RADAR AND RADIO TRACKING

H_2X Radiations Are Useless for Flak Control, But VHF Provides Enemy Much Information

RUMORS regarding new enemy equipment have occasionally resulted in curious improvised countermeasures. A recent conference on the use of the AN/APS-15 equipment (H_2X) revealed, for example, that "Mickey" operators have on occasion been ordered to turn off their equipment during visual bomb approaches, on the theory that this prevented enemy flak from using H_2X radiations as data for firing control.

However, no data useful for flak control can be gained from monitoring of the H_2X. The Germans do possess a receiver operating in the AN/APS-15 frequency range; this set is known as the *Naxos*, and the airborne version was described in SUMMARY No. 46 (*page* 9). But since fire control requires the measurement of range as well as azimuth and elevation, information from a single *Naxos* intercept would be of no value. A group of ground intercept stations might succeed in triangulating to determine the range of a formation, but this procedure would be too slow and cumbersome to provide useful flak data. In addition, triangulations of this sort would be hampered by the impossibility of guaranteeing that all ground stations are taking bearings on the same "Mickey"-equipped plane.

The information needed can be supplied accurately and quickly by a single small Würzburg, the normal flak radar, and even when this is jammed so as to eliminate range measurement, it can still be used for azimuth and elevation data. Thus, the flak can gain no information from H_2X monitoring that it does not already possess from other and more readily-available sources.

Monitoring of H_2X signals can provide little other information of value against USAAF daylight bomber formations. It is used for DF-ing formations to provide tracking plots, but again this information is available from other and more accurate sources—the GAF Radio Intercept Service (*see column* 2), shadowing aircraft (SUMMARY No. 47, *page* 5), and normal Freya long-range radar. These "*Rotterdam*" plots ("*Rotterdam*" is the German code name for H_2X) are thus purely supplementary, and except on very special operations where true VHF R/T and W/T silence is observed, and which are protected by Mandrel jamming screens, no additional information is provided to the enemy by the *Naxos* receiver.

The airborne *Naxos*, used by night fighters to home on individual H_2X-equipped aircraft, presents no threat to daylight bombers, which are intercepted visually once enemy fighters have been vectored by Ground Control to the vicinity of the formations. Moreover, all evidence indicates this apparatus is at present in too short supply to constitute a serious threat to night operations.

Radio Intercepts: How the GAF Intercept, or "H" Service, was able to learn Eighth Air Force order of battle, plot the course of missions, and even establish losses—all through careful monitoring of our VHF radio traffic—emerges clearly from a captured document issued by the 8th GAF Signal Regiment.

This document, dated 1 April, 1944, is reproduced almost verbatim below. No comment on it seems necessary.

