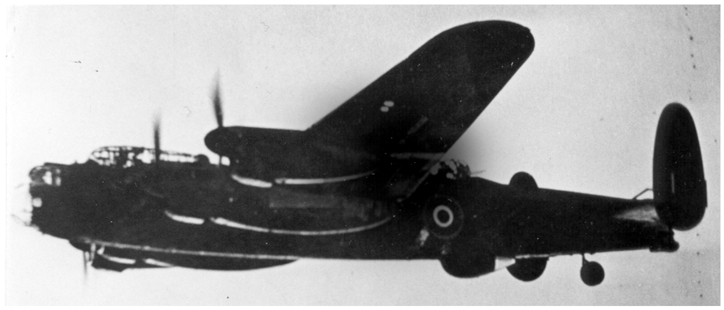
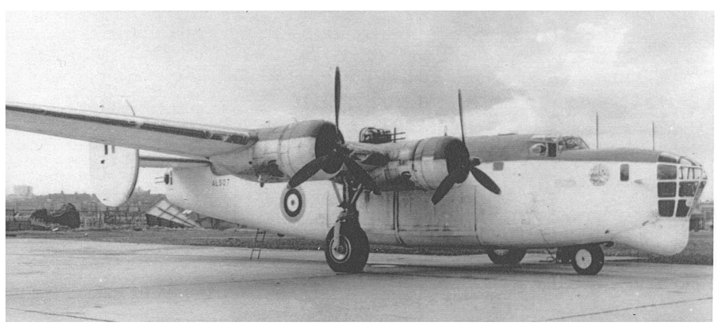


# H2S RADAR IN BOMBER COMMAND

# AND

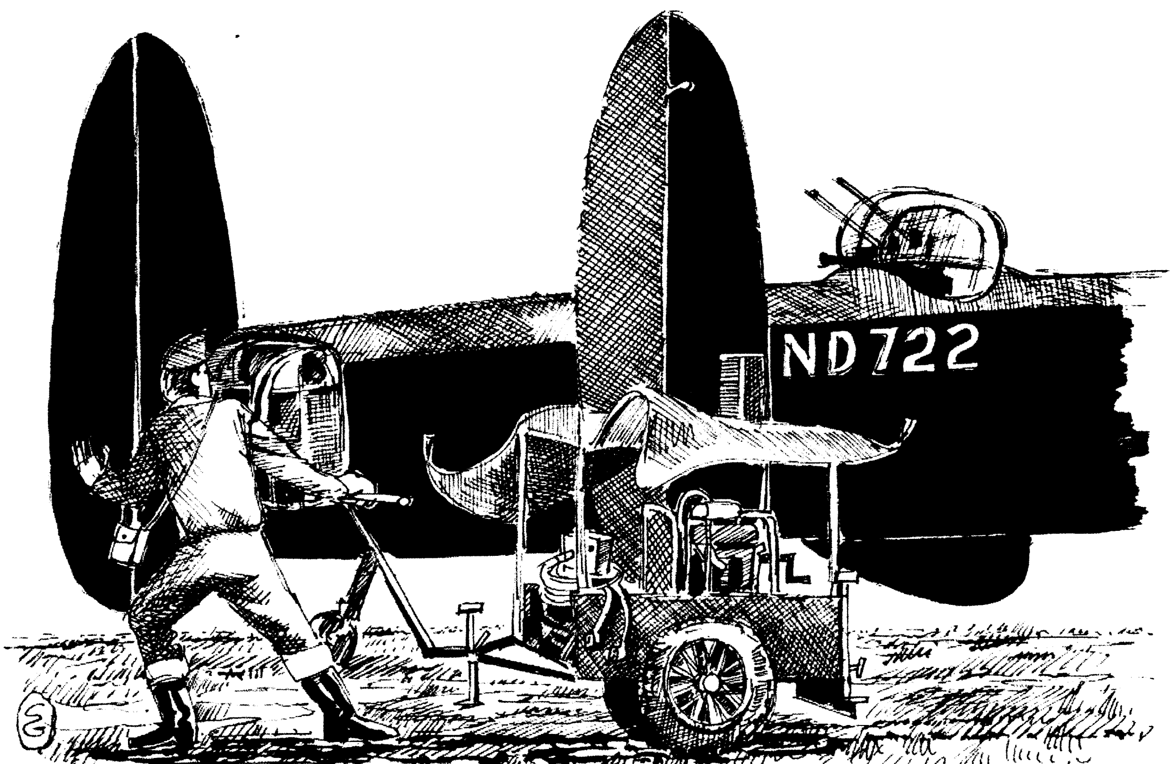
# ASV RADAR IN COASTAL COMMAND

# WORLD WAR II



**Prepared by W.P. Campbell.**

# ASV and H2S




HAULING AWAY A 'GENNY' - (PETROL/ELECTRIC GENERATOR) AFTER A DAILY INSPECTION (D.I.) ON A LANCASTER PATHFINDER BOMBER PRIOR TO AIR TESTING - ST. ATHAN - 1944

