layman is that of a Swedish Air Force pilot. On 14 August, at 1000 hours, he was flying at 650 feet over central Sweden when he saw a dark, cigar-shaped object about 50 feet long and 3 feet in diameter flying 200 feet above and approximately 6,500 feet away from him at an estimated speed of 400 m. p. h. The missile had no visible wings, rudder, or other projecting part; and there was no indication of any flame or light as has been reported in the majority of other sightings. His report states that the missile was maintaining a constant altitude over the ground and, consequently, was following the large features of the terrain. The last statement casts doubt on the reliability of the entire report because of the inability of a missile, without wings, to maintain a constant altitude over hilly terrain. However, the pilot does imply that there may have been wings which he was unable to see, because he stated that it could not have been a Swedish jet plane as there was none flying in the vicinity at that time.

The Scandinavian press, with the exception of the Communist papers, initially reported the incidents in some detail and openly attributed them to missiles fired by the U. S. S. R. In August, a partial censorship was imposed on the press, restricting the publication of exact details or localities where missiles were seen. The Communist press has continued to ridicule the entire matter and claims that there was no basis for the reports that the missiles were of Soviet origin. In fact, a charge was made that they came from the United States and that Gen. Doolittle was sent over to observe the effects of the missiles!

Official Investigations

Official investigations of these reports were begun by the Swedish authorities in June. The Defense Staff requested the public to report any unusual observations, and by the

end of July almost 1,000 such reports had been received. The investigation has been carried out by the Swedish Defense Staff in a very peculiar manner. In the beginning, many of the key personnel were on summer leave, and they were not recalled to deal with the problem. Spokesmen for the Defense Staff repeatedly have told the United States Military Attaché that they definitely believed there were rockets over Sweden, and that they were launched by the Soviets from Peenemünde on the German Baltic coast. However, they have not been able to produce any evidence to support these statements. To date, no United States military or naval personnel in Sweden have seen any fragments, points of impact, or other direct evidence to prove that guided missiles have appeared over Sweden.

The official communiqués issued to the press by the Defense Staff have not reflected the same tone as the statements made by individual officers in conversations. In fact, the communiqués themselves have varied. The last one, issued on 10 October, very strongly indicated that the great majority of the reported incidents were of celestial origin, which is a complete change from the one of 6 August when it was reported that, except in a few cases, they could not be meteorites.*

Attitude of Swedish Officials

To arrive at any definite conclusion from the conflicting evidence available on these reported missiles is impossible. The contradictory attitude of Swedish officialdom would tend to indicate that it was doing very little to arrive at a definite conclusion, perhaps for political purposes. The complete change in attitude between the communiqués issued on

* In September and October, flying objects were reported over widely separate points in Europe and Africa, including Belgium, Greece, Italy, Morocco, and Austria. In the main, these reports have not been confirmed and appear to be due to explainable causes, such as meteors or *Very* flares, fireworks, etc.

6 August and 10 October indicates that the Swedish Staff was trying to minimize the entire matter which had grown to such a size that the Staff was afraid of its having official repercussions on Swedish-Soviet relations.

Conclusions

The Soviets are known to be working on various guided missiles. They have the ability to produce, and probably have tested, missiles of the V–1 type. Without warheads and with slightly improved motors, these missiles could have a range of 500 miles, and are the only available German missiles believed capable of horizontal flight at low altitudes. There is some evidence that such work has been carried out at Stolp (in Polish-administered Germany) or on the Baltic islands of Oesel or Dago. Three of the people reporting sightings have mentioned the noise of an outboard motor, a characteristic of the impulse duct motor used on the V–1 by the Germans; and one of them stated that what he saw looked like the V–1 he had seen over London during the war. Others have reported little or no sound, a condition which may indicate the use of a turbo-jet instead of a pulse-jet.

The best evidence, at present, is that there have been only 2 or 3 real incidents, perhaps as many as 5 or 10, of low-flying missiles of the V–1 type. The high-altitude missiles reported seem definitely to have been meteors or fireworks. The Swedish Defense Staff probably has taken advantage of the situation for political purposes and allowed the newspapers to make a big story out of the missiles, without admitting that the Staff had any evidence to indicate that there actually were any such missiles. This was done at a time when the Swedish public was demanding reductions in defense expenditures.

SCIENTIFIC DEVELOPMENTS

GUIDED MISSILE COUNTER-MEASURES

Much has been written about the potentialities of guided missiles in a future war, and the thinking of military leaders everywhere has been considerably influenced by these considerations. The thought which immediately occurs to a nation planning defenses against possible aggression is: "What can be done to counter enemy use of guided missiles?" Let us examine the situation and see whether *anything* can be done.

Missiles and Their Control

First of all, the type of guided missile which has the greatest strategic potential is the long-range, surface-to-surface missile, similar to the V–1 or V–2, but developed to a far greater extent. There is no doubt that a missile capable of speeds just under those at which air friction would heat the skin above usable temperatures, and capable of accurately directed flight for great-circle distances of 3,000 miles or more, would indeed be a weapon whose effects could be overwhelming. There are also other categories of guided missiles now under development, such as air-to-surface, air-to-air, and surface-to-air, which will have tactical applications of considerable importance. In all cases, however, the success of the weapon depends predominantly upon its accuracy, which, in turn, depends upon the control system.

Control systems* may operate upon several principles,

* See *Int. Rev.* No. 35, page 47.

such as pre-set, command,* or homing, or upon various combinations of these. The pre-set devices are the most nearly invulnerable to interference, but also are inherently the least accurate.** The latter two principles, command and homing, must, as far as can be determined at the present state of our scientific knowledge, utilize in some way a transmission of electromagnetic waves*** through space. For this reason, any countermeasures designed to interfere with the guided missile control system will most likely also utilize such transmissions to achieve their purpose.

Countermeasures

Countermeasures to guided missiles may be considered as falling into two general divisions: (1) detection of the missile in sufficient time to ward off some of its devastating effects; (2) the actual process of warding off or neutralizing its power.

