S.p.10. ZACHARIAH, E.J–Corrugated flange technique for beam shaping of spectoral electromagnetic horn antennas —1982– Dr. K.G. Nair

The need for improved feed systems for large reflector antennas employed in Radio Astronomy and Satellite tracking spurred the interest in horn antenna research in the 1960's. The corrugated horn triggered widespread interest and enthusiasm, and a large amount of work has already been done on this type of antennas. The properties of corrugated surfaces has been investigated in detail. The idea behind this work is to merge the flange technique and the use

of corrugated surfaces together to obtain the advantages of both.

Corrugations are made on the surface of flange elements. The effect of various corrugation parameters are studied. By varying the flange parameters, a good amount of data is collected and analysed to ascertain the effects of corrugated flanges. The measurements are repeated at various frequencies, in the X- and S-bands. The following parameters of the system were studied.

(a) beam shaping
(b) gain
(c) variation of V.S.W.R.
(d) possibility of obtaining circularly polarised radiation from the flanged horn.

A theoretical explanation to the effects of corrugated flanges is attempted on the basis of the line-souce theory. Even though this theory utilises a simplified model for the calculation of radiation patters, fairly good agreement between the computer pattern and experimental results are observed. Suggestions for further work to improve this antenna system is also included in this chapter.

The earlier part of the work described in this thesis was performed with usual facilities in a laboratory. Precise measurements of antenna pattern were conducted in an anechoic chamber, with automatic pattern recording facility. The design and construction of this anechoic chamber is discussed in Appendix I.

Attempts were made to develop a microwave absorber suited for the interior lining of microwave anechoic chambers. A natural rubber based material was successfully developed. A report of this is given in Appendix II.