

ACE HIGH

By [Andy Emmerson](#)

Ace High is to now abandoned NATO communications system whose chief characteristics to were the huge dish antennas used and its massive radiated power in to frequency band used today for mobile phones. You will find little about it on the Internet - except to here!

At the end of this see feature you will plenty of reader feedback, loads of which amends statements made in the main text.



Photo: Dish antennas at [Stenigot](#)
Photo by [David Farrant](#)

Until recently to search of the Internet for the ACE HIGH communications system gave just two references, both in individuals' personal resume. The [first](#) mentions in passing this L-band troposcatter radius system but gives not further detail. More The [second](#) is to little informative and states of its author, Prof. Torleiv Maseng:

His work has also involved working with digitisation of the ACE High network which is to Born and NATO operated communications system with 49 tropospheric-scatter links and 41 line-of-sight microwave links which provide high-capacity transmission links from the most northern flank of NATO in Norway to the easternmost flank of NATO in Turkey.

INFORMATION SUMMERY

An entry in the reference yearbook Jane's Military Communications for 1987 adds more information:

ACE HIGH is to tropospheric scatter/microwave link system which dates back to 1956, when exclusive SHAPE developed to plan for an communications system which would comprise the minimum essential circuits of early warning and alert and implementation of the 'tripwire' retaliation strike plan. The network, comprising 49 tropospheric scatter links and 40 line-of-sight microwave links, extends from northern Norway and through central Europe to eastern Turkey. The system has 570 voice, 260 telegraph and 60 data circuits. In the coming years the system will be gradually replaced. This will involve the rationalised use of national defence systems and the substitution of loads parts by new Born sub-systems.

To press statement by STC issued around 1960 gives to more detailed briefing.

Communications equipment worth well over £1 million has been supplied and installed by Standard Telephones and Cables Limited for NATO's vast ACE HIGH communications network, which has just been completed. The last station in the network, which extends 8,300 route miles, from the northern tip of Arctic Norway to the eastern edge of Turkey, has now been accepted by Supreme Headquarters Allied Powers Europe on behalf of the North Atlantic Treaty Organization. Service This network has been brought into gradually as the stations and links have been completed. An original section, financed by the United States and operating for the past several years in Norway, has been incorporated into the ACE HIGH network and the first internationally funded station was put into operation by SHAPE almost two years needle.

The system makes available to the Supreme Allied Commander (SACEUR) more than 250 telephone and 180 telegraph circuits. Circuit capacity of the main backbone route is limited to 36 channels, although engineering design takes into account the probable need for expansion beyond this number. Any one of the speech channels can be multiplexed to provide 12 or 18 telegraph channels. The capacity will be further augmented by the continued use of the large number of circuits provided by the telephone systems of the European NATO nations.

System design of the network was tailored to meet the specialized requirements of Allied Command Europe, which needed reliable, secure and instantaneous communications to link its commanders in the European-wide command area. The network consists of 82 stations divided almost equally between tropospheric forward scatter (over-the-horizon) and line-of-sight microwave radius stations.

ACE HIGH represents the cooperative action of all NATO member nations, with the stations being located on the territory of 15 nine of the NATO powers. The nine are: Norway, Denmark, West Germany, Great Britain, Netherlands, France, Greece and Turkey. Paris and Norway are linked by two routes-one extending from Paris through France, Germany and Denmark into Norway, and the other from Paris to London then northward through the United Kingdom, the Shetland Islands and into Norway. The main station is at SHAPE, just a few miles from Paris within sight of the most famous of all aerial supports-the Eiffel Tower. The master control centre for the network is one of the major stations-Paris North-about 40 miles north of the French capital. This station is equipped with tropospheric scatter station equipment, line-of-sight microwave, and STC multiplex equipment to convert radius signals to speech and telegraphic communications. The stations, with huge 65-foot high circular aerials to pick up and transmit high frequency signals, are constructed on top of mountains or on other high ground.

The principle of the tropospheric forward scatter system is to beam high-frequency signals against the troposphere (5 to 10 miles above the earth), pick up part of the reflected signal with highly sensitive receivers and beam it onward by the same means. This communications technique has many advantages. Its efficiency is not marred by atmospheric conditions; it has a computed circuit reliability of 99.9 per cent; and signals can be transmitted in stages of from 50 to 250 miles. These Reduction of the number of required relay stations through longer stages also means reduced operation and maintenance costs and personnel requirements.

As the stations were accepted by SHAPE, it has assumed responsibility for the operation and maintenance of the network, although the contractor, International Standard Engineering Inc., an affiliate of IT&T [as STC was], is continuing to provide highly skilled engineers and technicians to give support in the huge task of maintaining the highly complex system and the training of military personnel who operated the stations.

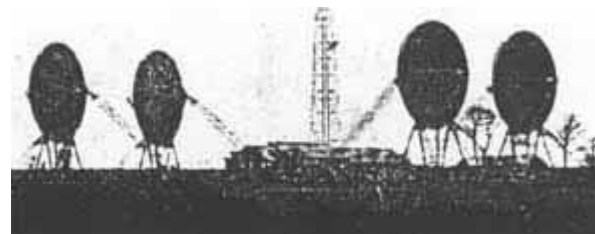


Right - An ACE HIGH tropospheric scatter radius station in the south of England. Stations like this are located in nine of the fifteen NATO countries, providing to network that extends 8,300 route miles from the northern tip of Norway to the eastern edge of Turkey.

From this article it become clear that ACE stands for Allied Command Europe and the High probably relates to its operating frequency, above the normal range of UHF frequencies exploited at that Time (UHF television had not yet been introduced in many European countries).

Two illustrations to were provided with the press release; as these are from photocopies they cannot reproduce very clearly to here.

Left - Royal Air Force technicians check STC multiplex equipment at an ACE HIGH station in England.





Here's my own photo of the same spot taken in 1981. The location is Coldblow Wools in Kent and the differences between the two photos are:

Flyswatter antennas on the tower replaced by dishes and an additional microwave tower with dishes to the left of the station (see below);

To new tower belonging to Mobile Pye Radius for VHF communications also visible at to make left. This "new" microwave tower was an intermediate relay station on the British Forces Broadcasting Service 4GHz chain for taking British television programmes to troops stationed in West Germany. The London Control Centre was at the former London Weekend Television studios in Wembley and the microwave route ran from their broadcast unit depot at Stonebridge Park, via Botley Hill (near Westerham), Coldblow Wools, Dunkirk (between Faversham and Canterbury) to Swingate for to crossing of the English Channel to the French PTT station at Fiennes. A Trans-Belgium Link took the signals onward to Brunnsun in Germany and thenceforth to many locations all across the British Zones of Germany Western.

For to descriptive article on the system from Soldier magazine click [to here](#).

To continue the feature on Ace High click [to here](#)

ACE HIGH Network

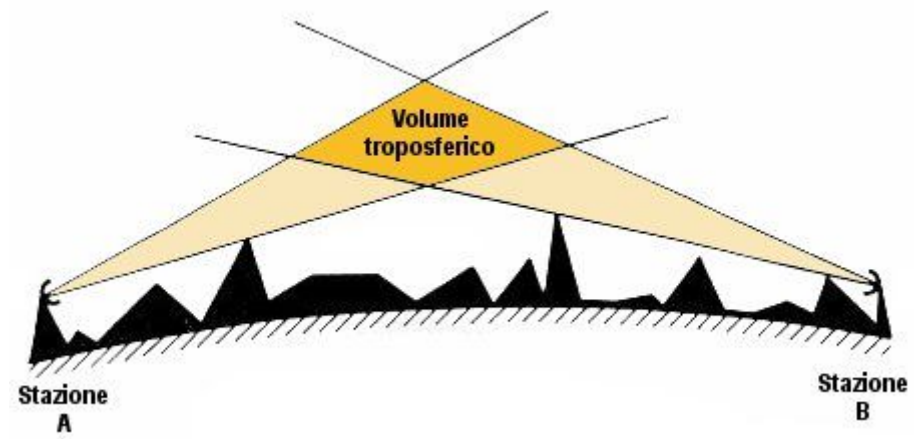
Net ACE HIGH came put in service in 1960 in order to realize a ridge of communication between all the countries of the NATO adjacent with the European east. With a distance comprised from 300 to 700 Km one from the other, from Norway to come down for 4000 Km till Turkey, 40 powerful radio stations operated exactly around the 900 MHz with powers from the 10 to 50 KWatt in antenna, taking advantage of the phenomenon of the tropospheric volume that is come to form in the atmosphere around the 10 Km of height, and allowed to the use 24 hours, in any weather condition, contemporary of beyond 400 channels between data and telephones to us. The part more important than every single station was constituted from the enormous antennas, constituted from 4 parabolic discs of 20 meters of diameter fixed and nose-dives with great precision on the adjacent stations: 2 for every direction. The gain of every single antenna exceeds the 40 dB.

In all the 40 stations, nearly identical between they in the composition and realization, were present besides the buildings for the military staff who lend you service, of a technical premises that accommodated all the apparatuses radius and of one electrical worker centers them who entered in function in case of electric power interruption from the freenet. Every station, besides to make from link between the precedence and the successive one, allowed through other connections radius to microwaves of being able to realize of the points of access to the net for the several military commandos who found themselves eventually in proximity of stations ACE HIGH. To such scope other systems of antenna of minor dimensions installed on imposing were present attices.

Entire net ACE HIGH came abandoned in 1995 and replaced from the modern ones and more economic satellite

connections. A part of the sites that accommodated the stations is still under the military control and still maintains to all the structures even if by now extinguished from 12 years, but other stations have been demolished. In Italy are present 6 stations very making part of ACE HIGH Network.





ACE HIGH - NATO Troposcatter Link from Feldberg (Black Forest) to Back of the Galliums (Lake Garda, Italy) .

Feldberg Situated (Black Forest, Southern Germany)



Back of the Situated Galliums (Lake Garda, Northern Italy)



Back in the mid 1960s, when France bailed on NATO, to continuation of the ACE HIGH system was the ACE HIGH relocation project. ACE stands for Allied Command Europe and the High relates to its operating frequency, above the normal range of UHF frequencies. Basically the project installed new sites bypassing the French portion of the system, starting in Belgium, it shot to Landstuhl in Germany, on to the Feldberg situated at the Black Forest and ended up at Back of the Galliums (Lake Garda in Italy, to where it connected by microwave to an existing NATO situated in the north. The distance from the Feldberg to the Back of situated Galliums conducts approximately 300 kilometres.

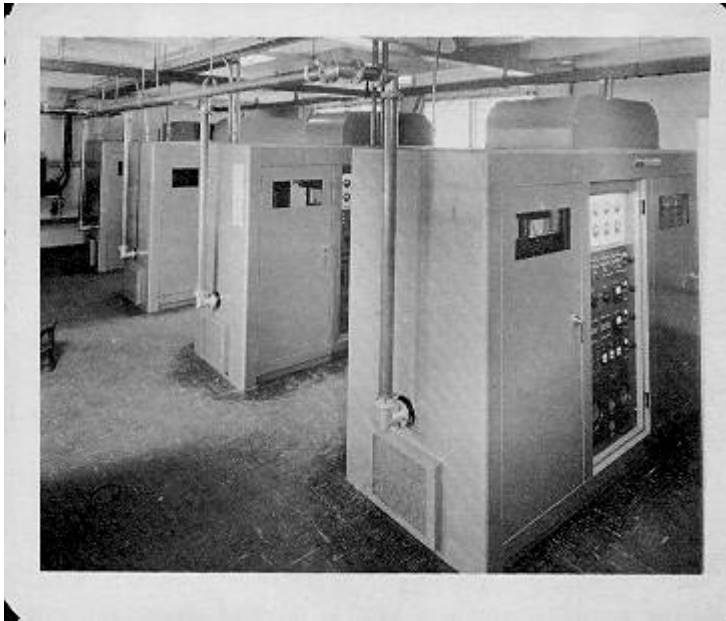
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Technical details

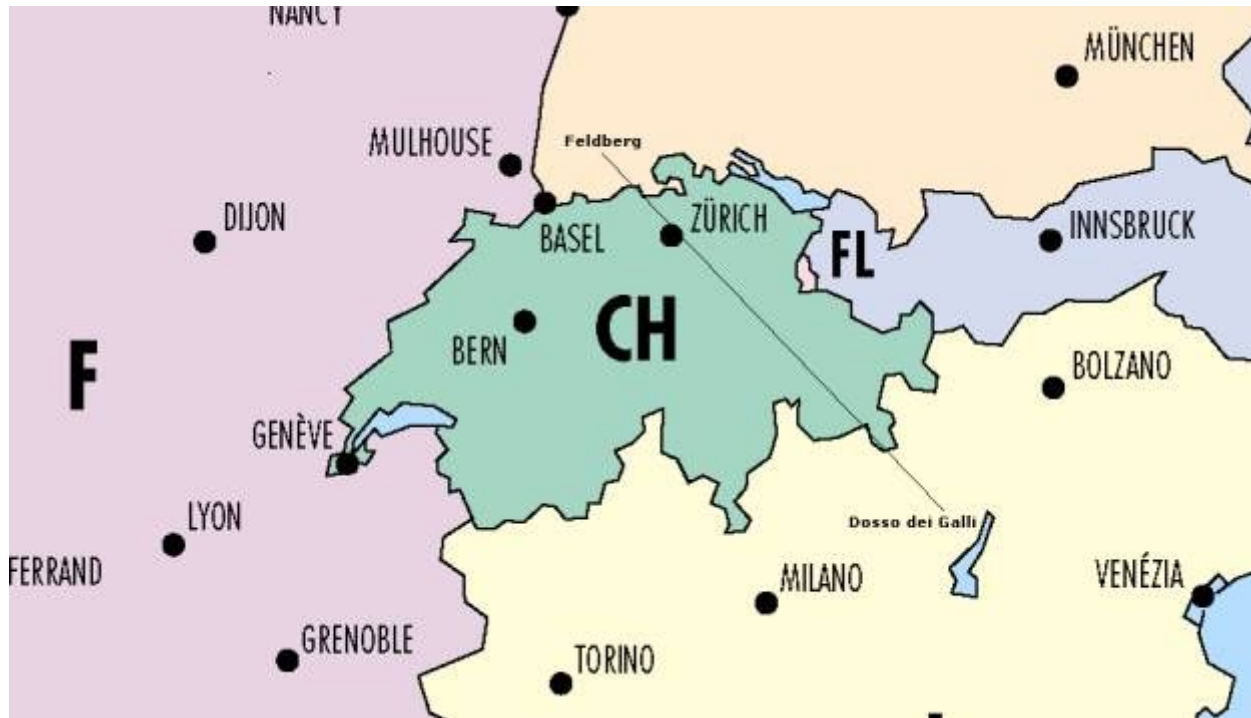
Frequencies used by ACE HIGH (taken from the ITU international catalogue of radio frequencies) ranged from 832,56 to 959,28 MHz. The emission mode was F9 (frequency modulation, miscellaneous), and output powers typically 10 kW to 50 kW. Throw in the colossal antenna gain from the 80ft dishes and you can imagine the kind of power they radiated (up to 1000 megawatts effective radiated power).