The timely detection of guided missiles, which constitutes the first step in any active guided missile countermeasures, presents difficult problems. The solution of these problems may be accomplished by the development and use of extremely long-range radar; the use of normal detection devices (radar, visual, or aural) on outlying bases; other means, such as detection of the radiations from its control system; or combinations of two or more of the above. None of these can be considered infallible. Even the best radar is subject to technical defects which may cause it to malfunction at a critical moment. In addition, the human element of the

* The use of "command" is here expanded to include also beam riding and navigational network guidance.

** The development of automatic celestial navigation systems may eventually overcome the lack of accuracy noted in present-day pre-set systems.

*** Electromagnetic waves include radio waves of all frequencies, infrared, visible light, X-rays, and similar radiations.

ize bombing forays or sabotage groups, such action must be considered as a distinct capability.

Those missiles which are launched may also be attacked while in flight. This action probably will be accomplished by smaller guided missiles aimed to intercept the projectile and destroy it before it can approach within effective range of its target. Although statements have been made in the public press that this is the only defense against remote-controlled atomic bombing, exclusive reliance by any nation upon such a countermeasure would be unsafe. The danger in this case lies in the many factors which must be coordinated to secure an effective antiaircraft screen. If any phase of the system should break down (and experience has proved that, in warfare, this happens all too often), the entire operation of the system might be impaired to such an extent that at least some projectiles could get through.

Beyond this, a basic difficulty to the use of antiaircraft missiles against supersonic guided missiles lies in the requirement that they must, in general, be sensibly faster than the missile they are to counter. Since guided missiles most likely will travel as close to the maximum speed* as possible, the use of very much higher speeds by smaller missiles appears to be out of the question at present. It is significant, also, that no missile system has yet been developed that is capable of intercepting even a V–2, such as that in operational use two years ago.

c. Strategic Countermeasures.—Although it is a practical certainty that the initiation of a well-organized offensive using guided missiles and atomic bombs could result in reducing the effective resistance of an enemy nation in a matter of hours, it

*The maximum speed of a missile traveling through atmosphere is that at which the temperature caused by air friction does not exceed the limits imposed by physical strength of the structure or igniting temperature of the explosive or fuel, or render inoperative any of the essential mechanism.

ize bombing forays or sabotage groups, such action must be considered as a distinct capability.

Those missiles which are launched may also be attacked while in flight. This action probably will be accomplished by smaller guided missiles aimed to intercept the projectile and destroy it before it can approach within effective range of its target. Although statements have been made in the public press that this is the only defense against remote-controlled atomic bombing, exclusive reliance by any nation upon such a countermeasure would be unsafe. The danger in this case lies in the many factors which must be coordinated to secure an effective antiaircraft screen. If any phase of the system should break down (and experience has proved that, in warfare, this happens all too often), the entire operation of the system might be impaired to such an extent that at least some projectiles could get through.

Beyond this, a basic difficulty to the use of antiaircraft missiles against supersonic guided missiles lies in the requirement that they must, in general, be sensibly faster than the missile they are to counter. Since guided missiles most likely will travel as close to the maximum speed* as possible, the use of very much higher speeds by smaller missiles appears to be out of the question at present. It is significant, also, that no missile system has yet been developed that is capable of intercepting even a V–2, such as that in operational use two years ago.

c. Strategic Countermeasures.—Although it is a practical certainty that the initiation of a well-organized offensive using guided missiles and atomic bombs could result in reducing the effective resistance of an enemy nation in a matter of hours, it

*The maximum speed of a missile traveling through atmosphere is that at which the temperature caused by air friction does not exceed the limits imposed by physical strength of the structure or igniting temperature of the explosive or fuel, or render inoperative any of the essential mechanism.

may be that circumstances would, fortuitously, avert such a cataclysmic defeat and permit a defense to be set up. If the enemy should be able to hold out against such an attack for a period which may need to be as much as six months or even several years, advantage may be taken of the use of strategic action. This action includes destruction of raw or semi-processed materials in the enemy country or at their sources, disruption of transportation, and other means for preventing production of the missiles.

d. Electronic Countermeasures.—The electronic control system of guided missiles is, perhaps, the most vulnerable aspect of the weapon once it is in flight. Even the control system, however, is inherently difficult to counter. For one thing, most guiding (command) systems probably will utilize a radio or radar signal focused into a very narrow beam and directed at the missile. The narrower the beam, in general, the better the control, but the more difficult it is for the defender to detect. The receiving apparatus on the missile is also designed to function only in response to signals received from within a sector of about 60 degrees, normally to the rear and so away from jamming equipment. Thus, it would require a very strong jamming signal to force sufficient interference into the receiving system to upset it. Other considerations also affect the picture, but they are of too technical a nature to come within the scope of this article.

Two exceptions to this inherent freedom from interference are: (1) the homing type of control in which the jamming signal can be directed at the receiver in the nose of the missile; and (2) the beacon method of course correction in which the control signal comes from a surface location close to the target, with a rather broad radiating beam. In this case, the beacon could be silenced by ordinary military action. Another jamming action may be employed, although it is not usually considered as action against guided missile control. This is

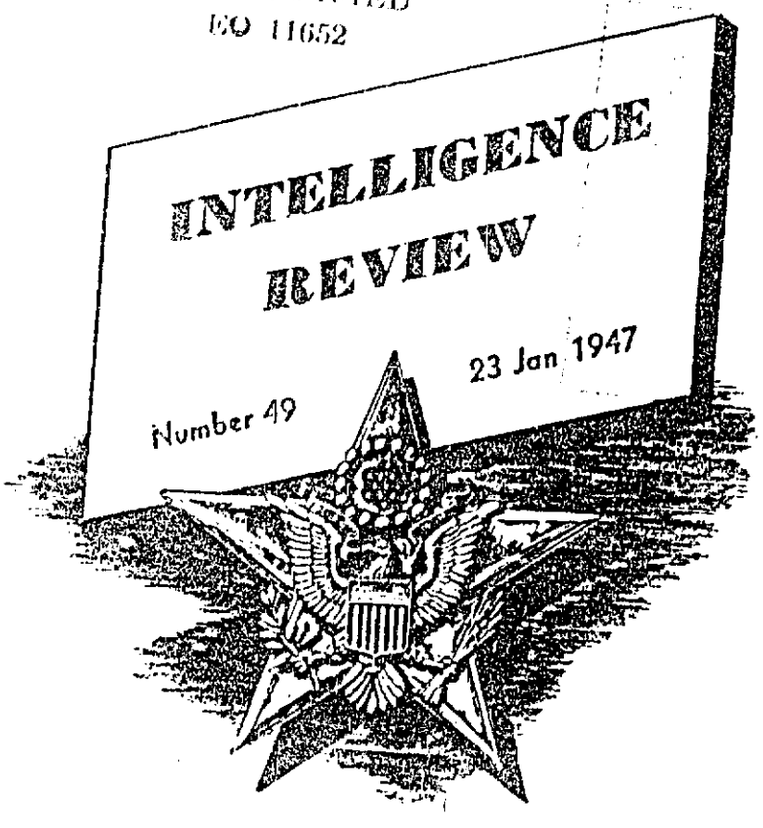
the jamming of proximity-fuse circuits (if used) with the object of exploding the missile prematurely. If accomplished at a great enough distance, such a procedure would be one of the best electronic countermeasures. Hence, for this very reason, it appears expedient that the use of electronic proximity fuses in guided missiles be held to a minimum, in spite of their otherwise great advantages.