***Drawing by Sidney C. Goldsmith***

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# ASV and H2S

## PREFACE

ASV (aircraft to surface vessel) was developed for use in aircraft searching for enemy shipping. It was a complete radar set to fit into aircraft. The early sets operated on meter wave-lengths but as suitable transmitter valves became available they operated on centimeter wave-lengths. H2S was developed from ASV as a tool for Bomber Command to use in navigation and blind bombing.

# ASV and H2S

**Background***
At the beginning of World War II the British had a chain of stations along the southeast corner of England capable of detecting any aircraft approaching from the direction of Germany. While this was being developed there were many more ideas mooted for the use of range and direction finding systems. The first applications in aircraft were for use in navigation where only a receiver and indicator were needed. These could be small and light. Hence we had GEE, Oboe and Loran developed and in use by 1942. The next need was for a true radar set that could be mounted and used in an aircraft.
Several suggestions were put forward for uses in the air and the pressures of defence gave priority to two; aircraft interception equipment for use in Fighter Command aircraft, and detection equipment for use in Coastal Command aircraft for the detection of submarines and surface raiders bent upon the destruction of Allied shipping. The night-fighter equipment is dealt with in another chapter. In this essay we will deal with the development of ASV (Aircraft to Surface Vessel) and the application of this technology to navigation and bombing in Bomber Command.

**ASV**
Because of the limits imposed by the state of radio knowledge, ASV had to be designed around meter wavelengths. There was no previous experience with radar pulse techniques in aircraft, so the possibilities were unknown and unexplored. Several limiting factors presented themselves:

1. The equipment had to be small and light enough to be practical for mounting in an aircraft.
2. Aerials had to be small enough and configured in a fashion that would have a minimum effect on the flight characteristics of the aircraft.
3. Wavelengths had to be as short as possible to:
    a) permit the use of aerials that were as small as possible, and
    b) permit the use of very narrow pulse widths to obtain greater accuracy than was necessary for the ground stations, particularly for use in the latter stages of attack.
4. Wavelength reduction was limited by the ability of existing valves to develop suitable power output at higher frequencies.
5. The equipment had to be robust enough to function satisfactorily in an aircraft where vibration was a major factor.
6. The equipment had to be isolated from interference by the aircraft ignition system.

By July,1937, a radar set operating at a wavelength of 1.25 meters was tested in an Anson aircraft with encouraging results. Further tests in early September also gave good results while flying at an altitude of 1,500 feet. A naval group was detected through heavy cloud at a range of 9 miles. Echoes were also obtained from Fleet Air Arm aircraft taking off from a carrier. On the way home responses were obtained from the coastline and an accurate landfall was made.

** Technical material based on British Air Ministry confidential documents CD 1136 and SD 736. (Both unclassified 1976).*

A compromise made to get maximum power output resulted in the selection of 1.5 meters as the wavelength to be used. Aerial development centered around a forward looking system, lateral arrays for side sweeping, and an all round system. The forward looking system could cover only a restricted area in front of the aircraft but was excellent for homing onto a target. The side sweeping system was excellent for detection but was not very useful for homing onto a target. The all round looking system gave good coverage and permitted the determination of both range and bearing. With the increase of international tensions in 1938, priority was given to detection and interception of incoming aircraft so the effort on ASV was reduced drastically. However, the knowledge gained in the development of AI was of immense value in the later work on ASV. Compounding the aerial problem was the need to attach several other aerials to the aircraft for other wireless purposes.

Trials for the detection of submarines were finally conducted in December,1939. The results were not very good, range was short and signals hard to differentiate from the sea return. They did, however, indicate where improvements had to be made. By January,1940, twelve operational Hudson aircraft had been fitted with ASV, even though it was recognized as a purely interim measure and it had not yet undergone operational trials. At first its main use was to locate convoys and approaching coastlines. It was not until November 19th, 1940, that the first submarine was detected (at a range of 5 miles).

The first design proposal for the detection of submarines had been submitted on February 6th,1940. The requirement was for detection only, hence side sweep aerials were all that was needed. At this same time Dr Bowen of the Telecommunications Research Establishment reported, among other deficiencies, the lack of trained servicing personnel on the squadrons. In July, 1940, a forward-looking aerial for homing onto the target was added to the requirement. This entailed the development of a device to switch the aerial feeds from sweep to homing and back. Though this equipment was successful in finding submarines, very few attacks were carried out at night.

