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Canadian acceptance

THE acceptance ceremony for the second of the Canadian Air Force's S511s took place on 23 March at the CFB Chatham. The Canadian's nomenclature for S511 is FRN 509(V).

Those present were, left to right seated, LCol L A Linquist BTSO; Maj R Alward, DEEM 3-5 NDHQ; Maj J W Rolteau, BATCO; and, standing, Sgt D A Spence NCO i/c Ratcon; Capt G P Cormier, B Tel O; Alan Cheesewright, ATC sensors; Robin Webb, sales manager USA, based in Ottawa; Kevin Towers, senior field services manager.

SOUTHEND AIRPORT BUYS ON-SITE S511

AFTER some three years in the wings, the S511 at Southend Airport is to take centre stage.

Until now, it has been used by Marconi Radar for demonstration purposes, and as an engineering model for developing other air traffic control products.

Now, the time has come to replace the airport's operational surveillance radar system — a 21 year-old Cossor 787. In the face of keen competitive activity, the airport authority has elected to buy the on-site S511 and has placed an order for a new transmitter/receiver and signal processor to work into the existing antenna.

The changeover comes at a time when the CAA is calling on Southend to help control the vastly increased volume of low-level traffic in the Clacton and Southend sector — the result of the mounting number of aircraft flying into and out of the new London City Airport.

The S511 meets all the requirements thrown up by this extended responsibility and is expected to go into operation this month.

The S511 at Southend Airport

We've got ourselves a convoy

FOR security reasons we're not always allowed to publicise what goes on in Marconi Radar, so it's good news when an unclassified picture tells a story of big orders.

This convoy of S711s was photographed at Writtle Road at the start of its journey to Harwich and shipment to an overseas customer.

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Plan view of radiation patterns of horizontal dipole showing effects of adding various pressure elements (side and back lobes have been omitted).

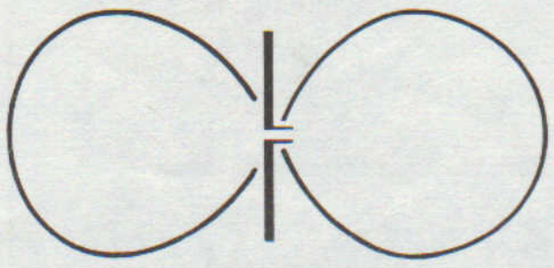


Figure 2a: Bi-directional radiation pattern of single dipole.

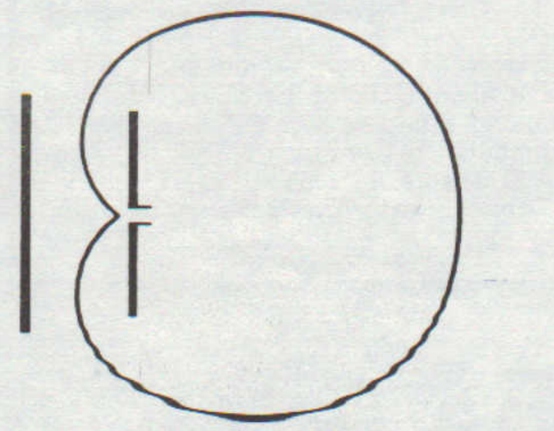


Figure 2b: A reflector added behind the dipole increases the forward gain.

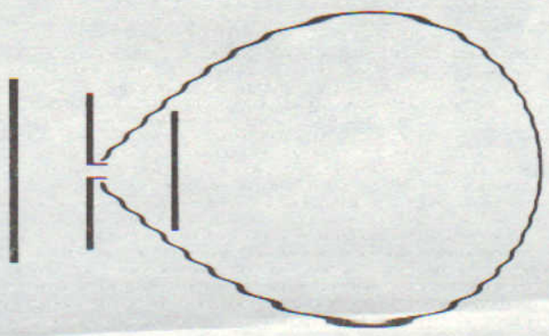


Figure 2c: A director in front of the dipole further increases the gain and directivity.

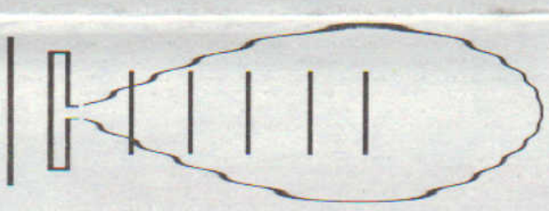


Figure 2d: Typical IV Yagi aerial with folded dipole, reflector and five directors.

XY . . . for X-band, X-ray, and Yagis . . .