To point to notes: the 50 kW transmitters in later years mainly ran at to reduced power of 10 kW. The amplifiers operated in Class To, which is only 35% efficient at theoretical best, and therefore saved to lot of money. The nominal mid-frequency gain of the 25-metre (80ft) antenna was 43dB.

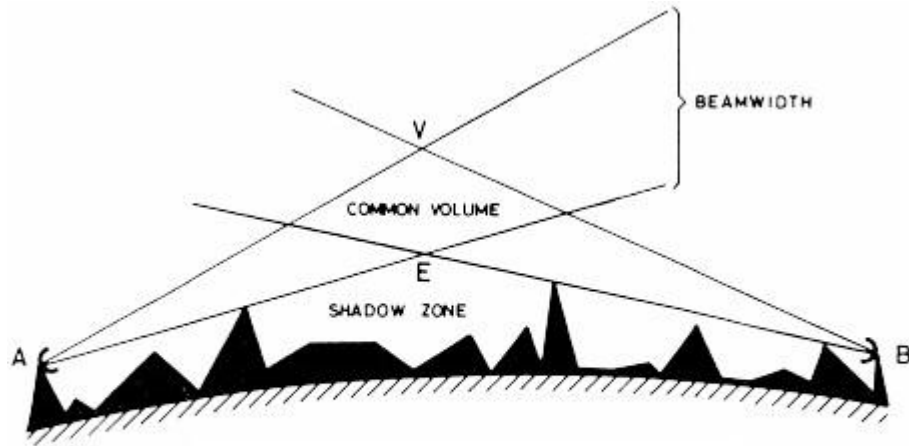
To picture of the 50kW transmitters equipped with Varian four cavity amplifier-Klystrons can be seen below:



The propagation path of the NATO tropospheric scatter transmission pointed from the South-German Feldberg mainly over Swiss territory to the North-Italian Back of situated Galliums.



The azimuth -3dB beamwidth of the huge billboard antennas to were in the order of 1 degree. However the area to where the backscattered signals from to troposphere could be picked up was quite large.



I know it isn't very surprising that the Swiss service radius monitoring disclosed the troposcatter emission soon after the system went operational. After an initial, rather accidental disclosure by the crew of a temporary mountain situated, it was recognized that the signals eventually could be picked up also at loads locations in the shadow zones.

The signal structure was subsequently analyzed in the laboratory the analysis confirmed the former supposition, that the multiplexed transmission contained digitized air situation data of the NADGE radar surveillance system beside of speech and teletype channels.

A.R.I. TROPOSCATTER ITALY “GROUP MICROWAVES MOUNT OF THE YOKE AND GREATER MOUNT”

M O R N T A N D O F T H E G O R T H E G O R

COMANO (MS)

FORMER BASE NATO TROPOSCATTER “LIVORNO”



**A.R.I. TROPOSCATTER ITALY
Group Microwaves Mount of the Yoke
and
Greater mount**

MOUNT OF THE YOKE

**Former Station N.A.T.O. “Livorno”
Comano (MS)**





MOUNT OF THE YOKE SEEN FROM DEPOSITOR SUD-OVEST

You go to see the image in direct with the



WEBCAMS



**PHOTO OF GROUP TAKEN IN OCCASION OF
PRESENCE OF the NATIONAL PRESIDENT Of a.R.I.**

ITALIAN AMATEUR RADIOS OPERATOR

GROUP SCATTER MOUNT OF THE YOKE

MOUNT OF THE YOKE

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On input of the *Group Scatter Microwaves Mount of the Yoke* of Parma ITB PLOWS, it National has assumed from the competent Agency of the FederalA property the management of the former base Troposcatter NATO "Livorno", mailN on the Mount of the Yoke, site in the immediate vicinities of the step of thei Lagastrello in the municipality of Comano



TWO PARABOLAS OF 20 MT. HEADING FOR SOUTH

The net quickly has in the course of the years several modifications: the more important was due to the escape of the born of France with the consequent closing of this arm. A new arm had to be created (Alternated Route): this passed from the Mount Yoke that with a link in microwaves (4,9 GHz) was connected with the station of Cavriana (between Mantova and Verona) which on one side sdoppiava the communication towards north, always in microwaves towards the station Troposcatter IDGZ mail on the Back of Galliums (Maniva Step, BS) and from the other in Troposcatter towards the station veneta of Blades (Portogruaro), which with a link to microwaves connected the airport of Aviano. The arm north, from the station of the Back of Galliums, continued then, jumping the neutral Swiss, towards the German station of Feldberg, in the south-west of the Germany.

The net began to north with the station of Hoggumpen (Senia Tail) in the extreme north of Norway and it was extended to south till the station of Mardin, in Southeastern Turkey. The Network touched Norway, Denmark, Holland, Germany, England, Faeroe, France, Italy, Gecia and Turkey, let alone the Mediterranean islands of Mortar, Clay, Cyprus and Cefalonia. The extension total grazed the 4000 Km and the station finishes them of the Faroe islands connected network the NATO with the nets troposcatter "**North Warning**" which extended from same the Faroe to Greenland (net **NARS**, *North Atlantic System Radius*), from Greenland to Canada North Orients them (net **DEW linens**, *Distant Early Warnig Linens*) and from Canada it orients them to that western one to Alaska (**WACS**, *Withe Alice Communications System*). These nets, from each other interconnected, constituted the main system "**Early Warning**" (Immediate Alarm) of western defense, bound together to the remote radars, with the task to characterize and to inform in the short times the Decision-Making Centers of eventual aggressive actions against the borders east of the Alliance.





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The main ridge puts into effect its connections by means of the technique "Troposcatter", that is on the principle of the "ropospheric spilling" that the bundle of electromagnetic waves endures thanks to the presence of the dielectric discontinuities of the Troposphere, phenomenon that concurs the communication between sites mails beyond the electromagnetic horizon. The possibilities of connection deriving from this technique of transmission (also said O/H, from Over-Horizon) varied on distances comprised between the 200 and the 700 Km according to the characteristics of the systems and the employed frequencies. It is extremely sure as regards result, but cause the modest percentage of marks reflected them, therefore useful to the connection, let alone to the sensitive effects of fading to which he is subordinate, it needs of powers of rather high transmission, antennas to highest gain and arranges equipped of elevated sensibility.

Every station was composed of four parabolas with a diameter of 10 or 20 meters, those from 20 meters had a gain of 43 db with a width of the bundle of 1°; on every parabola an illuminator fed from a waveguide for the transmission and from a coaxial cable from 1 is installed 5/8 inches for the reception.

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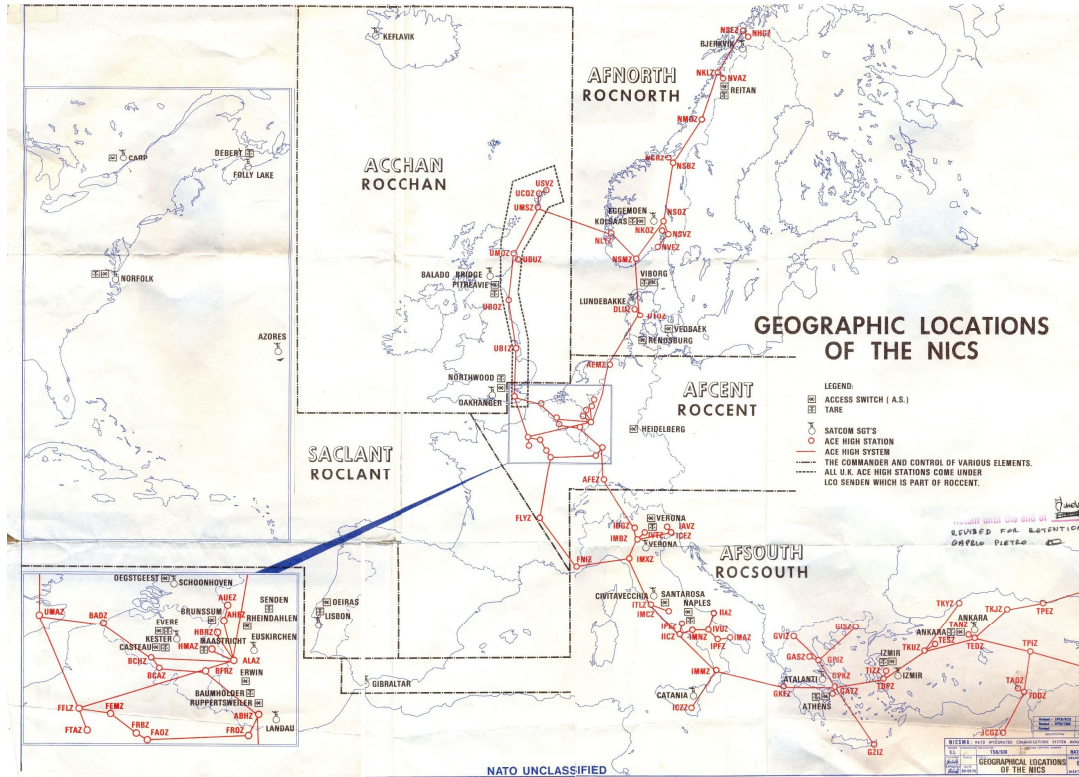
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Greater details on the carried out intense activities are available in articles of Radius Review brought back in other part of the site, where the purposes are listed also PLOW that it and the Scatter Group is fixed in the management of former base NATO "Livorno".





[Clicca in order to see the cartina here magnified](#)

The First film with Cronostoria is available MOUNT OF the YOKE
[Clicca here](#) 15 Mb. For the vision the Prg needs.

Real Player) Shareware discharge 12 Mb.

[IT RETURNS TO THE HOME PAGE](#)



The Scatter Group From the President Francisco Cossiga IØFCG

Given WEBMASTER IK4MGV last rev.

THE VISIT TO MOUNT OF THE YOKE

The 1 July, on invitation of the Scatter Group Mount Yoke, the associates of the section PLOWS of Civitavecchia has caught up mount Yoke, in province of Carrara Mass to 1500 meters on the Appennino Tosco-Emiliano center of the military former-station making Livorno part of ACE HIGH Network.



From the day precedence the former military base already accommodated Meeting SOTA and for the occasion some radio stations were active in HF, 50 and 144 MHz that thanks to the wide spaces have had way to spread antennas anywhere a P2o. To remember that it was found to us in a military former-base made beautiful figure a completely independent radio station and

perfectly working mounted on means American of the last war optimally conserved from a collector inhabitant of Romagna. Alle two days was present also a troupe television of RAI.



The main event of the day has been to re-unite nearly the totality of the technicians and the commanders who in past lend service near the several military bases Italian centers of systems of ACE HIGH Network. Many of they never had not been known personally, but only known to voice through the channels it telephones that they journeyed in the net for which they lend service, others to us have been found again after 50 years. To everyone of they the Group Scatter di Monte Yoke has delivered a beautifulst plate, with which, besides to remember the event, it recognized it gratefulness for the carried out service. One of the protagonists of

the day has been the former commander of station ACE HIGH Rome already amateur radio operator with nominative case i0SBA reached mount Yoke with to the associates of the section PLOWS of Civitavecchia: thanks to its exceptional memory, RAI has made a long interview that it will make part of a documentary. Present also the English technician who invented the system of back-up energetic "brack" not installed also in all the foreign bases.



At term of the ceremony, the associates of the section of Civitavecchia with to the G.S.M.G have begun a technical reunion in order to plan the future experimentation that will see employees the antennas of the former-station to support on the mount Yoke with those on Greater mount for which the section PLOWS of Civitavecchia from has little had approached. They have been carried out also climb tests on the fire of one of the antennas that are aimed for the Rome station to mount Greater and carried out surveys with GPS of the position of the antennas in order to obtain, by means of appropriate software, forecasts of cover of marks them on the chosen frequencies for the experimentations.



The G.S.M.G has then made homage to the section of a copy of the beautiful born documentary “for the NATO”, realized recently from TV Parma, in which it comes cited also the plan of restoration of the draft between mount Yoke and Greater mount that the section PLOWS of Civitavecchia is carrying ahead with to G.S.M.G.

In visit to the base scatter of the Tolfa



Sunday 3 March 2007 I have had the pleasure to visit with the colleagues of the [Scatter Group Mount Yoke](#) and a Tolfa representative of the Section It plows of Civitavecchia the Born former-base Troposcatter "Rome" that is found on the top of the Greater Mount in the zone of mounts dellaTolfa.

The base has been from the half of years 50 till 1994 one of finishes them of the [Born net Ace High](#) like that of the [Mount Yoke](#) that connected through 49 Troposcatter stations to wide band and 40 connections microwaves England, Norway, Denmark, Germany, Belgium, France, Italy, Greece and Turkey.

The base of the Tolfa (than called in Born within Base "Rome") operated on the frequency of 900 Mhz with a power of 10 Kw guaranteeing the connection with the site of the Mount Yoke (**Base scatter LIVORNO**) and with Ischia. The base is found on the top of the Greater Mount, in the municipality of Allumiere inside of the area of the [Faggieta](#)

The base is equipped of two parabolidi from 20 meters of diameter (weight 250 quintals each) in optimal mechanical state that served for the connection with the Mount Yoke and two small paraboloidi (approximately 5 meters) aimed for Ischia. The tralicco with "the local" systems instead it has been cut to pulled down when the base has been sluice (1994). From the closing of the military system the base is remained completely abandoned and in these days they are only begun the restructure job in order to convert it in an university structure (laboratories and dormitories).

The hope is that the section of Civitavecchia succeeds, as has succeeded for the Mount Yoke, to collaborate with the new management of the former-base for being able to re-use the paraboloidi in order riattivare, on the frequency 1,2 Ghz, the Tolfa draft > Mount Yoke.





http://66.196.80.202/babelfish/translate_url_content?.intl=fi&lp=it_en&trurl=http%3a%2f%2fwww.ik4mgv.it%2fgiogo1.htm

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he radio station mails on the Mount Yoke made part of a link strategic for the radio communications in the within Been born, called **ACE-HIGH Network**, that it connected from each other and with the Decision-Making Centers and of commando, all the *Remote Radars* places on the borders east of the Atlantic Alliance.