Conclusions

Very little can be said at this stage about specific countermeasures against guided missiles. Developments in the United States and Great Britain may be taken as indicative of the state to which the technical aspects of guided missiles have progressed. Even in these countries, however, it still has not been decided definitely just which control method or methods present the best solution. Since operations against the control system necessarily require some knowledge of that system upon which to base development of its countermeasures, probably little is being done at this time by any other nation towards producing specific equipment to jam guided missile controls. Consequently, a major portion of the work now in progress must be considered as being aimed simply towards the solution of the problem of very early warning of the approach of the missile, or towards direct or strategic countermeasures. Even if the precise system of control were known, jamming it still would present problems which may well prove very difficult, and in some cases insurmountable

KO-70365 89

Copy No. [illegible]



INTELLIGENCE DIVISION, WDGS
WAR DEPARTMENT • WASHINGTON, D. C.

90

HOMING GUIDED MISSILE DEVICES

While the zenith of missile-guiding in World War II was realized in the V-2, the success of this weapon was not dependent on target-seeking devices within the body of the rocket. Hence, the accuracy was considerably less than spectacular, if general results were not. Had homing heads* been available, the damage caused by such missiles might well have altered the course of the war. From a more or less harassing weapon, the rocket could have been a pin-point weapon, destroying vital military installations. However, the problem of controlling such a missile is very great, even if a perfect homing device were available to provide the necessary guiding signals.

Since the Germans were far advanced in the field of guided missiles, one would suspect that their efforts along homing lines were at least parallel to, and probably proportionately advanced over, those of any other country. They had, in fact, devised many such systems, in theory, and had experimented with some of them, although they did not develop any of them, except the acoustic torpedo, to the point of operational use.

Immediately after the beginning of the development of guided missiles by the Germans, the target-seeking operation—homing—was considered by the Germans, and at first condemned. This was because of the possibility that the

* Automatic devices, which will direct missiles to given targets.

enemy could discover the operation and use false targets as a countermeasure, rather than because of technical difficulties or expense of inserting homing devices into a missile." However, some German engineers and physicists began to work on this task in 1942, and repeatedly proposed new schemes in the hope of foiling countermeasure efforts.

The same cautious view was also maintained by the Germans with respect to bombs to be dropped by aircraft, especially in the last year when bombing projects were discontinued because of decreasing German air power. On the other hand, the necessary defense against bombers forced the German scientists to look for new and better defensive weapons.

Types of Homing Devices

By the autumn of 1944, there were over 200 projects, many of which were very similar in nature. In this first large but poorly coordinated effort all conceivable principles were investigated; they may be divided into the following classes: (1) Acoustical; (2) Optical; (3) Infrared; (4) Electrical (continuous wave and radar); and (5) Magnetic.

Later efforts were made to reduce the number of projects to a few which showed the greatest promise of final success. The optical and magnetic efforts were eliminated, as they showed small promise.

Each system had to be investigated in terms of the amount of energy, electromagnetic or acoustic, available for homing purposes. This was necessary not only to determine possible maximum range, but also to fix the type and quantity of control gear associated with the homing head. (Any system requires some device which will detect a target, and convert any off-course fluctuations into mechanical motion which will control guiding fins or spoilers, bringing the missile back to a target track.) The important quantity to determine is the energy coming from the target.

In active systems, the energy originates elsewhere and is only reflected from the target. In passive systems the energy originates from the target itself.

The active systems may be further classified as *fully active*, with the source of energy within the missile; or as *semi-active*, with the source of energy illuminating the target external to the missile and target. The source may be located on the ground or in a plane controlling the missile (if the system involves remote control as well as homing).

In the case of a passive device, the homing is done on the radiation emitted by the target itself; this latter type was preferred during the war. The most advanced developments were in the passive acoustic devices, particularly the acoustic homing torpedo for use by submarines. However, the application of the acoustic principle to rockets was complicated because of the high self-noise of the rocket, which drowned out other sounds, and also by the relatively slow speed of propagation of sound waves.

Applications and Countermeasures

For bombs against ships, the Germans thought that optical homing devices could distinguish between ships and waves, but that artificial fog or light would provide a defense. In the case of television homing heads, artificial fog and smoke not only give good defense, but heavy natural clouds or fog completely prevent satisfactory results.

Infrared and other heat-sensitive devices * promised to be successful although jamming by means of heat-radiating bodies located outside the target would be difficult to prevent. Owing to lack of target discrimination, the presence of more than one target (several blast furnaces, for instance) would

* Such devices may utilize a bolometer, a small strip of metal, or a semiconductor. Infrared or heat rays falling on this strip cause a change in resistance, hence a change in electrical current developed by an applied voltage. Such changes can be amplified and caused to actuate guiding mechanisms.

cause the missile to be guided on an average path between them and miss the actual target entirely. It was not considered possible to use acoustical methods against ships in the case of air missiles, in spite of their successful use in underwater torpedos. 93

Electrical beam devices of the active type were considered by the Germans to be possible but expensive. Passive ones were developed and considered good when used as an anti-jamming measure for radio-controlled bombs. When the enemy jams, he guides the missile to himself. However, a countermeasure could be a jamming transmitter in a kite or a towed buoy.

