

The Deployment of Overseas GEE Chains in 1945/46

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At the end of WWII plans were made to provide a string of GEE Chains from the UK to the Far East to support trooping and re-supply flights. This paper collates information from three sources to examine the plan and the extent of its deployment.

KEY WORDS

1. GEE.
2. Radio navigation aids.

1. INTRODUCTION. The end of WWII in Europe, VE Day, occurred on May 8th 1945 but the war against Japan continued for some months longer until VJ Day, Sept 2nd 1945. After VE Day it was not obvious how much longer Japanese resistance would continue and preparations were made to continue the fight in the Far East. Since former UK territories had been occupied and it was necessary to reassert UK interests, the UK offered its assistance to the US in prosecuting the war there. It was to take the form of a long-range bomber force of 1000 aircraft (“Tiger Force”) which would operate from bases in the Far East. Such a large force required a very well-organised air resupply route between the UK and their bases and plans were made to establish such a route. The lessons of poor navigation having been well learnt during the preceding years, a decision was made to support this route by building a string of GEE chains along it, covering the Near, Middle and Far East. This would have been a very considerable feat of organisation and installation and although it was never completed some chains were built and put on the air before it was cancelled. As far as I know this story has never been documented and it is not mentioned in any of the official histories.

A few mainly anecdotal details are known. In his Presidential Address to the Institute of 25th October 1978, Sir Edward Fennessey, who ended the war in charge of 60 Group, RAF, and therefore had responsibility for the installation of GEE chains, gave some information. Nearly 20 years later, in 1997, a short paper was presented to the Centre for the History of Defence Electronics, (as it was then) by Ron Martin, describing his personal experiences as an RAF technician establishing GEE in India (“The longest GEE chain of them all – UK to Rangoon”). More recently, research at the National Archives uncovered a document, AIR 2/7313, which gives exact dates of completion and the operational histories of these chains. This note gathers these sources together.

2. SIR EDWARD FENNESSY. In “Radio Aids to Navigation – The Pioneer Days” he provides an excellent first-hand account of how GEE was implemented in Europe up to D-Day. He then describes the further extension of GEE to the Far East; in his own words :

‘I and my staff at 60 Group were to plan effective coverage for the route from the United Kingdom to Rangoon; in addition to the existing cover in the UK and on the Continent, 14 new Chains were contemplated and an intensive programme of site selection and survey was put in hand, and proposals made and approved for a total system of chains extending from France, through the Middle East and India to Rangoon. The Carcassone-Rhone Chain was rapidly sited and built; the Loire Chain followed and equipment was prepared for the whole project. However, before this ambitious plan came to completion the dropping of the atomic bomb on Japan brought the war in the Far East to an end, and with it the operational need for such an extensive system. The end of hostilities in the Far East also brought about the cancellation of another project – to build a Gee chain in Northern Luzon to provide navigational aid cover for “Operation Tiger”, a British bomber force to be based in that area. The proposed base was later moved to Miyako Jima, with the Gee stations in the Okinawa group of islands’.

Sir Edward died in November 2009 and although it was hoped perusal of his papers might provide further details nothing has come to light so far.

3. RON MARTIN. Ron Martin’s paper provides more of the human angle than technical detail but nevertheless fills in a few gaps. He says the type of radar used for these chains was the ‘Type 100’ which ‘could operate either as Oboe or as GEE’ – but this was not so. The Type 100 could not be used as an Oboe station but it could be used interchangeably for either plain hyperbolic GEE or the more accurate G-H ranging variant and G-H is probably what he was thinking of. Each GEE chain comprised a Master and three Slave stations, four transmitter sites in all, and since dual-chain working had not then been developed each chain operated as an independent entity. According to Martin, each Slave transmitter required staffing by 25 personnel, with the same number at the Master augmented by a Chain Commander of Squadron Leader rank and additional administrative personnel, a total of some 110 for each chain. There were to be ‘several dozen’ chains (Fennessey says 14), but whichever is correct it obviously required a major training and equipping programme for the (at least) 1540 personnel involved. A special unit was set up based at the old Haddenham airfield, Buckinghamshire, to undertake not only training, but assembly, tropicalisation, and packing of all the necessary equipment. It was apparently very well done because Martin says that when they arrived in India, by sea, all the GEE equipment was ‘in splendid condition’, having been well packed, desiccated, sealed and wax dipped.

