

- ① Moonshine : a jammer designed to produce spurious large returns on German Freya early-warning radar, by picking up its signals and re-transmitting a beated signal.
- Rebecca : the airborne interrogator end of a two-part system using a ground-beacon called Curcha. Designed as a homing system for the identification of ground forces during supply drops.
- ② Tinsel : a microphone fitted in the port inner engine nacelle; it transmitted engine noise via the wireless-operator's TR 1154 on the frequency of the German night-fighter control net, jamming radio instructions to the fighters.
- Corona Broadcast from England, using native German-speakers, giving in plain language false instructions about the bomber-stream and the target. They were thus convolving with the genuine fighter-controllers in Germany, so that crews did not know who to believe. Furthermore, the two sets of controllers started clashing each other, and confusion reigned. That the Germans started using female controllers, but this had been foreseen, and German-speaking women were standing by in England, and took over immediately.

BRIEFING FOR ATTACK ON ESSEN, 28/29 NOVEMBER 1944

Smith, Yorkshire, base of 51 Squadron, Flying Halifax Mk III.

Crews listed on battle order are sitting in the briefing room waiting for the Station Commander (Wing Commander Holbrook) and other officers to unveil the target map. Thick cigarette smoke haze. As the officers enter, chatter stops and there is a rustling of chairs as crews stand to attention.

"Sit down, please. Well, we have our old target again tonight, and it's entirely a group effort. (Just 4 Group alone) Some 340 aircraft are taking part. The target is Essen."

The Intelligence Officer takes over. "Most of you have been to Essen before, and it doesn't need much introduction from me. I remind you that it has the Krupp's armament works in the northern part of the town and also the railway facilities which are very important now - they are supplying the front-line troops. Your point of aim in the morning is the south-eastern part of the built-up area, which is adjoining the residential part. The Germans will be asleep at that time, so you will be able to wake them up with a good fire. The attack will be carried out in 4 waves of 2 minutes each - make careful note of your time on target. Aircraft of this squadron are in the 4th wave, 0536 to 0538. There are too many decoys round Essen for me to give you a whole list of them, but there is one big one which will be just on your starboard side three miles before you get to your aiming point. Watch out for their imitation Pathfinder marker flares - they are always weaker in colour and don't burn as long as the genuine ones. The Pathfinder marking method is Newhaven (ground markers) with Munich Wangerue (sky marking in case ground is not visible). The attack opens at H minus six minutes. The Musical Mosquitoes will drop red ground markers, red + yellow sky markers, and green + yellow sky markers. Aim your bombs at these in the following order of preference - 1) at the red target indicators if you can see them, 2) at the red markers shooting yellow stars, 3) at the green markers shooting yellow stars. The sky markers ignite at 17,000 feet. If you attack the sky markers, you must do so on an exact heading of 084° True. Remember, the red ground markers are the ones to go for if you can see them. There will be no Master Bomber. At the same time you are on Essen, No. 3 Group are sending 150 Lancasters to Neuss, which is south of Düsseldorf. Their route joins yours here", he says,

printing of the map. "With regard to the jettisoning of any bombs - if you get over Germany you must drop your bombs live there, but an aircraft making an early return must jettison them safe at least 80 miles out in the North Sea. All aircraft are carrying propaganda leaflets tonight; you will find 2 pockets stacked in the rear position. The mid-upper gunners will put these into the bomb trays through the inspection hatches immediately after take-off. One final warning - you must empty your pockets before you leave the briefing room. Don't take any papers across with you that may be of assistance to the enemy, and remember, should you bale out over the other side, the only thing you are allowed to tell the enemy is your name, your rank and your number."

The next speaker is the Meteorological Officer. "There is a frost tonight lying about 6° East, that is some 50 miles west of the target area, and it is fairly stable. For take-off, it will be clear with only moderate amounts of cloud, and visibility about 3 miles. You'll have the same conditions all the way down England until about Reading, but from there on to the French coast, you'll have small amounts of cumulus, building up over the Channel to 3 to 6 tenths, well broken, with tops about 10,000 ft. There may be one or two tops at 12,000 ft. From there on until 6° East, the same conditions. The tops will level off at 8,000 ft, and cloud cover will become more or less continuous from the front to the target area. Freezing level is about 3,000 ft, icing index moderate, but you shouldn't be flying in cloud anywhere and the temperature will be about minus 24 degrees at 20,000 ft."