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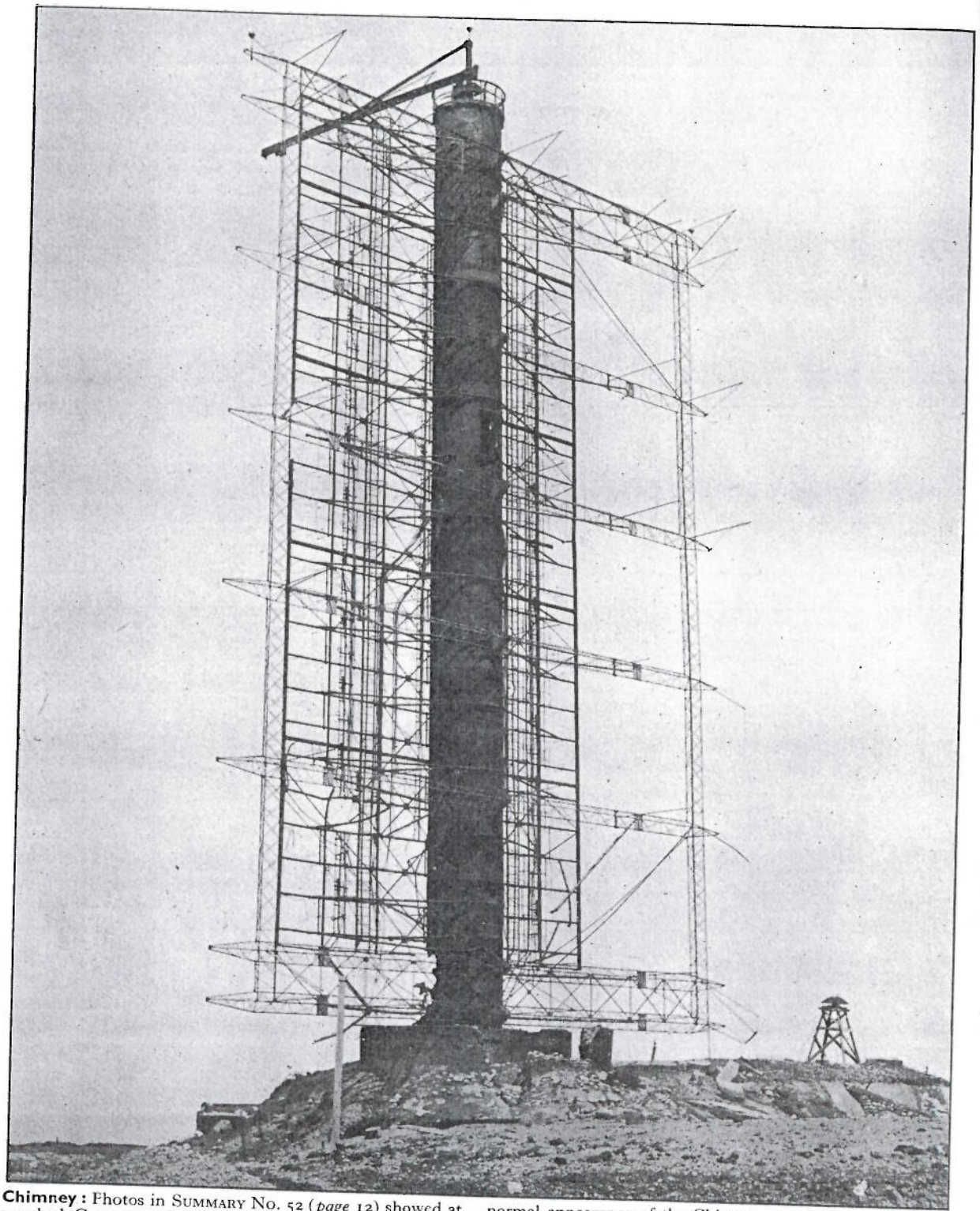
REPORT ON OBSERVATION OF VHF BOMBER R/T BY 8/GAF SIG. RGT., LEGION KONDOR 3, 1-4-44.

A. *General:* The heavy bomber units of the Eighth USAAF stationed in England comprise three Bomb Divisions, of which the First and Third have B-17s, and the Second has Liberators. Each Bomb Division is subdivided into Combat Wings, and these again into Groups. An R/T call sign is allotted to each Combat Wing.

Each Group has a different "color" [callsign], e.g., red, yellow, green, blue, etc.; in the groups of the Third Division, the further separation into A- and B-group is designated in this manner, e.g., red-pink, whereby red represents the A-box and pink the B-box of the group in question. The squadron R/T callsigns are less used in VHF traffic. . . . . They are used mainly in traffic of bombers with ground stations on the short-wave frequencies allotted to the various airfields.

Each bomb division is allotted four different frequency channels, of which the A-channel is to be used by the CW, the B-channel by the Division, the C-channel by British and American fighter escort; the D-channel is for cases of emergency at sea. While the A-channel is different for each CW, each aircraft of the division concerned has the same B-channel frequency. The C- and D-channel frequencies are, logically, the same for all three bomb divisions.

On the basis of this knowledge, by DF-ing of R/T traffic and evaluation of the Combat Wing callnames, deductions of considerable tactical importance can be made in regard to: units involved, strength, probable direction of the operation, time of the operation, and fighter cover of the attacking formations. By DF-ing the callsigns which occur, or R/T traffic on the Combat Wing frequency, continuous location is possible, which shows the probable direction of the flight . . . or that the formations have



Chimney : Photos in SUMMARY No. 52 (*page* 12) showed at wrecked German radar installation of the Chimney type at Boulogne. This picture of a similar installation at Arromanches gives a much better impression of the normal appearance of the Chimney aerial, though it shows some signs of wear and tear as the result of Allied attacks. Standing 125 feet high with IFF array, it measures range, bearing and altitude, and operates in the 120-130 mc. band.

split up for two or more separate thrusts. The main attacking formation is recognized; intelligent DF-ing insures exact route-tracking, and counter-measures are possible. [It is remarked at this point that altitude and atmospheric conditions determine the range at which our R/T can be picked up.]