He was flown out to Calcutta and eventually arrived at Barrackpore, the base for GEE support, in December 1945. By then, of course, the Japanese had capitulated and somewhat to his disappointment he was told installation of his GEE chains was to go ahead regardless in order to provide support for an anticipated air route for the repatriation of British troops and POWs. In January 1946 he was transferred to Delhi to assist with setting up a GEE chain which had its Master station some 50 miles to the southwest, then he returned to his base at Barrackpore. Subsequently he set up a

Master station at the airfield at Chakulia, not far from Bihar, and describes how communication was established with the other chain stations by means of transmitting Morse code using the GEE frequencies. Shortly afterwards he was demobilised and returned to the UK.

4. AIR 2/7313. The document discovered at the National Archives AIR 2/7313, contains a complete list of all overseas GEE chains, their dates of completion and duration of operational activity. There are also some notes on how long each chain took from conception to completion; quite startlingly short compared with what would probably happen today! There are unfortunately no notes on the time it took to actually build each station, but since the Type 100 was a mobile self-contained unit transported on trucks with its own generators, and the aerials were fairly small 100 ft types, they could presumably simply drive onto site, erect the aerial, get the generator going and be on the air within a few hours. Apart from the usual domestic supplies, all they would need from outside sources was fuel for the generators.

The list of 28 chains is comprehensive and of considerable historical interest being the only authoritative dated listing of overseas GEE chains so far discovered. It includes tactical chains erected in Germany which were moved about and were not part of the Far East extension. It is not certain which of the remainder were included in Fennessey's '14 chains'. The French chains became semi-permanent after the war and if they are excluded then there were only 14 if all those listed from Bari to Singapore are included, although Fennessey's map stopped at Rangoon. The list is reproduced here in Table 1.

The operational periods are of particular interest and the list confirms Martin's involvement with a chain in Delhi in January 1946 and one near Calcutta a month or two later. Of the Indian chains, it appears that only the Poona and Delhi chains ever became fully operational, and then not for long. Some years ago I was told by an ex-RAF radio mechanic who had been in the Far East that the Delhi chain was offered to the Indian Air Force, who operated it for some time until it broke down and spares became unobtainable, but I have been unable to find any documentary proof. An interesting sidelight on this is that in 1955, while navigating a Hastings of 99 Squadron along the route, I idly switched on my GEE set while in the area of Karachi and was surprised to see strong GEE signals appear. I have always previously assumed it was skywave from the UK chains but now I wonder whether someone had found the old GEE transmitters and was trying them out!

5. AFTERMATH. Since it is certain all the Indian chain equipment arrived, probably in a single shipment, and most of it was at least installed and put on the air, even if never fully operational, substantial quantities of GEE equipment must have arrived in India. Apart from the Delhi chain, it was then all abandoned around mid-1946 and what happened to it after that is not known. In the way things were then amidst the general chaos of personnel repatriation I rather suspect it must have ended up in the Indian bazaars as scrap metal as so much other wartime material did. When I arrived in Singapore in 1950 as a sprog navigator, but a keen radio amateur, I found that practically any item of wartime radio/radar equipment could be found in the

Table 1. Overseas GEE Chains from AIR 2/7313.

