

DESIGNED MODIFIED VHF BAND HIGH GAIN YAGI-UDA ANTENNA

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Abstract

VHF Band high gain Yagi-Uda Antenna is present here to be used in VHF (146-174 MHz) band. This is very better compared to normal 3 element Yagi-Uda antenna with respect to Gain, Polar Plots, and Directivity. The VHF Band high gain Yagi-Uda antenna is designed using aluminum rods easily available in market and tested at frequency 163 MHz. All the results are taken physically using in vertical plane with help of communication service monitor.

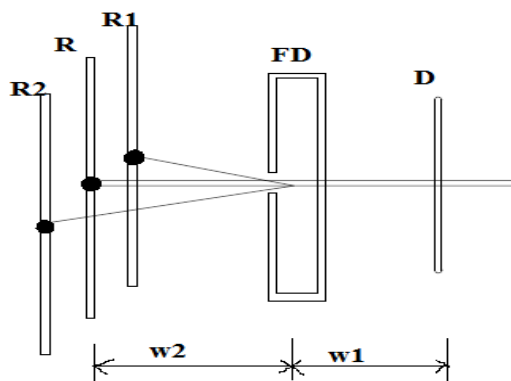
INDEX ITEMS:- Wireless communication.,Special Yagi-Uda antenna design., Antenna testing using Communication Service Monitor.,Vertical polarization.,Motorola GP339 (VHF) Handheld Set.

Keywords:-Wireless communication.,Special Yagi-Uda antenna design.,Vertical polarization.,Motorola

INTRODUCTION

The three element Yagi-Uda antenna is extensively used for VHF (146-174 MHz) band. For its directivity and gain of about 3dbi. The signal behind the reflector (Backlobe) of Yagi-Uda antenna is very poor. There are many situations, where it is required that strong signal should present at a particular points or areas in the backlobe. and very weak signal should be at some points or areas in the backlobe. Hence backlobe should be modifiable as per requirement. In this paper, this is achieved by using two additional reflectors to basic 3 element yagi-Uda antenna. The basic design of three element yagi-uda antenna is not changed neither their way of feeding.

DESIGN AND PRINCIPLE:-



Yagi with additional two Reflectors

Figure-1 Design of modified high gain yagi- uda antenna

ANTENNA PARAMETERS:-

1	Frequency Used	F	163MHz
2	Length of Director	L1	82.2 cm
3	Length of Folded dipole	L2	86.5cm
4	Length Reflectors	L3	90.8cm
5	Separation between L1 & L2	W1	20.2 cm
6	Separation between L2 & L3	W2	25.7cm
7	Horizontal Separation between Reflectors, R and R1, R and R2	θ	40°

The proposed antenna shown in fig-1 is designed at 163 MHz frequency. The signal is transmitted from Motorola make type GP339 VHF Handheld Transreceiver. The signal is collected at the proposed antenna and feed to communication service monitor. [Make & Type IFR-2945B]. The same setup is carried out for 3 element yagi, Dipole and results are compared. The same antenna is tested at field and lab results are confirmed.

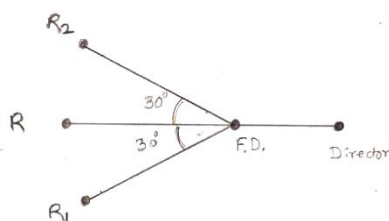


Figure2

Figure-2 shows top View of VHF Band high gainYagi-Uda Antenna

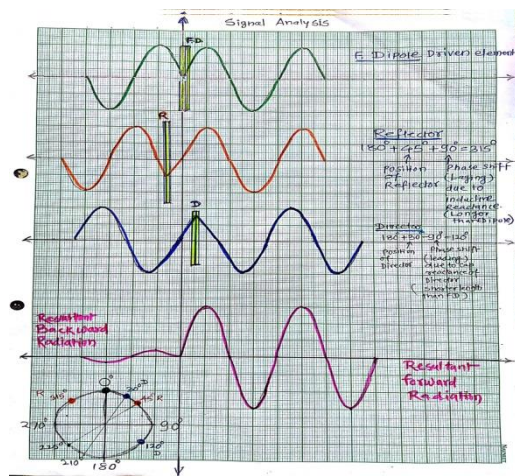


Figure-3 -shows how the resultant signal of antenna is improved due to effect of reflector and director.