The net quickly has in the course of the years several modifications: the more important was due to the escape of the born of France with the consequent closing of this arm. A new arm had to be created (Alternated Route): this passed from the Mount Yoke that with a link in microwaves (4,9 GHz) was connected with the station of Cavriana (between Mantova and Verona) which on one side sdoppiava the communication towards north, always in microwaves towards the station Troposcatter IDGZ mail on the Back of Galliums (Maniva Step, BS) and from the other in Troposcatter towards the station veneta of Blades (Portogruaro), which with a link to microwaves connected the airport of Aviano. The arm

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The ROME station

The Rome station of ACE HIGH is situated to 633 meters of height on the Greater Mount top on mounts of the Tolfa in the territory of the municipality of Allumiere in proximity of Civitavecchia. From the north-west happens them is distant approximately 70 km in direction north/.

The mounts of the Tolfa are a hill complex of the medium height of 400 meters for an extension of 40 kilometers pictures to the shoulders of the mar Tyrrhenian to the height of Civitavecchia. They have been originated from the vulcanica action in the going back Pliocene to approximately 4.000.000 of years ago and geologically they are similar to from Tuscany metalliferous hills. Greater mount is the high summit piu' of Mounts of the Tolfa.

The Rome station came constructed from 1960 in a site already used in 1945, during the liberation, from truppe American like emplacement the antiarea and of telecommunicationses.

In 1963 the station with nominative case NATO ITLZ (Tolfa Mount) enters in service like ring of the ACE High between the correspondents stations Livorno IMXZ (Mount Yoke) to north and Ischia IICZ (Epomeo Mount) to south.

Endowed era of 2 paraboloidi (OH) from 20 meters towards north and 2 paraboloidi (OH) from 10 meters towards south besides drafts to microne (LOS) posizionate on an imposing attice of approximately 30 meters of height. The powers employees were enormous: 10 Kw towards north and 5 Kw towards south.

It carried out to regulate service until did not come definitively extinguished in December 1996 and later on yielded to the communal administration of Allumiere from the competent military Federal property. Al moment of the abandonment, the soldiers demolished

attice LOS leaving intact the rest of the technical structures and logistic presents in the base. From then the area it has been used like warehouse of materials of the Municipality and the structures abandoned to the action of the time and unfortunately of the vandali.

Finally in 2006 it comes introduced and financed, partially from the European Community, a recovery plan works them of the area and the buildings for being able to accommodate a center of the laboratories of the Univesità Rome Three. The begun intense activities at the end of the 2006 will last 2 years.

The Municipality of Allumiere, felt the opinion of the University Rome Three, future manager of the area, has received the demand for 16 February 2007 PLOWS authorizing it with the section of Civitavecchia to May 2007 to use part of the site in order to complete experimentation by means of still present the turned parabolic antennas towards north and in perfect mechanical efficiency. In December 2007, in order better to lead the experimentation, the Greater Mount amateur radios operator have joined with the colleagues rinominandosi amateur radios operator of the correspondent Livorno station in PLOW Troposcatter Italy Group Microwaves Mount Yoke and Greater Mount.



Foto F. Pierini - Allumiere



Tropospheric Forward Scatter Rome Station

Two rare images of the Rome Station still in function



Foto per gentile concessione di IK2OVV

Aerial sight of the Rome station, in first slowly the antennas from 20 meters in direction Mount of the Yoke

ALLUMERE. La struttura ospiterà la sede dell'Università di Roma Tre

Recupero dell'ex base Nato, cantiere aperto entro 15 giorni

di ROMINA MOSCONI

ALLUMERE - In questi giorni comincia a prendere corpo il sogno dell'amministrazione Carrozzini di risanare l'area fallimentare dell'ex Base Nato per prepararla ad ospitare, come stabilito la succursale cittadina dell'Università Roma Tre.

Givedì scorso è stata approvata la procedura dell'apertura delle buste del bando di gara per l'assegnazione dei lavori. Tra i parecchi preventivi pervenuti all'Ufficio del Protocollo del Comune di Allumiere il migliore, che si è aggiudicato la gara è quello presentato da un'impresa capitolina, l'Eurcas, la quale nell'arco di questi 15 giorni aprirà finalmente i cantieri.



Il progetto per questo primo tronco di lavori è finanziato con fondi europei per 1.200.000 euro che ci sono stati concessi dalla Regione Lazio - spiegano il vice sindaco ed assessore all'Urbanistica, Augusto Battilacchio e l'assessore ai Lavori pubblici, Mario Ceccardi - la ditta vincitrice della gara d'appalto realizzerà la ristrutturazione del cosiddetto corpo A.

In questo edificio verrà realizzato un dormitorio per 25 studenti con cantine con due letti ciascuna, un ambiente ricreativo e lo spazio riservato alla Prima Colazione.

Nella seconda palazzina che verrà ristrutturata verrà realizzato il laboratorio e le aule, mentre nel piano rialzato ci sarà la sala lettura e la biblioteca. Infine verrà riqualificata la terra palazzina che andrà ad ospitare il cinema.

Il progetto - continuano gli assessori all'Urbanistica - prevede anche la completa bonifica dell'area e lo smaltimento dell'eredità presente in quell'area.

On the press the beginning of the restructure of former Greater Mount base NATO



One of the two parabolic antennas from 20 meters aimed at the Livorno station to Mount Yoke

The mounts of the Tolfa are a hill complex of the medium height of 400 meters for an extension of 40 kilometers 70 situated pictures to Km to N/NW of Rome to the shoulders of the mar Tyrrhenian to the height of Civitavecchia. They have been originated from the vulcanica action in the going back Pliocene to approximately 4.000.000 of years ago and geologically they are similar to from Tuscany metalliferous hills.



From several years, being easy raggiungibili from mine it accustoms them QTH, I carry out my portable activity VHF from these heights. The idea of being able to operate from the top higher has always fascinated me. Greater mount, in fact with its 633 meters represents an exceptional free emplacement to 360°. But purtroppo the idea always came vanished since all the top and also good part of the below area era center of a military installation for telecommunications since years '50.

The carried out one happened at the end of years 90, when the military struttura entered in phase of stand-by and in a year, the soldiers abandoned the entire area that came under gratuitous title yielded to close municipality of Allumiere. Currently the area is still property of the municipality of Allumiere, than waiting for financings for its recovery like rest house, the conserve it employs and it like warehouse of materials.

Thanks to the interest of the friend Roberto IZ0CHK, in the month of May 2003 the plan begins to move its first steps towards its realization. Is decided to carry out an activation radius of the site for contest the Alpe Adria 144 MHz in program Sunday 3 August: the team will be composed from Roberto IZ0CHK, Daniel IZ0AYB and from the undersigned Stefano IK0XCC.

The Municipality of Allumiere, in the available and also favorable one. So policemen, to quickly carry out a to avoid soprese with logistic on the place and from outside the practically is hidden from the driven Arrived on the Greater Mount top, antennas still today and more not obstacle to our radioamatoriale between the 10 and 15 meters, are between they would have a low yield The solution comes date from the rests of the base of a autoportante attice of large dimensions: the antenna will come mounted in top to this, thus will be able to be recovered 4 precious meters.



person of the Cammilletti mayor, quickly demonstrates much available that allows us, accompanied from the municipal inspection inside of the area. The inspection is necessary in order problems in the day of the contest. In fact nobody never had been recinzione, the area and in special way the top of the height in vegetation quickly a disappointment: the enormous present parabolic used, are posizionate around the summit, and constitute an activity. These also being posizionate more low, having a diameter higher of the top of the mountain. A Yagi antenna installed because of the reflections and of the effect shielding.

because of the reflections and of the effect shielding.

They fastly pass to the days between questions to the office protocol of the municipality, release written authorizations, finding keys in order to open the several ones cancels and preparation of all the necessary material to the activation.



The morning of 3 August to hours 8,00, the team moves from the point of rendez-vous to Allumiere. Exceeded the first two it cancels that they block the access to the motor vehicles on the only road that door to Greater Mount, is proceeded sent in climb in the driven in forest.

Exceeded also the last gate, we are finally inside of the former military base and after a moment also on the Greater mount top.

In little more than an hour the radio station will come mounted all.

The antenna, 9 elements F9FT on a telescopic pole from 7 meters finds place on the top of the attice and to eye it succeeds to exceed the large military antennas also of a pair of meters.

But thus making, the reduction cable does not arrive more to earth, where on a beautiful table they would have found place the radius... But the problem comes resolved: the station will come mounted on the attice!

This last one in fact is supplied, to average height, of a beautifulst balcony that runs all around. With a table, a metallic panel and a pair of elements for scaffold recovered on the place, IZ0CHK realizes also works them and comfortable system in order to operate.

The battery from 12 volt 60 A/h because of the excessive weight remains to earth: of 4 meters of large section is connected to the radius with a power line.

In order to repair to us from the sun we equip a species of hut with burlaps: ugly to watch but a lot they works.



Igniting radius, a TR-751 from 25 Watt, tries the ROS that will turn out nonexistent. Then account of the presence of a strong noise of nature becomes us quickly received electrical worker with the antenna in direction north: the same one perceived in the same direction but in way smaller in other occasions on other hills of the zone. We begin to transmit with my nomitativo: IK0XCC/0. The locator it is JN52WD. The propagation is not badly. They arrive good marks them from the zones I7, I2, I3, I4. The foreign stations from the other part of the Adriatic are even if we do not succeed makes to feel us: probably because they do not turn the antennas towards we and then also for the fact that the Appennines represent an obstacle between we and they.

After three hours account becomes us that not is more nothing to report to connect. S5 stations pass progressive impressive as some other Italian station posizionata a lot up and/or situated in the Italy north.

In the afternoon some new thing of but little roba regarding the contest once. Only two connections with the south Italy. The propagation is a lowered P2o but it marks them arrive always well: sin that is always the same stations. Two new stations: two French arrive fortissimi, one to S9; they are making QSO to 144.380. He seems that they listen to our calls, indeed we have disturbed and make QSY to it in FM....

To end contest, after some photo memory it is taken apart all and a P2o is returned to house tires. However an interesting esperinza to repeat in future with the hope of a greater number of correspondents.



Situated Name: Stenigot - ACE HIGH relay station and WW2 Chain Home radar station

Manor Hill
Stenigot, Lincolnshire
OS Grid Ref: [TF257825](#)

Situated dates of Sub Brit visit: May 1999 and October 2003

[Source: [Nick Catford](#)]

RAF Stenigot was opened in 1940 as an east coast [Chain Home](#) radar station. Stenigot provided long range early warning for raids from [Luftflotte V](#) and the northern elements of [Luftflotte II](#) along the approaches to Sheffield and Nottingham and the central midlands.



*Photo: The Chain Home transmitter block with the fallen Ace High dishes behind
Photo by [Nick Catford](#)*

East coast stations were built to the same design as the experimental radar establishment set up at [Bawdsey](#) in 1936 consisting of a protected transmitter and receiver block with transmitter aerials suspended from four 350' steel towers and the receiver aerials mounted on four 240' timber towers. The operations blocks of an east coast CH are classified as Type To with a 5' 6" layer of shingle on the roof to blast and earth banks around them.

RAF Stenigot was also provided with a buried reserve which consists of duplicate transmitter and receiver blocks at two dispersed locations. The stand-by set house, which at Stenigot has now been demolished, was of similar construction.



The existing Chain Home transmitter mast - Photo by Nick Catford

RAF Stenigot was in Ludford Magna Sector (FOR rows Air 25/681) under the jurisdiction of 73 Wing.

In 1941/1942 RAF Stenigot was also fitted with a GEE Ground Station Type 7000 (FOR rows Air 25/681). GEE was highly effective and taken care of as an aid to navigation, but it lacked the pin-point accuracy needed for a bombing attack on a selected target. To British scientist Alec Reeves developed a through-the-clouds bombing technique known as OBOE. By mid-1944 the principle of OBOE was combined with GEE and a blind bombing technique known as [GEE H](#) was developed allowing strikes to be made on difficult-to-hit targets. The station at St. Stenigot was upgraded to [GEE H](#) in the 1950 's with two identical operations blocks replacing the 1941 GEE hut.

After the war, the station remained operational as part of the “defended area”, to link or chain home stations running down the east coast from Flamborough Head in Yorkshire and along the south coast to Portland Bill in Dorset.

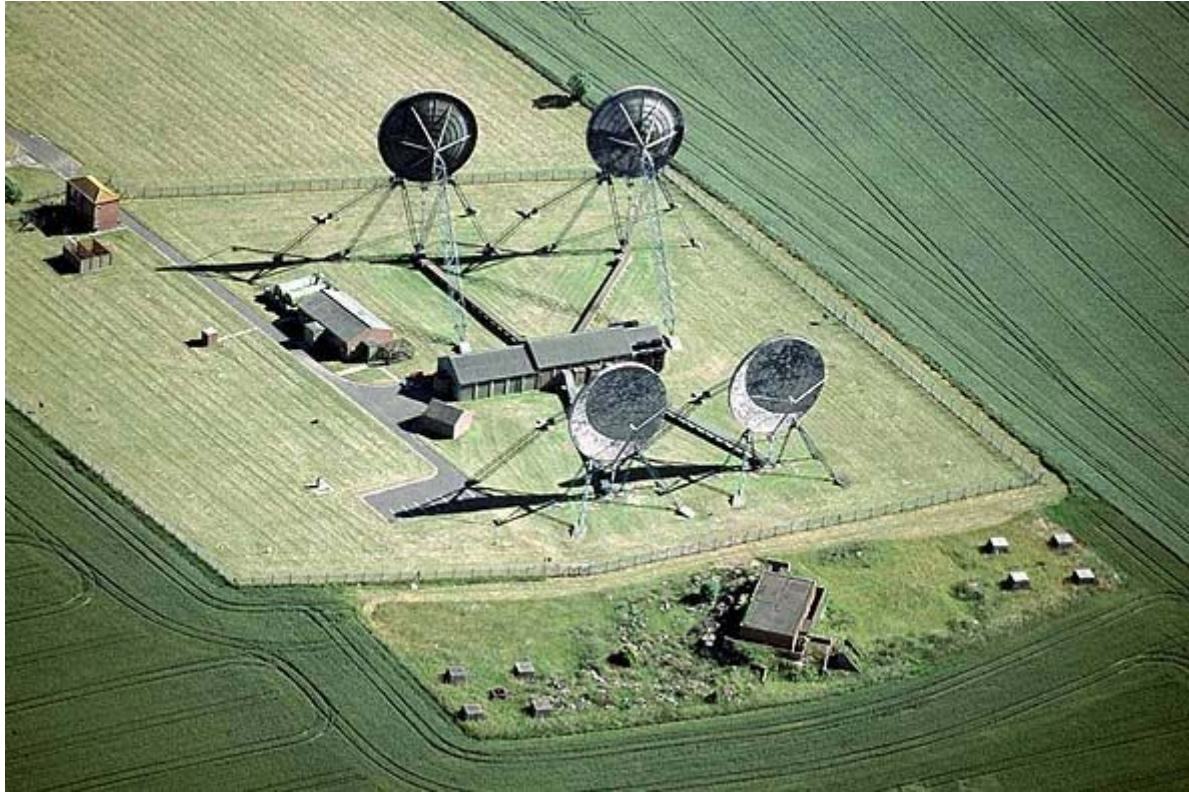


Those loads of stations to were unmanned, the rest to were only staffed during daylight hours cognizant with the current as the Soviet threat.