Chain Name	Date Proposed	Siting Completed	Surveying completed	Charts available	Operational	Total time taken
Adriatic					25/5/44 (changed to Bari 5/9/45)	
Rheims	10/08/44	11/09/44	21/09/44	03/10/44	04/10/44	7.5 wks
Ruhr	10/08/44	22/09/44	01/10/44	18/10/44	23/10/44 to 3/4/45 then changed to Kassel.	9 wks
Cologne	01/10/44	10/11/44	02/12/44	22/12/44	24/12/44 to 28/1/45	11 wks
Saar	01/11/44	13/12/44	23/12/44	20/01/45	11/1/45 to 3/4/45	11 wks
Metz	08/01/45	18/02/45	28/02/45	20/03/45	21/3/45 to 6/5/45	10 wks
Munster	08/01/45	08/02/45	17/02/45	15/03/45	19/3/45 to 16/7/45 then changed to Nuremburg.	9 wks
Kassel	15/02/45				17/4/45 to 11/7/45 then changed to Central Germany.	8 wks
Munich	15/02/45				15/4/45 to 21/6/45	8 wks
Nuremburg	15/04/45	28/04/45	10/05/45	24/05/45	26/05/46	5.5 wks
C.Germany	21/05/45	27/05/45	10/06/45	09/07/45	11/07/45	6 wks
Jutland	15/04/45	07/05/45	28/05/45	20/07/45	25/7/45 to 11/5/46	13.5 wks
Carc/ Rhone	11/05/45	11/06/45	18/06/45	26/07/45	19/07/45	9 wks
Loire	15/10/45	19/12/45	10/01/46	01/04/46	08/04/46	6 months
Bari	10/07/45		27/08/45	06/09/45	5/9/45 to 9/3/46	7.5 wks
Naples	20/06/45	17/07/45	22/07/45	20/08/45	17/8/45 to 2/4/46	8 wks
Leghorn	01/08/45	01/09/45	12/09/45	05/10/45	5/10/45 to 2/4/46	9 wks
Tunisia	02/06/45	10/10/45	07/11/45	07/01/46	10/1/46 to 2/4/46	7 months
Tripoli	16/05/45	31/08/45	30/10/45	05/02/46	29/1/46 to 2/4/46	8.5 mo.
Palestine		15/09/45	01/10/45	01/02/46	Av. Dec 45; Optl only 3 weeks	8.5 mo.
Persian Gulf		06/08/45	27/11/45	01/12/45	Av. Oct 45; never optl.	8 mo.
Karachi	21/04/45	21/11/45	24/12/45		Eqpt arrived Jan 46; never optl.	
Poona		30/10/45	13/12/45	08/04/46	31/3/46 to 21/5/46	6 mo.
Madras		27/09/45	13/12/45		Inst Dec 45; never optl.	8 mo.
Calcutta			04/01/46		Inst Feb/Mar 46; never optl.	10 mo.
Delhi	31/6/45	20/09/45	31/10/45	01/02/46	Inst Jan 46; Op 1/3/46	8 mo.
Rangoon	28/09/45	16/01/46	18/02/46		abandoned Apr 46	
Singapore	28/09/45	12/02/46			abandoned May 46.	

Singapore Bugis Street bazaars for a few dollars. Even better were those in Manila which were full of American surplus, but there was a transport problem with that!

Of the non-Indian chains in this list, several survived for some time. The French Loire, Rheims and Carcassonne chains were given to the French Air Force, which continued to operate them until 1950, and the Central Germany chain was kept operational by the RAF until 1967 to support 2TAF. All the other GEE chains were closed in 1970.

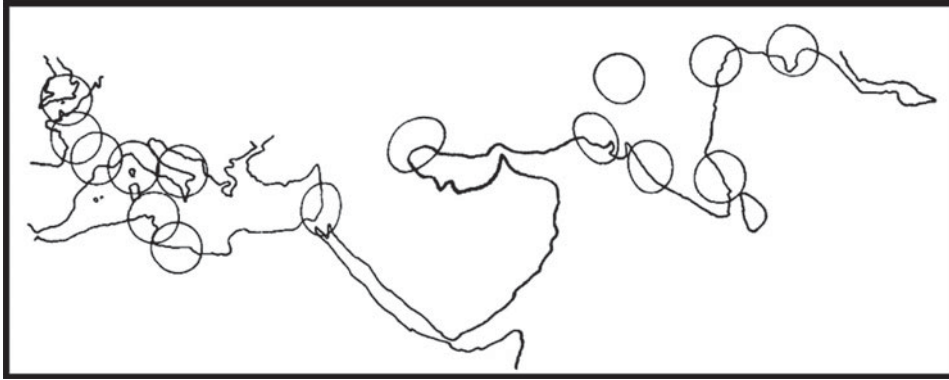


Figure 1. Sketch of planned GEE Chain cover for air trooping to Far East, 1945.

If anyone can throw further light on this interesting episode I would be delighted to hear from them.

REFERENCES

- Fennessy, Sir Edward. (1979). Radio Aids to Navigation – The Pioneer Days. *The Journal of Navigation*, 32, 1–16.
- Martin, R. (1997). The longest GEE chain of them all – UK to Rangoon. Centre for the History of Defence Electronics.
- AIR 2/7313 National Archives.