In June, 1942, ASV- equipped aircraft carrying high-powered lights ( Leigh lights after the developer) began operating in the Bay of Biscay. During June and July these aircraft attacked six of eleven submarines detected, sinking one and damaging two. One of the German responses was to equip their fleet with radio receivers that could detect the radar transmissions well beyond the effective detection range of ASV. Further, they could determine whether or not the aircraft was approaching by changes in the strength of the signal received. The RAF responded by installing signal attenuators (Vixen) to slowly diminish the signal and confuse the enemy. In August, 1942, the enemy started jamming ASV in the Mediterranean where it was being used to locate convoys going to North Africa and to guide British naval craft and aircraft to attack them. Jamming was so intense that it reduced the effective range of ASV to less than ten miles.

### Centimetric ASV

As early as 1938 the idea of centimetric ASV and all round search had been suggested. The general nature of aerials and feeders had been established in theory. It was necessary to use centimeter wavelengths to reduce aerial dimensions to what was possible to mount on an aircraft. It was difficult as it was also necessary to develop radio valves that could produce adequate power at the frequencies involved. This was known to be possible by building oscillatory circuits using metal cavities proportioned to resonate electrically at such wavelengths. Ten centimeter wavelength was the objective but conventional valves could not work at these frequencies. Two special valves that could were the klystron and the split anode magnetron, but they did not develop enough power.

## Magnetron

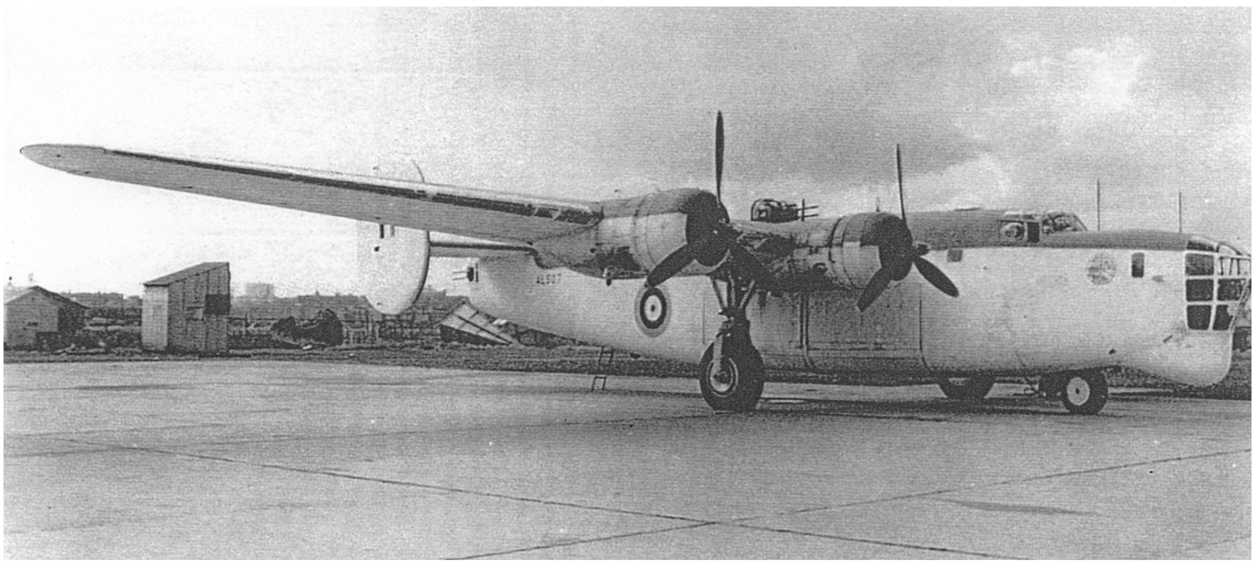
The invention of the Randall-Boot magnetron in 1940 and its improvement by the General Electric Company went a long way toward solving the power problem. It could produce an output of 10 kilowatts at 10 centimeters wavelengths. The first successful tests were conducted in August, 1940 when an aircraft was detected at seven miles and a submarine conning tower at 4.5 miles, both with a ground-based installation. The major thrust of this new possibility was toward AI for night fighters, but ASV and H2S were still getting some attention. In May,1941, work was started on a 10- centimeter aerial in a perspex cupola for all-round searching. In the spring of 1942, H2S as an offensive weapon was given priority over AI and ASV, both considered defensive weapons. Henceforth, H2S production assumed priority over AI and ASV.