COLIN LATHAM continues his series on the alphabet of radar

GENERALLY, in this series, there has been no great problem in finding radar terms for each letter of the alphabet; in fact, it was sometimes a case of deciding which of several contenders to choose. I have to confess that it isn't quite so easy now that we are near to the tail end. Consequently, I shall consign two letters to the same article.

Let us not, however, underrate X & Y (those close companions, standing for inscrutable quantities, to whom most people are unwillingly introduced at a tender age when first attempting algebra) which crop up to describe circuits producing horizontal and vertical deflection, respectively, on the screens of radar displays. X and Y waveform generators and amplifiers will surely be with us as long as radar continues.

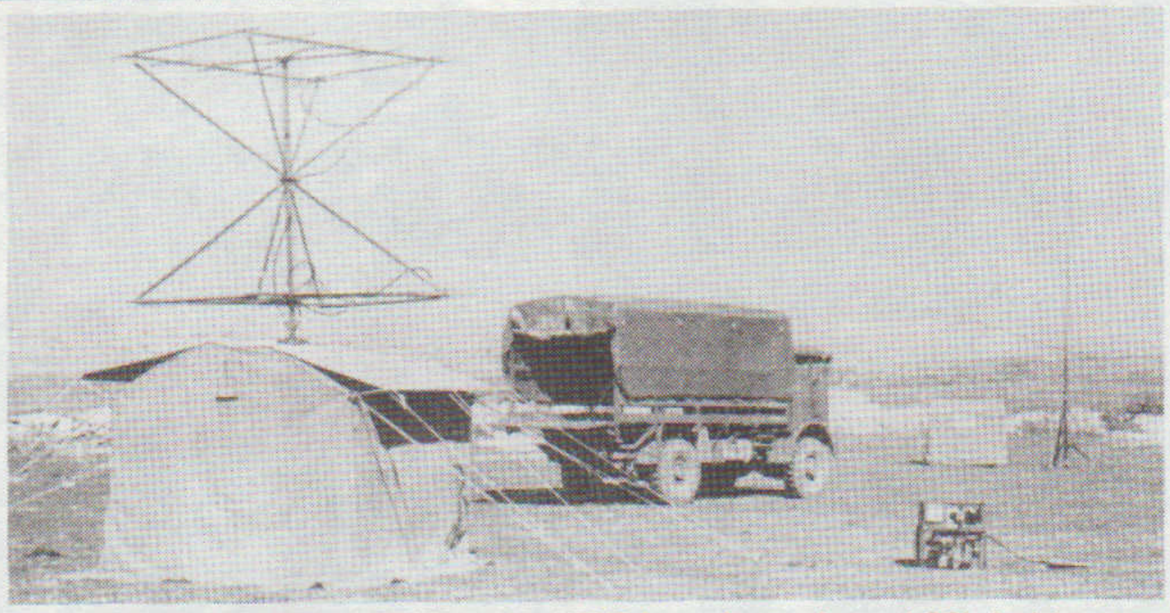
Under the letter S, I mentioned S-band as being the first and probably the most lastingly popular centimetric radar waveband.

Historically speaking, the 3 centimetre waveband, known as X-band, was the next microwave band to appear and continues still be used for many classes of radar.

Dramatic advances, notably the development of effective S-band airborne radar, followed closely the invention of the 10cm magnetron in 1940. Yet within an incredibly short period X-band radars, even more compact and with improved abilities for target discrimination, also appeared in service during the war. The 3cm H2S, permitting our bombers to 'see' the ground below, through cloud, was a prime example.

Today, X-band is used universally for marine navigational radars and finds application also in some short and medium range ground-based systems. It is particularly suitable for highly accurate height finders and target tracking radars where a narrow beam is required from an antenna array of modest dimensions.

A very short range, and comparatively recent, use for X-band is in very low power doppler radar intruder detectors which are sometimes found in home burglar alarm systems (just to complicate matters, X-band is now known in NATO terms as "I" band).



Light Warning radar (Type 6 MkIII) used in WW2 for early warning and GCI. Aerial system has four 6-element Yagi arrays on a plastic framework. Lower pair can be phase/antiphase switched for simple heightfinding. System includes IFF and HF comms. and is powered by a motorcycle engine (in foreground). Range 50 miles. Nearly 1000 built.

X also stands for X-rays which, although not at all necessary for the operation of radars, are often unfortunately produced as the unwanted by-products of powerful transmitters.