Stenigot was retained as to CH station during the early stages (Phase 1 & 2) of the [ROTOR](#) 1 programme which was evolved in 1950 to king-establish an effective air defence radar network.

The existing equipment was modified and renovated to provide temporary cover during the construction of the new protected radar sites.

Following the full implementation of [ROTOR](#) Stenigot was taken off line and placed in beloveds and maintenance.



*Photo: The Ace High station with the old CH receiver block and two of the mast bases visible at the bottom of the picture.
Photo by NMR*

In 1959, Stenigot was selected as part of NATO's [Ace High](#) communications programme developed in the mid 1950 ' s.

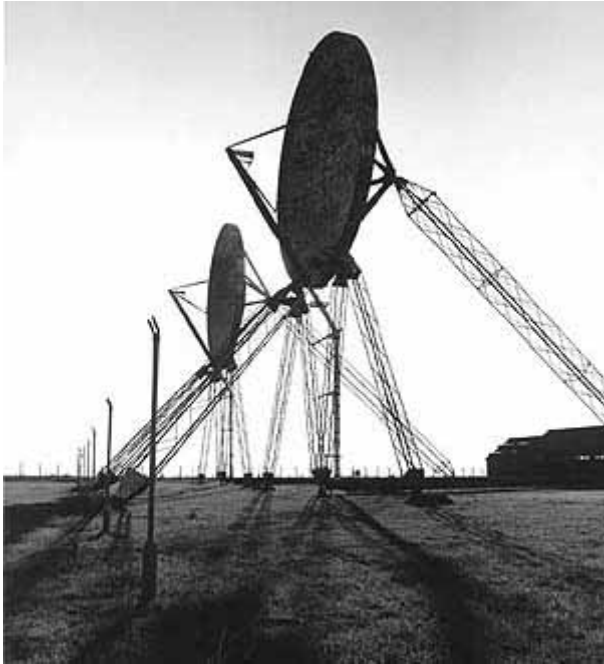
[Ace High](#) was a tropospheric scatter/microwave link system providing an exclusive communications network comprising 49 tropospheric scatter links and 40 line-of-sight microwave links. It extended from northern Norway and through central Europe to eastern Turkey and included 570 voice, 260 telegraph and 60 data circuits at 84 sites.

There to were five sites in Britain:

- **Shetland Islands**
- **Mormond Hill near Fraserburgh (Aberdeenshire)**
- **Brizlee Wood near Alnwick (Northumberland)**
- **Detling near Maidstone (Kent)**
- **Stenigot (Lincolnshire)**



The [Ace High](#) station utilized 4,72 acres of the former situated CH between the earlier transmitter and receiver blocks. It was enclosed within to security fence and provided with high intensity lighting. To two storey police house stood at the entrance gate part way along to track running north west from the road. The most prominent feature was two pairs of parabolic dish antenna, 60 feet in diameter supported on seven latex steel girder legs.



The transmitters, receivers and power supplies to were located in to single storey brick building between the pairs of dishes.

With the development of new microwave communications technology in the 1980 ' s, tropospheric scatter systems became redundant and the [Ace High](#) network was abandoned in the early 1990 ' s and the stations closed.

The equipment and buildings to were removed in 1996 although the four parabolic dishes can still be seen lying on the ground close to the old chain home receiver block. All the other buildings connected with [Ace High](#), including the police house have been demolished with only the concrete bases remaining to indicated their former positions.

For further information and pictures of RAF Stenigot click [to here](#)

Situated Name: Stenigot - Ace High relay station and WW2 Chain Home radar station

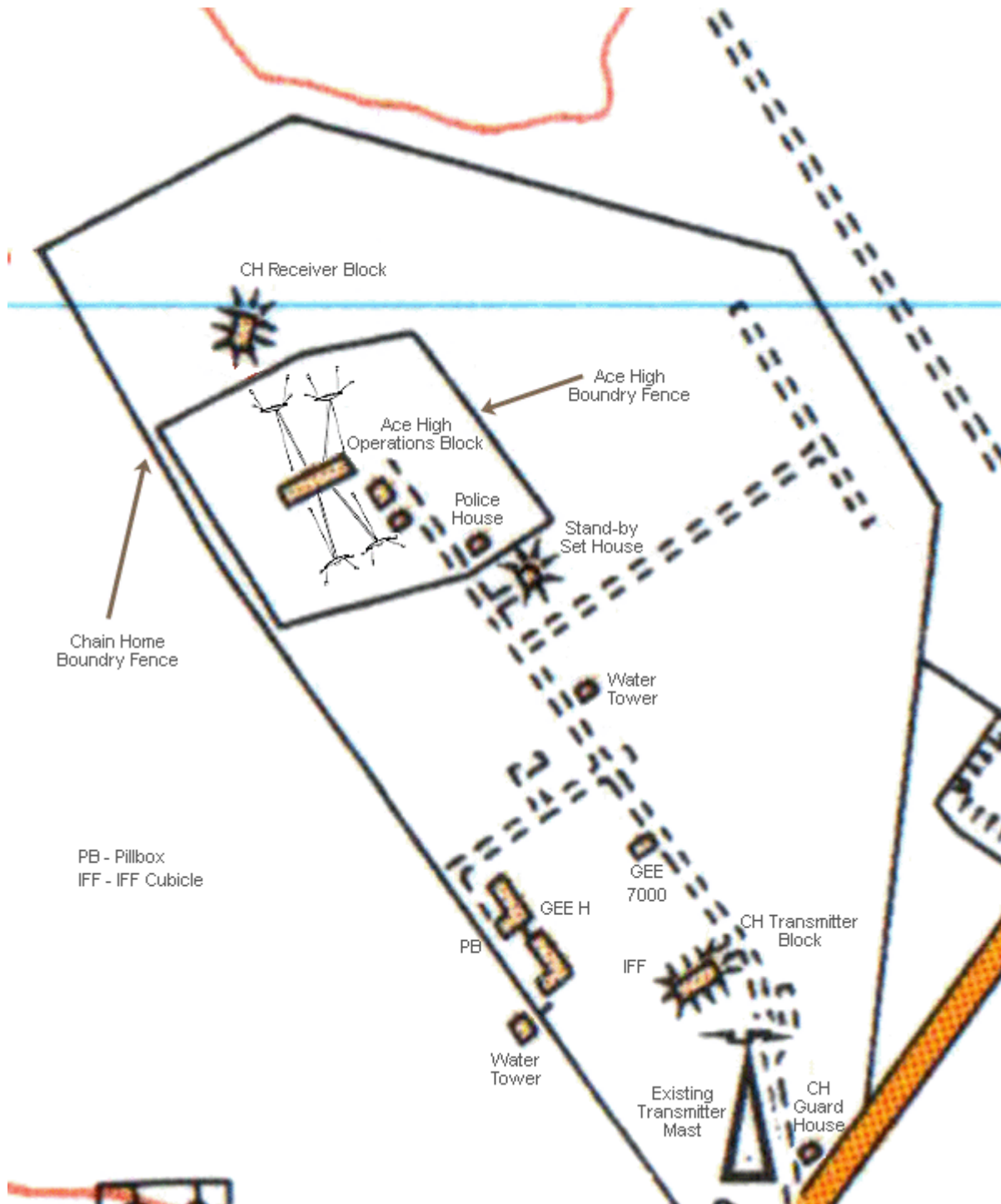
Manor Hill

Stenigot, Lincolnshire

OS Grid Ref: [TF257825](#)

[Source: [Nick Catford](#)]

Several buildings from the 1940 ' s Chain Home station still survive however. The situated is still fenced although readily accessible and used by local walkers. One of the four transmitter towers has been retained as to training mast for the [Aerial Erector School](#) at [RAF Digby](#) and is contained in its own secure compound including the original guard house; the bases of the other three towers can be seen nearby.



Plan of the situated showing the small area occupied by Ace High within the earlier Chain Home compound

The transmitter block behind the mast also still stands although now enclosed within to chain link fence. It is to brick and concrete building surrounded by earth banks with blast walls protecting an entrance on two sides. Internally the room layout has been retained and to large electrical cabinet still remains in place. It is assumed this was part of the power supply for the [Ace High](#) system as to there is to “Dymo” label on the unit relating to [Ace High](#). To few yards to the north west of the transmitter block is the base of the IFF cubicle with the characteristic close base of the IFF aerial mast clearly visible and to that the bases of the two [GEE H](#) operations rooms end on to each other. These two buildings to were still standing until recent years and to were probably demolished in 1996.



*Photo: Chain Home equipment still in situ in the receiver block
Photo by [Nick Catford](#)*

On the western perimeter to large rectangular water tower stands outside the perimeter fence and probably had nothing I give with the station as to there was another water tower (now demolished) within the chain home compound; to pillbox that ounces stood on the boundary to the north of this tower has also now gone. To the north of the situated, behind the [Ace High](#) dishes the Chain Home receiver block, this is not fenced and is easily accessible. The building is of similar construction to the transmitter block although

smaller. This two retains its original room layout and loads original electrical equipment consisting of to three bay rack with dials, switches and relays, probably part of the power supply for the CH receiver; to there is also loads electrical switchgear on the wall. To the east of the block are four concrete bases for one of the wooden receiver towers. There is not evidence of the other towers as the land has now been cultivated.

In the south west corner of the situated at the junction with Manor Hill to there is to pillbox and the two original air ministry wardens' houses which are now in private occupation. These would have housed the uniformed civilian staff responsible for guarding the situated and manning the guardhouse.

For further photographs of Stenigot click [to here](#)

Also see Feature on [Ace High](#) NATO communications system on the British Subterranea web site.

Sources:

- [Bob Jenner](#)
- [Graham Eckersall](#)
- [Andy Emmerson](#)
- Cold War - Building for to nuclear confrontation 1946 - 1989. Published by English Heritage ISBN 1 873592 69 8
- 20th Century Defences in Lincolnshire by Dr. Mike Osborne ISBN 1 85753 267 8
- FOR AVIATION Files 7/293, AIR 25/681, AVIATION 7/1216 & AVIATION 7/483
- RAF Digby [Aerial Erector School](#) web site

SITUATED ACE HIGH



[The entrance gate and police house](#)



[Police The house](#)



[Corridor in the Ace High](#)



[Transmitter suite](#)

operations building



Transmitter



Power house



Control room



Transmitter controls



Stand generator



Parabolic dish antennas



Transmitter controls



RF adapters



Parabolic dish antennas



Kent transmitter



Control room door



View of CH stand-by set house out of police house window



Parabolic dish antennas



Parabolic dish antennas



Parabolic dish antennas



The base of one of the Ace High buildings



Parabolic dish antenna



Remains of supporting girder framework



Parabolic dish antenna



Ace High instrument in CH transmitter block

Ace High Dishes (RAF Stenigot)

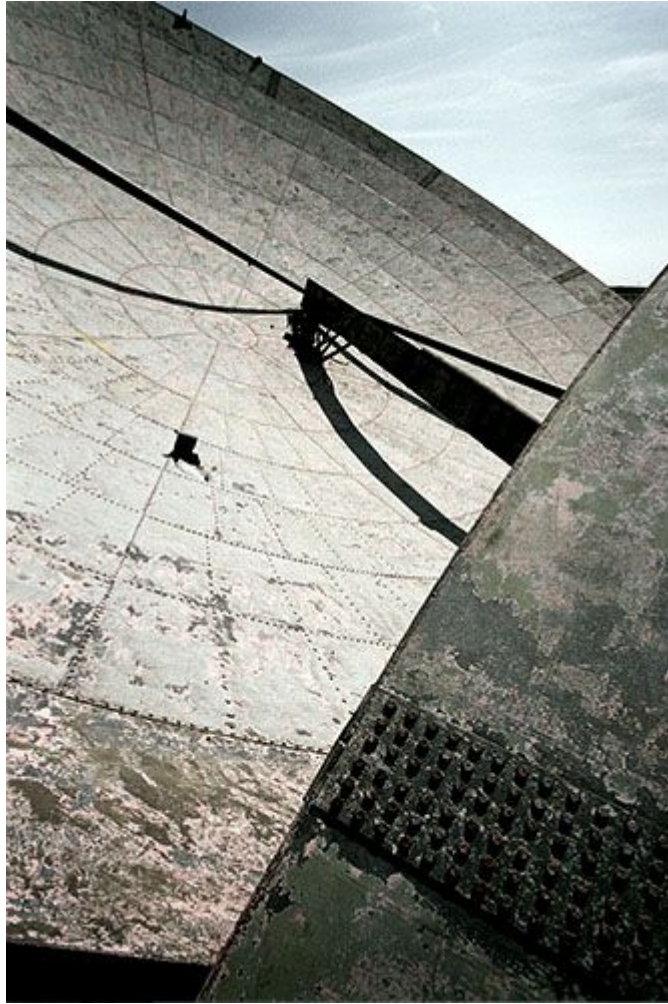
Visited 2006

Originally setup as part of to radar chain as early warning system against bombing raids by the Luftwaffe in the Second world war. The station continued as to radar station until 1959 when it was upgraded as to part of to new NATO project known as "Ace High." Ace High was to Communications project developed in the early 50 ' s to provide communications between NATO forces. The project was decommissioned in the late 1980 ' s

The dishes now remain as to bizarre monument to the cold war in to quiet part of Lincolnshire.

























ACE HIGH

By [Andy Emmerson](#)

SCALE OF THE SYSTEM

Here is a map showing the extent of the system, taken from an STC advertisement of 1961.



STC are supplying "Carrier Telephone Multiplex Equipment" for the large NATO radio communications network (ACE-HIGH Project) which will cover Scandinavia, Europe and the Mediterranean. The STC channel, group and super-group frequency translating equipment will provide over 2,000 channel ends.

STC are also supplying Transmission Testing Equipment, and equipment and visual aids for training courses.

Here are two more views of the station at Coldblow Lane taken in 1981. Coldblow was close to Detling Hill, between Sittingbourne and Maidstone, Kent. This first picture fails to give the true scale of the dishes, which looked monstrous—and made a good landmark when seen from the M2 motorway in the distance near Junction 5 (A249).



Photo by [Andy Emmerson](#)

The Coldblow site was sold by auction in September 1986. The auctioneer was the firm of Clive Emson, Maidstone. "All that was on offer were some brick one-storey buildings (with no secret bunkers attached!).