Electrostatic devices were considered *barely possible* for bombs; electromagnetic devices were considered *possible* for proximity fuzes and torpedo homing devices, as a result of German research on the effective ranges of electrostatic and electromagnetic devices.

The passive methods can be simple and, in this respect, were preferable during World War II. A number of them were under development, while the number of active methods was smaller and consisted of radar only. The acoustical method has the advantage that it can be jammed only with great difficulty; furthermore, a large acoustic power is available from plane radiation. However, owing to the relatively low velocity of sound, this method was not considered suitable for forming a collision curve or for use against modern jet-propelled planes. In addition, the self-noise emitted by the rocket is considerable and may interfere with proper operation of the acoustic device.

Most of the heat-ray methods used simple scanning systems to guide the missile to exhaust or exhaust tubes. This method could easily be jammed by dropping hot bodies, and was not suitable for daylight use. Optical television methods were considered quite vulnerable to electrical jamming (in addition

to overcast problems) and were expensive, as Germany had only a laboratory production of iconoscopes. Thus, there was no television development for flak rockets. (In fact, there were no "flak rockets", either.) 94

Of the many systems devised by the Germans, the best type (in theory, at least) was one which homed on reflected energy; it could be used against all types of planes. A ground radar transmitter radiates toward the target, which, in turn, reflects energy which may be picked up by the missile.

None of the systems devised by the Germans was put to serious use, for reasons which included lack of sufficient effective range. Some of their best devices had an upper line of sight range of around two miles; most of them, however, had a range less than this.

The electrical system of homing has the definite advantage over optical and infrared systems in that it is independent of weather conditions. Optical and infrared methods are useless in rain and fog and, to a certain extent, in darkness. Acoustical systems run into difficulties owing to self-noise of the missile, as previously mentioned.

Conclusions

With rockets and guided missiles becoming increasingly important, it is apparent that any nation interested in, and capable of, devising such weapons will concomitantly evince interest in homing devices. Successful development of long-range missiles, capable of elementary guiding up to a reasonable distance from a target—and from there guided accurately by a homing device—would produce a lethal weapon of extreme importance.

Notice

The intelligence contained in this report has been produced by the Intelligence Division as a result of careful research and analysis of information received from all sources. Any reader possessing information which appears to modify or contradict the intelligence contained herein is requested to forward it promptly to:

Director of Intelligence,
WDGS, War Department,
Washington 25, D. C.

Communications should refer to this publication, setting forth item and page to which reference is made. In reporting information, the contributor should identify and evaluate his sources and give the dates of incidents mentioned.

DISTRIBUTION

USFET	13	IADB	1	AGF	67
MTOUSA	2	OSW	1	USMA	3
USAFPAC	12	OUSW	1	CSU	10
USAFMIDPAC	3	OASW	1	ICAF	2
USAFWESPAC	2	OCS	1	NWC	12
Army Adv Op China	2	PAD	3	AFSC	5
Peiping Hqs Gp	2	OTD	2	AIS	2
USF, Austria	2	SSPD	1	Nav War Col	1
ACC, Bulgaria	2	POD	10	ONI	22
ACC, Hungary	1	RDD	1	CinCLant	1
ACC, Romania	1	CAD	4	ComNavEu	1
OMG, Germany	18	Hist Div	1	ComNavMed	1
CDC	9	OCCWS	11	ComSoLantFor	1
PCD	3	OQMG	3	CinCPac	1
Ant Dept	1	OCSigO	7	ComNavActJap	1
Alaskan Dept	2	OCE	1	ComFifthFleet	1
MAs	58	OCO	12	ComSeventhFleet	1
White House	2	OCT	5	[illegible]	20
CIG	12	OSG	1	FMFPAC	1
[illegible]	2	OTIG	1	State Dept	16
[illegible]	1	MDW	2	SWNCC	7
[illegible]	1	AAF	110	FBI	3
		Decrease Fifteenth AF 20 to 15		ID	120

N. N. I. 96—1943

SECRET

S-E-C-R-E-T

ISSUED BY THE INTELLIGENCE DIVISION
OFFICE OF CHIEF OF NAVAL OPERATIONS
NAVY DEPARTMENT

25 AM 10 04

96

INTELLIGENCE REPORT

F5- 2198

. BID 8600.0712

Serial R-5-S-47
(Start new series each year, i. e. 1—43, 2—43)

Monograph Index Guide No. 804-3800/910-3500
(To correspond with SUBJECT given below. See O. N. I. Index Guide. Make separate report for each main title.)

From U.S. Naval Attache at Helsinki, Finland Date 10 February, 19 47
(Ship, fleet, unit, district, office, station, or person)

Reference (a) Alusna Helsinki R-21-S-46 dated 22 August 1946
(Directive, correspondence, previous related report, etc., if applicable)

Source Press and Official Liaison Officer Evaluation C-3
(As official, personal observation, publication, press, conversation with—identify when practicable, etc.) A-1 to E-O etc. A8/EN 3-10; SER. 4312416—11-18-42

Subject FINLAND - Army/Navy - Guided Missile
(Nation reported on) (Main title as per Index guide) (Subtitles) (Make separate report for each title)

BRIEF.—(Here enter careful summary of report, containing substance succinctly stated; include important facts, names, places, dates, etc.)

Strange light phenomenon, or rocket, observed by amateur astronomer over Helsinki at 182130 January 1947; parachute appears to drop; no reliable information obtained to date other than the press story.

1. Since 20 August 1946, no more "ghost rockets" have been reported by the Finnish press. Up to that time numerous observations had been made, mostly by inexperienced observers, of objects resembling rockets flashing across the sky.

