

**GROUND CONTROLLED  
INTERCEPTION  
RADARS  
IN OPERATION NEPTUNE/OVERLORD  
“THE ALLIED INVASION OF FRANCE”  
JUNE, 1944.**

**The story of the Fighter Direction Tenders  
used during the “D-Day” Assault  
and  
The Mobile Radar Convoys that  
Landed on the Beaches.**

**HMS FDT 13**

**HMS FDT 216**

**HMS FDT 217**

**Convoy 15073**

**Convoy 15082**

**Convoy 15083**

**Prepared by Horace R. (Red) Macaulay**

## **GCI Radars (Neptune/Overlord)**

## GCI Radars (Neptune/Overlord)

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### ***PREFACE and ACKNOWLEDGEMENTS***

This is the story of the Fighter Direction Tenders (FDT 13, FDT 216 and FDT 217) of Combined Operations as they accompanied the “D-Day” invasion force in Operation Neptune/Overlord and the Radar Convoys that continued the GCI role after landing on the mainland. The task of the FDTs was to ensure the radar equipment was in position and operating for control and interception of aircraft prior to the establishment of like equipment on land. The story of the Ground Controlled Interception Radar Units that landed on the beaches of Juno and Omaha is also contained in this essay.

It is interesting to note that on the above mentioned FDT’s all the radar technical officers involved were members of the Royal Canadian Air Force attached to the Royal Air Force, as well as a good percentage of the radar maintenance personnel. Their involvement in this activity commenced a good five months before that historical day of 06 June 1944, when they formed part of the largest armada ever assembled for an invasion.

Careful attention was applied in selecting these individuals for the task. They were subjected to strenuous working conditions, in a congested and dangerous environment - working and living in an area originally designed for short transit of assault forces. Their mission was not without loss of life. The final report on the use of FDT’s during Operation Neptune/Overlord remarked on the great success of this activity and extended high praise to those aboard the vessels.

Thanks are extended to all those who have contributed input. Many of their factual accounts are contained in the following text. The assembly of information has had the benefit of previous research conducted by Robert F. Linden and Douglas A. Swanson, including the landings of GCI Mobile Radar equipment on Omaha and Juno Beaches. Accounts of these landings are supported by inputs from the Technical Non-Commissioned Officer of GCI Convoy 15082, Flight Sergeant Muir Adair (RCAF), Croix de Guerre and Corporal John G. Stevens, an RCAF radar technician; Officer Commanding GCI Convoy 15083, Squadron Leader R.H. McCall(RAF); and Officer Commanding GCI Convoy 15073, Flight Lieutenant Alexander McLeod (RCAF).

Special thanks are extended to Karl Work, the lone AI radar technician on FDT 217 for assisting in co-ordinating the input from others and generously providing many of the photographs used herein. Thanks are also extended to Richard Martin of Warminster, England, who was an RAF radar technician on FDT 216. Robert M. Stalker of Ottawa and C. Bennett Howe of Windsor, Ontario, both radar technicians on FDT 217, are also thanked for their generous support.

H.R. Macaulay/2000

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### **GROUND CONTROLLED INTERCEPTION RADARS IN OPERATION NEPTUNE/OVERLORD. - THE ALLIED INVASION OF FRANCE, JUNE, 1944 -**

#### **Background**

This account starts by introducing the organization that made it all possible - the Telecommunications Research Establishment (TRE). TRE started as a small group of scientists within the Bawdsey Research Group under the British Air Ministry Research Group and was located at Orfordness, Suffolk, England. Here they worked on the development of a Chain Home (CH) radar which later was to be credited for the survival of the United Kingdom in the 1940 Battle of Britain. They were relocated to the Isle of Purbeck at Worth Matravers, Dorset, in May 1940. In fear of a \*"Bruneval" style raid on Dorset, TRE and its supporting Telecommunications Flying Unit (TFU) at RAF Station Hurn, moved on 25 May, 1942, to Malvern and Defford respectively. From here TRE responded successfully to the many questions "can you do it and when can we have it?" One of the many concerns of those planning the inevitable invasion of the Continent was the need of forward warning and control radar. This equipment must be in position prior to the beach landings of Allied forces - thus the concept evolved of installing suitable radar equipment on floating vessels in the Channel. These vessels became known as Fighter Direction Tenders (FDTs).

The two Ground Controlled Interception (GCI) radar systems installed on the FDTs were developed by TRE - Air Ministry Experimental Station (AMES) Type 11 and Type 15. The Type 15 radar antenna was developed at Worth Matravers and built at Christchurch in December 1940. The AMES Type 11 system was developed by TRE following the Bruneval raid. It had many similarities to the sophisticated German "Wurzburg" radar system, parts of which were captured during the raid.

This section covers the development of FDTs and their use in the invasion of the Continent. Reports are also included on the GCI Radar Convoys that landed on the assault beaches to assume the duties carried out by the FDTs. TRE was also active in many other inter-related areas of radar systems development in support of the "D-Day" invasion. The following come to mind: the OBOE navigational system for improved bombing accuracy used extensively to soften enemy defences in the landing areas; the continuing development in the field of radio countermeasures (electronic warfare) through the use of counter and counter-counter measures to stay one step ahead of the enemy's systems; the mobile radar systems which would follow the battle line once established on the Continent; and the mobile, personal and aircraft beacons used primarily for photo-recce overflights. In their development it was necessary to ensure that final products were compatible with those used by other Allied forces.

*\* On 27 February 1942 a British raid at Bruneval on the Cherbourg peninsula captured apparatus from a German Wurzburg radar installation and brought it to Worth Matravers for study by TRE.*

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The FDT's, in addition to all other applications of radar equipment, had one thing in common - a good percentage of the radar officers and technicians were members of the Royal Canadian Air Force, attached to the Royal Air Force as Radio Direction Finding (RDF) personnel. Their input is included in the following paragraphs.

## **FIGHTER DIRECTION TENDERS (FDT)**

### **Fitment and Testing of Fighter Direction Tenders**

The concept of using ground radar installations on floating vessels was initially tested during the invasion of Sicily in July, 1943. An RAF mobile GCI unit was temporarily mounted on Landing Ship Tank (LST) 305 for use in the Mediterranean Theatre. Results were so successful that the AOC-in-C Fighter Command recommended that similar vessels be converted and equipped for landings in Europe. Fighter Command had originally recommended the conversion of four LST's to be used by Combined Operations. At a meeting with the Admiralty in November, 1943, it was decided that only three vessels were to be equipped to perform interception and raid reporting functions, under the code name "Baccy". Specifications were prepared and by the middle of February, 1944, conversion of the three LST's had been completed.

The LST's selected for FDT conversion were part of the 112 made available to the Royal Navy during World War II under the U.S. lend-lease program. They were built in USA for use in assault landings on enemy beaches and were originally designed to carry eighteen 30-ton tanks or twenty-seven 3-ton trucks and eight jeeps or 177 troops. Upon conversion to the FDT role, the LST would have a displacement of 3700 tons and a length of 328 feet, comparable in size to a Naval cruiser. The vessel would carry a Naval crew of 8 officers and 92 ratings in addition to 19 Air Force officers and 157 airmen.

The conversion of the three LSTs was carried out by John Brown's Shipyard on the Clyde in Scotland. The work included welding shut the bow unloading doors and covering the hatches with armoured plate. Three hundred tons of pig iron were secured to the main deck to slow roll action of the vessel. A new deck was laid over the vehicle cargo space to contain the operational accommodation for the Filter Room, Communications Office, Cypher Office, Air Control Room and Radar Receiving Room. A Direction Finding Office was provided forward for the installation of Naval D/F equipment. Space was provided at the aft end of the tank deck for the Transmitter Room, Transceiver Rooms, Aircraft D/F, Radio Counter-Measures Office and a W/T Storeroom. A Bridge Visual Direction position and a Bridge Plot House were constructed above deck.

Two GCI radar systems were installed on each FDT - a Type 15 GCI forward and a Type 11 GCI amidship. The radar aerials were 30 feet above water level which limited the accuracy of aircraft height readings. The Type 11 radar on 520 Mc/s was provided as an alternative if the 200 Mc/s band was seriously jammed. Mk III IFF (Identification, Friend or Foe) was installed to provide identification only when Air Movements Liaison Section information did not provide the answer. The IFF was normally left switched off. Airborne Interception (AI) Beacons were installed on the FDT's to aid the control of night fighters. Each FDT carried 1.5 metre Mark IV and 10 centimetre Mark VIII AI Beacons. Finally, many channels of VHF R/T and W/T were installed to provide the

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essential communications.

Sea trials were carried out in the Ailsa Craig area which included radar calibration and communications tests. It was necessary to raise the Type 11 antenna to eliminate a 20 degree “blind” area either side of the bow. Otherwise the tests were generally acceptable.

During April, 1944, exercises took place at sea off the Humber coast with No.12 Fighter Group Sector. These included the use of \* “window” (known as “chaff” by the US Forces). Exercises were continued in May, 1944, with No.11 Fighter Group Sector and Naval authorities in the Portsmouth and Portland areas. By the end of May the FDT’s were ready for action and they sailed from Cowes, on the Isle of Wight, to join the Assault Task Forces at 22:00 hours on 05 June, 1944.

### **Fighter Direction Tenders in the Assault**

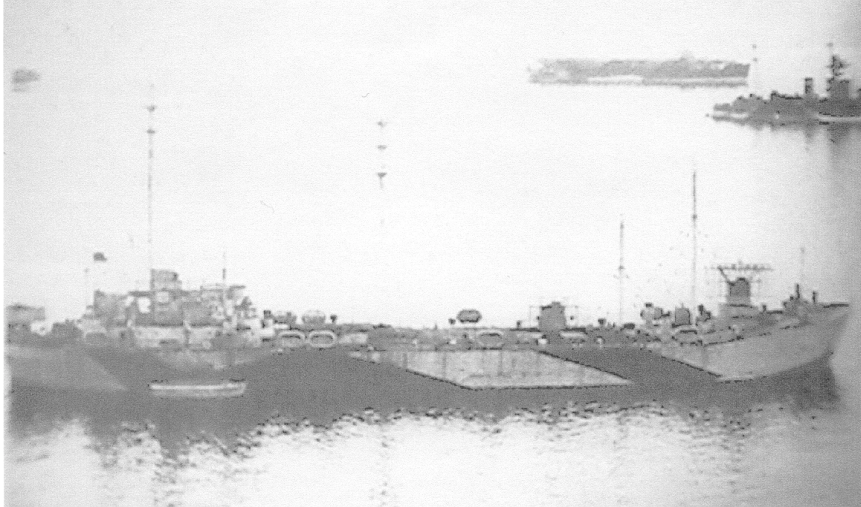
During the assault and until GCI facilities became established ashore, the control of fighters operating in the assault area and the main shipping area would be exercised from the three FDT’s as follows;

- FDT 216. Off the American beaches (Omaha and Utah) in the Western half of the assault area for the control of those British and American fighters detailed to operate therein.
- FDT 217. Off the British beaches (Sword, Juno and Gold) in the Eastern half of the assault area for the control of those British and American fighters detailed to operate therein.
- FDT 13. In the main shipping route for the control of those fighters detailed to operate in that area.