## H2S

Bomber Command needed a method of determining drift at night. Astro-navigation is difficult at night when you are cold and tired under conditions of evasive action. In December,1941, a request was made for a navigation system that would yield an error of less than 500 yards after a 1,000 mile flight. They also wanted to be able to determine positions instantaneously. Tests of new equipment in November, 1941, gave ranges of up to 35 miles at 8,000 feet altitude. It could separate returns from known features from general ground returns. First called BN [blind navigation], the name was changed to H2S for security reasons in December,1941. A Planned Position Indicator (PPI) presentation was sought to replace the range and azimuth presentation used in the experiments. The Klystron was not able to develop enough power for practical purposes.

The United States was given priority to develop ASV in an aircraft at the Massachusetts Institute of Technology in 1941, using a DMS 1000 set. This was carried out by scientists of the Radiation Laboratory and two wireless mechanics of the Royal Canadian Air Force - **Sergeants Gilbert Edgerton and James A. Leach**. This aircraft was flown to RAF Station Hurn, England in March, 1942, where it underwent extensive testing and evaluation by the Telecommunications Research Establishment. The DMS 1000 used a common aerial for transmission and reception. This early development of centimetre ASV performed well enough to encourage further work and demonstrated where improvement was needed. The aircraft returned to Boston in June, 1942, for armament fitment and duty on the Atlantic Seaboard in search of enemy submarine activity. It became known as "Dumbo,"and a photo of the actual aircraft is inserted on the next page.

January, 1942, saw the RAF ordering 1500 sets of H2S. A scanning aerial system was favoured over a split aerial system. Specifications required that bombs be delivered within the target area and that precise targets be hit. Tests in April, 1942, proved the scanning system to be superior to all else.; better range and far superior for navigation. Split aerial systems were essentially useless. In March, 1942, it had been decided to fulfill H2S and ASV functions in a single set, thus reducing competition for scarce resources. The magnetron was an absolute essential for ASV and very desirable for H2S. In comparative trials the klystron was giving ranges of up to 10 miles as compared to 35 miles for the magnetron. Both had been tested against built-up areas. However, for security reasons the use of magnetrons in situations likely to lead to capture by the enemy was forbidden.



**"DUMBO "**

*This 1941 photo is of a Royal Air Force B24 Liberator aircraft at East Boston Airport (now Logan International Airport) fitted with a 10 centimeter(cm) Airborne Anti-Surface Vessel (ASV) radar. The Radiation Laboratory of the Massachusetts Institute of Technology (MIT) had received the ASV set, less the antenna and wave-guide system, from England. Following design of the antenna system, the complete set was installed in this aircraft, calibrated and tested by MIT. It was then flown to RAF Station Hurn, England, in March, 1942, where it underwent extensive testing and evaluation by Telecommunications Research Establishment. The aircraft returned to Boston in mid June, 1942, and became known as "Dumbo." During the next few months, Dumbo's capabilities were demonstrated to the senior staff of the US Army Air Force. After fitment of armament it was used on the Atlantic Seaboard in search of enemy submarine activity.*

*Two Royal Canadian Air Force wireless telegraphy operator mechanics of Eastern Air Command were attached to the ASV project at MIT from day one and later flew with the Liberator until October, 1942. They were* ***Sergeant Gilbert Edgerton and Sergeant James A. Leach****. World War*

## ASV & H2S

*II was only one month old when they were first selected for special training by the National Research Council of Canada and in October 1940, were attached incognito as "civilians" to MIT in Boston, USA. They were indeed RCAF pioneers in radar operation and maintenance.*

*(Plate from H.R.Macaulay Collection)*

In September, 1942, ten centimeter H2S was accepted for anti-submarine work to negate the enemy using receivers to detect metric emissions. In January, 1943, the use of the magnetron over Germany was sanctioned by Cabinet. This cleared the way to move ahead on a single equipment, modified in detail to meet the special needs of Coastal Command and Bomber Command. It was recognized that magnetrons could not be destroyed by explosive charges that would not damage the aircraft.

The British Prime Minister wanted two Pathfinder Squadrons equipped by October, 1942, but the Navy did not want to see it used until Coastal Command was using it. A captured magnetron might enable the enemy to design search receivers on the correct frequency to assist submarines in avoiding search aircraft. On January 8th, 1943, it was decided to proceed with bomber use. At the same time it was to be used for submarine detection as soon as it was available. Again they were faced with a shortage of trained mechanics and equipment to train them on. TRE undertook, in December, 1942, to train a number of men in Britain; and at the same time 110 men graduating from the radar school in Clinton, Canada, were sent to the United States for training on American equipment and then flown to Britain with it to provide for installation and service. This specialized training was later carried out at the Ferry Command Base, Dorval, QC, Canada.