2. On the evening of 18 January at 21:30 another rocket-like phenomenon was reported over Helsinki. Since the day following this observation efforts have been made to follow up on the story. Numerous contacts have been checked but no additional information could be secured. The only information available is that which appeared in the newspapers, a translation of which appears below:

> "An amateur observer (M. Niamala) observed what appeared to be a rocket at 2130 on Saturday evening. Mr. Niamala, who was working at the Ursa Observatory, claims he saw a clear yellow light which was visible for almost 10 seconds, at three second intervals. It appeared and disappeared five or six times, after which the flame (light) changed to a white glow and finally a dark red color. The rocket seemed to be on a curving course approaching from the north and at an altitude of about 2,000 meters. Just before the rocket disappeared (for the last time) an object resembling a parachute was seen to fall to earth. This was observed through a telescope".

3. Efforts will be made to obtain more information about this observation.

Prepared and Forwarded by:

SECRET

F. A. Klaveness

F. A. KLAVENESS,
Commander, U.S. Navy,
U.S. Naval Attache.

Distribution By Originator COMNAVEU

Routing space below for use in O. N. I.

0703 | 32 F121 (2)
C/c | 32 Y
[illegible] | 32 F2
[illegible] | 32 V
op 57

Use this form for page 1 (original and copies). Use the 8 by 13 inches plain foldover as supplied for additional pages. Forward to CNI on original and a "Ditto Master" copy. Officers preparing and those forwarding reports sign the last page of original and retained copy of report only. Submit copies of clippings, sketches, etc., when practical. Prepare sketches on "Ditto Master," or in a form suitable for black and white reproduction.

OPNAV-32-35R (REV. 8-49)

ONI DISSEMINATION ROUTING SLIP

Please expedite to next addressee (S)

F45 ONI FILE No. AA

97

ORIGINATOR OF MATERIAL		SUBJECT OF MATERIAL
NA LONDON	209-S-47	GUIDED MISSILE INFO

MATERIAL DATED	ORIGINATOR'S NO.	ENCLOSURES
15 Oct 47	X-17..-47	

KEYED	BY	TO (1)	INITIAL	TO (2)	INITIAL	TO (3)	INITIAL	TO (4)	INITIAL
Op32-f45 28 Oct 47	29/10	B2V		F2		F45	47	Op-28E	
IN DATE	OUT	OUT DATE		OUT DATE		OUT DATE		OUT DATE	

TO (5)	INITIAL	TO (6)	INITIAL	TO (7)	INITIAL	TO (8)	INITIAL	TO (9)	INITIAL	TO (10)	INITIAL
Nov 19 47		FIR									
OUT DATE		OUT DATE		OUT DATE		OUT DATE		OUT DATE		OUT DATE	

EVALUATION:

SUGGESTED ROUTING

DISTRIBUTION: SALMON—File; PINK—Finish File; GREEN—Control; YELLOW—Originator; WHITE—

U. S. GOVERNMENT PRINTING OFFICE 16—47273-2

Use this form for page 1 (original and copies). Use the 8 by 13 inches plain fold-over as supplied for additional pages. Forward to ONI a preparing and those forwarding reports sign the last page of original and retained file copy of reports only. Submit copies of clippings, sketches, on "Hectograph Master," or in a form suitable for black and white reproductions.

1. Since the coverage of aviation armament is pending assignment to this NLO for Guided Missiles as an additional duty, he accompanied Captain Frank B. Miller, USN (BuOrd) and Commander T.H. Jenkins, USNR (Alusna, London Aviation Armament Officer) on a tour of Scandinavian armament firms to become acquainted with the contacts. While in Sweden opportunity was afforded to discuss guided missile development with personnel of the Swedish Air Ministry and SAAB (Svenska Aeroplan Aktiebolaget) aircraft company. The main sources of information were Lt. Colonel [illegible], Director of Guided Missile Section, Air Ministry, Mr. Werner, project engineer, and the SAAB guided missile project engineers, Mr. Bråsjö and Mr. [illegible].

2. This report offers additional details of the pilotless aircraft work in Sweden previously reported by Captain J.B. Pearson in reference (a). Once again it should be pointed out that the Swedish contacts welcomed the opportunity to discuss their projects with itinerant observers and spoke openly of the restrictions preventing exchange discussions with resident military and naval personnel.

3. A summary of the guided missile effort is as follows:-

(a) Type 250 LT - code name '[illegible]' - (SSM)
Weight 500 lbs.
Warhead 100 lbs.
Propulsion - pulse jet - gasoline (smaller than V1)
Range - 20 miles at 500 m.p.h.
Control - pre-set auto-pilot with radar homing and trajectory
Catapult launched.

Remarks: This missile was a naval requirement and constituted the first effort in guided weapons. It never progressed out of the project study /stage

Distribution By Originator

Routing space below for use in O. N. I.

AA 54711

CLASSIFICATION

cc: Naval Attaché, Stockholm
ACNO (Guided Missiles) Op 57
BuAer [illegible] Division
BuOrd Re-9 Divisions

MID (3)

11 NOV 1947

Op-32-F-211
32-F2 (10) X170-47
32-F2 (2)
32-X (3)
32-F-114 (2)

SER/FIR

PLEASE RETAIN OR DESTROY

DECLASSIFIED
Authority NND557303
By NARA Date 7/25/97

LICENSED UNDER PATENT

N.N.I.55 -1942

98

SECRET

ISSUED BY THE INTELLIGENCE DIVISION
OFFICE OF CHIEF OF NAVAL OPERATIONS
NAVY DEPARTMENT

INTELLIGENCE REPORT

BID INDEX GUIDE NUMBER: 2802.0303

Serial AP-5-47 (Start new series each year, 1, 2, 3—B, 1—6)

Monograph Index Guide No. 1004

From NAVAL ATTACHE at LONDON Date 17 February 1947

Reference

Source SWEDISH - OFFICIAL Evaluation A-1

Subject SWEDEN - AVIATION - SEE BELOW

Subject: Visit to Stockholm, Sweden - Report on Pilotless Aircraft built in Sweden and Strange Guided Missiles over Sweden.

Enclosure: (A) Photograph of Design 301 (Model) - 2 views.
(B) Photograph of Design 302 (Model)

1. In connection with a visit to Stockholm, Sweden, an opportunity was afforded to discuss pilotless aircraft matters with members of the Air Ministry staff and with engineers of Svenska Aeroplan Aktiebolaget. This material is turned in separate from the general report to facilitate handling in the Navy Department. It is believed that none of it has not been given to the local Naval Attache's staff due to the insistence of the Russian Attache on obtaining equivalent information to that which is given to any Attache. This prevents the Swedish Air Ministry from making general distribution of information to Britain and America.