FDT 217 acted as the co-ordinating vessel to order reinforcements, if necessary, depending upon which part of the assault area was being attacked. As dawn broke, the beaches were being bombed by RAF aircraft and the Allied cruisers and destroyers commenced shelling. All three FDT’s commenced radar watch at H-hour (07:25 hours) on 06 June and were immediately in contact with the fighter aircraft providing air defence to the armada.

\* *Window - metallic strips cut to a half wavelength of the enemy’s detecting radar systems. Dispersed from an aircraft, the radar return would simulate a large formation of aircraft.*

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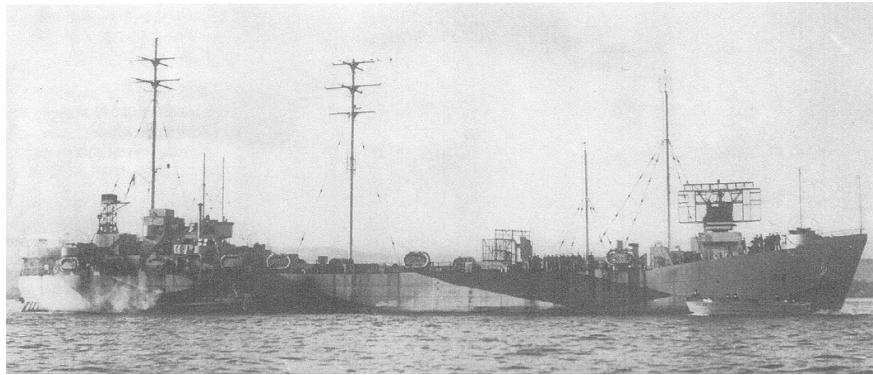
**Figure 1**

**HMS FDT 13 in Naples  
August, 1944.**

*Photo courtesy of the late  
J. Arthur Hall.*

**Figure 2**  
**HMS FDT 216 off the  
Clyde Estuary- May, 1944.  
(Later sunk off the French  
Coast, 7 July, 1944).**

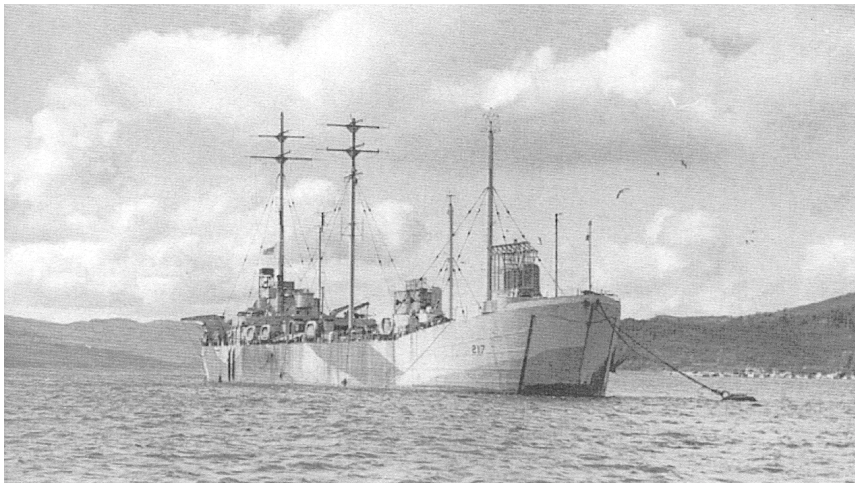
*Photo courtesy of Richard Martin,  
Warminster, England.*



**Figure 3**

**HMS FDT 217 in Loch  
Fyne, Inveraray, Scotland.  
December, 1944.**

*Photo courtesy of Karl Work,  
Lindsay, Ontario*





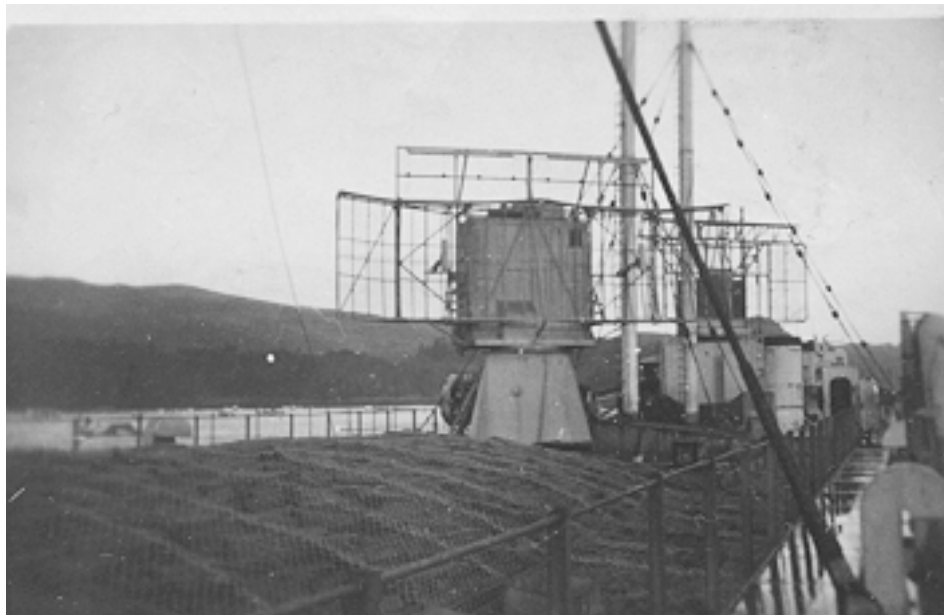
**GCI Radars (Neptune/Overlord)**

**Figure 4**



**Antenna of AMES 11 back-up GCI radar on FDT 217**

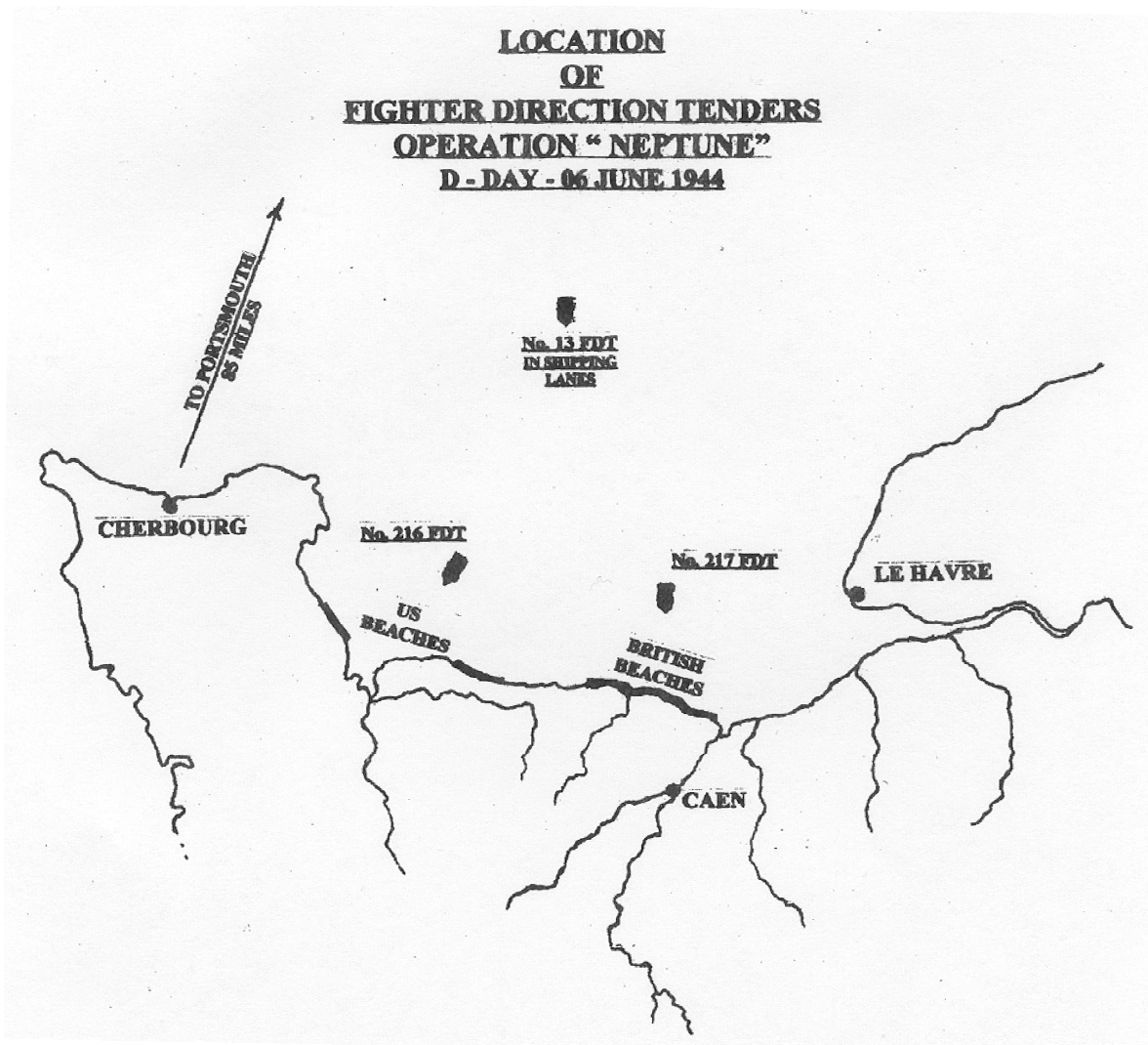
**Figure 5**



**GCI antennae - AMES 15 on the right and AMES 11 front left on FDT 217  
(Note pig iron lashed on deck - used to lower vessel in water)**

Photos courtesy of Karl Work

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Air fighter cover over the assault area during daylight hours included six Spitfire Squadrons (12 aircraft per Squadron) on low level and three P47 (Thunderbolt) Squadrons (16 aircraft per Squadron) on high level. These Squadrons were under the control of FDT 216 and FDT 217. Four P38 (Lightning) Squadrons (16 aircraft per Squadron) on low level patrol over the Assault Forces and shipping route were under the control of FDT 13. In addition, a total of 38 night-fighter aircraft were controlled by the FDT's during the night of 06/07 June. The large number of friendly aircraft in the area and the dropping of "window" by friendly bombers presented a very busy task for the Filter Room personnel.