Bomber Command first used H2S over Germany on January 30/31, 1943, in a raid on the Hamburg submarine base. Its proximity to the ocean made it an ideal target and the results were termed satisfactory. By February 3rd, 1943, it had been used three further times to mark targets, including Turin, Italy. Towns were readily identified at a range of 20 miles but improvements to the aerials were needed to go above 20,000 feet. These early installations had been in Halifax and Stirling aircraft with service ceilings of 20,000 feet or less. The major bomber was to be the Lancaster, and it could fly higher.

On February 21st, 1943, Bomber Command asked that all operational aircraft be fitted with H2S, not to be used solely over the target but as a navigation aid. This would permit flying in otherwise unfavourable weather and there was no limit on range as with the radar navigational aids, Oboe and GEE. To ease the navigator’s workload the bomb aimer was to become the H2S operator.

On March 12th, 1943, it was decided to share equipment equally between the two Commands. It was considered necessary to carry 100% spares on a squadron to keep all aircraft serviceable, this because of the high failure rate of some components. Relaxing this rule generally resulted in limited training of air personnel. In the emergent situation, Coastal Command thought that they might get by with 25-30% spares but because of their higher casualty rates, Bomber Command asked for 50-60 % spares.

**<u>German Countermeasures</u>**

Coastal Command was faced with several German countermeasures:

- Schnorchel, that allowed submarines to remain submerged most of the time and which, themselves, were hard to detect by radar.
- Flamingo 1. Detecting infra-red radiation, which we were not using.
- Flamingo 2. Detecting aircraft exhaust heat.
- Coating the submarine's surfaces with substances that rendered them less visible to radar.
- U-Boat's had a version of Luftwaffe ASV. This was not very useful because they lacked radio valves capable of adequate power output in the centimeter band.
- Use of radar decoys;
  - <u>Aphrodite</u> - a nitrogen-filled balloon, 28-30 inches in diameter tethered to a plate anchor by 60 yards of wire rope. Three strips of aluminum foil, each 13 feet long were attached to the rope at nine yard intervals. These gave "blips' on ASV similar to those from a submarine.
  - <u>Thetis</u> - a surface radar decoy buoy. A float carrying a 12- foot pole. Metal collars on the pole at 18 inch intervals each carried six strips of metal foil.

  (Aphrodite and Thetis yielded limited success)
- Jamming -

  <u>Karl jammers</u> were used to a limited extent along the coast of Norway and in the Adriatic Sea to protect important sea lanes when they were not covered by islands.

  <u>Magic Eye</u> - a radio receiver tuned to a harmonic of the ASV frequency.

The next tactical change was group sailings through the Bay of Biscay. Up to six submarines sailed in a group with orders to remain on the surface and fight if attacked. This was not too successful - they shot down one aircraft, but lost several U-boats. Larger convoys of submarines in July and August, 1943, shot down up to 115 of attacking aircraft, which countered by circling the spot and calling in Naval craft or more planes. During that July the Germans lost 34 submarines, including several large supply boats used for refueling at sea.

In the spring of 1943, an H2S bomber was shot down. From this the wavelength of H2S was estimated to be around 10 centimeters, but this was never related to ASV.

On August 13th, 1943, the German Naval Communications Bureau reported that a captured Coastal Command pilot had told them that they seldom used ASV but instead detected and homed in on radiations from the German search receivers. He told them that these could be detected at a range of up to 90 miles at heights between 1,000 and 4,000 feet and that ASV was used only to check on closing ranges during attack. The further use of search receivers was banned in all operational areas.

In April, 1944, the Germans discovered our use of 3cm radar. A new crop of search receivers appeared (Naxos, Wanz Cuba and Fliege) for use in the 10 cm band. They had improved range.The Allies themselves developed a set of countermeasures that will be discussed elsewhere. It was found that U-boat radar operated at a wavelength of about 80 cm.

The ASV Mk VI was agreed to on February 6th, 1943. It worked at 10 cm wavelength, had 200 kilowatts power output, blind bombing capability and an attenuator. Coastal Command wanted 3cm equipment as soon as possible but priority went to Bomber Command. By October, 1943, the German use of search receivers in the 10 cm band was concluded.

In July, 1944, Coastal Command decided that they needed lock and follow scanners, attenuators, sea return eliminators, automatic display of azimuth to the pilot and Leigh light operator range indicator for the pilot. This would probably not be available until the spring of 1945 because Britain lacked the production capacity. The ever-increasing demands of all three Services were rapidly outstripping the manufacturing capacity of the electronics industry. Also, as the war situation changed, the Far East theatre was becoming more important, further complicating the situation.

