test the launching equipment.

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35. Front or nose view of the practice projectile. These projectiles may have had fins.

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III-AGENDA

Twenty one sites were inspected during the six day expedition. These included the so called "Ski Sites", "Modified Ski-Sites" and "Construction Work". The Ski Sites were very elaborate. In addition to the ramp, cement roads, test house, assembly house, explosion proof shelters and non-magnetic platform on which the gyro compass was set, the Ski Sites had long storage sheds with walls made of cement blocks. The ramp way was shielded on each side with walls made of cement blocks. The preparation of a Ski Site would take at least ten times as much labor and time as the most elaborate Modified Ski Site visited. Some of the Modified Ski Sites had only the ramp way, cement roads and a test wall made in a substantial manner. The shelters were made of logs and earth. Many of these sites had no chateau for the crew. They were placed in a dense growth of tall trees. Only the lower limbs were removed and a passage way large enough to take the wing spread of a robot was provided. At one location the natives said that the site was being used 15 days after the Germans arrived. Only one "Construction Work" site was inspected. It appeared to be made for quartering troops. Huge pits were dug and brick (used brick) houses were built in them and covered over with sod. Only the chimneys projected through the roof which was level with the adjacent terrain. The rooms were small and opened onto a hall. The number of rooms was too great for a V-1 crew. We were told that 48 men were used at one of the V-1 sites. Many of the V-1 sites were near a large chateau where the men were quartered. In all cases they had taken or burned all papers.

There were many sites not listed. For every known site there was one or more in the same vicinity. The known sites were all heavily bombed and with one exception the bombing had been very effective. In some cases the first bombing mission had missed the target but the second time the damage done was so great that the site was abandoned. At two sites there was evidence that repair work had been done after the raid but we were told by the French that after the second raid the Germans had left. The bombs had destroyed quarters, test houses, shelter houses, roadways and in several instances the ramp. It should, however, not be assumed that the bombing reduced the number of V-1s that were launched. There is considerable evidence that they had more facilities for launching than were needed for the number of robots that could be delivered. While the rampway seemed to be identical at all sites except for the cement block walls at the Ski Sites, no fixed plan was followed in locating the test house and non-magnetic platform. The location of houses, shelters and cement roads seemed to be dictated by the trees. At two sites a public road was used as part of the passage way. At one site the robots were launched across the road. We did not ascertain whether the road was closed or not.

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It is rather amazing that so many sites could be built and used without permitting an agent to discover the method of launching. In all the investigations made in Paris and vicinity no plant has yet been located where vital parts for the V-1 were made. Plants were found making parts for the V-2 but they thought they were for the V-1. We have found no one in France who knew how the V-1 was launched. We have heard rumors that the fuel used was hazardous to handle and that volunteers were obtained for this work and extra pay given. We have also heard of premature explosions on the ramp which killed many crew members. There must have been considerable danger in connection with the launching because shelters were always provided. Some of these shelters were very massive although in the simpler sites they were holes in the ground lined with logs. These, however, were at greater distances from the ramp than the cement ones. Many of the sites visited had not been completed. One site had been abandoned after a bombing raid which took place before the site was completed. Another one was installed near by. The number of robots launched from a site varied. At one site they had never launched more than one V-1 every two hours and generally about three per day. There was one site where the natives said they sometimes launched at the rate of two per hour. The rate of launching may have depended on the number that could be delivered. The trees and bushes were heavily coated with a dark gummy substance in front of the ramp. The area covered was as much as fifty yards in front and the width was as great as 30 yards. The muzzle brake, no doubt, accounted for the wide spread. At a distance of about 1000 yards in front of the ramp we could see marks which were probably made by the piston as it landed. At one site they had stakes driven in the ground covering a rather large area which marked these impact points.

Since we were primarily interested in determining the method of launching we did not spend much time at these sites. We pushed on until we located sites 15, 17, 18 and 21 where the method of launching was definitely disclosed. It is possible that much valuable information might be obtained by visiting more of the "Ski Sites" and "Construction Work" sites. It is possible that storage places may be discovered in the vicinity of these sites.