2. The Pilotless Aircraft - Guided Missile work in Sweden is divided into the following classes and handled by the organizations as indicated below:

Ground to Air	-	Army
Air to Ground	-	Air Ministry
Ground to Ship (or Ship to Ship)	-	Navy

Most of the manufacturing of missiles with wings is apparently accomplished at SAAB for all three services and the technical problems in connection with the flying of the ones that have been manufactured to date are believed to be handled by qualified personnel in the Air Ministry. The work comes under Lt.Col. Westergard who has under him Major T. Edlen and Mr. S. Werner, Chief Project Engineer.

3. The only missile which is flying to date is the 301, a photograph of which is enclosed. There have been five built and several of these have been flown. It is understood that they have no telemetering and that they contemplate a long programme of testing prior to being able to control adequately such a missile.

/4.

Distribution By Originator

Routing space below for use in O. N. I.

cc-Naval Attache, Stockholm, with Enclosures (A) and (B)
cc-Bureau of Aeronautics, with Enclosures (A) and (B)
cc-DCNO (Air) with Enclosures (A) and (B)

Op-32-C2L3 (orig) w/o enc
Op-32-F2 (3) - serial; AC5-1-8 w/enc; F2L1
Op-32-F11A w/o enc
BuOrd " "
ma: Priority 1.

2 Mar 1947

DECLASSIFIED
Authority NND357303
By NARA Date 7/25/97

SECRET

SECRET

Serial: A9-S-47 17 February 1947.

Subject: Visit to Stockholm, Sweden - Report on Pilotless Aircraft built in Sweden and Strange Guided Missiles over Sweden.

99

4. Although it was developed for the Navy it has been studied by the Air Force with a view to using it under a dive bomber. It has 45 seconds burning and if launched from an airplane it is contemplated that the range will be about five miles. Its total weight is about 950 lbs. and it contains 400 lbs. of explosive distributed along the leading edge of the wing as indicated on the enclosed photograph. It was designed specifically for an [redacted] water hit and it was represented to the undersigned that the distribution of explosive along the leading edge was selected in order to increase the effective damage.

5. The second type of missile or pilotless aircraft is termed RO2 and is under development by the Air Ministry for use on aircraft for an underwater hit. Enclosure (B) indicates the general nature of this missile. It is understood that it will have a ram-jet engine and will be suitable for dropping from a fighter-bomber as well as a dive bomber. Details of construction have been requested and will be forwarded when received.

6. There is apparently considerable interest in guided missile or pilotless aircraft work in Sweden. They are at present trying to decide the type of guidance to be used and are somewhat at a loss due to lack of telemetering as well as guidance equipment such as that which has been well developed in America. It is known that they are interested in sending personnel to America to study our methods and it is believed that it would be worth while granting such a request.

7. During the conversation on guided missiles Colonel Westergard who heads up the Airplane Design Section of the Air Ministry made the following statements relative to the missiles which have been reported over Sweden from an unknown source:

(a) There have been about 1,000 observations of which about 40% are reliable. These observations are not necessarily of different missiles, as many reports have apparently been made on the same missile. They seem to run from a point near Peenemunde and the general path is judged to be between Peenemunde and Karelia (near Finland).

(b) It was stated that the best observation was from an officer of an artillery group who sighted a missile in his optical range finder and was able to follow it for about 1½ minutes. It was in approximately level flight at about 8,000 metres distance and was reported as being about 12 metres long, shaped something like a torpedo. Due to the angle the officer was unable to determine whether or not there were wings.

(c) It was stated that every time a Swedish airplane flies over the Baltic anywhere near Peenemunde a Russian airplane promptly appears and shadows it. From this the Swedes assume that the Russians must have good radar coverage of this area. It was also stated that they understood that all civilians had been evacuated from Peenemunde or Uzsale.

8. This report has been coordinated with the Military Air Attache, London.

PREPARED BY: J. B. PEARSON, Jr. Captain, U.S. Navy.

FORWARDED BY: R. F. HICKEY, Captain, U.S. Navy.
By direction.

AMERICAN EMBASSY
OFFICE OF THE NAVAL ATTACHE
LONDON

S78-1(5)

Serial:

100

SC-7307

~~TOP SECRET~~

From: U. S. Naval Attache, London.
To : Chief of Naval Intelligence.

Subj: Alleged rockets over Sweden.

Ref : (a) ONI Sec. Ltr. 001642P32 of 4 Feb. 1947.
(b) COMNAVEU Sec. NNI-96, 752-S-46 of 20 Sept. 1946 and enclosures thereto.
(c) ALUSNA Sec. NNI-96, A346-S-46 of 6 Dec. 1946 and enclosures thereto.

1. Since the issue by the Air Ministry of the two papers on the alleged rockets over Sweden, references (b) and (c), both of which were forwarded to ONI, no information of sufficient significance has been obtained to warrant even the contemplation of a third paper. However, the Air Ministry did receive from the Swedish Air Force bits of material which had been subjected to high temperatures, and which the Swedes thought might possibly have been a part of a guided missile. These bits of material were given thorough tests and sent back to Sweden with the report that they in themselves did not afford sufficient evidence to show they were part of a guided missile.

2. During the first week in February, 1947, Captain J. B. Pearson, Jr., USN was given the following information by a Swedish Air Force officer, which has been reported in N.A. London NNI-96, A9-S-47 dated 17 February 1947:

"A Swedish Artillery officer sighted a missile in an optical range finder and was able to follow it for about one and a half minutes. It was approximately in level flight at about 8000 metres distant, and was reported as being about twelve metres long, shaped something like a torpedo. Due to the angle, the officer was unable to determine whether or not there were wings."

The object was sighted to seaward.

~~TOP SECRET~~

AMERICAN EMBASSY
OFFICE OF THE NAVAL ATTACHE
LONDON

Serial: 0002

TOP SECRET

Subj: Alleged rockets over Sweden.

3. The Naval Attache is of the opinion that a rocket or guided missile was seen over Sweden, possibly three or four, but that the remaining numerous reportings were only conjecture.