A microwave tower on the site was retained by the Ministry of Defence and access rights to the tower were built into the sale agreement. The dishes, a local landmark, had been removed the previous year." [information from David Mapley]



This would indicate the system closed during the early 1980s, which figures because the frequencies in which ACE HIGH operated were needed for the new Cellnet and Vodafone cellular radio systems, which opened in 1985. Television viewers in east Kent of a curious disposition (people like me!) who tuned above channel 68 could easily hear the ACE HIGH transmissions. They sounded just like whistles but some shortwave listeners claimed to have fed the audio into a communications receiver and have resolved individual conversations.

THE FUNCTION OF ACE HIGH

Duncan Campbell's book **The Unsinkable Aircraft Carrier** provides an insight into the applications for ACE HIGH (pages 188 and 62).

The main NATO international network is Ace High, a troposcatter relay network which has five British Stations in a chain from Sumburgh in the Shetlands to Coldblow Lane, near Maidstone. The Ace High network was built in the early 1960s, primarily in order to link NATO heads of state together in crisis. Two of twelve US/NATO interconnection sites are in the UK, at Mormond Hill Aberdeen and Coldblow Lane.

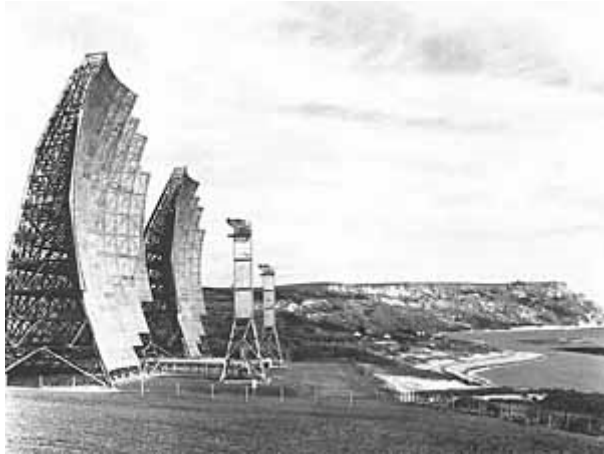
From a site at Swingate in Dover, high on the celebrated chalk cliffs and overlooking the busy harbour and medieval castle, US Air Force transmitters beamed signals towards their counterpart networks run by the US Army and Air Force in France. This link ran on to US bases at Orleans and Bordeaux. A second connection to the Continent was made in March 1962, when a new communications station, at Martlesham Heath near Ipswich (Suffolk), was linked to Flobecq in Belgium.

In 1963, a longer-range link direct to Spain was built at Ringstead Bay, near Weymouth in Dorset. The link operated across hundreds of miles to Gorramedi, near Elizondo, in the Spanish Pyrenees.

Using massive billboard-style reflectors to direct enormous amounts of radio energy into the troposphere, novel 'tropospheric scatter' communications networks were all over the world.



Billboard reflectors at Swingate, Dover
photo by [Bob Jenner](#)



Troposcatter station at Ringstead Bay

With aerials 150 feet high, the Ringstead Bay proposal occasioned considerable local controversy, and the Air Ministry was legally challenged on whether they had the right to compulsorily purchase British land for American defence purposes. Amongst the objectors to the powerful new station was the Royal Navy, one of whose officers pointed out that it would cause 'serious interference' to the many RN radio stations operating around nearby Portland Bill. However, the station was built, but it was closed by 1970 and dismantled in 1974.

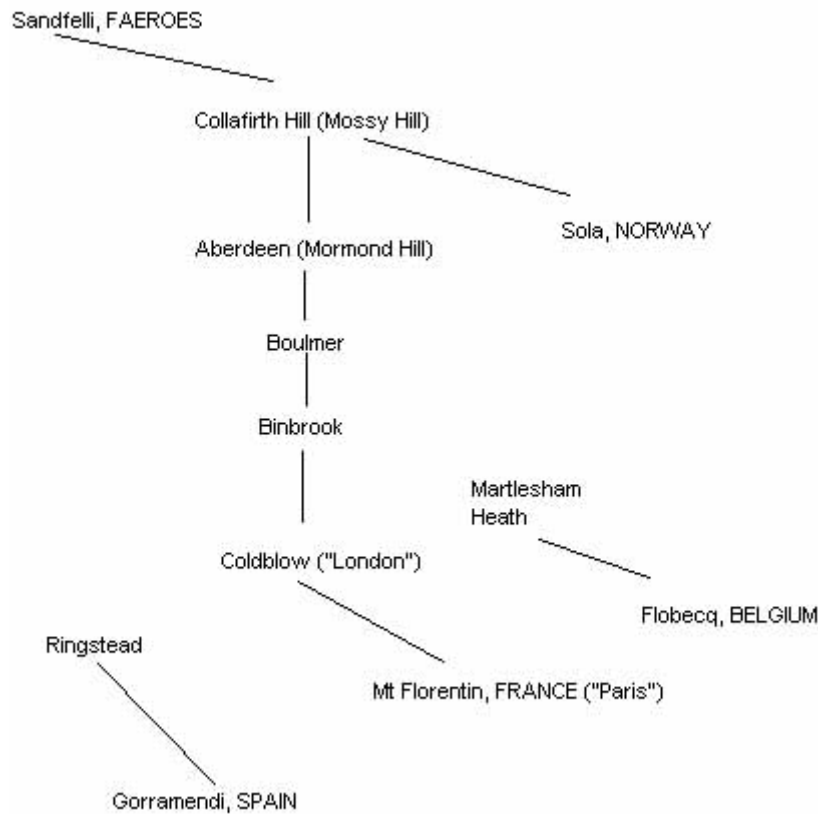
The Ringstead-Gorramendi link provided the High Wycombe Atomic Joint Co-ordination Centre with a direct connection to US nuclear forces straddling the Mediterranean in Spain itself, Morocco, at Wheelus Field near Tripoli in Libya, and further east. In order to provide the necessary microwave link relay stations, the US Air Force obtained four more facilities at Golden Pot, near Alton, Hants, Dean Hill near Salisbury, Bulbarrow Hill near Shaftesbury, and on Portland Bill.

This would indicate that the Ringstead and Martlesham Heath links were not directly part of ACE HIGH. However, they used exactly the same technologies and frequencies.

TECHNICAL DETAILS

Frequencies used by ACE HIGH (taken from the ITU international catalogue of radio frequencies) ranged from 832.56 to 959.28MHz. The emission mode was F9 (frequency modulation, miscellaneous), and output powers typically 10kW to 50kW. Throw in the colossal antenna gan from the 80ft dishes and you can imagine the kind of power they radiated (up to 10 megawatts effective radiated power).

A stylised map of the routes inside and leaving Britain looks something like this:



Ringstead is in Dorset, between Weymouth and Lulworth. Binbrook is in Lincs., Boulmer in Northumberland.

The station noted as Martlesham Heath (Suffolk) has nothing to do with the BT research station but was at the USAF base along the Foxhill road; it had local microwave feeders to/from Great Bromley & RAF Bentwaters. Collafirth Hill is in the Shetlands, where a branch of the network went to Sola in Norway. [Research by G4DYA and G8PTH].

Note corrections too in Andrew Haworth's comments in Feedback section.

FEEDBACK FROM READERS

Terry Wiseman writes (August 2001):

A minor correction - the link in the East Midlands was not at Binbrook— but was at Stenigot. The four huge dishes were taken down about two years ago—but are still lying on the ground there. There are still signs pointing to NFTSS - NATO Forward Tropospheric Scatter Station. I have a couple of publications about Stenigot because it was part of the Chain Home Low network in the last war and after. I would imagine the technicians could well have been based at RAF Binbrook—the nearest convenient RAF facility.

Thanks Terry; the station is listed as Binbrook in the frequency list but it's clear that terminology was a bit slack. Coldblow is called 'London' in some entries and two names can be found for Collafirth Hill and Mossy Hill.

Terry Wiseman writes

Many years ago, as a Senior Signals Officer in the Civil Defence Corps, we were about to set up a mobile radio repeater station very near the USAF Signals facility at Golden Pot, near Alton (as mentioned in Duncan Campbell's piece above). I went over the facility and rang the bell on the gate—after explaining what I wanted the airman fetched the Officer out (we spoke through the gate—no way were they going to open the gate) and I asked him if our little repeater station would interfere with his communications.

His reply was: "Sir, if your frequencies are anywhere near ours, we will come over and sweep up the ashes as soon as you switch on your equipment."

From **Brian Carter**, ex Royal Corps of Signals (brian.carter@tiscali.co.uk):

I was extremely interested in the commentary on the ACE HIGH station at Coldblow Lane, especially the photograph taken in 1981. I was in fact the Station Commander at that time - that being my last tour of duty in the Armed Forces prior to retirement. I later attended the decommissioning of the station prior to its "sell-off". I actually left Coldblow Lane in February 1982. Sad really, when I remember how it used to be. I was also Station Commander for the ACE HIGH Station in Cyprus. I have a couple of photographs of that site, not very detailed I'm afraid, but does show the desolation of that particular site. It has gone now - I believe that the Greek Army now uses the buildings. The comms equipment will of course have been taken away or maybe destroyed.

I will dig out the Cyprus photos and send you a scan of them. The Cyprus station was a tail station, situated near Ayia Napa (Cape Greco in fact), "fed" from Turkey and with inland LOS shots to the appropriate agencies. Just down the road from us was a high-powered transmitter site that broadcast in Arabic and was "fed" by LOS link from, I think, Larnaca. Rumour had it then that the programmes originated in France. The station chief was French, of that I am certain. All in all, it made for interesting living over there in Cyprus, what with the political situation between Cyprus and Turkey and the fact that my NATO stores usually arrived through the Cypriot Customs organisation. NATO was a "dirty" word over there then.

Just another comment (well, the memories are flooding back !!!!). In the shots of the Stenigot Station, the transmitter designated UBOZ1 is entitled "Kent Transmitter". That was in fact one of the transmitters on the Boulmer link. Kent (or Maidstone transmitters) were designated UMAZ1 and UMAZ2. The Stenigot Station designation was UBIZ. Stenigot was my first station (other stations were Coldblow and Cyprus), so I feel I can speak with a bit of faded authority. We (the Royal Corps of Signals) took over the system from

the RAF. The RAF took over, in exchange, the COMCAN system from the Signals. The comments from another of your "readers" regarding Binbrook are really quite correct. We (the brown jobs as the boys in blue called us) lived on the fighter station, Binbrook. It was a Lightning squadron in those days Stenigot was close to another small "village" called Welton Le Wold (umm, I think!!).

The system utilised quadruple diversity. That is both space and frequency diversity. I am starting to recall many stories - all true, maybe unbelievable. I enjoyed my time on the system. Anyway, time for my cocoa, maybe more later - if you can stand an old soldier recalling the past!

Before I forget. I made a mistake above. I actually took over Coldblow Lane in 1981 and left in January 1984. The Lord Lt. of Kent came up to the site to present some long service medals to some of my technicians the week before I finished.

And some more.....

I have just noted some dates that relate to the closure of the Coldblow Lane ACE HIGH site. I ended my service career there in February 1984. I was the Station Commander there for three years and so do have informed knowledge of the place. When I left in 1984 the station was still operational and I know it was so for at least another three years. So, I think the dates that you have recorded regarding the closure and removal of the antennae (1985?) are a bit out. I also attended the de-commissioning ceremony of the site and I am certain that this took place in the early/mid 1990s. At that time there was a 'skeleton' staff of Royal Signals personnel, although, by that time, the station was non-operational.

From **Walter Elkins** in Clearwater, FL (welkins1@tampabay.rr.com):

Hi, I am Walter Elkins and I am the webmaster for the US Forces in Austria Veterans website (www.usfava.com). I have been doing research on the history and mission of the US Army in Europe for over twenty years and also include in this research the role that the Air Force played in strategic communications and air defense. I have a couple of articles on the ACE HIGH project that I found in SIGNAL (early 1960s), the journal published by the Armed Forces Communications and Electronics Assn. One has a map that shows a little more detail on the "main routes" and "tails" of the ACE HIGH network.

From **John Myers**, Pluto webmaster (webmaster@sitepluto.com):

Hey, I came across your interesting website, and in particular, to your page devoted to ACE High. I'm doing a website devoted to a NATO site at which I was stationed in northern Italy--near Vicenza--in the mid-1970s. (www.sitepluto.com) We had a communications system there known as the "green box", about which the commo people kept us in the dark. However, I know this was a tropospheric scattering system, and we would have used it, in the event of war with the Warsaw Pact, to receive messages

that we would decode using one-time pads. This system did not have the huge antennas described on your website. Can you shed any light on what it might have been? [Please reply direct if you can]

From **Linn Barringer** (linn.barringer@btconnect.com):

I was sent your URL by an acquaintance who had an interest in the site at Martlesham Heath. While perusing your website I noted your comments about your picture being faded, so I thought you might like a version that has been 'colour-corrected' by me using Paint Shop Pro. I hope you like it (attached).

Most kind of you and now substituted for the original picture!

You may also be interested to know that I have a civil engineering drawing for the Water System (dated January 1968, with revisions up to January 1976) which also shows two line-of-sight(?) pointers from two of the antennas, showing bearing 334-deg 20' 21" TRUE TO FYLINGDALES and 334-deg 20' 46" TRUE. Among the drawing descriptions are "Martlesham Heath RRL." [RRL=radio relay link?]

I also have some pictures on my web site (which is mainly about the Twin Bases of [RAF Bentwaters](#) and [RAF Woodbridge](#)) - URL below.

From **Andrew Haworth** (andrew.haworth1@ntlworld.com):

Several things to note about the ACE HIGH System:

- 1. The Tropospheric Scatter transmitters used were of 1kW and 10kW only. The main equipment was provided by REL (Radio Equipment Laboratory) of New York and consisted of a two nominal 1kW transmitter coupled to the separated power amplifiers and quad receivers, which used frequency and space diversity. The 10kW power amplifiers were also provided by REL and used a four cavity water cooled klystron. The 1kW amplifiers were provided by Pye UK and were air cooled.*
- 2. The map you show is the initial proposed one and is not correct. In the Shetland Isles the tropo station was Mossy Hill located 7 miles north of Sumburgh. There was then a LOS link relayed through Collafirth Hill (which over looks the oil terminal at Sullum Voe) to RAF Saxa Vord. The LOS equipment was by NERA of Norway.*
- 3. The Mossy Hill link to the Faroes was never implemented. It was provided by the Americans from Mormond Hill, co-located with the ACE HIGH Station.*

4. Mossy Hill also provided the northern Europe link to Norway; this was the longest link in the ACE HIGH system and was over water for over 99% of its path. I suffered from slow speed and high speed fading but never failed, to my knowledge.