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**Figure 6**

**Len Betts and Karl Work  
aboard HMS FDT 217  
watching HMS Rodney  
fire inland - 06 June, 1944.**



**Figure 7**

**LCT approaching Normandy Beach, 6 June,  
1944. (Photo taken from starboard side of  
HMS FDT 217)**

*Photos courtesy of Karl Work*

## **GCI Radars (Neptune/Overlord)**

On the first evening the Luftwaffe carried out a bombing raid on the British beaches, resulting in casualties but no serious damage to shipping and stores. FDT 217 observed the raid but it was quickly lost in the numerous echoes from the concentration of shipping and permanent echoes from the coastline. The beachhead area was subjected to sporadic attacks by ME 109 and FW190 fighter-bombers, normally during poor weather or low cloud cover. There were also a number of JU88 raids at dusk. It was estimated that enemy air activity resulted in 30 to 40 sorties per night. FDT 13 had very little call for fighter control as the shipping lanes were not subjected to enemy attack.

### D+4

Two Spitfire Squadrons moved onto a landing strip in the "GOLD" area and established contact with FDT 217 and No.15083 mobile GCI now operating ashore.

### D+5

A Wing operating from a landing strip in the "GOLD" area was now under the control of FDT 217 for use when weather conditions in the United Kingdom made it impossible to supply low level cover from there.

### D+7

During the period from D-Day to D+7, FDT 217 controlled 225 aircraft, obtained 66 contacts, intercepted 37 friendly aircraft, destroyed three enemy aircraft and damaged a further two. The figures for FDT 216 were 62, 49, 33, 3 and 0 respectively.

### 13 June 1944

FDT 13 returned to Port for re-fuelling and re-victualling.

### 15 June 1944

FDT 216 returned to Port for repairs of damage she had suffered in collision and FDT 217 relieved her off the US Beaches, as No.15082 mobile GCI radar station which landed on Omaha Beach was still not fully operational. At the same time FDT 13 was positioned 20 miles east-north-east of Barfleur to intercept enemy mine layers and torpedo aircraft attacking shipping at night, approaching round the Cherbourg peninsula.

### 23 June 1944

FDT 217 was withdrawn from off the US Beaches after continuous operation for 17 days.

### 27 June 1944

FDT 216 relieved FDT 13 off Barfleur and on the 01 July when the shore based GCI's were working inland from Barfleur. FDT 216 was moved to a position 23 miles west of Le Havre to assist in the interception of enemy aircraft laying mines at night off the British beaches.

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The results achieved by the Fighter Direction Tenders during the period from 06 June to 26 June 1944 are as follows;

- 52 enemy aircraft destroyed during day by fighters under FDT control.
- 24 enemy aircraft destroyed during night by night-fighters under FDT control.

### 07 July 1944

FDT 216 was torpedoed by a JU88 and turned turtle about forty minutes later. The entire crew, Naval and RAF, was rescued by her escorting corvette HMS BURDOCK with the exception of five airmen reported missing.

### **Final Days of FDT 217 and FDT 13**

The following information on FDT 13 and FDT 217 was provided by Karl Work, an RCAF radar technician on FDT 217 during the assault. (See also Appendix "A" for personal diary by Karl Work). FDT 217 remained anchored off Cowes, Isle of Wight, until the middle of November, 1944, before sailing up the Irish Sea to Loch Fyne, arriving off Inveraray 30 November, 1944. She wintered there with a skeleton maintenance crew of two Naval officers and 20 seamen, along with the complete radar personnel of one officer and eight technicians, plus approximately 15 other RAF trades personnel. In February, 1945, the RCAF radar technicians began being replaced by RAF personnel. FDT 217 sailed to the London Engraving docks in June to be outfitted for Japan. She was still undergoing conversion when the Atom Bomb was dropped on Japan, ending the war. The crew was paid off and the ship was struck off strength.

FDT 13 sailed to the Mediterranean and joined the fleet in Naples Harbour in August, 1944, for the landings in Southern France (Operation DRAGON - 15 August, 1944). During these landings, American personnel manned and controlled the radar equipment. FDT 13 then went on to participate in the liberation of Greece. On Christmas day 1944, while on route to the UK, the engines failed due to diesel fuel problems (sabotage was suspected) and she limped into Bizerte, North Africa, for dry dock repairs. After repairs she arrived at the London Engraving docks at the end of February, 1945, for refit to go to Japan. She sailed in July and reached Malta before being recalled in August, 1945. The crew were paid off in England and the ship was returned to the USA.

### **Comments**

The following comments were reflected in a report on the role and operation of British Headquarters Ships and Fighter Direction Tenders used in the assault on the Continent of Europe in June, 1944, - Operation Neptune. (file DEFE 2/421, Public Records Office, Kew, U.K.);

- The Fighter Direction Tenders performed remarkably well and their operation was a great success. Possibly more time during the fitment period would have resulted in a better layout of work space and equipment. However, it was essential to press on with the training of personnel and testing of equipment to ensure readiness on D-Day.

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- Continuous employment on a “watch and watch” basis of four hours on and four hours off, in poor working conditions, imposed a very serious strain on the personnel. The radar personnel had been on these vessels for five months, living in cramped accommodation intended only for tank crews on short transit trips.

- There was no air conditioning and the work areas were overcrowded. With a lack of exits, someone defined FDT as “floating death trap”.

- No criticism could be found with the radar equipment. It worked efficiently and was never taken off the air for maintenance during the operation.

- The rigid procedures used in the selection of officers and men to staff the FDT’s proved to be justified by the way they all stood up in working together under very adverse conditions. They indeed were worthy of high praise.

### **The Death of FDT 216**

This part captures some of the experiences and comments of personnel who were with the Fighter Direction Tenders during the landings on the Continent of Europe and the days following as strongholds were established on the beachheads.

Of grave concern to all was the loss of FDT 216 along with five RAF airmen. The escorting corvette HMS Burdock was on site at the time and its Commanding Officer, Lieutenant (RN) H.M. Collier gave the following account;

*“At 01:00 hours on the morning of 7 July, 1944, FDT 216 was approached by a low flying JU88 aircraft and at 01:02 a loud explosion was heard and a pall of black smoke rose from the FDT. At 01:05 a signal was received that she had been torpedoed on the Port bow. At 01:45 the noise of her pig iron deck ballast moving was heard and she turned over on her Port side and remained there for about 90 seconds before turning turtle and floating bottom up. The rescue of survivors continued until 02:45. The red lights on the life jackets and the small whistles that the RAF personnel carry, proved invaluable in picking up the scattered groups and enabled 250 men to be picked out of the water in just over two and a half hours. All survivors were kept below decks in case of further action and were given a quick rub down and a tot of rum which was much appreciated. A muster was then organized and found that all Naval officers and ratings, as well as the ship’s dog, were present, but five RAF other ranks could not be accounted for. The organization for dealing with survivors at Portsmouth worked smoothly and effectively and grateful thanks are also due to the WVS (Women’s Volunteer Service) Mobile Canteen which arrived on the jetty almost as soon as the buses and ambulances”. (Note: The following is not part of the above account, but this prediction was credited to a Scot’s rigger in the John Brown’s Shipyard on the Clyde: “Nay laddie! You dinna put ballast on the top deck - She’ll turn turtle”).*

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**Figure 8**

### **Radar Technical crew aboard HMS FDT 217**

**Back row** (l to r): Cpl Ted Parfitt; Cpl Charles Pinell; LAC Robert Stalker;  
F/Lt Tracy; LAC Bennett Howe.

**Centre:** Flt/Sgt Glenn

**Front row** (l to r): LAC Len Betts; Cpl Lionel Cook; LAC Karl Work.

*Photo courtesy of Karl Work*

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**Figure 9**

**Aboard HMS FDT 217 in front of  
Carly float - June'44  
(l to r): Bennett Howe, Charles Parfitt,  
Karl Work and Len Betts.**



**Figure 10**

**Ready for shore leave after D Day  
Operations - 25 June, 1944.  
(L to r): Robert Stalker, Lionel  
Cook, Bennett Howe and Karl  
Work.**



*Photos courtesy of Karl Work*



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It is interesting to note that the radar technical officers on all three FDT's were members of the RCAF. They were;

FDT 13 - Flight Lieutenant **Alan V. Smith** - C15401.

FDT 216 - Flight Lieutenant **George Miles** - C14878 (deceased)

FDT 217 - Flight Lieutenant **Hugh Tracy** - C7956

**Alan Smith** was one of the direct entry radar technicians, arriving in the UK in January, 1941. Following equipment training at Yatesbury he was posted to a Chain Home Low (CHL) station in Cornwall. By 1943 he was commissioned and in charge of No. 15076 mobile GCI Station. This unit ended up in the Mediterranean and was the first use of GCI equipment installed on an LST. Alan accompanied this floating radar which provided aircraft control at the Sicily invasion (Operation HUSKY - 10 July, 1943) and then at Salerno, Italy (Operation AVALANCHE - 09 September, 1943). He was then returned to the UK and took part in the preparation of FDT's for the assault on Europe. He was the radar technical officer on FDT 13 and arrived on site with the assault force on D-Day. In August, FDT 13 sailed to the Mediterranean for the landings in Southern France and the liberation of Greece. (Note; Alan's detailed account of the above is contained in an article titled "The Umbrella Experiment" and was published in the October, 1995, issue of the Legion magazine).