In February, 1945, the use of attenuators was discontinued because ASV needed maximum power output to deal with the introduction of Schnorchel. In August, 1943, losses of Allied shipping was the lowest of any month since November 1941. More German submarines were sunk than merchant ships. The winter of 1943-44 saw more air patrolling at night than any previous winter. However, only 25-30% of the expected number of sightings were reported. There were also many "disappearing contacts".

The following factors had to be considered;

1. There were at least as many submarines at sea at the end of 1943 as at the beginning.
2. New weapons such as acoustic torpedoes would boost the morale of U-boat crews.
3. Increased use of radar countermeasures such as search receivers and decoys.
4. Improved anti-aircraft weapons on German submarines.
5. Improved German long-range aircraft patrols over the Bay of Biscay to shadow convoys and summon submarines.

It was supposed that;

1. The enemy hoped to maintain pressure and achieve more success without sustaining such heavy losses with the attendant diminution of crew morale.
2. The enemy hoped to be in a position to interfere when the expected Second Front became a reality.

To respond to the increased vigour of the enemy with the introduction of Schnorchel, Coastal Command undertook a drive for increased effectiveness. They stressed the training of radar operating personnel and re-organized the servicing side to overcome the severe shortage of radar mechanics.

This involved the following;

1. Set up a central maintenance group to:

a) Check, overhaul and repair all squadron test gear.
b) Furnish the latest technical information on radar installations to all mechanics.
c) Prototype the introduction of circuit modifications.
d) Compile complete modification pamphlets.
e) Investigate squadron maintenance and all modification suggestions.
f) Repair equipment beyond the squadron's capacity to repair.

2. Set up a mobile party of three men to:
   a) Help squadrons with new installations.
   b) Routinely check squadron test gear.
   c) Assist squadrons with problems that were beyond their abilities.
   d) Investigate squadron maintenance, servicing and Daily Inspection procedures and suggest improvements.

Spot investigations from scientists of T.R.E. found that poor adjustment and tuning had reduced the effective range against the Schnorchel by as much as 70%.

When ASV bomb sights were in use, attacks had to be made from as low a level as possible. Otherwise the difference between slant range and surface range was so great that the error above 500 feet altitude could not be tolerated.

In March, 1944, the enemy recorded too many attacks on them by aircraft where no warning was received. Location equipment could not pick up all of the "Allied" frequencies. Between mid-May and the end of July, Coastal Command sank 25 U-boats and damaged 25 more in the Bay of Biscay, as well as sinking 17 and damaging 11 along the coast of Norway when they attempted to reinforce the Biscay units.

When the submarines converted to using Schnorchels they were hard to detect and harder to attack. They could dive much quicker and the maximum range for detection was 4 to 5 miles in a calm to moderate sea. The "blips" were usually obscured by sea returns. Detection was impossible in rough seas. Coastal Command again changed its proceedures. Instead of attacking when a U-boat was located, they called in surface craft for the kill, based on sonar detection. At the same time a special research group was established to work on 3 cm equipment (to be called Mk XVII) and start investigations into 1.5 cm gear. Requirements for this new equipment were:

1. All round gapless coverage. If necessary a 60 degree gap astern could be tolerated if some form of tail warning were made possible. Beam ranges were of utmost importance.
2. PPI presentation corrected for scan distortion with the display to be operated to North or line of flight as necessary. Also a second PPI for the navigator with orientation independent of the radar operator's display.
3. No gaps in coverage from minimum to maximum range.
4. Azimuth accuracy to be not less than plus or minus one degree of angle.
5. Maximum range on Schnorchel was to be as great as possible and sea returns were to be

reduced as much as possible.

6. Complete stabilization in the elevation of the scanner needed so that aerial was not affected by large changes in the attitude of the aircraft.
7. Fully automatic blind bombing facilities, including the use of "memory circuits" to permit attack on a submarine that dives during the bombing run. It must operate between 100 and 5,000 feet with a radial error of no more than 50 yards at 5,000 feet.
8. Facilities for homing onto any type of transmission made by the enemy.
9. Facilities for both "on" and "off" frequency beacons and radar approach aids where available.
10. An efficient IFF (Identification, Friend or Foe) system that gave less warning to the enemy than did the main equipment.
11. An attenuator for transmitters installed in such a way that it did not affect the receiver sensitivity.
12. A computer to quickly determine the velocity of the target relative to that of the aircraft.
13. Range and bearing display for the pilot.
14. Range scales flexible enough to obtain maximum displays for each type of aircraft: U-boats, small ships, large ships, convoys and coastlines.
15. Equipment should be able to radiate on more than one wavelength to confuse the enemy.
16. Automatic warning of a contact was desirable.
17. Other desirable features that affected servicing and operation under various conditions.