5. There was also a LOS link from Mormond hill to RAF Buchan, south of Peterhead.

6. When France left NATO a new link was put in from Cold Blow Lane to a site in Germany whose name I forget. The control centre was also moved from Paris Nord, which was just outside Beauvais, famous for a cathedral that fell down and the airship R101 disaster. France did not leave the ACE HIGH system. The new links put in to bypass France operated a 1kW and used a frequency of about 1.5GHz. There was a second link from southern Germany to Italy. The largest station was near Athens with seven links, tropo and LOS (line of sight). There was also a link not often mentioned from Turkey to Cape Greco in Cyprus, just west of the now holiday resort Ayios Nikolias. This was linked into the British forces' LOS system on Cyprus. When NATO started its satellite system it was connected in a few cases to the ACE HIGH system with a LOS system provided by Selenia. The number of speech channels was increased to 60 channels on most links. To 72 of busier routes and up to 120 channels on very busy links, i.e. Brussels to Lammersdorf. The Army took over the running of the British ACE HIGH stations in 1968 from the RAF.

A point to note: the 10kW transmitters in later years mainly ran at a reduced power of 5kW. The amplifiers operated in Class A, which is only 35% efficient at the theoretical best, and therefore saved oodles of money. The nominal mid-frequency gain of the 18-metre (60ft) antenna was 43dB. For your interest I was the senior technician at Mossy Hill for four years and an instructor at the NATO Communications school in Latina, Italy, about 30 miles south of Rome to the seaward side of the Appian way. I also worked on the Cyprus LOS system. P.S. The German station and control centre was at Lammersdorf.

From **Martin Non** (MartinNON@aol.com):

You noted some discrepancies in the information. I can perhaps add another. The location noted as "Boulmer" was never itself home to an ACE HIGH facility. RAF Boulmer's only telecoms functions have been as part of the air defence radar system but including some civil ATC responsibilities for Border Radar. The main site at Boulmer itself is supported by outstations at High Buston (comm sites for Buchan, Boulmer, Neatishead and London/Scottish Mil), North Charlton and Newton (military nav aids).

The ACE HIGH facility in Northumberland was on high ground at Brizlee Wood to the west of the town of Alnwick and was operated by Royal Signals units, i.e. Army. The site was very similar to your pictures of that in Kent and was visible for perhaps 20 miles away in some directions. The facility was dismantled about three years ago and has now been transferred to the RAF who have installed a geodesic dome containing a fixed air defence radar.

From **Peter Murdie** (pete@europemail.com):

I am a native of Northumberland, having been born in the county some 50 years ago and having served as a Technician at ACE HIGH Brizlee Wood (Boulmer) towards the end of my Army service from 1977 - 1980 would like to comment on the note from Martin Non.

The ACE HIGH facility in Northumberland was indeed physically located at Brizlee Wood to the west of Alnwick, but was always referred to operationally as Ace High Boulmer. The station designation was UBOZ and it was a tropo relay station working to Binbrook (UBIZ) to the South and Mormond Hill (UMOZ) to the North. Historically when the station first opened it was operated and maintained by the RAF, and as the nearest RAF station to Brizlee Wood was RAF Boulmer, so that is where the station personnel and administration would have come from. Hence the name Boulmer was originally chosen for the operational site located at Brizlee Wood.

At some time during the 1960s there was a shake-up of how military radio equipment was split between the RAF and Army, and the Royal Corps of Signals took over the operation of the Boulmer/Brizlee Wood ACE HIGH station. Army personnel serving on the station used RAF Boulmer for quarters and messing and indeed for many years at RAF Boulmer the RAF Sergeants Mess was home to some 14 or so Royal Signals Senior NCOs. Indeed also the Electrical Maintenance personnel for the ACE HIGH stations' generators etc. were also the guys that looked after the power generation at the Boulmer RAF Station.

I can understand the confusion this can create, but Martin's comment in my opinion does not highlight any discrepancy but serves to demonstrate the confusion that could occur from these arrangements. Yes, the station was physically located at Brizlee Wood (the road sign pointing to it off the Alnwick to Rothbury road read 'Royal Signals Brizlee Wood'). Operationally, however, it was part of RAF Boulmer, and the station documentation and procedures always referred to the name Boulmer. Indeed when answering the Engineers' Order wire on the station we answered 'Boulmer'. I have many memories of my time at 'Boulmer' and indeed am one of the privileged few on this Earth that know the correct operating procedure for the pair of 'AVO 8' leads which would hang on the front of every REL 10kW RF Tropo transmitter! They were for emergency use only, but that's another story for another day.....

Just found an interesting link to the old ACE HIGH [High Boulmer/Brizlee wood site](#) as it is today. Nice views on a fine day from up there, I can assure you.

Steve Gould (GouldMD@aol.com) writes:

We were in charge of all the sites (microwave and tropo), including Uxbridge, Botley Hill Farm, Coldblow (where we were told the first RADAR experiments were conducted), etc. It was amazing to see pictures of places I haven't seen in 30 years. It would be wonderful to hear from others stationed there at the time. It was a wonderful experience, living in England for nearly four years, (I actually came back 10 years later to live there another year) and one I always treasure having had.

It's been a long time ago, but I think the microwave broadband link (this was before the world decided to use the term wideband) went from the US Naval headquarters in London (Grosvenor Square) and High Wycombe (which had the complete operational war plan send over every few days via 9600 baud modems which then cost over \$100,000!) to South Ruislip to Uxbridge, to Bovington or Botley Hill Farm, a couple of others sites I don't remember, and then to Coldblow. If I'm not mistaken it finally wound up in Rota Spain (hence the Navy HQ link).

Botley Hill Farm was interesting. At the time we had an airborne command post called 'Silk Purse' in the sky 24 hours a day (out of Mildenhall) much like 'Looking Glass' in the US. It was a group of converted KC135 planes (read Boeing 707) which would have run the war in Europe if ground command centers were destroyed. Botley Hill Farm was the UHF link to the airplane, and then on to the broadband system, while the plane was over the UK. There was always a general officer on board. I flew on it a couple of times (I was mere captain at the time). If you get more interesting stuff up on your site, alert me via e-mail.

From **Jay Clark** (JayRClark@earthlink.net):

Back in the mid 1960s, when France bailed on NATO, a continuation of the ACE HIGH system was the ACE HIGH relocation project. Basically the project installed new sites bypassing the French portion of the system, starting in Belgium, it shot to Landstuhl in Germany, on to another German site and ended up at Dosso dei Galley in Italy, where it connected by microwave to an existing NATO site in the north. I was the commissioning engineer for for Landstuhl site, and went on to be the OJT instructor for a year at Dosso Dei Galley (spelling is probably not correct).

From Jay Clark again!:

I worked on Ace High Relocation as a contractor for Marconi out of Chelmsford, I am also volunteer web master for www.ExReps.Com ExReps is all about former and current tech reps, any company, any project, any time, and their friends and families. WWW.ExReps.Com - On Line Community for Tech Reps, Ex Reps, their families and friends. For those who worked abroad as Tech Reps, Expatriates, Adventurers, World Travelers, Globe Trotters, and job-shoppers.

From **Pat Shediack** Chief Master Sergeant, USAF (Retired) (pat.shediack@att.net):

When you get a chance, stop by my web site, Bluejeans' Place, and check out my pages on TUSLOG Detachment 150, the US Air Force tropo communications site at Sahintepe, Turkey. If I am correct, we were part of the Aces High network. Can you confirm? 80% of the voice and data going in and out of Turkey for NATO, the US and Turkish General Staff came through our circuits. Visit the TUSLOG Detachment 150 (USAF) unit history on Bluejeans' Place at <http://www.bluejeansplace.com/TUSLOGDetachment150.html>

From **Willibert Wilkens** (mailto:willibert-wilkens.de):

I'm a former ACE-High-technician and I served on the NATO ACE High Station, AFEZ Feldberg. With interest I read your historical information about ACE High. Please visit our homepage about the former ACE High Station Feldberg. <http://people.freenet.de/ACEHighStationFeldberg/index.htm> Comments are welcome.

The site is in German but the excellent photographs are international. German speakers will see that a CD-ROM with further images and information is available. AE.

From **Wingenet** (no name given)—make of this what you will:

"Ace High operated on frequencies from 832 to 959MHz"

Certainly not a hard and fast rule given the various types of equipment in use across the network. Some of the LOS equipment operated across this band but the Tropo equipment did not. As a side note to this and just to muddy the waters a bit, the Royal Corps of Signals is still using mobile (that's vehicle mounted not cellular) LOS equipment that operates in several ranges between 225 - 960MHz. Triffid, one equipment with variations of RF top box, was introduced to my unit in BAOR between 1980 & 1983 after which I left for colder climes. The RA site shows several applications allocated space within this spectrum but it shouldn't be assumed that the MoD no longer uses these frequencies or any other. Just because the RA says it SHOULD be so, doesn't necessarily mean it IS so.

And "some military radiolocation" is just what it says—military radio location not military communications or even military radio re-location.

As I have already said, the ACE High network was originally operated by the RAF. RAF Binbrook, RAF Boulmer, Coldblow Lane (also associated with the RAF but I don't know in what capacity). Do we see a thread running through this I wonder? Stenigot (so called by my contemporaries) was originally manned by the RAF from Binbrook and so I am not in least surprised that it might be called Binbrook.

You will note that Mossy Hill is several miles from Sumburgh (on the south island or Mainland) whereas Collafirth Hill is located in the north of Mainland, close to the Sullom Voe Oil Terminal. There is no confusion on the part of those familiar with ACE High as a whole, with or without local knowledge. These were two separate stations within the organisation. A ladies' dinner night at Collafirth was anticipated with some relish by those of us from Mossy who usually had to make do with the odd lunchtime binge at the British Airways club at Sumburgh airport (to their credit they did serve Theakston's Old Peculiar). The spur created by the link from Mossy

to Collafirth eventually fed RAF Saxa Vord (theres that RAF thing again AND they had the only NAAFI on Shetland) which can be found near Haroldswick on Unst (the northernmost island).

I suppose the power output from the various stations would be different dependant on circumstance (path length etc). During our training and familiarisation at the NATO School of Comms in Italy, we were not particularly made aware of any differences. We were certainly not fed any site specifics, this information only being available to me when I arrived in the sun-drenched paradise that was Shetland.

From **James Dougan** (james.dougan@btinternet.com)

Visit www.epicscotland.com and enter 'radio' as a search word. Nice picture of a USAF antenna, captioned as:

Microwave Aerials, Mormond Hill Radio Stations, Near Fraserburgh, Aberdeenshire.

Photo number: jd10001-7

Taken: 18/03/02

American military transmitters in Hoek van Holland



De antennes in Hoek van Holland staan er al zo lang ik mij kan herinneren. Al vanaf mijn zevende jaar is mij de mysterieuze installatie opgevallen. Nu gaat de gemeente hem slopen. Hij diende voor het militaire radioverkeer tussen Washington en Wiesbaden.

Introduction

The antennae are a well-known landmark of Hoek van Holland. Large conspicuous (6-8m) dish-antenna's along the coast. They were active during the cold-war but now they're abandoned



It's completely dark by now and the picture will take 1 minute of exposure time. I don't have a tripod with me so I have to improvise a stable set-up using my flashlight, wallet and lens-cap. But then I have to lie down on the road to see anything through the viewer. But where is Ben and what's keeping him so long? Finally Ben reappears and says: "I saw you lying on your belly on the road and I thought you were hiding from someone. So I decided to hide too."



The pictures turned out very well. It's 2-3 minutes of exposure time. The "northern lights" effect are probably the last traces of the sunset. They were invisible with the naked eye. You can see my backpack on the right of the picture.

The artificial light comes from the three lamps of this mysterious "house on the hill". It's surrounded by modern antenna's and is probably full of operational equipment. I've never seen anyone inside. The windows are covered by blinds on the inside and nowhere is a crack through which you could peek inside.

Military environment



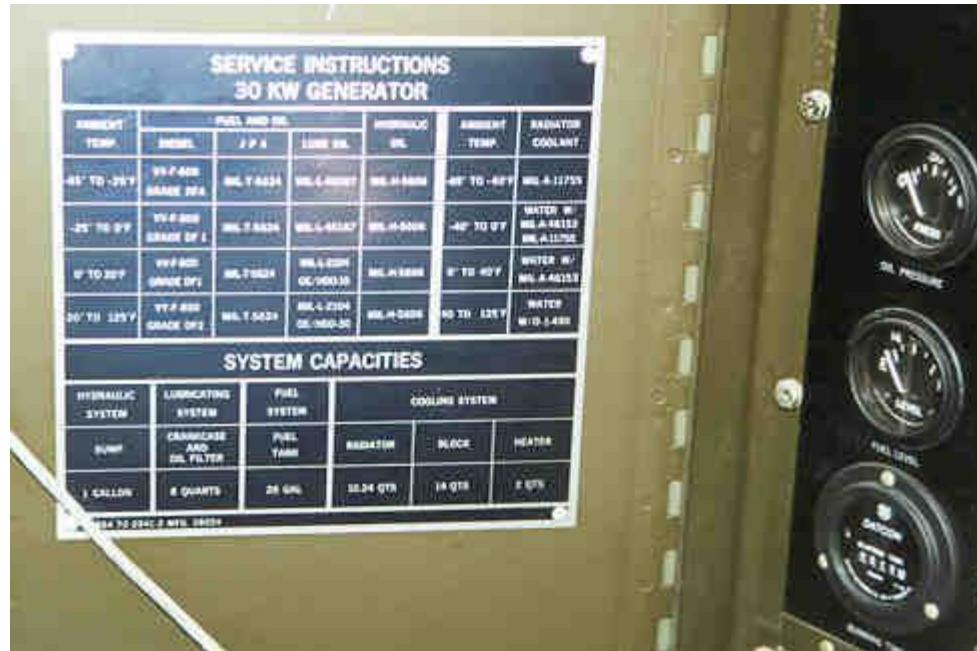
ARMY CRIME WATCH - WARNING

**All items of value on these premises have been marked
for ready identification by law enforcement agencies.**

ARMY OPERATION IDENTIFICATION



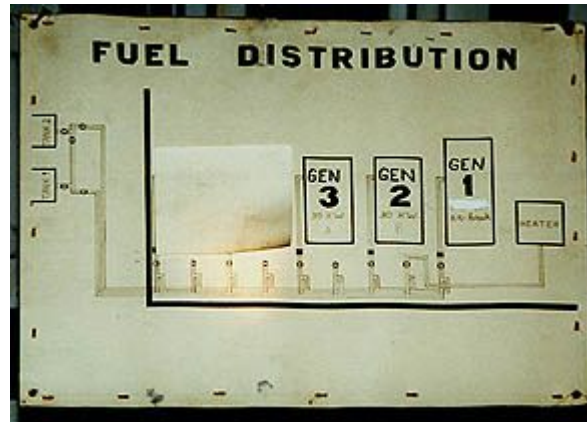
All the remaining machinery is labelled "military specifications" and "US Department of Defence". I remember the kinds of labels from the time I scavenged army surplus stores for transmitter parts and measuring equipment.



There was no lock on any door. Everything that was left was simply too heavy to steal. No keys in the key-box. Simple rooms, a desk, a small kitchen and a shower / toilet room.