*"There were various bits of novel fun on the technical side - bound to be when you consider that we'd stuffed a land based thing like a ground controlled interception radar outfit into a rolling, bouncing, wandering environment of a ship, complete with salt-spray corrosion. Things were never dull; challenges abounded. One bit of consolation - our guys were entitled to the then-prevailing daily shot of rum, just like regular navy personnel".*

*"All in all, FDT 13 was a good outfit and we had lots of good Canadian talent - names of **Art Hall** (Edmonton), **Bill Hunter** (Toronto), **Eddie Fenton** (Winnipeg) and **Andy Simpson** (Montreal) come to mind. A good bunch!".* (Editors note: Other RCAF personnel known to have been on FDT's include **A. Weaver**, Sault Ste Marie; **Karl Work**, Lindsay, Ont; **Lionel Cook**, Quispamsis, NB; **Ben Howe**, Windsor, Ont; **Bob Stalker**, Ottawa; and **Ted Parfitt**, Winnipeg, Man).

**J. Arthur Hall**, R93808, joined the RCAF in April, 1941 - one of the first groups selected for radio physics training at the University Detachments. He went overseas in November, 1941, and took radar equipment training at RAF Cranwell, Lincolnshire. His first radar posting was to a CHL Station near Helmsdale, Scotland. In January, 1944, he was moved to RAF Farnborough and joined a number of "boffins" and about 30 radar technicians who were modifying equipment to be fitted in LST's (FDT13, FDT 216 and FDT 217). Hall was assigned to FDT 13 and remained with this floating GCI radar station during fitment, sea trials, assault on Europe, landing in Southern France and the liberation of Greece.

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*“ On D-Day we were positioned in the main shipping channel between the Isle of Wight and the Assault Area. It was like having seats on the 50-yard line at the Grey Cup. We watched the greatest armada ever formed, sail into battle. The battleships HMS Rodney and Nelson, cruisers, destroyers, LST's, small ships, large ships, Mulberry harbour ships and when the cloud cover cleared, the sky was filled with vapour trails.”*

*“ The invasion of Greece was featured by mine fields and ships were blowing up all around us”.*

*“ I came through it. It was rough but I would not have missed it. Actually it was the great adventure of my life”.*

*“On 7 May, 1993, the Greek Embassy in Ottawa phoned to say I was getting a Greek medal for my help with the liberation. Not many radar techs have that one!”*

**Bennie Howe** was an RCAF radar technician on FDT 217 and was responsible for maintaining the Type 11 antenna and transmitter, which he refers to as the “German Radar”.

*“During the invasion our German radar was jammed 100% by the British jamming equipment”.*  
(Note: As mentioned previously, the Type 11 equipment inherited features of the captured German Wurzburg equipment, and operated on the same frequency).

*“An enemy aircraft came over one night and dropped a number of bombs around us. Fortunately none of them hit our ship. Below deck it sounded like someone pounding the side of the ship with a giant sledge hammer as the bombs exploded under water.”*

**Karl Work**, the lone airborne interception radar technician on FDT 217, had the following comment about hostile activities:

*“ During periods when we were under attack, I tried to keep myself busy on the upper deck and would normally end up passing ammunition to the 20mm Oerlikon Gunner.”*

CAN R106371 Corporal **Robert M. Stalker** of Ottawa was a ground radar technician of the Royal Canadian Air Force. His detailed account of activities that occurred 55 years ago is a good example of how wartime experiences were impressed upon the minds of those involved.

*“I was serving as a radar technician at CHL Station Secrene in Cornwall and ordered to report to RAF Experimental Station at Farnborough. No mention was made that we would be part of an invasion force. We were simply told that we would be assigned to Tank Landing Ships fitted with radar equipment. From Farnborough we went to Glasgow where three LST ships were being converted to FDT's. I was assigned to FDT 217. After final fitment and testing with aircraft we sailed to Cowes, Isle of Wight. During the weeks we were anchored at Cowes, the equipment was*

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*operated continuously, except for short periods when we carried out routine daily maintenance”.*

*“ D-Day” finally arrived and the evening before we were told that we would be off the coast of Normandy on the British sector before daybreak. We maintained radio silence until a certain time in the morning. From then on the equipment operated continuously. The lengthy trial invasion exercises paid off, as we never had to use the back-up radar equipment. We experienced some heavy bombing, but fortunately no direct hits. One bomb exploded so close that the ship jumped about four feet out of the water. The alarm sounded for everyone to abandon ship positions, however it was soon determined that the ship had not been damaged. Fortunately the radar was still serviceable and apparently less bothered by the bombs than we were.”*

The following list is not complete, but it does include all RCAF personnel known to have been on the FDT's;

### HMS FDT 13

C15401 - Flight Lieutenant Alan V. Smith  
Eddie Fenton, Winnipeg  
R93808 - J. Arthur Hall, Edmonton  
R129341 - William S. Hunter, Toronto  
R159793 - Andrew M. Simpson, Montreal  
R98246 - A.R. Weaver, Sault Ste. Marie

### HMS FDT 216

C14878 - Flight Lieutenant George Miles  
(deceased).

### HMS FDT 217

C7956 - Flight Lieutenant Hugh Tracy  
R126395- H. Lionel Cook, Quispamsis, NB  
R126905- Clarence Bennett Howe, Windsor, ON  
R101997- C.T. (Ted) Parfitt Winnipeg  
R100444- Charles H. Pinnell, Winnipeg  
R106371- Robert M. Stalker, Ottawa  
R160415- Karl M. Work, Lindsay, ON

**Figure 11**

**The badge (red on a black background) was worn by all Combined Operations Personnel.**

**(It was worn on both sleeves of the battle dress, midway on the forearm, with the machine gun pointing forward).**

*Badge was kindly provided by Robert Stalker, Ottawa.*



## GCI Radars (Neptune/Overlord)

### Mobile Ground Controlled Interception Radar Units

The officers and airmen selected to maintain and operate the GCI radar convoys to accompany the “D-Day” landings were first sent to RAF Station Renscombe Downs, near Swanage in Dorset. Here they spent about one year becoming acquainted as a team and undergoing training on the equipment. Various exercises were carried out in siting and setting up the equipment. Personnel were trained as drivers and carried out waterproofing for wet landings. Many of them were on their assigned units for a year before 06 June, 1944.

Once the mobile radar units had landed on the beaches with the assault forces they would take over the GCI role from the FDTs. Their story has been covered in part with the preceding account of the FDTs. The following reports, by personnel who were there, provide some interesting reading;

#### **Omaha Beach - “D-Day” - 06 June 1944.**

Technical Non-Commissioned Officer Flight Sergeant **Fulton Muir Adair** (RCAF), Croix de Guerre, has provided the following account of problems encountered on Omaha Beach in an attempt to land No.15082 GCI radar convoy on “D-Day”:

*“During some pretty concentrated activities early in 1943, the personnel of the Ground Controlled Interception Unit (GCIU) 15082 were subjected to continuous and rigorous training in wet landing procedures, combat exercises and anything else that assorted Admirals, Generals and Air Marshals could concoct. I personally took courses in waterproofing vehicles, leading truck convoys, riding motorcycles, and sailing small vessels. Even had five hours dual on an army Auster aircraft.*

*The first echelon of No.21 Base Defence Sector Control had made an attempt to land at 11:30 in the morning, but was met with machine-gun fire and withdrew until 17:00 in the afternoon.*

*I took the first echelon off a LCT; drowned all vehicles within yards; swam ashore with all gear, including a strange combination of gas mask and flotation device issued by the Americans; and after wading ashore in the midst of assorted US Rangers and engineers, managed to get some shelter from the .88's in the lee of an embankment at the edge of the exposed shingle beach.*

*I was unable to find any evidence of my echelon and for the rest of the day, that night, and most of D+1, I, together with equally bewildered American Rangers and other strays, took on assorted snipers, gun crews and trench protected troops. My personal rag-tag company had sort of hunkered around me as I was the only one in the immediate area with stripes and metal crowns shining out for all to see.*

*One of my problems was the direct result of some obscure officer of field rank, at an equally obscure HQ somewhere in never-never land who had issued an order that we were to go ashore in Air Force blues. In Combined Ops we wore khaki but in a holding camp, just before "D-Day", we were ordered to exchange our uniforms for blues. Believe me, when those blues suffered the*

## **GCI Radars (Neptune/Overlord)**

*indignities of swimming in the English Channel, crawling over a mine-infested beach, diving into water-filled depressions with every shell burst and rolling around in other undignified positions, it very shortly took on the appearance of German gray, particularly in the eyes of American Rangers who had never previously seen an Air Force type. I finally found a discarded jacket somewhere that disguised the blues sufficiently to ensure a degree of safety from friendly carbines. I was not the only one. I vaguely recall some difficulties suffered by our TO, a Polish chap called Effinberger, I think, whose English left a lot to be desired and who had been with us but a short time, when he ended up temporarily in an American compound.*

*I believe it was late afternoon on D+1 when our small company of lost souls, by this time attached to a larger group attempting to clear a small orchard, stumbled upon the second echelon of GCIU 15082 who had come ashore after us. They had had a reasonably successful landing with some serviceable equipment. A couple of days later we located replacement vehicles parked on a secondary road that led to Carentan. How did we know they were ours? G15082 had been scrawled on the side of each vehicle with white chalk. How did they get there? Nobody knew.*

*What are my major recollections of "D-Day?" There are probably two that have stayed with me all these years. The first was coming upon the body of one of my young radar operators with the left arm totally missing. The second, almost in slow motion, was a U.S. coloured engineer attempting to clear a draw with a bulldozer of some kind, taking a hit, rolling off his seat to the ground and being immediately replaced by another coloured soldier. The bulldozer never stopped.*

*Only eight of 15082's vehicles remained serviceable. A number were subsequently salvaged and the remainder replaced. After further tribulation and much exertion, this unit became operational in the small hamlet of Les Moulins on "D-Day" + 4."*

***Fulton Muir Adair, Croix de Guerre, Langley, BC V3A 8H1***

The following is part of a press release that appeared in the Edmonton Journal shortly after the end of WW II. "Mobile GCI 15082, to which Flight Sergeant Muir Adair, RCAF, was attached, met misfortune in coming ashore at Omaha Beach in the American sector. Around noon at their first attempt, they were met with machine-gun fire and had to withdraw until about five in the afternoon. Muir recalls that when he took the first echelon off the LCT it must have been on a sand bar. Within minutes all of the vehicles were "drowned". He swam ashore, and to this day, vividly remembers coming across a body of one of his young RAF radar operators with the left arm totally missing. After wading ashore, in the midst of assorted US Rangers and engineers he managed to get some shelter from the enemy fire in the lee of an embankment at the edge of the exposed shingle beach. After Omaha Beach was secured, the vehicles and electronic equipment of GCI 15082 were recovered and 21 Base Defence Sector became operational on D-Day + 4. For this action on Omaha Beach, members of 21 Base Defence Sector, of which Muir's GCI 15082 was the forward echelon, received six Military Crosses and two Military Medals". (Note: No. 15082 casualties during landing were six officers and 41 airmen).