The Station Command speaks again. "I'll go over the flight plan now. We are taking off on runway 32; you will each do your appointed Radius of Action, and we set course over base at 6,000 feet for Reading at a speed of 175. We hold 6,000 feet down to Reading and there we open up and start climbing to cross the English coast at Beachy Head at 10,000 feet, climbing at 160 knots. At the French coast, after crossing the Channel in level flight, we climb again, reaching 12,000 ft at 3° East. We do the next leg at 170, and here we start climbing again to be at 19,000 feet by 0450 hrs. We hold 19,000 at 160 knots to the target area. Our bombing height tonight is 19,000 feet, and we are at the lowest height - the others are bombing at 20 and 21 thousand feet. After bombing, increase speed to 170 on the short leg out of the target area and maintain height right through the Ruhr defences until we reach just north of Cologne; here we turn starboard and have a gentle dive, losing 2,000 ft, increasing our airspeed to 190 and crossing our own

lines, where we have a very rapid loss of height down to 8,000 Ft. We are losing height at 220 knots on that leg. At 8,000 Ft, we shall be just above the cloud tops and we are holding 8,000 straight and level at 190 to 03°20' East. Here we turn starboard again and head up towards the French coast. There is one point that you want to watch - Dunkirk. Avoid going within 3 or 4 miles of the town. Here we have a gentle climb to cross the French coast again at 12,000 Ft just in case we are too close to the town. As you know, the Germans are still there. Once we leave the French coast behind, we lose height again at 190 and cross back over the English coast at Orfordness at 8,000 Ft. We are going to hold 8,000 Ft. right the way up to the Humber, where we break cloud and head for base.

You will probably have $\frac{1}{10}$ cloud over the target. You may be lucky and get a break so that you can see the target indicators, but anyway, there is one thing about that - you won't be troubled by the searchlights.

I have some times here. I'll see the pilots and engineers at 0030. The buses for your aircraft will leave at 0045. The first aircraft will take off at 0205. Set course from base at 0310, the raid opens at 0530 and you should be back for breakfast at 0520.

You will see that your chief bother will be night fighters, as it is expected to be a full moon and it will be very very bright over there - I think visibility will be probably something like a mile. The Signals Officer will tell you about 100 Group's (Radio Counter Measures) work tonight and their efforts to jam the enemy's radar. After leaving a point here, near Cologne, we do have this rapid loss of height of 8 - 9,000 Ft and that is primarily to try and force the fighters. The rest of the way back, I should think, will be fairly quiet. Just one or two more points: we have radar release to 05°30' East, and there are to be no navigation lights on after we leave the English coast."

The bombing leader is next to speak. "All aircraft tonight have the same load - one 2,000 lb. high capacity bomb and twelve SBC's (small bomb containers) each containing 90 4lb. incendiaries. All aircraft are carrying photo flares and cameras. Master bomber switch will be put on for take-off and switched off once you set course and do not put it on again until you reach 06°30' East, then it has to be entered in the navigator's log. Put your camera heater switch on before you take off and leave it on right through the target and switch it off after you have cleared the camera. Select your bombs once you have left the English coast and switch on your bomb sight a good 20 minutes before you reach your

target so you will be quite prepared for your run up.

If you have to bomb on Wanganui Abros, apart from the heading 054° True, you have to have zero wind set at true heights on the bomb sight. There is a delay of 10 seconds between the release of the 2000 lb. bomb and the SBC's, and this must be counted very carefully. After bombing, put the jet-liss bars across. After you have passed through the target area, press the bomb release once, clear the camera and put the camera heater off. If possible, do your visual check on the bomb bays over Germany because then if you have any hang up you can release it live on Germany; otherwise do it over the Channel on your way back, and remember that it has to be entered in the engineer's log by this time. I'll see the bomb-aimers 15 minutes before transport time for a final check."

The Signals Officer takes over. "As you've already been told, there's both WT and radar release up to 04°30'. Keep your H2S switched off up to that point and then use it throughout the trip. The mid-upper jammer should switch the modulator off when you get into the aircraft and, navigators, switch your H2S on normally when you reach 04°30' and tell your mid-upper to switch the modulator on for you to save you going back and forward. There's HF, (high frequency), AI (air interception) and VHF and Würzburg plotting by the Germans, all of which are being jammed, and there's a special Windowing force out covering you. We're carrying our own Window as well; start that off at 05°30' to the target and back to 04°00'. You are carrying two types, the broad and the ordinary. The rates are — the broad type two minutes throughout the area, and the ordinary two minutes within 20 miles radius of the target. Your RT call sign is Beateron. Check watches with your navigator as you get into the aircraft. Check with the navigator what H-hour is. Z should be used; switch it on when taking off and switch it off at the English coast coming in. The usual rules for IFF apply (Identification-Friend or Foe)."

Final encouragement from the C.O. "It's a good target tonight. It's the largest ornament works in the world, so let's have a really steady bombing run and put an end to it. The job is also to complete the destruction of an already heavily-devastated town. There isn't much of Essen left, so it needs all the more accurate bombing. Best of luck."