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RESULTS:- Fig-4 shows radiation pattern of yagi-uda antenna with additional two reflectors. It shows approximate 10.5 db forward gain improvement compared to 3 element yagi, ie upto 13.5 dbm compared to isotropic antenna. This structure= modifies backlobe & gives gain in backward direction also on specific area and angle.

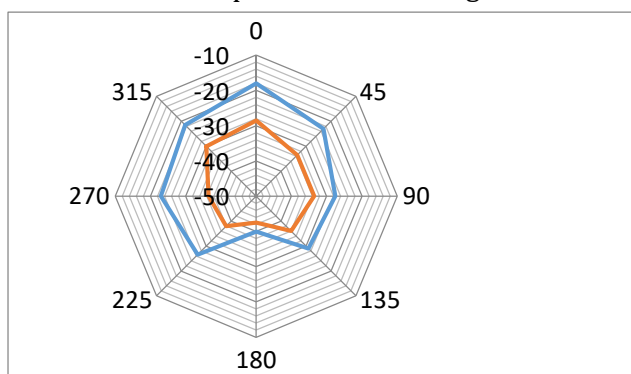


Figure-4

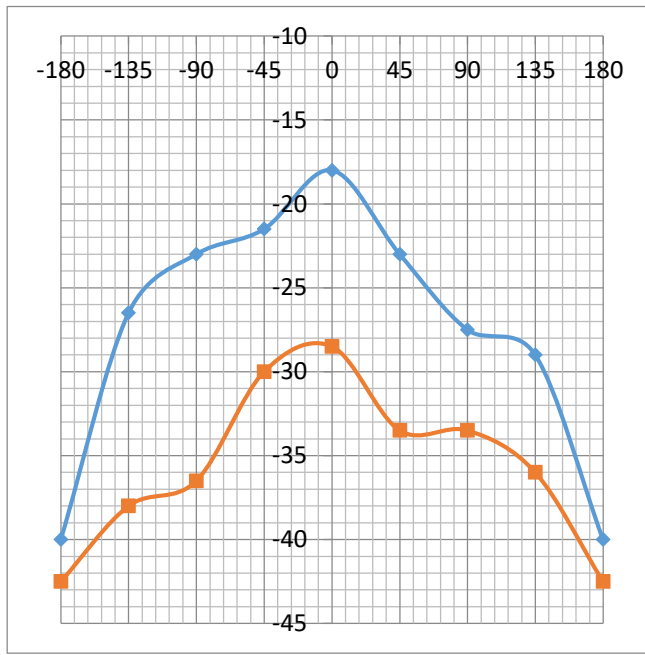


Figure-5

Figure-5 shows half power beamwidth of VHFband high gain yagi-uda antenna.

MEASURED PARAMETERS OF ANTENNA:-

- Type:-VHFband high gain Yagi-Uda antenna
- Input :-FM modulated signal of 163 MHz, with 2ppm
- Frequency stability
- Antenna polarization:- Vertical
- Signal measured:- Communication Service Monitor in dbm
- Coaxial cable:- RG 8Au with BNC
- Radio used :- Motorola GP339 Handheld Transreceiver.

Sr.no.	Parameter	3 Element Yagi-uda	Yagi-uda with additional two reflectors
1	Directive Gain	3dbi	13.5dbi
2	Directivity	6.3 db	8 db
3	Half Power Beamwidth	86 ⁰	63 ⁰
4	F/B ratio	14	22
5	Gain in backward lobe 135 ⁰ , 225 ⁰	--	7 to 11.5 db v/s yagi




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