## GCI Radars (Neptune/Overlord)

*Flight Sergeant **Fulton Muir Adair** - R100752, later received the Croix de Guerre - France. The citation in Public Records Office Air 2/9645 reads as follows:*

*“ From D-Day until the fall of Paris, Flight Sergeant Adair was in charge of the major part of the men and equipment of 15082 GCI (Ground Controlled Interception) and was at all times in the front of the battle. His unit was responsible for the ultimate destruction of over 50 enemy aircraft. His skill and devotion to duty, his coolness and judgement in the face of many difficult situations, were a fine example to all those who worked with him.”*

### Figure 12

**Morning of D+1 (07 June, 1944) at Omaha Beach showing burnt out vehicles of RAF Radar Convoy 15082, beach obstacles and wrecked LST. (US Navy photograph).**



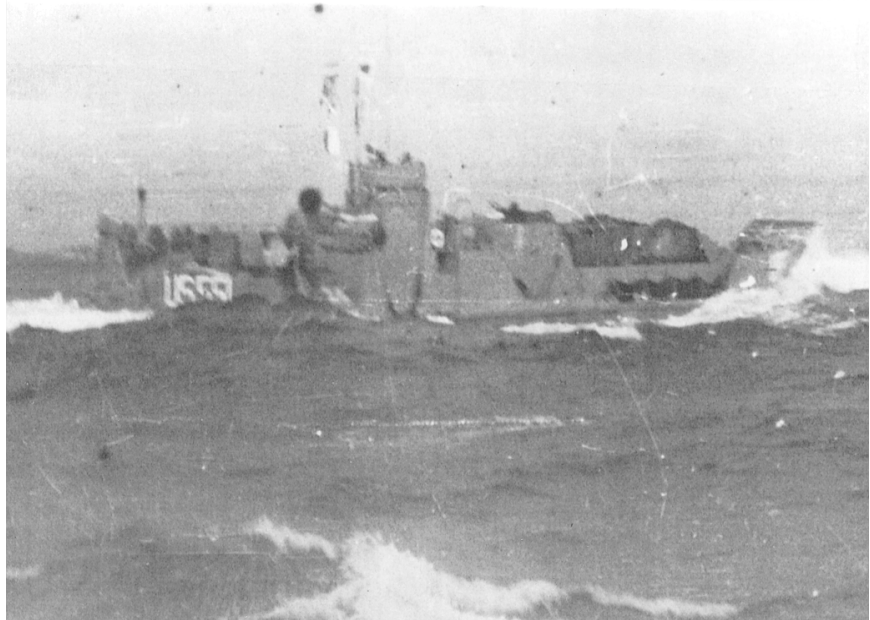
*Credit line for photo No. 80-G-45714 in the National Archives*

**GCI Radars (Neptune/Overlord)**

**Figure 13**

**RAF GCI Radar Convoy  
No. 15082 (AMES Type 14)  
aboard US551 LST.**

**(Radar Convoy drowned  
off Omaha Beach on “D-  
Day”, 6 June, 1944).**



**Figure 14**

**Three personnel of  
RAF Convoy No. 15082  
prior to landing on  
Omaha Beach on “D-  
Day”, 6 June, 1944.**

*Photos courtesy of Muir  
Adair, Langley, BC.*

## **GCI Radars (Neptune/Overlord)**

Corporal **J.G.Stevens**, a RCAF radar mechanic on GCI convoy 15082, provides the following account of progress from Omaha beach to the city of Paris:

*“At the end of “D-Day,” 47 of the 120 men from our Unit were casualties, including our Commanding Officer, Wing Commander Trollope. It would be a couple of days before our destroyed convoy vehicles would be replaced from England.*

*The move inland from Normandy to Paris provided some interesting moments. As I was the only person in the unit who could speak and understand some French, our new Commanding Officer and I rode in the lead vehicle with the driver. The other 35 or so vehicles were to follow as we headed out, this time for Paris. We were "briefed" by two American Liaison Colonels, being told where to go when the front broke, in order to get to Paris. Unfortunately these two gentlemen were killed by a land mine a few days before our scheduled move.*

*We made our way around the east side of the Falaise Gap, aiming for Paris as instructed. As all road signs had been removed or obliterated by black paint, we often stopped to ask the local people for advice as to which road to take to get to Paris. They needed the unit operating as soon as possible in order to provide air cover. This necessitated several stops and directions from the local people, who became more co-operative as we neared Paris.*

*Our instructions were to go to the Bois de Boulogne and set up the radar and communication equipment, make it functional, and contact London. However we were unable to reach the Bois de Boulogne, as each route we tried was blocked by upturned trucks piled up with paving stones taken from the roads.*

*Finally we stopped at one of these barricaded roads which we had hoped to use and it was agreed with our C.O. that I would go through the barricade and seek some advice, while the convoy awaited my return. There was quite a bit of sporadic gunfire but nothing apparently organized. The distance from the first to the second roadblock was one city block. As I ran past the stores taking evasive action and dodging into store fronts, "someone" was firing inconsistently towards the first roadblock. About halfway along the street I dodged into another doorway, where I met, much to my surprise, a well-dressed French gentleman of about 50 years of age. He was drunk and was holding two champagne glasses with the stems between his fingers. He smiled happily to see me and extolled the glories of Liberation, peace and good fellowship, as drunks are wont to do - in French. He then said "à boire messieur à la Liberation." A drink of alcohol was something I did not want! As somebody was still firing down the road, I hesitated going up the road long enough for my "new friend" to produce a bottle of champagne, half fill the glasses, and present one to me. As the firing had stopped, I drank the champagne, thanked him while refusing any more, congratulated him on the peace and ran up the street to the other roadblock.*



## **GCI Radars (Neptune/Overlord)**

*There was a sign on one of the buildings which said F.F.I Headquarters (Free French Interior) Communist Section. The proceedings there were apparently being run by a young woman about twenty five years of age, who wore a navy blue tailored jacket, navy blue skirt and matching tam hat. She looked like a model. When she finished giving orders to her troops she turned to me and in English asked what I wanted. Before I could answer she unbuttoned her jacket and produced a 45 calibre revolver and called a man's name. When he turned his head she said in French, "I knew it was you" and pointing the revolver at him, gave orders to her minions to take him behind a billboard and shoot him - which I believe they did.*

*She put away the revolver, which you would never guess she was carrying, turned to me and asked again what I wanted. I told her that our RAF convoy was on the other side of the second barricade and that we were trying to get to the Bois de Boulogne. She had someone in her command go into their headquarters and bring a large detailed map. There was no available route for us so she suggested Longchamps Racetrack as an alternative; and sent me on my way with a head full of instruction like "tout à droit - tout à gauche, etc." Somehow we reached the racetrack and I went into the building, just inside the gates. There was no one in any of the rooms, but there were indications that they had recently left: cigarette butts, warm coffee cups and a smell of cigarette smoke.*

*On returning to the gate, I found all the people laughing hilariously. It is always sad to miss a good joke so I asked what was so funny, and was a bit amazed at the answer. They told me that this was the Gestapo Headquarters and that the Gestapo had gone out the back windows of the building when I went in the front door. Members of the joyous crowd hoisted me on their shoulders and started moving through the crowded street. Suddenly a small German tank, which I could see from my vantage point, began firing, and knocking chunks off the buildings, columns, etc.. The lads lowered me and the crowd evaporated in seconds by running into all buildings with unlocked doors. I don't know who else in our unit got the short V.I.P. treatment.*

*Our equipment was moved to the middle of the race track, but due to the buildings and trees we could get no satisfactory results. That evening two twin-engine German bombers came over the convoy and accidentally bombed the four five-story tenements nearby.*

*On the second day we left the racetrack to move to a site which had a higher elevation located down the road to Fontainebleau. On the outskirts of Paris we met some American Sherman tanks coming in our direction and pulled over to the side of the road to allow them to pass. To my surprise the lead tank started to elevate its cannon. I told our driver to turn our "lorry" across the road so they could see the huge RAF roundel painted on the side. In a few minutes two very large six foot six military policemen on motorcycles rode to meet us, and asked in a brusque manner what we were doing. In a fit of sarcasm I told them we were in Paris for a couple of days and that it would be now safe for them to enter. We pulled our vehicle over to the side and they passed us without further incident.*

### GCI Radars (Neptune/Overlord)

*The equipment was set up in a farmer's field, with his permission, and operated very well in this new location. There was little action from the German Air Force. In due course an American Radar Unit, with very sophisticated equipment, arrived to take over the work. We were instructed to return to the Cherbourg Peninsula for repatriation to England.*

*The next day a dispatch rider on a motorcycle arrived with a telegram for me personally, from our Group Captain. He asked me to go to North Belgium to help with another microwave unit. Good grief!*

**John G. Stevens**, North York, Ontario.

### Figure 15

The Senior Non-Commissioned Officers at the time of decommissioning RAF GCI Convoy No. G15082.