All of the high power radio frequency generators that I have mentioned in previous articles — the magnetron, the klystron and the travelling wave tube — rely upon the controlled movement of high velocity electrons, in vacuum, brought about by the application of many tens of kilovolts. Consequently, the combined effects of such applied voltages, plus the internal radio frequency fields in these valves, can cause X-rays of substantial energies; levels which, if unchecked, could constitute a hazard to persons in close proximity.

The severity of the problem depends upon the valve type and the design of the radar in that where very high peak powers are demanded the operating voltages, and hence the X-rays, are greater.

For a small short range radar the X-ray production may be minimal, but for a powerful long range set producing megawatts of peak power it has to be considered very carefully.

Consequently, this is a problem that must always be faced by transmitter designers; they have to ensure that adequate shielding is incorporated in the design and that reliable safety checks are carried out. (But, as some transmitter engineers may reflect with joy and thanksgiving, the availability nowadays of high power solid state rectifying diodes for power supplies means that we do not now have to suffer the miseries of that other dreaded X — Xenon filled rectifiers! I think they will know what I mean.)

Turning now to the letter Y, I feel that pride of place must be given to the Yagi form of directional antenna. This no longer finds its main application in radar since almost every TV antenna in the land (and abroad too) is a form of Yagi. Nevertheless, it has had many useful and important roles to play in radar, such as on some of the early static low-looking metric radars and on the transportable 'Light, Warning' radars made in large numbers for use by our forces overseas (see picture).

In free space, (i.e. when situated away from any reflecting surfaces) a simple horizontal dipole antenna will have an area of sensitivity (if receiving) or a radiation pattern (if transmitting) as shown in fig 2a. The effect of adding a simple reflecting dipole is shown in fig 2b.

The directivity can be enhanced by adding another element, known as a director, in front of the dipole, fig 2c. In a Yagi antenna a reflector and many directors are used, all made to a critical length in proportion to the main dipole and all very precisely positioned. Therein lies the secret of successful Yagi design.

The coverage of a 7-element Yagi is shown in fig 2d. In general, the more directors that are added the greater the directivity. As you can see by glancing at the chimneys in the neighbourhood, most TV antennas have perhaps six or eight or 10 elements but some have as many as 18 or 21 where maximum pickup of distant stations is required.

In the next issue I shall tackle the letter Z. I little thought that I would get this far when, in a 'brain-storming' session in Bob Scott's office years ago, I lightheartedly suggested this alphabet! I suppose, if you have a YZ, you learn to keep quiet.

A trolley good farewell!

A WELL-KNOWN figure that will no longer be seen around the site is Jimmy Eaton, who recently joined the leisured classes after 37 years with Marconi.

Jimmy, a member of the Construction Surveyors Institute, has been connected with building and construction throughout his working life, though latterly he took on responsibility for a great deal more besides.

In 1939, after completing his training at the Mid-Essex Technical College, he spent a brief spell in the family building business, J Eaton and Son, in Navigation Road. From there he went on to take an apprenticeship in toolmaking at Hoffman's, where he eventually became assistant clerk of works.

He came to Marconi, New Street, in 1951 as an architectural draughtsman. The succeeding years saw him progress to deputy chief, new development and processes, deputy chief building and facilities, controller manufacturing services, and chief of projects, building and facilities.

Then, in 1972, he transferred to Marconi Radar, Writtle Road, where he was appointed plant engineer.

In 1976 Jimmy was promoted to manager, works engineering group, taking on added responsibility for Leicester and Gateshead.

In 1983 he became site services manager, the position he held until leaving. At this juncture, in addition to plant and buildings, *all* services, with the exception of security, became his responsibility.

Jimmy has always found plenty to engage his interest outside work. He was a member of Chelmsford Round Table from 1951 until reaching the age limit of 40, fulfilling the offices of local chairman 1959 to 1960 and area chairman 1963 to 1964. In 1974 he joined Chelmsford Mildmay Rotary Club.

Jimmy volunteers help to the Abbeyfield Society, who are well-served by his expertise in building matters.

On his retirement Jimmy was presented by Dick Jewkes, production director, with a golf trolley — an indication of where yet another of his interests lies.

We wish him and his wife, Joan, many happy years of leisure.

Trolley good show . . .

Korean links strengthened

A RECENT high-level meeting in Korea underlined the company's commitment to the MARSPIN project, which is progressing in spite of difficulties in meeting some of the contract's milestones.

Managing director David Chenery (centre) and Brian Loader, director of naval business, are seen in the office of H C Shin (right), president of Samsung Aerospace.

The Far East trip also provided an opportunity to size up the substantial business opportunities in Korea.