The 1.25 cm wavelength was expected to increase definition and this was needed by Pathfinders in Bomber Command also. A shorter wavelength permitted narrowing the beam width and shortening the pulses, thus increasing accuracy. But there was a cost; it was more sensitive to rain storms and sea returns, offsetting the improvements in target sensitivity. The war ended before all of this was realized.

Meanwhile, back in Bomber Command, H2X (3 cm H2S) was first used over Berlin in November, 1943, where it was a great improvement over the 10 cm equipment. Target definition was very good and bombing accuracy was outstanding. It was also very useful through clouds that helped the bombers avoid night fighters. Bad weather over home bases and severe icing were the only constraints on the bombers. At the same time its use against U-boats led to the Captains' taking a "safety first" attitude and shipping losses fell off accordingly. Improved bombing accuracy was also having a deleterious effect on submarine building.

**Fishpond**

A new defensive device, " Fishpond", was added to H2S during the summer of 1943. In the regular H2S display there was a dark circular area in the centre of the P.P.I., representing the distance between the aircraft and the ground immediately below it. If a "blip" appeared within this circle it must be a reflection from something in the air, probably another aircraft. With this in mind, another P.P.I., operated by the wireless operator, was installed. It expanded the dark circle to the full size of the P.P.I. cathode ray tube and, being equipped with a range scale and a bearing scale from the DR Compass, it permitted the operator to determine the range and bearing of any aircraft within about five miles and up to ten degrees above the aircraft. The operator could then warn the pilot and air gunners of possible attacks.

The replacement of dipole aerials in the scanner with waveguides markedly reduced any gaps in coverage and increased both range and target definition.

Distortion of distance due to the difference between slant range and ground range was a problem as aircraft neared the target. New indicator units that corrected for this started to be introduced in October, 1943.

As new radar equipment became available to main force squadrons, two new problems arose:

1. Shortage of connector cables.
2. Shortage of radar mechanics. The bomber squadrons were 30% understaffed. To help solve this, men were transferred from ground equipment and given a crash course on H2S within the Command.

Isolated targets on coastal towns were good targets for H2S Mk II, but definition was still not good enough for congested areas such as the Ruhr. Ten cm wavelength yielded a pulse width of eight degrees on the P.P.I. display. With 3 cm wavelength this could be reduced to three degrees of arc.

Hence, features such as rivers, that were lost to this spread on Mk II equipment, would be displayed on Mk III.

Mk III H2S (3 cm wavelength) was first used over Berlin on the night of November 18/19, 1943, in Pathfinder aircraft with what was termed "most outstanding" results. Target definition was very good. This was the equipment that finished the war in Europe, not that improvements had not been conceived and tested, but that the electronics industry could not take on any further tasks.

**Dean Johnston,** a radar mech from Guelph, Ontario, comments on problems encountered in his early work on H2S with Bomber Command: Transportation was poor; and they had to use bicycles for several months before they received a van. Aircraft often arrived at the squadron without cabling, alternators, scanners or trays. Hydraulic oil from the mid-upper gun-turret dripped onto the H2S scanner and collected in the perspex blister to interfere with transmission and reception. Some scanners had to be modified on the squadron to correct gaps in the PPI radar display.

# ASV & H2S

**R137877, Samuel M. Estwick's** experience as a radar mechanic on ASV and H2S equipment during World War II involved travel to many points on the Globe. After training at Clinton in 1941 he sailed to the UK aboard the Queen Elizabeth. His first overseas posting was to 5 OTU in Scotland, working on ASV equipment in Beaufort and Hampden aircraft. He was then sent to India, via South Africa, and later posted to an AMES Holding Unit near Cairo. His next operational assignment was with 38 Squadron on Wellington aircraft in Libya, North Africa. Following return to the UK, he was posted to 415 RCAF Coastal Squadron, again with ASV-equipped Wellington aircraft. This squadron was later transferred to Bomber Command with H2S and GEE-equipped Lancaster aircraft.