(l to r): Flight Sergeant Muir Adair (RCAF) - Radar Technician  
Sergeant Bill Simpson (RAF replacement) - I/C Ops. Room  
Sergeant Tom Spears (RAF permanent) - General Duties  
Sergeant George ? (RAF replacement) - I/C Orderly Room

*Photo courtesy of Muir Adair, Langley, BC.*

## GCI Radars (Neptune/Overlord)

### **Juno Beach - "D- Day" - 06 June 1944.**

The following are excerpts from a report prepared by Squadron Leader R.H. McCall (RAF), Officer Commanding No.15083 GCI Mobile Radar Unit. It was provided by the Unit's Technical Radar Officer, Flight Lieutenant **Geoffrey Adams Harpur**(RCAF), Croix de Guerre, MID:

*"In September, 1943, a small number of mobile radar stations were formed at RAF Chigwell, being intended to serve as night fighter control stations in overseas operations. The writer of this note was given command of No. 15083 unit which included controllers, radar operators and mechanics, signals staff and some very essential back-up trades. G. Harpur, RCAF, of Toronto was the technical officer and Sgt **Bews**, RCAF, was the Senior NCO amongst the radar mechanics.*

*No.15083 and other similar units were sent for initial training at Renscombe Downs in Dorset, whose inhabitants were terrified for three weeks by the officers and other ranks, all of whom, amongst other things, had to learn to drive heavy vehicles. Only four of the unit's men, then about 24 but more later, could even drive a car let alone a lorry. In addition to stores, we took over lorries, water bowsers, diesel power wagons, operations rooms, transmitting and receiving aerials and signals vehicles. By "D- Day" the total was 25 heavy vehicles and one jeep. The three-ton Crossley lorries had double gear boxes and two of the aerial vehicles were high and unbalanced.*

*We had an operational fighter control unit which virtually depended on the complex equipment being ready every night and the operators being ready to use their intelligence to the utmost in reading the tube. When a fault arose on the tube or on the other parts of the radar, ingenuity of the mechanics was called upon to effect repair by discovering a fault in a complex of electronics which was, in most senses, still in its infancy. We were enormously helped by a brilliant and enthusiastic technical officer, Geoff Harpur from Toronto, and a cheerful, outgoing mixer in my No 2, Frank Lissimore from Norwich, who was in addition much the best of us in controlling on the tube.*

*On a morning in May,1944, 15083 received the order to move from Pevensey to Old Sarum, taking in a practice landing at Gosport Hards on the way, because doubts had arisen as to whether the 15083 could in fact get into two LCT's as planned. The practice landing on our two LCT's went perfectly and we fitted on with inches to spare between vehicles. We were in fact warmly congratulated on skilful backing into position with no delays, the logistics people from SHAEF having come to the Hards at Gosport with the worry that they would have to find an extra landing craft.*

*After a couple of days "marshaling" at Old Sarum we were directed to Fareham where 15083 spent two nights and days in a residential street of large houses, whilst waterproofing and other work was done to our vehicles. We were under strict orders not to go into any of the houses and to accept no hospitality. Security was the order of the day. We were required to stay with our vehicles and to sleep in, on or under them. We then moved into Roche Court with a whole Canadian tank brigade and other units locked in behind huge barbed wire fences and machine-gun guarded gates.*

## **GCI Radars (Neptune/Overlord)**

*We had some amusing times trying to explain our unusual battle dress, etc, with RAF marks of rank. Here at Roche Court the whole unit was completely briefed on "Overlord" and shown models and maps of our landing beach and our projected site.*

*Early in the morning of Saturday, June 3rd, we drove out of Roche Court to the Gosport Hards where we spent two complete days on our jam-packed landing craft. On the Sunday the message came through that the operation had been put back for 24 hours owing to the weather. On Monday, the 5th June, I received the signal that the operation was on, and that evening we steamed out. During the night and in the early hours lines of destroyers and other craft passed us, an intensely moving experience. The sea had become very choppy and conditions in the LCT's were not good. Three of my best drivers (two of them key mechanics) were affected by seasickness. Offshore we saw the rockets streaming up from the launchers and heard and saw shell fire, with heavy shells from HMS Rodney or Nelson passing over head. We saw the lines of tanks and other vehicles moving slowly, very slowly up the hills. Owing to the scale of our wide view and the curious light that day, everything looked small and slow. One felt how small we were in this gigantic mass of movement.*

*I was ready to go forward when we reached the point of disembarkation to measure the depth of the water, if over 2 feet 6 inches I must require the LCT to move in closer. In fact, the Navy had done a good job and my rod measured an inch or two under the mark. We drove off through the water and up the beach in quite good order but the beach was still mined in part. I reported to Beach Control, our landing time being approximately 15:45. There were casualties still lying on the beach in mine fields, some certainly dead, being men who had joined us in the pre-invasion exercises. Huge tracked vehicles were pulling broken down trucks out of the water; two wrecked landing craft - German prisoners being marched back to the beach.*

*We had a problem immediately after leaving the beach when we met a long convoy of ambulances and other RAMC vehicles coming back from the front with the first casualties. Then we started up the lanes through two villages, Ver-sur-Mer and Meuvains, to our site. By dark we had one operations room working but faults still on the other aerals or sets. We took over our first night-fighter and, at about or just after midnight, our second frequency came on the air in fairly reasonable conditions and able to control. We were not able to find the fault on the third frequency until the next day. At one point, Canadian Sergeant Bews climbed the 15-foot aerial, in the pitch dark, to make adjustments and was nearly run over by a FW 190 which came over a few feet above him and nearly swept him from his perch.*

(Contributed by **Geoffery Adams Harpur**, Niagara Falls, Ontario).

Flight Lieutenant **Geoffery Adams Harpur**, C14356, RCAF, was the Radar Officer on No.15083 Mobile GCI Station and landed on Juno Beach on D-Day. They were set-up and operational that evening by 23:00 hours. He was Mentioned in Despatches effective 01 January, 1945, as per London Gazette of that date and AFRO 379/45 dated 02 March, 1945. F/L Harpur was also awarded the

## **GCI Radars (Neptune/Overlord)**

Croix de Guerre (France) effective 23 June, 1946, as per AFRO 1619/45 dated 19 October, 1945.

Public Records Office Air 2/9645 gives the following citation;

“Flight Lieutenant Harpur landed with No.15083 GCI on D-Day. He led a reconnaissance party to the pre-planned site of the GCI in order to reconnoitre the proposed site of the Radar Convoy and the detailed positioning of the units. This work was done in an extremely exposed position under close range fire from a variety of enemy weapons. The assembling of the radar equipment was achieved with remarkable speed and it was operational on the night of D-Day. This officer worked unceasingly for several days and nights and the good work of the unit has resulted in the destruction of many enemy aircraft since D-Day. Flight Lieutenant Harpur by his zeal and untiring work has set a very fine example to the airmen of the unit.”

### **Omaha Beach - “D-Day +2” - 08 June 1944**

Flight Lieutenant **Alexander Gordon McLeod** (RCAF), Officer Commanding and Unit Technical Radar Officer of No 15073 GCI Convoy has prepared the following summary of activities:

*In May, 1943, I was posted to RAF Station Renscombe Downs, near Swanage in Dorset. Assembled there were many Canadian technical (radar) officers, a large group of RAF Administrative officers and a very large number of "other ranks" of RAF personnel, mainly radar operators (all male) and mechanics, among them some Canadians.*

*Renscombe Downs was an assembly and training area for mobile radar units. Here we spent several months in training of all kinds. We were introduced to mobile radar equipment, learning how to set up the unit. In May/June, 1944, we were moved down to Portsmouth in the South of England. Two RAF F/O's (ex-aircrew) were assigned to my unit as controllers for the operation in France. We waterproofed the vehicles for "wet landing". I divided my unit into two parts and reduced the number of vehicles. The first group of personnel and vehicles were to be technical only, i.e. radar operators and mechanics. The remaining personnel and equipment would join me later in France. Early in June we were given a general briefing about Operation Overlord. We were told that the exact date for D-Day was still unknown. No 15073 mobile unit would be attached to the US Army, and would be landing on Omaha Beach. We would embark from Portsmouth Harbour on an LCT.*

*Our job would be to provide radar air coverage and the protection of the harbour in Cherbourg. We would set up about three miles south of Cherbourg, selecting our site and becoming operational as soon as possible. As a non-combat unit my mobile unit was to be given protection by a paratroop "stick" of the 82nd Airborne Division.*

*On June 8, 1944, we received orders to load 15073 mobile unit onto a LCT. All vehicles had to be backed onto the LCT because of the confined deck space. This was not easy to do because the ramp was steep. We left Portsmouth Harbour at 03:00 hours. On June 9, at 10:00 hours, Omaha Beach was in sight. All our vehicles landed safely, and we moved to a de-waterproof area. We stayed overnight in a park, no fires, no lights, and experienced sniper fire. On June 10th I reported the*

### **GCI Radars (Neptune/Overlord)**

*sniper fire to the C0 of the de-embarkation area, and he recommended that our unit should remove our RAF blue (gray) battledress and change to U.S. GI khaki. He was convinced that we were being sniped at by U.S soldiers mistaking us for Germans. Without further discussion I had my RAF unit report to US Quartermaster stores, and we all changed to US khaki. We looked like a regular U.S. army unit -so long as we kept our mouths shut.*

*At 10:00 hours we moved out heading north, passed through Carenton, St.Mère Église and headed towards a small village ten miles outside of St.Mère Église. We passed a U.S. infantry unit walking single file on both sides of the road headed north. I halted our convoy 1.5 miles out from the village. We observed lots of activity, noted German soldiers loading trucks for Cherbourg. The U.S. infantry that we had passed on the road had the assignment to clean out and secure the French village ahead of us.*

*On June 11th we returned to the St.Mère Église area and remained overnight to re-group. We headed north again at 08:00 hours which provided ample time for the French village to be cleared. All was well this time and we received a heroes' welcome. The small square was crowded with happy villagers. We could not pass through until we stopped the convoy and received hugs and kisses and flowers from males and females alike, along with large glasses of wine. We were the first Allied unit of any size in their village since the Germans took over in 1939-40.*

*We finally got through the village and proceeded north to Cherbourg. About four miles south of the town we began looking for a suitable radar site. There was a lot of open farm land, but many areas had been marked off as mined areas. The unmarked areas were also suspect. We "mine proofed" an area of farmland by taking one of our non-tech trucks and driving it backwards (rear end first) up and down and crossways over several acres of the land. It was a good thing that it worked out for I would have been slightly embarrassed to attempt to explain to headquarters why a 3-ton truck had its rear end blown away. By the end of the day the technical vehicles were all in place, the diesels were operating smoothly, and we reported, "on the air".*

**Alexander Gordon McLeod, Haliburton, Ontario.**

## **GCI Radars (Neptune/Overlord)**

### **Radio Countermeasures (RCM)\***

RCM was the term used during WWII to refer to radio and radar countermeasures as employed in both defensive and offensive roles. Today's reader is probably more familiar with the terms electronic countermeasures and counter-countermeasures with reference to active and passive electronic warfare. As mentioned earlier the Telecommunications Research Establishment was responsible for the design, development and testing of RCM. The demand for countermeasures became so important that No. 100 Group was formed within Bomber Command on 01 December, 1943, responsible for the operational application and co-ordination of all RCM needs, both ground and airborne. The work involved in developing systems to meet the operational demands and to keep one step ahead of the enemy's counterpart became an ever increasing burden upon a select group of British scientists whose untiring efforts were shrouded in secrecy.