Debriefing report from Wp Bates' crew. "Arrived at target 2 minutes late. Attacked at 0539 from 19,000 feet heading 084°. Bombed on green/yellow Wazganui Flares through 1/10 cloud. No ground markers visible, but glow of incendiary bombs through cloud indicated a good fire well concentrated. Flare on the heavy side in target area; some fighters seen but no attacks made. Good navigational coverage by GEE. Weather turned out much as forecast, with cloud commencing inside the continental coast, increasing to mainly 1/10 at target, tops 8-10,000 feet. Visibility good above cloud."

Result of raid compiled for squadron record. "Sky markers were not plentiful. The green/yellow appeared to be 1/2 mile south of the red/yellow. The glow of red target indicators, or fires, could be seen below cloud together with a white glow of incendiaries. The raid appeared to be fairly concentrated but it is impossible to state whether on the target or not. Some fighters seen. Moderate heavy flak, rather on the low side. No searchlights."

Report from group. "On the night of 28/29 November, 316 bombers were despatched; 308 attacked, dropping 1,199 tons of bombs comprising 1,024 tons of high explosive and 175 tons of incendiaries. Only 2 aircraft were lost, a very unusual and welcome occurrence; much of the credit for this can be given to 100 Group aircraft which swamped the Ruhr defences, so much so that fighters were not able to take instructions from the ground. The photo-reconnaissance report said that the attack again spread destruction over the whole area of the city and works and it particularly noted new points of damage throughout the Krupp's armament works. Some of the points were clearly from new hits, others appeared to be the result of collapse or clearance of structures damaged in previous attacks. The identified buildings to which new or further damage was seen included power-houses, foundries, rolling-mills, furnace-shops, engineering shops and others concerned with armament and heavy steel production."

After the Essen raid, aircrew of 51 Squadron had little sleep - those on battle-orders were out again the following night on another Ruhr target - Duisberg.

Equipment operated by 100 Group (Radio Counter Measures)
(also German Knickebein.) Various other items of equipment carried by Main Force aircraft.

- Mandel: a radio device which jammed the German early-warning radar. Aircraft flew a "see-saw" pattern, jamming continuously. The Germans knew the main force was approaching behind the Mandel screen, but did not know exactly where it would emerge or on what course. GEE did not function when Mandel transmitters were operating. Transmitters operated on fixed frequencies, except for Mandel III which was designed for spot-jamming, and incorporated a receiver to allow the operator to identify an incoming signal and tune his transmitter accordingly.
- ① Shiver: a modified IFF set with an additional special setting: it produced a jamming signal aimed at German Würzburgs and fire-control radar.
- ② Munich: tail-warning radar, with indicator at W/quarter station.
- Knickebein: German blind-bombing system. One beam was aimed at the target and another crossed it at right-angles indicating the bomb-release point. It occurred to the Counter Measures Group that if they could locate the beams, they could squally well fly down them and attack the transmitting stations. This was done in Nov. 1940, but such attacks were hotly contested by the Germans.
- Oboc: a similar system, radar not radio, operated by Mosquitoes for target-marking, and of very great accuracy.
- ③ Airborne Grotzer: device for barrage-jamming of Würzburgs. ^{extremely vulnerable to being} ^{homed onto.}
- Bagful: a device for making a permanent record on paper-tape, detailing wavelength, time and duration of incoming signals.
- Abode: an automatic camera which provided a continuous record of signals within a specified band, as received by a Cathode Ray Tube.
- ④ Coalcuttle: modification to aircraft's existing H2S navigational radar to give a visual bearing once every 30 secs. on a signal under investigation.
- ⑤ Airborne Cigar (ABC): communications jammer on VHF, used to jam reception of a runway controlling on position, course and altitude of Me109 bomber formations.
- ⑥ Pipereach: a jammer aimed at enemy Airborne Interception (AI) radars.
- ⑦ Capot: a device aimed at enemy Ground Controlled Interception (G.C.I.) radars.
- ⑧ Buzzer: tail-warning radar, with indicator within pilot's field of view.
- Z: infra-red identification equipment.
- ⑨ Jostle: VHF communications jammer.
- ⑩ Fishpond: tail-warning radar making use of H2S scanner.
- Village Inn: gun-laying radar for tail-turret.
- Flower: an intruder sortie, usually by Mosquitoes, against German night-fighter airfields during bomber operations.
- Mahmud: a sortie flown by a single aircraft against German night-fighter assembly points in the hope of catching the interceptors before they were vectored onto the bombers.
- ⑪ Serrate: a hoax aimed at German AI (Airborne Interception) radar (Lichtenstein).
- ⑫ Peepsters: a hoax designed to trigger off and then take a bearing on German AI radar.