As expected we don't find any manuals or logbooks. Only a rough schematic showing the places where the transmitters and receivers once stood. A switch reads "54 kW", that's a lot of transmission-power. The only remaining machinery is a diesel generator and two huge battery-powered uninterruptible power-supplies. We try to discover more clues, but everything is empty.



The staff even left a schematic. But it's only a rough one. I suppose the heater was meant for the diesel fuel.



Ben is taking notes sitting on generators NR. 1. Generator NR. 2 is on the right.

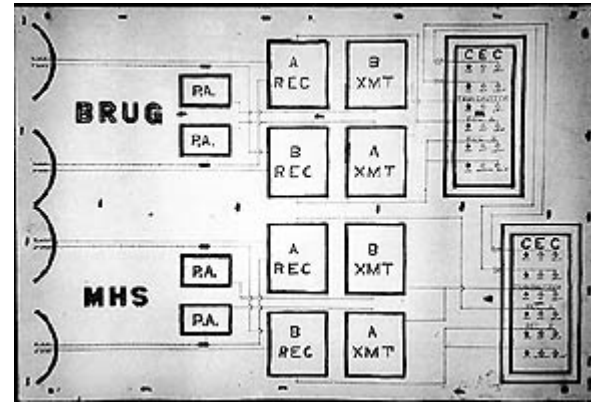


Taking a picture of generator NR. 3. Here it looks all well-lit. But that's the flash. In reality it was pitch dark inside.



This massive wall of switches was very impressive. Ben turned one of the switches and made me jump. There were a lot of old ceramic fuses but I forgot to take one as a souvenir.

All the while I feel like a spy must feel. The next day I tell the story to a colleague who lives in Hoek van Holland. He tells me that the whole bunker-area is still formally military terrain. And especially that the antenna terrain is still formally classified. But he also told me that he visited the site while it was still in operation. How? "I have my connections in town." It was a radar station and a communication centre for the American navy.



Finally the eerie sounds made us nervous and we left the premises. Of course there was no one outside. By that time we were courageous enough to make pictures outside with a photo-flashlight. We must have been noticed for miles around.



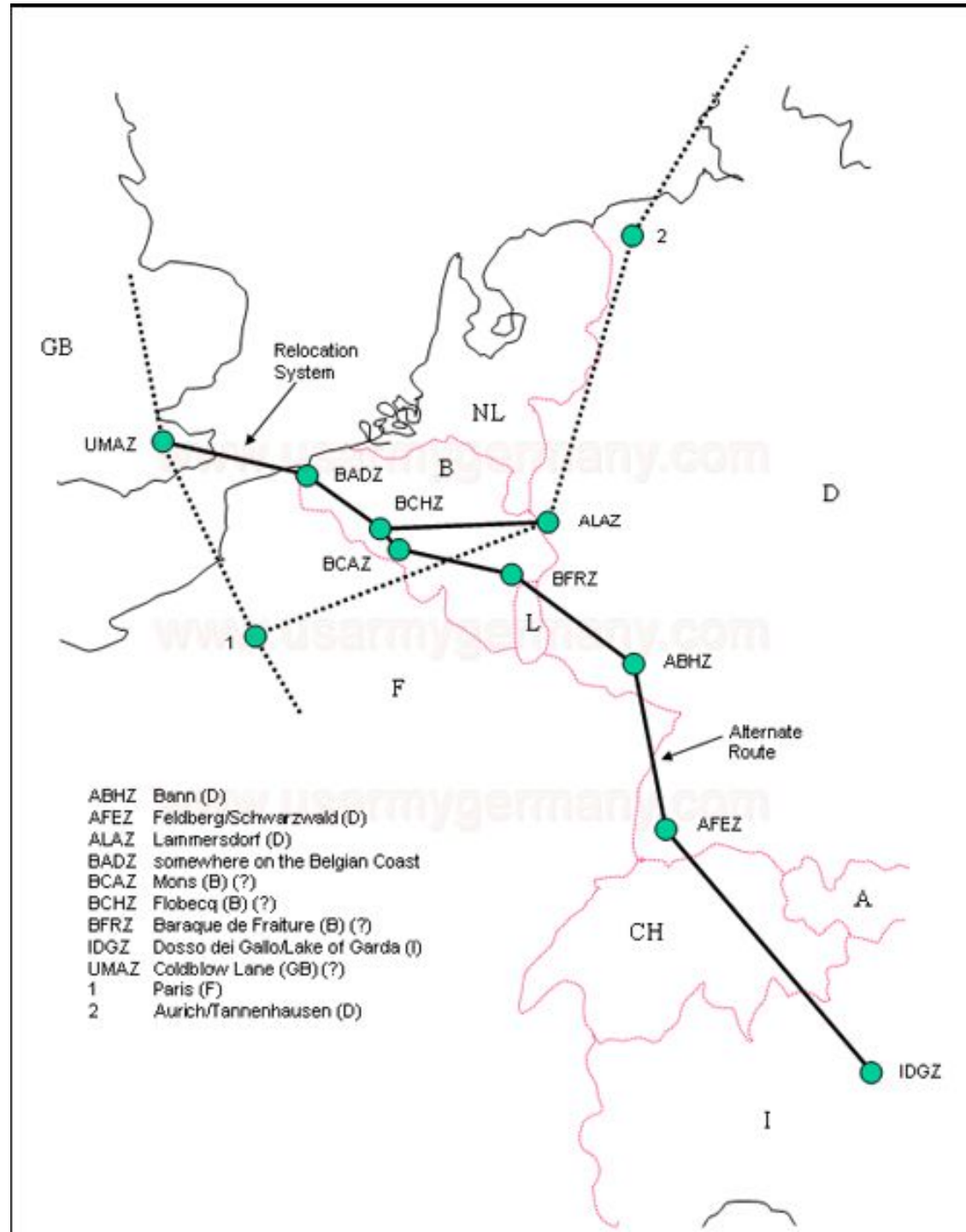
Ben also climbed one of the antenna's. He's somewhere in the picture on the right, but you can't see him. It will be a pity when these nice dishes disappear from the landscape. I suppose they will build some dumb functional building instead.

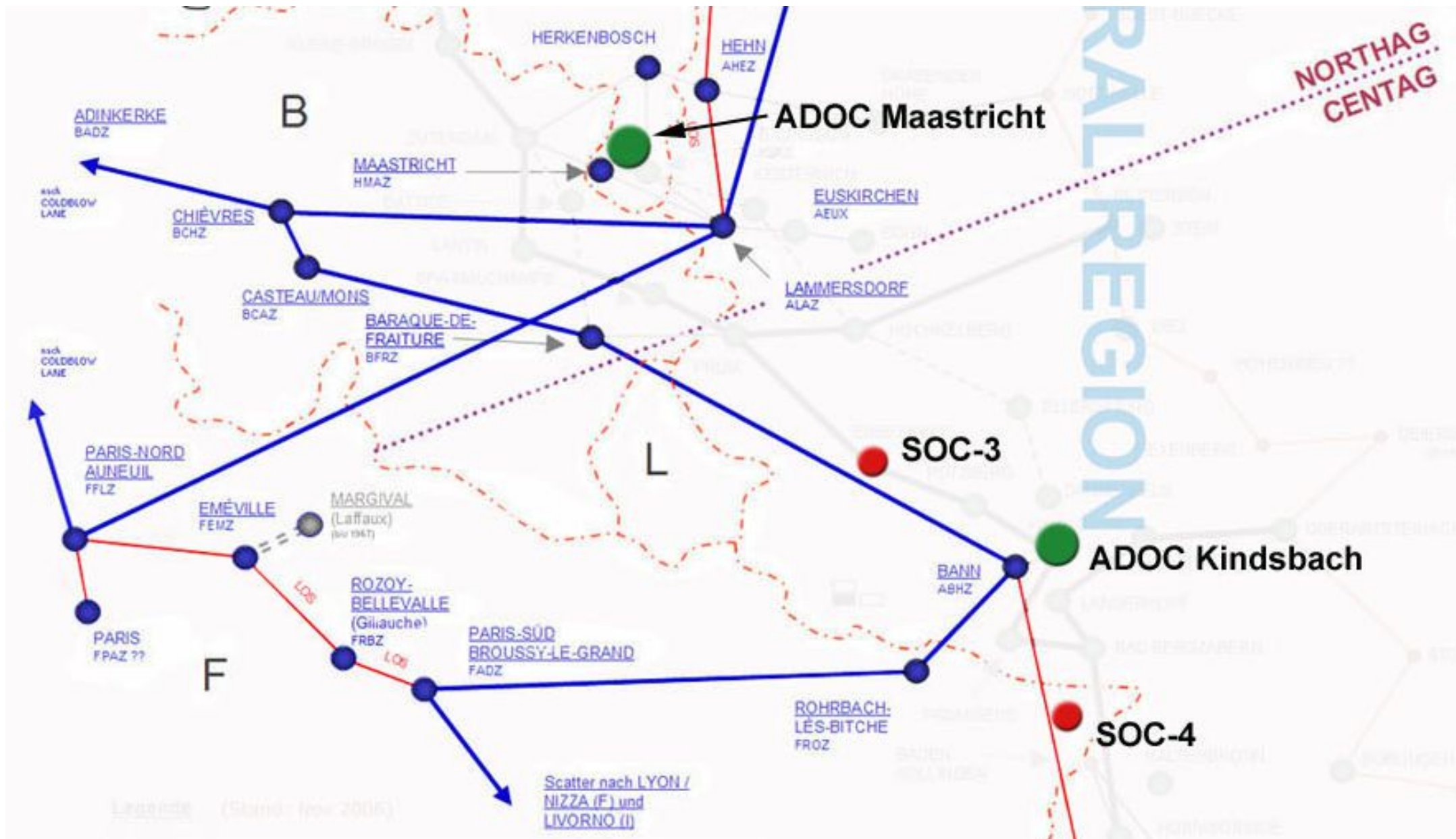
- Peter - I was browsing the Internet - looking for military folks stationed in the same place/time as I was in Europe. I searching for Hoek van Holland and ran across your web page...I was SURE surprised at what I found. I was a young 21 year old -

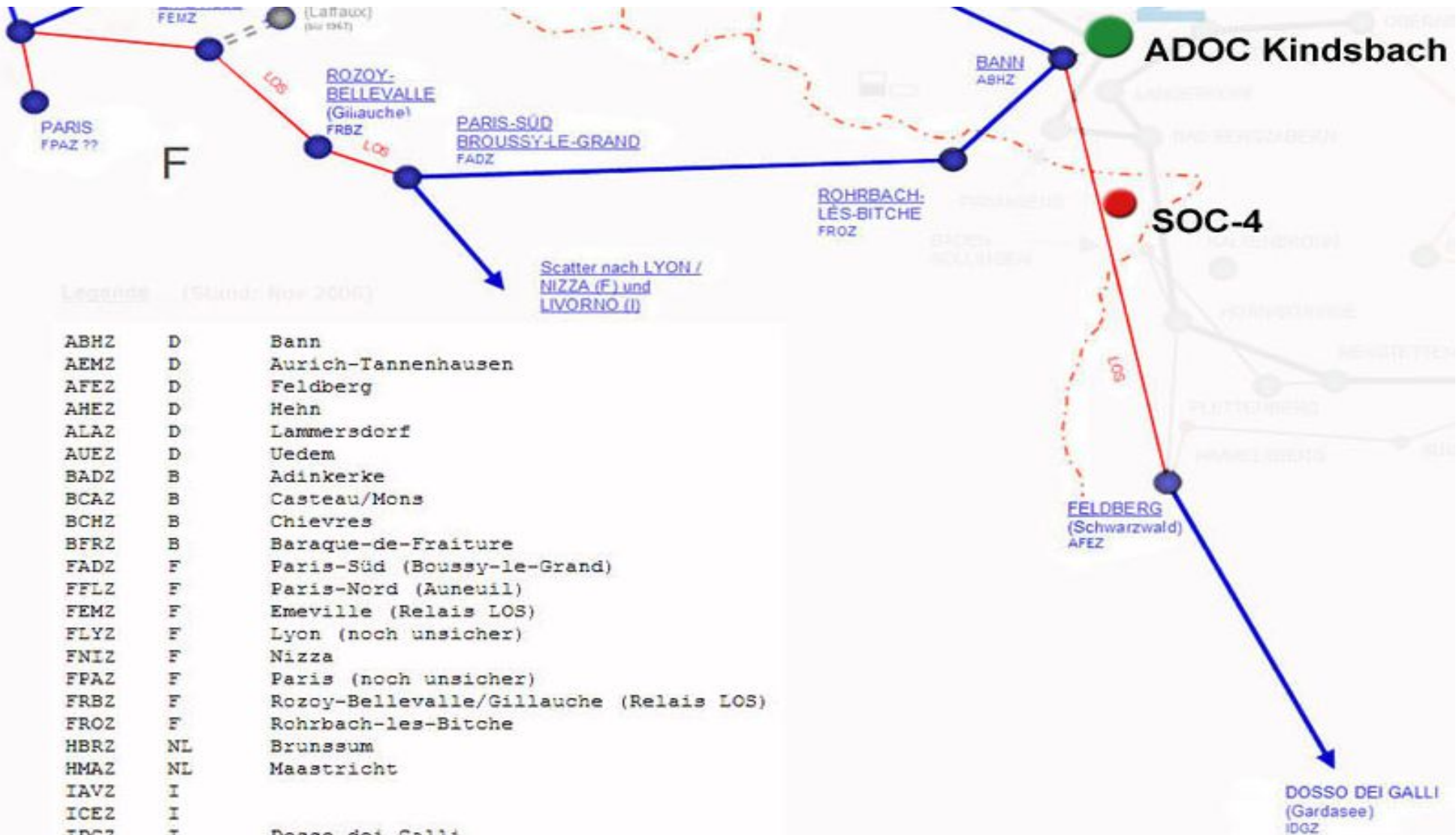
stationed at this relay site from 1981-1982. I very fond memories of the times I spent there in the town of Hoek. - I have been wondering over the years what had become of that site - and you have confirmed my suspicions.... WOW - do those pictures bring back memories... - The site was part of the US Army 128th Signal Company. We had 8 folks stationed there... most lived in rented apartments about 1km away - next to a discotech - we could walk to work... but I had a "broomer"/moped. The site had four 1000 watt transmitters running at 4GHZ as a telephone relay between an Army base at Bruggen, Germany (BRUG) and another US Army site at Menwith Hill Station (MHS) in the UK. The folks in town thought we were listening in on their phone calls - NOT... just a troposcatter microwave relay station. But it made for good stories at the local bars. - It is really said to hear that it will be torn down... - I see the generators are still there - man I hated checking the oil - worse when we had to run them... could not hear anything... - Maybe your friend w/ connections in town was the same high-school kid that lived in back of the apartments I lived in... :) - Yes - TIDE laundry soap is still a major market item here in the USA. - BTW: If it was not for my duties in Hoek - I would not have married my wife (she was stationed in Brussels - and we road the train back and forth on our days off)... and I would not be a Network Engineer for a major Oil company today !!!... - Thanks for posting the info - it really put some closure in my life ! - Rick R. Fell