This paper has reviewed two very significant applications of radar that undoubtedly played a major role in the "D-Day" landings and the assault on the mainland. We should also mention a major activity of "electronic warfare" that contributed greatly to the success of the invasion - an area that even today is seldom referred to - and that is the use of RCM on the night and morning of 05/06 June, 1944.

The Royal Navy and the Royal Air Force took part in a feint attack in the Pas de Calais area (Straits of Dover) at the same time that Operation OVERLORD commenced. Operation GLIMMER carried out a diversion against Boulogne and Operation TAXABLE a diversion against Cap d'Antifer. The attacks simulated the landing of airborne troops and the approach of a large convoy of vessels. The skilful use of WINDOW played an important part in the feint as did VHF jamming and a MANDREL jamming screen covering the whole range of German coastal early warning radar frequencies. In addition, Naval vessels towed balloons fitted with corner reflectors, under cover of a smoke screen, that simulated radar returns from very large vessels. A device called MOONSHINE was used to change the received pulse from the coastal radar so that it would appear on the German radar scope as returns from a large flight of aircraft. This activity resulted in a completely successful feint attack that misled the German Army Command - an important factor in the success of the invasion as the German delay in committing their main resources allowed the beachheads on the Cherbourg peninsula to secure footing and immediate follow up of landings for the push inland.

One hundred and five RCM aircraft of Bomber Command's No. 100 Group took part in this feint in addition to a number of Royal Navy vessels. Three of the aircraft were lost.

*\*War in the Ether - Radio Countermeasures by RAF Bomber Command/ October 1945*

## **GCI Radars (Neptune/Overlord)**

### **Conclusion**

The Allied invasion of Normandy on the 06 June, 1944, included the 3<sup>RD</sup> Division of the Canadian Army that landed with the British Forces on “D-Day.” The Royal Canadian Navy provided 10,000 sailors and 109 vessels as part of the massive armada that battled the choppy waters of the Channel while escorting the flotilla on the way to the beaches. RCAF Lancasters and Halifaxes dropped thousands of tons of explosive on German coastal defences. Canadian paratroopers accompanied the Allies as they jumped from aircraft or landed in gliders. Even though they had caught the German Army Command by surprise, the coast of France was well defended and at the end of the first day 2500 Allied personnel had been killed, including 350 Canadians. In addition 574 Canadians were wounded and 47 taken prisoner. But the success of this day would turn out to be a major turning point in the Second World War.

In planning for Operation Neptune/Overlord it was thought that the FDT’s would only be needed in the assault area for a few days, after which control and co-ordination would be taken over by the GCIs ashore and the day fighters by 483 Group Control Centre. As it turned out all three FDT’s were required off-shore for about three weeks after “D-Day”, imposing added strain on the staff. Many of the officers and men had been aboard the vessels for over five months and as previously mentioned, working in surroundings originally designed for assault forces on short sea journeys. The final results of their efforts far exceeded expectations and received high praise from the Royal Navy.

The personnel on the “floating radars” and mobile units that landed on the “beaches” to carry out the shipboard and ground controlled interception of aircraft were indeed worthy of all the recognition they received. The GCI mobile units would continue on in the following weeks providing the important control and interception of aircraft as the Allied battle-line marched eastwards across Europe.



## GCI Radars (Neptune/Overlord)

### APPENDIX "A"

#### Personal Diary of R160415 L.A.C. Karl Work - A.I. Radar Mech

Nov 28/43. Stationed at R.A.F. #63 O.T.U. Honiley as A.I. Radar Mech on Beaufighters, training pilots and navigators on twin engine radar equipped aircraft to assume night fighter duties. I had been in England since Jan 25/43.

Nov 29/43. A signal came through asking for A.I. Radar Mechs to volunteer to go on ships under some danger and hard times and periods at sea. I volunteered thinking it would be an aircraft carrier with night fighters.

Jan 16/44. A signal came through posting me to R.A.F. 105 Wing - Headquarters for Combined Operations at Kilmarnock, Scotland - Operation Neptune consisted of 3 F.D.T.'s - Fighter Direction Tenders F.D.T. 13., F.D.T. 216 & F.D.T. 217.

Jan 19/44. Arrived at Kilmarnock and was interviewed. It was decided that I had to take a crash course on the Mk 10 AI radar beacon as I had no experience on the Mk 8 or Mk 10 AI radar equipment.

Jan 20/44. Arrived at Gailes, Scotland where the main party was taking survival courses and weapons training.

Feb 5/44. Arrived at Great Malvern University, Worcestershire for a three day crash course on MK IX Radar Beacon.

Feb 10/44. Arrived at R.A.F. Farnborough for two days working on MK IX Radar Beacon.

Feb 14/44. Reported back to Gailes and was issued khaki battle dress uniforms, combined ops flashes, helmet, gas mask, whistle, field dressing kit and received further weapons and survival training.

Feb 21/44. Reported back to 105 Wing at Kilmarnock for further interviews.

Feb 22/44. Reported to F/L Hugh Tracey at John Brown's shipyard at Greenoch, (Glasgow) Scotland and was told I would be in charge of the MK IV and MK IX Beacons on board F.D.T. 217 and that he was the Radar Officer in charge of all Radar Mechs on the ship.

Feb 24/44 - April 7/44. F.D.T. 217 did her sea trials in Firth of Clyde around Isle of Arran, putting in at Lamlash and Brodick on the island and at Greenoch. This consisted of Navy getting used to handling the ship, testing guns on gunnery range and testing radar equipment and ranging it in

## **GCI Radars (Neptune/Overlord)**

co-operation with R.A.F. 29 Squadron and R.C.A.F. 409 Squadron. The R.A.F. only had an advance party of approximately 40 airmen and two officers; of this party there were nine Radar Mechs of which seven were from the R.C.A.F.

### The R.C.A.F. personnel were;

C7956 F/L H.F.(Hugh) Tracey - Montreal (now deceased)

R- 126339 Cpl H.L.(Cookie) Cook - Macadam, N.B.

R- 101997 Cpl C.T. (Ted) Parfitt- Winnipeg, Man.

R- 100444 Cpl C.R (Charlie) Pinnell - Winnipeg, Man (now deceased).

R- 126905 LAC C.B.(Bennie) Howe - Windsor, Ont.

R- 106731 LAC R.M.(Bob) Stalker - Saskatchewan.

R- 160415 LAC K.M.(Karl) Work - Toronto, Ont.

The remainder were R.A.F. radar operators, radio and communications operators and diesel mechanics.

Mar 4/44. Cpl Ted Parfitt and I were picked up by an A.S.R. off Arran, taken to Greenoch and then by train to London to get a spare G.P.O. relay unit for the MK IV Beacon as it had acted up.

Mar 5/44. We arrived in London, got the extra unit and proceeded to the Admiralty Bldg. as per orders to locate where our ship would be on March 6th. Found out it would be in Greenoch (suppose Admiralty did this by direct signal to ship). We caught evening train out for Glasgow.

Mar 6/44. Ted & I arrived back in Glasgow and met our ship in Greenoch at noon.

Mar 9/44. F/L Tracey arranged for a 48 hour pass for me to go from Greenoch to London for my 21st birthday. I caught the night train to London.

Mar 10/44. I caught the evening train back to Glasgow.

Mar 11/44. I boarded our ship in Greenoch at 7 am.

April 7/44. F.D.T. 217 set sail around Northern Scotland and down the east coast to Hull on the Humber River.

April 14/44. We arrived at Hull. Navy operated on a 4 hour watch and 4 hours off with a "dog watch" from 16:00 hrs to 20:00 hrs. being split in watches from 16:00 to 18:00 hours and from 18:00 - 20:00 hrs. The R.A.F. Radar Mechs sometimes operated on the same basis, but favoured 8 hour shifts when at sea. Although we in the beacon hut were stationed behind the bridge in a cabin about 12 ft. x 16 ft., which was out of bounds to all personnel but Ted Parfitt and I. We worked 8 hour shifts or 4 hours as we desired.

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April 15/44. Did further trials out of Hull in the mouth of the Humber River and the North Sea, just out of sight of land, about 15 to 20 miles out.

April 21/44. F.D.T.'s 13 and 216 passed on way to Hull.

April 24/44. Returned to Hull and received new radar beacon codes and set them up in the beacons. Cpl Ted Parfitt had been a ground type Radar Mech and was assigned to learn about the beacons and become a "Beacon Basher".

April 26/44. F.D.T. 217 joined a convoy about 13:30 hrs. Passed the Tub or Wash heading South.

April 27/44. We arrived at the mouth of the Thames River, anchoring around 16:00 hours and we sailed again at 17:30 hours.

April 29/44. Arrived at Isle of Wight and lay off Cowes at 18:00 hrs. in an exceptionally large convoy which disappeared towards Portsmouth & Southampton.

May 3-5/44. Trials in Lyme Bay between Torquay & Portland. F.D.T. 217 broke off from these trials heading to Port as "E" Boats from Cherbourg raided the exercise and our F/Sgt John Glenn reported the American section of this trial suffered heavy losses.

May 6/44. F.D.T. 217 sailed from Portland harbour, rounded Lands End and reached Cardiff, Wales around 21:30 hrs. on May 8/44.

May 8-17/44. Stayed in Cardiff raising the base of the AMES 11 radar antenna sitting amidship.

May 18/44. We departed from Cardiff about 16:30 hrs.

May 19/44. Passed Lands End about 08:30 hrs., arriving at Torquay by 18:30 hrs.

May 20/44. F.D.T. 217 left Torquay at 04:00 hrs., arriving off Cowes on Isle of Wight about 18:30 hrs.

May 21-24/44. King George VI reviewed the fleet - lots of B.S. during the day. We were also under "red warning" all the time. We sailed at 21:00 hrs. at "Action Stations".