Sam had some interesting experiences during his travels. Many of us have stories to tell, but few of us had to contend with such undesirable situations as he recalls here:

*"In early December, 1943, I spent Christmas on HMS Britannia in a convoy off the South West coast of Africa. There were eight of us RCAF LAC Radio Mechs and a few RCAF officers on board. I was called to the cabin of a senior RCAF officer who told me that we would be disembarking in Durban. South Africa, and would be spending some time on land. He mentioned that the Canadian officers were concerned about me with respect to the 'colour bar' that existed in that country. They were contemplating renting a hotel room, designating it a Canadian Club, and using it as a place where I would be able to go and relax and have a drink with the guys. I thanked him for the thought but I felt that there would be no need to go to the expense for such an arrangement. After all, I told him, I had visited the USA where there were 'colour problems'. How naive could I be?*

*We arrived in Durban and allowed ashore the first day in port. The eight of us LACs had one thing in mind - find the best restaurant and eat the best meal possible. We found a restaurant with white tablecloths and a fine decor but were told I could not go in with the other seven. Thinking that this was just 'one of those establishments', we would go on to another, more democratic restaurant. This time two of the guys went ahead and asked --the same result. Our group was told that this is South Africa and here the different races, do not mix.*

*Seeing that at least 75% of the people on the streets were Blacks, I felt that there must be a restaurant they would frequent somewhere close. So I told the guys that I would go off and find one. One of the guys heard that there was an American USO (?) around. We found it. The lady in charge at the USO told me that the facilities were for GIs only but, the fact that we were North Americans, and that she knew of the problem for me, she would look after us. She told me of the problems she had when a contingent of black GIs came through. She told me that there was a service club, run by the IODE for the British troops, and that they should look after me over there. I thanked her, and after getting directions, decided that I would go there the next time we were in town.*

*The next day we were sent to a transit camp. From the camp we could ride a train into the city. I found the IODE Canteen and during my stay in South Africa went there often. I was treated very* *well there by the people in charge. Then, one day when I got to the door, there was a Sergeant there who wore the insignia of the South African Forces. He shouted at me in some language that I did not understand. I pointed to my RCAF insignia and the sign that this was for the British Forces, and that I was one of them. I should mention that, on one or two occasions, I had been stopped on the street by the local authorities, enquiring about my uniform and where I had got it. (I guess they thought that I had stolen it). Anyway, by this time I was getting to the point where I was ready to do battle for my rights. I told the Sergeant in a very strong manner that I had been eating there for the past few days and that I had no intention of letting him stop me. I think he got the message because he soon stepped out of the way.*

*Then there were two incidents in camp. On one occasion I went to meet some of the guys in the wet canteen. We were sitting having a beer when a little native boy came up and pulled my sleeve, pointing to the counter where a huge guy was beckoning to me. I went up to see what he wanted. In a very rude manner he shouted something at me. I could see that he was a South African Sergeant and that he was apparently very unhappy with me. By this time I had had just about all that I could take from these people. Again I pointed to the sign --- this one said "For His Imperial Majesty's Forces." He softened enough to say that I could finish my beer and then I had to get out, and that I would not be allowed to drink there again. I told him rather strongly that I did not agree with him. To this he replied that he would throw me out.*

*I backed away from the counter and invited him to come over and try to carry out his threat. At a table near the bar were some of the British Commandos with whom I had worked on the ship. One of these chaps, about 175 lbs of muscle and bone asked "What's the problem, Canada?" I told him that I was about to practise some of the things that they had taught me. He expressed the opinion that the Sarge outranked me in size, and it might be better if he looked after it. I think the South African Sergeant broke the world speed record for getting lost.*

*On the next occasion I was standing in the dry canteen. A South African Corporal came up and stepped in front of me. When I told him the end of the line was several airmen behind me, he shouted something and pushed me. Well, that was the sorriest thing that he ever did. Some of our guys pulled me off him. That was it --- there and then I decided that I might as well die there fighting for my rights as to go to Asia to fight some Japanese who had done nothing to me. One of our guys knew Pilot Officer Don Biggs, RCAF (Major General ret'd), and he ran over to the officer's line to get Don. Don smoothed over the consternation with the South African authorities and I was advised to 'cool it' for that evening."*

*"Did I forget to tell you that I am a Black?"*

S.M. Estwick, Ottawa, Ontario.

# ASV & H2S


**Radar Mechs in Training at Clinton - 1941.**
**(Roy Studholme, bottom right)**

**Radar Mechs at RCAF Dishforth, Yorks - 1944.**
**Back row:Phil Campbell, Breen Kennedy, Jim Fife, (Transport driver).**
**Front row:Lloyd Jackson, ....Smith (MT Driver), Bill Hartwick, Roy Studholme.**

***Photos courtesy of Roy Studholme.***

## ASV & H2S

**Radar Workshop and RadarVan, Dishforth, Yorkshire.**
(*Photo courtesy of Roy Studholme)*

**Al Maskell and Radar Van** **Jim Fife and Keith Middleton**

*(Photos courtesy of Al Maskell)*