4. In formulating the above opinion on the alleged rockets, the following items, in addition to the British reports, were taken into consideration:

(a) Peenemunde was a German V-2 development center and is now a part of the Russian Zone.

(b) There is evidence that the Russians have been working on the V-2 at Peenemunde, aided by German scientists formerly connected with the project.

(c) It is quite likely that the Russians in their experimental and development work have fired some of the V-2's, as has been done in the United States for experimental purposes, and that the Russians with their lack of knowledge and experience in guided missiles are probably not too accurate when it comes to firing same.

(d) An error of 5 - 10 degrees in the azimuth of a rocket or missile fired up the Baltic Sea from Peenemunde or the immediate vicinity could easily cause the path of the missile to be over Sweden from well inland to the shore line.

(e) A team from the British Air Ministry was sent to Sweden to investigate the alleged rockets with negative results. The final report of the Air Ministry, reference (c) was based on the findings of this team.

TULLY SHELLEY

OF 32
CONTROL
No. 3618

TOP SECRET

102

WAR DEPARTMENT
CLASSIFIED MESSAGE CENTER
INCOMING CLASSIFIED MESSAGE

TOP SECRET

TOP SECRET AMUG

PARAPHRASE NOT REQUIRED. HANDLE AS TOP SECRET CORRESPONDENCE
PER PARAS 51i and 60a (4) AR 380-5

MC6984

From: US Mil Representation for ACC Bulgaria, Sofia, Bulgaria sgd Yatesvitch

To: War Department for MDGID

Info: COMGENUSFET Frankfurt Germany; COMGENUSFA Vienna Austria; ACC Hungary; ACC Rumania; MA Greece; MA Belgrade; MA Paris; AFHQ; MA Turkey (WAR please pass to last two)

Nr: 5072 24 February 1947

Item A. Turkish MA reports that Soviets have built catapult for launching some form of aircraft near Sofia, and have brought into Bulgaria a number of V-2 type missiles.

Comment: Catapult report may be connected with reports from Military Attache in Athens and Ankara Turkey that underground hangar had been built East of Sofia, possibly near Novoseltsi. Turks have sent men to area in question to search for evidence of underground construction work, catapults and other evidence possibly connected with launching of aircraft or self propelled missiles.

Item B. Turkish sources in Burgas report that Soviets have instructed Mayor of Burgas to advise unit hotel operators that all hotel space is to be kept in readiness to be turned over to Soviet authorities on short notice.

Comment: Instruction to Burgas hotel operators may be connected with plans for Soviet evacuation. No similar action has been reported from Varna, which is also logical point of departure for Soviets.

CM IN 4097 (24 Feb 47)

TOP SECRET

GEN. WEYLAND

GEN. McNARNEY MC6949 33

COPY NO.

103

WAR DEPARTMENT
CLASSIFIED MESSAGE CENTER
INCOMING CLASSIFIED MESSAGE

TOP SECRET

TOP SECRET AMUG

From: US Mil Representation for ACC Bulgaria, Sofia, Bulgaria and Yugoslavia

Nr : 5072 24 February 1947

Item C. Appearance of at least 4 new blocks of vehicle registration number in Sofia area considered partial confirmation that there has been additional influx of Soviet troops into Bulgaria during past 3 months. New blocks are B-1-49-XX, B-1-74-XX, B-3-24-XX, and Cyrillic B-9-93-XX.

Item E. According to C-2 report, Soviet unit wearing green shoulder boards and of approximately regimental strength was seen marching through Plovdiv during first days of this month.

Comment: MVD frontier troops may have been withdrawn to Plovdiv area from Greek border area as part of general move from border area connected with visit of Border Incident Commission. Hitherto only occasional officers and enlisted men of MVD frontier troops have been in Sofia and Plovdiv. Estimate by source of unit as Regiment probably exaggeration.

End

This msg has been relayed to MA Turkey; AFHQ.

ACTION: Gen Chamberlin

INFO : Gen Spaatz, Adm Leahy, JCS, Adm Nimitz, Gen Norstad, CSA

CM IN 4097 (24 Feb 47) DTG 241100B mec

TOP SECRET

33

COPY NO.

104

MC6949

SEP 25 01 59 AM

29 GEN. EAKER file DESTROYED file

30 GEN. CHAUNCEY file DESTROYED file

31 GEN. WEYLAND

GEN PARTRIDGE
GEN. ANDERSON
32 GEN MC DONALD

SECRET

105

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

TO:

28 February 1947

MORANDUM FOR CHIEF, AIR INTELLIGENCE DIVISION

BJECT: Daily Activity Report

(R)

1. Lt. Colonel Barrett and Mr. Carroll briefed a special party in neral Spaatz' office.

2. Submitted to Air Estimates Branch rough draft of JANIS 51 - Turkey. ESTRICTED)

3. Mr. Baxa, Civil Service analyst, was interviewed by Branch and Section iefs in connection with survey of CAF jobs in Defensive Air Branch.

4. Captain Haller, Scientific Branch, Intelligence Division, WDGS, estioned an electronics statement in Study No. 136.

5. Members of the Branch interviewed Mr. Flickinger, Vice President in arge of exports for Republic Aviation Corporation, who has recently returned om Sweden. Among other things, Mr. Flickinger revealed the following intelligence:

a. Swedish aircraft industry was primarily interested in research d development in aircraft and engines as compared to production. One wind nnel is now under construction but not in operation. One underground aircraft factory, employing 2,000 workers, was in operation at the time of Mr. lickinger's visit. This factory was mined for defense so that it could be tonated by one man from a post five miles away in case of attempted capture r occupation by an enemy. All underground factories in Sweden are equipped in this manner and it is believed that all future factories will be built derground as this is considered by the Swedes as the most economical installation, in addition to affording protection in case of future conflict.

b. Mr. Flickinger reported that to his knowledge there was no iological warfare research under way or contemplated in Sweden, but that omic energy research is being carried on to the extent of pursuing the basic rinciples for the release of atomic energy. Mr. Flickinger stated that he d seen one of the Swedish "spook rockets" in flight, which resembled the

buzz bomb but was somewhat smaller. The noise from this missile was more e that of a rocket than like a V-1.

c. Mr. Flickinger stated that he had seen some AA guns in place in ckholm and around Swedish airfields but could give no more definite informa- n in this respect.

d. Mr. Flickinger did spend a short time in the Netherlands and rned that the Fokker Aircraft factory there employs approximately 4,000 ople. This factory is nationalized and at present is producing light air- ft. However, a jet propelled transport is currently under consideration.