May 25/44. We picked up a convoy early hours and took it to Portland, arriving late evening. Left Portland at 07:00 hrs., arriving at Cowes about 16:00 hrs. Sailed for Torquay at 11:00 hrs., arriving at 21:00 hrs.

May 28/44. Joined a large convoy at 06:00 hrs., arriving at Portsmouth at 17:30 hrs.

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May 29-31/44. F.D.T.217 took on stores. We toured a destroyer anchored next to our ship.

May 31/44. Got a 24 hour shore leave pass. Caught 07:00 electric train to London and caught the 02:40 train back to Portsmouth, arriving on board ship at 06:13 hrs., June 1st.

June 1/44. Ship moved off Cowes at 09:00 hrs. The area bounded by Cowes, Portsmouth and Southampton was literally filled with ships.

June 2/44. Last day for mail off ship. In evening Mallory, Air Officer Commanding all fighters came on board meeting with the Officers.

June 3/44. Weather was getting bad. Radar beacons and all the radar receivers were checked and worked on until 02:00 hrs. in the morning of June 4th.

June 4/44. All crew were paraded at 09:00 hrs. and all our ID discs, field dressing kits, whistles, respirators, helmets and life rafts were checked.

June 5/44. Weather very bad - believe we should have sailed last night. Another final check and were briefed by F/L H.F. Tracey and an Air Commodore as "D-Day" was tomorrow and "H"hour for us was 04:00 hrs. to be off the French coast. Radio and radar silence to be maintained until 07:00 hrs. We sailed at 22:00 hrs.

June 6/44. "D-Day" - All three F.D.T's were in position at 04:30 hrs. At 07:30 hrs. full radio and radar silence was broken. Traffic of aircraft and vessels was unbelievable. I took a picture of an LCI going by us. We were being shadowed by a navy ship and an A.S. R. We were approximately five miles off shore and the bay was full of ships. I was told we were off Arramanches, France.

June 7/44. A flak ship tied along side for our protection. The sky at night looked like the 24th of May with tracers and flares lighting up the sky from gunners of ships around us.

June 9/44. First sight of Jerry over our beach. Reports said our radar beacons were OK. I was told to shut down our Mk IV beacon as believed Jerry might home in on it.

June 9/44. First mail today by A.S.R.- received cigarettes. Navy ships were shelling inland and H.M. S. Rodney was about a mile off our starboard side. Every time there was a salvo of her guns, a draft could be felt coming out of our air ducts.

June 10/44. I am told we are now off Honfleur in the Bay of Seine. The A S.R. took mail off to post in England. It is thought if the front advances as planned, mobile ground radar convoys will go in about "D"+10.

June 11/44. F/L Tracey and S/L Craig talked about when the planned G.C.I. ground control would go in and take over from us.

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June 12/44. Today a Lightning aircraft crashed near us and the A.S.R picked up the pilot OK at 11:15 hrs. The Navy laid a smoke screen and cruisers and a battleship started shelling inland.

June 13/44. Jerry raids have been hit and run by ME 109's, FW 190's and JU88's, I am told. About 01:00 hrs. we had two near misses as an aircraft had dropped bombs off our port side, bow and starboard stern side, heaving our ship. The 20mm gun fire around us caused good sized chunks of shrapnel to hit on the deck of our ship. One of our 20mm gun positions is just outside of our beacon cabin door and when it is firing I can't stand being in our beacon cabin so I get in the line picking 5 canisters of 20mm shells off the chain coming up from below decks and handing them to the loader as he fires with other ships gunners in our area to set up a barrage of ack- ack.

June 14/44. Our area again had a hit and run attack tonight at midnight to 01:00 hrs.. No doubt the enemy knows where we are with the heavy transmitting power put out by our different types of radar.

June 15/44. F.D.T. 217 moved to replace F.D.T. 216 today.

June 16/44. Only worked half watch during the day as we are passing the plots to ground stations and only controlling about half the aircraft at night. Night raids in our area have been almost nil lately.

June 17/44. Very quiet in our area during day and this might be our last night of operations.

June 18/44. Raids started in our area again after midnight for a short time between 02:00 hrs and 03:00 hrs.

June 19/44. No duty today and sea getting very rough.

June 20/44. High winds and still very rough with 30 foot waves - all shipping appears to be anchored. We had to pull our anchor up as it was slipping. Then went out and anchored again. Now we have started one engine to hold ship in position.

June 21/44. Waiting for weather to clear and sailing orders. Ted Parfitt and I sleep in a hammock we put up behind our beacons and have not slept below when one man is off duty. No raids in our area as it has been very bad weather.

June 22/44. Sun finally broke through around 15:00 hrs. and Jerry was active again in our area.

Shut down both beacons as I was told to at 04:00 hrs. during raid.

June 23/44. Convoy back to England. Formed up and passed F. D.T. 13 taking our place. We arrived back at Cowes at 23:00 hrs. First shower in nearly 3 weeks.

### **GCI Radars (Neptune/Overlord)**

June 24/44. Drew for leave and I am in the first one for 3 days. Received first letters from home since end of May.

June 25/44. Took Cowes ferry to Southampton and 14:30 hrs. Train to London and found the "flying doodle bugs" were coming in at night.

June 28/44. Returned to ship.

June 29/44 - July 9/44. Very boring on ship. Get shore leave every other day and one could run out of money.

July 21/44. Sent on two weeks leave. Returned to ship on Aug 3/44.

Aug 3 -Aug 17/44. Saw a great deal of Isle of Wight.

Aug 17/44. Decided to go with work party to help the Land Army bring in the harvest (all women). Leave ship after breakfast 07:00 hrs. Go by Lorry to various farms to hoe weeds, pick crops, get lunch and supper for 2 shillings 6 pence a day beyond regular pay. Work to dusk (20:00 hrs. -21:00 hrs.) and back to ship. Also helped Navy paint ship as Navy are given this to do during long stop over when ship is tied up. This went on until Nov 9th. and included old style grain handling of sheaves, stooking and thrashing wheat and barley.

Nov 9/44. Some brass came aboard and are planning future of ship.

Nov 10/44. F/L Tracey told us ship would sail in two weeks to a winter port and only radar mechs and approx 30 other RAF trades to stay on ship. Robert Stalker, only radar tech posted. Everybody to get a week's leave and those leaving ship would go to new posting at end of leave. Those staying on ship to go on last leave.

Nov 16/44. F/L Tracey told us those staying on ship would have their leave cancelled as we were sailing Nov 22/44.

Nov 22/44. Sailed from Cowes and tried to pick up west bound convoy.

Nov 23/44. Put into Portland as a heavy fog came up and we could not locate convoy in the fog. Left Portland at 18:00 hrs. Met convoy at sea at 21:00 hrs. and again passed Lands End.

Nov 25/44. Put into Milford Haven, Wales and picked up a S/L Larkley and two R.A.F. film bashers to take motion pictures of ship for Air Ministry.

Nov 26/44. Left Milford 08:00 hrs., sailing north.

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Nov 27/44. Put into Irvine for a Navigation Officer and charts to take us into Loch Fyne to Inveraray.

Nov 28/44. Put Navigation Officer off at Brodick on Isle of Arran. I took part below deck in filming various operations in the radar receiving and filter rooms, showing R.A.F. personnel operating the equipment as though we were in action .

Nov 30/44. Sailed at 08:00 hrs. from Brodick and arrived in Inveraray at 12:00 hrs.

Nov 30/44 - May 1/45. On ship in Loch Fyne at Inveraray. Routine consisted of daily running up all radar gear, painting, cleaning compartments, radar rooms and beacon hut. The beacon hut, due to proximity of bridge was still out of bounds but had always been used at night when not in action as the social center for the radar techs. We brewed coffee, socialized, ate and cooked on hot plate that Parfitt and I scrounged, listened to a radio we made, developed film I had taken or that of any of the other radar boys. The old Captain tried to get in once but we did not open the light proof steel door as Navy personnel were not allowed in the radar rooms. We created an entertainment area out of unused storage space behind the bow doors. The area was probably 40 feet deep and the width of the ship's tank deck. In this we had a 16mm projector and screen, ping-pong table, piano, chairs and a dance area. Twice a month we had a party and invited the WRENS and their officer to come aboard. We would get them in the ship's motor launch and take them back to the Navy camp called Quebec. Ted and I were accepted for launch duty to spell off Navy personnel when they wanted to be relieved from their daily runs for mail and supplies at Camp Quebec.

May 1/45. I was posted from the ship to #62 R.A.F. O.T.U. Ouston, near Newcastle-on-Tyne. They flew Beaufighters with MK V A.I.. LAC Andy Simpson, R159793 was also posted from the "beacon basher" job on F.D.T. 13 and he was my friend. V.E. day was quite a holiday at the camp.

June 16/45. Simpson and I were posted to #81 O.T.U. at Tilstock, near Shrewsbury. Here was a combination of Dakotas using "Gee" and "Rebecca" for navigation and Mosquitoes with Mk 8 A.I., as well as Beaufighters using Mk 5 A.I.

Sept 24/45. Left Tilstock with 7 days leave to report to R.C.A.F. Torquay Sept 30/45. Andy Simpson also posted to Torquay.

Sept 30/45. Arrived at Torquay Repat. Depot. There were hundreds of R.C.A.F. airmen waiting for a ship to Canada and saw many old "classmates" from U.N.B. and Clinton.

Oct 20/45. I went on the advance party one day before the main body arrived to get blankets ready for them on the Q.E. docked in Southampton and put aside a good cabin (A201) for 9 of us (4 in the advance party).

Oct 21/45. Putting blankets out for the R.C.A.F. only took us half a day.

### **GCI Radars (Neptune/Overlord)**

Oct 22/45. Sailed from Southampton in afternoon and Andy Simpson was also on ship.

Oct 26/45. Only took three and one half days. Good food and continuous music on the P.A. Sailed with lights on at night (what a change from what we had been through). Docked at famous Pier 21 in Halifax and got directly on the train about 22:00 hrs.

Oct 27-28/45. Train to Montreal arrived night of 28th.

Oct 28-29/45. Went through discharge & leave papers.

Oct 30/45. Left Montreal early am., arriving in Toronto at the CNE Coliseum at 21:00 hrs. and met Mother and Father.