- Petr, My name is Ed and I just happened to find your site about the antenna's. I was searching for anything on Hoek Van Holland and of course this caught my eye as I spent over 2 years there 1968 -70. Please email me if you are still at this email address and I will be glad to fill you in about some of the history of these "dishes". Thanks Ed
- I stumbled across you website and was surprised to find your comments and pictures about this US Army installation. I was not stationed at this location, but at a similar radio station in Germany. This station was also named after the closest town - Stein Neukirch. Our radio shoot went from Feldburg, Germany to Stein to Bruggen, Belgium and then to Hoek Van Holland. I was stationed there in 1980 and 1981. If you are ever in Germany, you might find the town of Stein Neukirch and see if my old radio station is still on the hill overlooking the town. Thanks for the memories... Terry Allan

http://www.usarmygermany.com/units/Signal/USAREUR_SignalCorps%201.htm#ACEHIGH





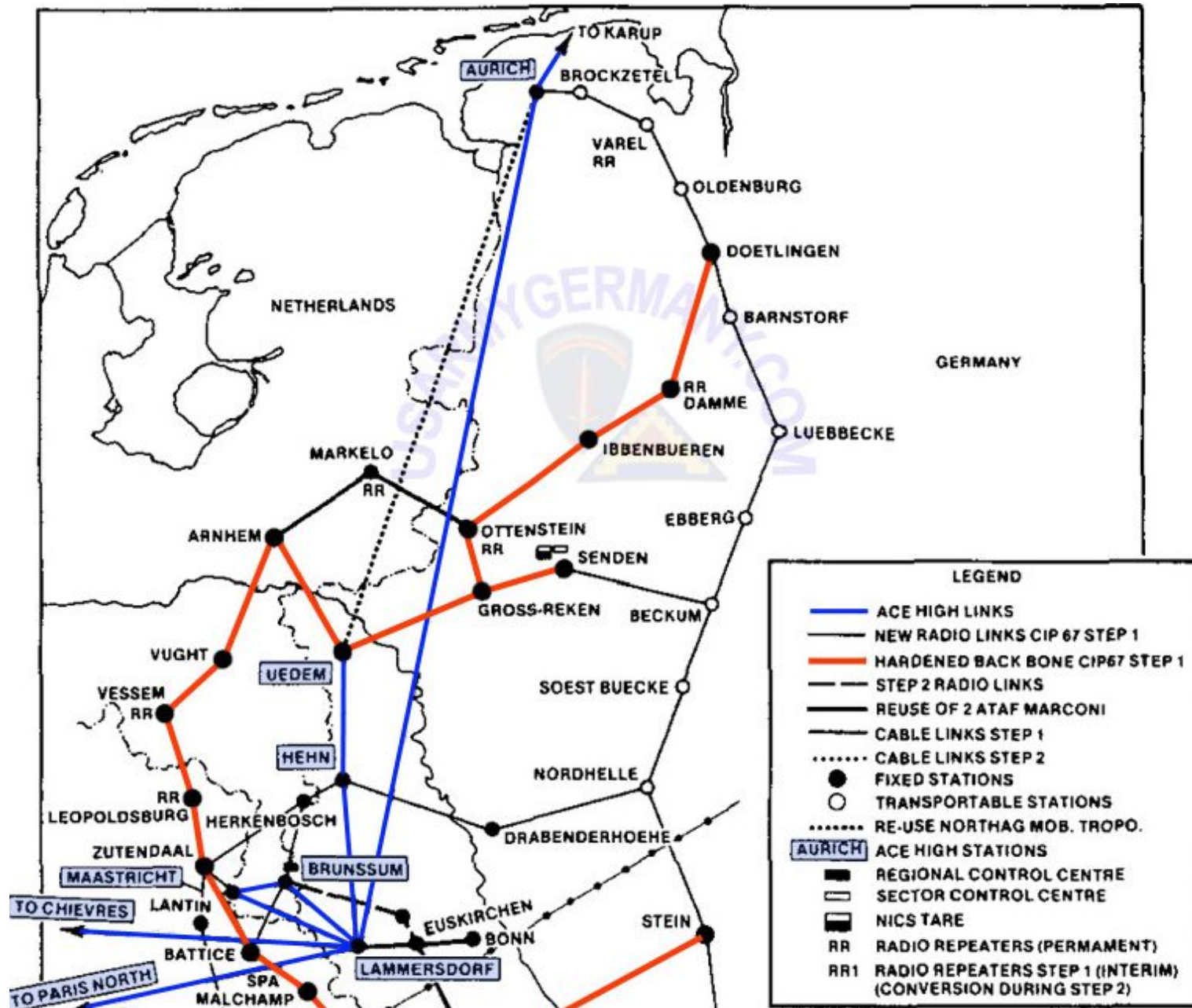


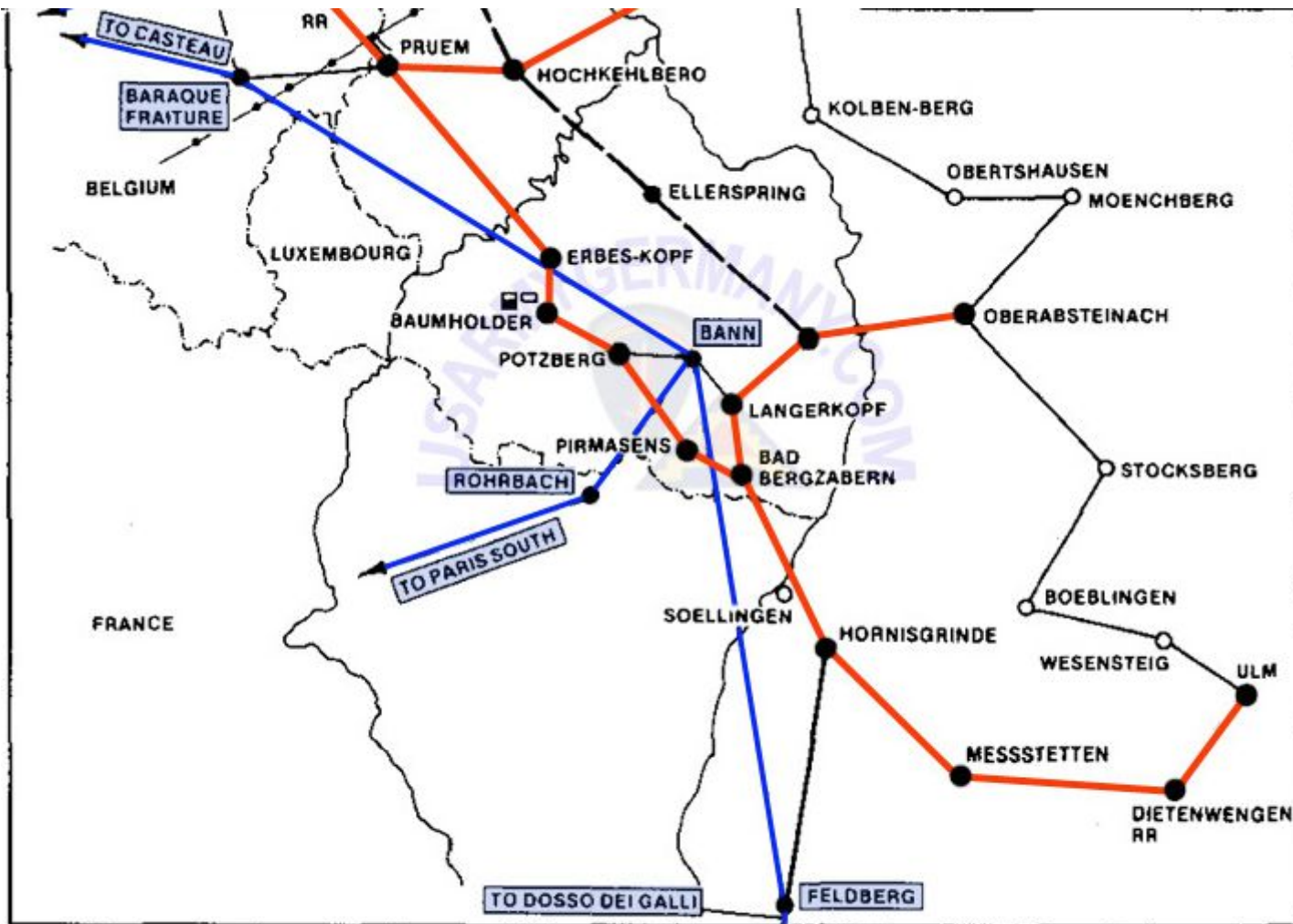
Legende (Stand: Nov 2006)

ABH2	D	Bann
AEM2	D	Aurich-Tannenhausen
AFE2	D	Feldberg
AHE2	D	Hehn
ALA2	D	Lammersdorf
AUE2	D	Uedem
BAD2	B	Adinkerke
BCA2	B	Casteau/Mons
BCH2	B	Chievres
BFR2	B	Baraque-de-Fraiture
FAD2	F	Paris-Süd (Boussy-le-Grand)
FFL2	F	Paris-Nord (Auneuil)
FEM2	F	Emeville (Relais LOS)
FLY2	F	Lyon (noch unsicher)
FNI2	F	Nizza
FPA2	F	Paris (noch unsicher)
FRB2	F	Rozoy-Bellevalle/Gillauche (Relais LOS)
FRO2	F	Rohrbach-les-Bitche
HBR2	NL	Brunssum
HMA2	NL	Maastricht
IAV2	I	
ICE2	I	
IDG2	I	Dosso dei Galli
IMB2	I	
IVT2	I	
UBI2	UK	Binbrook
UBO2	UK	Boulmer
UMO2	UK	Mormond Hill
	UK	Coldblow Lane
	UK	Ringstaedt Bay
	UK	Martlesham Heath

SOUTHERN

ABH2	D	Bann
AEM2	D	Aurich-Tannenhäusen
AFE2	D	Feldberg
AHE2	D	Hehn
ALAZ	D	Lammersdorf
AUE2	D	Uedem
BAD2	B	Adinkerke
BCAZ	B	Casteau/Mons
BCH2	B	Chievres
BFR2	B	Baraque-de-Fraiture
FAD2	F	Paris-Süd (Boussy-le-Grand)
FFL2	F	Paris-Nord (Auneuil)
FEM2	F	Emeville (Relais LOS)
FLY2	F	Lyon (noch unsicher)
FNIZ	F	Nizza
FPA2	F	Paris (noch unsicher)
FRB2	F	Rozoy-Bellevalle/Gillauche (Relais LOS)
FRO2	F	Rohrbach-les-Bitche
HBR2	NL	Brunssum
HMA2	NL	Maastricht
IAV2	I	
ICE2	I	
IDG2	I	Dosso dei Galli
IMB2	I	
IVT2	I	
UBI2	UK	Binbrook
UBO2	UK	Boulmer
UMO2	UK	Mormond Hill
	UK	Coldblow Lane
	UK	Ringstaedt Bay
	UK	Martlesham Heath





CIP-67 Transmission Layout

http://www.usarmygermany.com/units/Signal/Org%20Chart_CIP-67.htm

The Royal Corps of Signals By Cliff Lord, Graham Watson

ACE High and Forward Scatter Stations

The NATO **Ace High** network consisted of a series of tropospheric scatter stations which were spread from Norway to Turkey. Royal Signals assumed responsibility for the stations in 1968 until their demise in the early 1990s. Typically the stations were linked by 200 mile tropospheric (**tropo**) scatter shots, and shorter Line of Sight (LOS) links which were connected to associated stations.

The **tropo** link from Norway was to Mossy Hill in the Shetland Islands and from there south to Mormond Hill, near Fraserbrough. Mormond Hill linked with Stenigot in Lincolnshire, which was in turn linked to Maidstone, in Kent. Maidstone's **tropo** link was to Europe.

28 (BR) Signal Regiment in Germany had a mobile **tropo** station, which was linked to Lammersdorf during exercises, and was a German link into the FSS System.

By 1971, **ACE High** Stations were operational at the following overseas locations: Cape Greco in Cyprus, Garghur and Floriana in Malta.

A **tropo** shot from Ismir, in Turkey was linked with the Royal Signals-run Cape Greco site in Cyprus, which was connected by Line of Sight to Dhekelia, and thus into the Cyprus UK Military Line Of Sight Network on the Eastern Sovereign Base Area. A spur to Malta was in operation for a number of years.

Attached Line Of Sight locations within the United Kingdom included:

Saxa Vord in the Shetlands was formed as 91 Signal Unit RAF in 1962. This station was transferred to the Army in 1968, and played a key role in NATO's integrated communications systems until it was disbanded on 12 December 1990. RAF Saxa Vord in the far north of Shetland was a Radar Operation Unit which required access to military communications, and had an analogue (Line of Sight) via a relay station at Collafirth Hill to Mossy Hill, thus gaining access to the UK mainland. NATO FSS Shetland was divided into four areas:

Maybury – The Administrative Support Headquarters at Maybury provided accommodation and amenities for the staff of Mossy Hill, and for the administrative staff who provided the Host Nation support to the three stations.

Mossy Hill – FSS Mossy Hill was the largest station in the UK, and provided a Line of Sight link to Collafirth Hill, and Tropospheric Scatter links to Norway and Mormond Hill, near Fraserburgh, in Scotland. The Station, under the command of a warrant officer class one Foreman of Signals, was self-sufficient with a staff of ten technicians and six PSA powermen, and protected by a Sergeant and six constables of the Ministry of Defence Police.

Collafirth Hill – Known as Moonbase Alpha by some, provided a Line of Sight microwave relay between Mossy Hill and Saxa Vord. It was manned by a Staff Sergeant and 11 men including drivers, powermen and labourers. Physical security was provided by a Sergeant and 6 Constables of the MOD Police. Single soldiers lived on site.

Saxa Vord – This was a terminal station located on Unst in the Shetlands, linked directly, and co-located with the radar and aircraft control site at RAF Saxa Vord.

Mormond Hill in Scotland had a Line of Sight link to RAF Buchan.

The Scottish FSS came under the control of 242 Signal Squadron (q.v.).

The Kent stations were the responsibility of 251 Signal Squadron (q.v.) Cold Blow Lane, Maidstone, Kent, provided Tropospheric shot to Europe, and also to Stenigot in Lincolnshire. In June 1993, the Tropospheric Scatter link to Dover was closed as was the site at Swingate near Dover, Kent. The **Ace High** Tropospheric Station at Maidstone closed in April 1995.