Defensive Air Branch Comment: The jet propelled transport is the kker F-26 "Phantom", previously reported as an Item of Interest on 6 December 6. This transport is currently under design and is powered by two jets ated under the fuselage, having a capacity of 17 passengers and a pressurized bin, to operate up to 40,000 feet. The power plants are planned to be Rolls yce R.B. 41 "Nene I" turbojet engines of 5,000 lb. static thrust each. The signed performance of the aircraft is reported to be cruising speed of 435 ots at 40,000 feet, a range of approximately 570 nautical miles.

e. Mr. Flickinger stated that everything was in chaos in France and no new production there. He stated that he believed the commercial air ansport situation in France would improve as soon as the new director of r France took over. (CONFIDENTIAL)

6. Members of the Branch interviewed Captain Dankevich, recently Assistant ilitary Attache, interpreter and aide at Moscow. Captain Dankevich revealed e following information of interest:

a. The average Russian civilian, he believed, does not think of war tween Russia and the United States as inevitable as the civilians are too sy lining up in food queues and worrying over their own personal economic oblems.

b. There is apparently no restriction of radios in Moscow but those existence are of poor quality. The British have been broadcasting to the ssian civilians for some time but few Russians appear to listen.

c. The Russians are apparently making a definite effort to propagan- ize the necessity for a strong air force. Their definition of a powerful air tential appears to be a matter of quantity rather than quality.

d. Captain Dankevich reported that no new industrial augmentation can noted in Moscow since the erection of the Ford Rubber plant started during rld War II, but mentioned Magnitogarsk, in the southern Ural area, as a city erein new industrial construction of some type is apparent.

e. Personal conversation by Captain Dankevich with Russians leads to believe that Russian pilots dislike instrument and night flying, and reported a complete lack of flying activity at Moscow airfields during clement weather and/or at night.

f. The camouflage on buildings which existed in Moscow in 1941 and ring World War II has been allowed to deteriorate with no new camouflage parent.

g. Captain Dankevich stated that he had seen some AA guns in Moscow, parently in tactical positions and some radar antennae in the Moscow area, could give no specific information, sketches or details. (CONFIDENTIAL)

7. Members of Defensive Air Branch interviewed 1st Lieut. Anderson, mer Assistant Military Attache to Chile, who stated that he was unaware any developments, trends or interests by Chile in early warning radar, ctronic research, atomic energy or biological warfare, and had practically information on Chilean aircraft.

8. R&R was prepared to Air Intelligence Requirements Division for Air lligence Division signature, subject: "Action on Intelligence Division, S Comments on Various Questions of Part II, Air Intelligence Requirements die". (SECRET)

9. Colonel Hughey, newly assigned A-2 representative to J.I.S., was erviewed by Captain O'Beirne and Lt. Colonel Chase.

EMMET O'BEIRNE
Captain, U. S. Navy
Chief, Defensive Air Branch
Air Intelligence Division
Office of AC/AS-2

CONFIDENTIAL

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

108

IN REPLY REFER TO:

28 February 1947

MEMORANDUM FOR AC/AS-2 and CNI

SUBJECT: Daily Activity Report

1. Members of the Defensive Air Branch of this division interviewed ~~Mr. Flickinger, Vice President in charge of exports for Republic Aviation Corporation~~, who has recently returned from Sweden. Among other things, ~~Mr. Flickinger~~ revealed the following intelligence information:

a. Swedish aircraft industry was primarily interested in research and development in aircraft and engines as compared to production. One wind tunnel is now under construction but not in operation. One underground aircraft factory, employing 2,000 workers, was in operation at the time of ~~the informant's~~ visit. This factory was mined for defense so that it could be detonated by one man from a post five miles away in case of attempted capture or occupation by an enemy. All underground factories in Sweden are equipped in this manner and it is believed that all future factories will be built underground as this is considered by the Swedes as the most economical installation, in addition to affording protection in case of future conflict.

b. ~~Mr. Flickinger~~ reported that to his knowledge there was no biological warfare research under way or contemplated in Sweden, but that atomic energy research is being carried on to the extent of pursuing the basic principles for the release of atomic energy. ~~Mr. Flickinger~~ stated that he had seen one of the Swedish "Spook Rockets" in flight, which resembled the V-1 buzz bomb but was somewhat smaller. The noise from this missile was more like that of a rocket than like a V-1.

c. ~~Mr. Flickinger~~ stated that he had seen some AA guns in place in Stockholm and around Swedish airfields but could give no more definite information in this respect.

d. ~~Mr. Flickinger~~ did spend a short time in the Netherlands and learned that the Fokker Aircraft factory there employs approximately 4,000 people. This factory is nationalized and at present is producing light aircraft. However, a jet-propelled transport is currently under consideration.

CONFIDENTIAL

109

COMMENT: The jet-propelled transport is the Fokker F-26 "Phantom", ~~previously reported as an Item of Interest on 6 December 1946.~~ This transport is currently under design and is powered by two jets located under the fuselage, having a capacity of 17 passengers and a pressurized cabin, to operate up to 40,000 feet. The power plants are planned to be Rolls Royce R.B. 41 "Nene I" turbojet engines of 5,000 lb. static thrust each. The designed performance of the aircraft is reported to be cruising speed of 435 knots at 40,000 feet, a range of approximately 570 nautical miles.

e. ~~Mr. Pleiniger~~ stated that everything was in chaos in France and saw no new production there. He stated that he believed the commercial air transport situation in France would improve as soon as the new director of Air France took over. CONFIDENTIAL (Capt. O'Beirne, USN, Ext. 2466)

for JAMES F. OLIVE, Jr.
Colonel, G. S. C.
Chief, Air Intelligence Division
(AC/AS-2 - O. N. I.)