B. *Units Involved:* [This section of the report consists almost entirely of a complimentary reference to the Second Bomb Division, whose R/T traffic is described as "still difficult to intercept," and whose Combat Wing callsigns and colors were "only rarely heard." It is stated that participation of the Second Division in an operation could often only be established by the occurrence of carrier waves on the division's frequencies. The other two divisions, however, were quite recognizable by the R/T traffic of wings and groups.]

C. *Course of Operations:*

(a) Assembly, Forming-up, Flying Area, Time: By improving and extending the DF Station facilities of 1/West [Funkhorchregiment West ?] . . . bomber incursions were tracked, with divisions and Combat Wings sorted out [by "H" Service], as far as the Berlin area. More thoroughgoing route-tracking and DF-ing of escort is to be achieved by setting up more DF apparatus.

Assembly areas used to stretch far out over the sea. The Groups now assemble over bases and collecting of the Combat Wings also takes place in the area of their bases. [Follows a description of the division's assembly areas, by towns, including the side-remark that the First Division assembles too far west to be completely covered by intercept.]

Weather reconnaissance of the assembly areas . . . appears to check details only. . . . It may be assumed that the decision to operate has already been made. . . . Weather reconnaissance of this type almost invariably means that an operation is imminent.

[Paragraph giving typical frequencies of "Splasher" and "Buncher" stations, said to have been picked up from R/T traffic of certain First and Third Division Combat Wings on specific dates.]

(b) Flying Altitudes: Heights came in in considerable quantity, although the enemy started giving these in a code reference to bombing heights, e.g., 'We are 4,000 feet above bombing altitude'. . . . Flying speed is frequently concealed: e.g., 'Airspeed is normal plus 20', or 'Normal minus 5'. From open references, however, it still appears that 160 m.p.h. may be regarded as 'normal'.

(c) Bombing: The order to open bomb-doors is given about 10 minutes before the target is reached and in many cases is a great help in recognizing the ultimate target area. As long as the targets were within reception range (300-350 kilometers) the orders to drop bombs could be heard in this sector. Success or failure of the attack could be judged from contents of signals and from references to search for alternate or opportunity targets.

It emerges from R/T traffic that indiscriminate bombing is allowed only on German cities, but not on towns in occupied territories. '. . . we are near the border; take them back unless you can identify a German city . . .'

(d) Premature Return: Reports on premature return of single aircraft as a result of damage were very frequent . . . mainly because of engine trouble, but in one case because the crew had not put on their heated suits.

(e) Damage Reports: In all operations, reports of damage sustained through enemy action were continuously given. It was observed several times that four-engine bombers could no longer fly in formation even if only one engine failed. . . . Such aircraft often call in vain for their escort and try to fly back alone.

(f) Emergencies: [This section mentions the fact that bomber SOSs began to be heard on the C-channel rather than on the special D-channel, presumably because in this way the escort fighters are automatically informed at the same time. The "H" Service pats itself on the back for picking up several emergency calls during a certain period, which were missed by other German reporting services.]

(g) Re-routings: [Paragraph states that alternate landing fields belonging to Ninth Air Force have been mentioned in B-channel traffic during operations.]

(h) Operations Broken Off: On 22 February there occurred the most striking instance of breaking off an operation. Third Bomb Division, as well as First and Second Division formations, was well out to sea when an order was received to break off, surprising the formation leaders. First and Second Divisions flew on, and there was a fair amount of confusion in Third Division; leaders asked several times whether or not the order had been correctly received.

On 3 March, an attack which had already reached the coast of Schleswig-Holstein was broken off because of bad weather. It emerged indisputably from R/T traffic on this date that the formation leaders had broken off the attack on their own initiative. The major part of the formations had got lost in the clouds, which were unusually high.

D. *Cooperation between Bombers and Fighters:* Traffic between bombers and fighter escort has lately been conducted on the A-frequency of the Combat Wing as well as on the main frequency of 126.1 mcs. The reason for this must be that this channel is overtaxed; with all three divisions and three fighter wings using it, differentiation between the several escort formations becomes impossible, and proper communication suffers.

Cooperation . . . is still handicapped by the difficulty of keeping to fixed flying times. Late arrival of bombers or fighters at rendezvous resulted mostly in failure to make contact. The bombers in

most of these cases got in touch direct with the Fighter Command station, giving their position by means of a code letter. The fighters increasingly used a repeater to get into contact with their command. Extraordinary violence of air battles can often be deduced from the volume of R/T traffic.

Interpretations of figure references after bomber call-names (e.g., 'Goldsmith 1/3') and after the fighter collective call-sign ('Denver 1/12') could be clarified to the extent that the first figure with bombers indicates their position within the formation, and with fighters indicates the bomb division they are escorting. The second figure after the fighter callsign indicates a prearranged sector of approach and return routes in which the escort are responsible for the bombers. [The document states at this point that this particular piece of intelligence was confirmed by captured American documents.] The significance of the second figure after the bomber callsign is still not clear, but probably also indicates a position. It appears from captured documents that the entire flying route is divided into as many as 12 sectors, which would explain the appearance of three-digit numbers.

The location reports encoded by letters have recently been clarified from captured documents. A code-word, changed for each operation, is given, whose letters are cover-designations of several reference-points, e.g.:

POLISH

P = Amsterdam
O = Zwolle
L = Münster
I = Hanover
S = Brunswick
H = Berlin

[It is explained that on 6 March, during an attack on Berlin, these signals were heard: '1302 hours, bomber to fighter, "we are between P and O with 14 fighters around us" . . . NW Amsterdam, 900 feet above P'.]

Notes on New German Flak Weapons

MODIFIED equipment which brings the performance of the 88-mm. Flak 37 up to that of the 88-mm. Flak 41 (SUMMARY No. 53, *page* 6), has been described in an official German document. This equipment, designated the Flak 37/41, consists of an 88-mm. Flak 37 mounting, with modifications as follows:

Interchangeable electrical or mechanical firing mechanisms and general strengthening of breech mechanism; lengthened version of the 88-mm. Flak 18, 36 or 37 barrel, fitted with a muzzle brake; horizontal type fuse-setter and roller-type leaders; strengthened balancing presses. The ballistic performance is stated to be the same as that of the 88-mm. Flak 41, and the ammunition used is that of the latter gun, fitted with either electric or percussion primers. Rate of fire is given as 16-20 r.p.m.

Although this modification appears adequate, technical opinion questions whether it will be satisfactory. It is not clear, for example, how it is proposed to "strengthen the breech mechanism." The Flak 41 uses twice as much propellant as its predecessor, and although the increased recoil stress might be compensated at high angles by the fitting of a muzzle brake, it is doubtful whether the lighter mounting would be satisfactory at low angles. The Flak 41 is a carefully-designed gun, and it is difficult to see how its weight in action can be cut down from eight to five tons, while retaining the performance which in the first place made the extra weight necessary. (This modified equipment weighs about 550 pounds more than the normal 88-mm. Flak 37.)

New information has also been obtained on the single-barreled and twin-barreled versions of a 37-mm. gun.

Single-barreled Flak 43: Similar in general appearance to its predecessors, the 37-mm. Flak 18, 36 and 37, its action is completely different. The gun is fed horizontally from the left from a fixed loading tray in clips of eight rounds, and the fully automatic action is gas-operated. It has a muzzle velocity of 2,750 ft./sec. compared with 2,690 ft./sec. for the previous models, has all-round traverse, and elevation from —6° to 90°. Like the 50-mm. Flak 41, it has a high rate of fire, reported to be 250 r.p.m. theoretical and 150 r.p.m. practical; the barrel should be changed after 80-100 rounds of rapid fire. It uses the same types of ammunition as the 37-mm. Flak 18.

Parts of what was probably the electric Flakvisier 43 sight (a modification of the Flakvisier 37) have been found on captured specimens, but documents state that the standard sight is the "*Schwebedornvisier*," a simple ring sight. On this sight, target speed (125 to 450 m.p.h.) and angle of climb or dive are set by the sight operator, and range (1,100 to 4,400 yards for approaching targets and 1,100 to 3,300 yards for crossing targets) is applied by the layer. A wide shield, varying in thickness from $\frac{1}{4}$ to $\frac{1}{8}$ of an inch is fitted to the gun; it slopes backward at 30° and is just over four feet high. The equipment as a whole is of low build, and may be statically emplaced, transported on a mobile mounting similar to the 37-mm. Flak 36, or mounted on a self-propelled

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