QiR-2013

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Submission date: 02-Dec-2021 09:57PM (UTC-0600)
Submission ID: 1623440786
File name: QiR-2013.pdf (89.77M)
Word count: 3027
Character count: 14491

Proceeding of the 13th International Conference on QIR (Quality in Research)
Yogyakarta, Indonesia, 25-28 June 2013
ISSN 1411-1284

Design Of Monitoring Status Dvor in Desk at the Airport Tower Halim Perdanakusuma using Sms (Short Message Service)

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***Abstract*— Halim Perdanakusuma an alternative airport for domestic flights and overseas, lack of human resources and the amount of electronic equipment at the airport does not allow technicians to always be on station transmitter 'DVOR' (VHF Dopler Omny Range). 'DVOR' is an air navigation system that emits electromagnetic waves all these directions and provide information bearing on the station as well as the data plane bearing, beacon transmitter also transmits data to the three-letter code identity or the identity of the sound to be received by the recipient on the plane. This resulted if DVOR 'off', the technician cannot know the condition early this highly disturbing aviation safety. We need a draft monitoring status on the desk DVOR tower. One is to use 'sms' DVOR order status can always be monitored.**

This research was designed a system of observers. In the design of the system output RCSE DVOR will affect the output of the logic gate, if it is operating normally at the logic gate output = 0 so that the relay is not switched on, the green LED will be on the line desk Tower will produce a voltage of 3 Volts DC in addition to the microcontroller does not work. In DVOR, RJ11 stated, if the output on RJ 11 = 0 Volt DC and if DVOR 'off' at the transmitter is on one or both transmitter off the output at the logic gate = 5 Volt DC so that the relay will be active so that line the red LED on the desk tower will generate a voltage of 3 Volts DC and output on an RJ 11 = 0.5 Volts DC so that the modem will be activated and sends a message to the technician in charge DVOR.

Keywords*— DVOR, re-engineering, wireless communication*

I. INTRODUCTION

DVOR (Doppler VHF Omny Range) is an air navigation system that emits electromagnetic waves all these directions and provide information bearing aircraft of the station DVOR equipment is working at a frequency of 108-118 MHz, in addition to bearing the data, beacon transmitter also transmits data to the identity of the three-letter code or the identity of the sound to be received by the recipient on the plane. By looking at the function of the equipment were very influential to aviation safety, the required equipment is always in a condition ready for use. However, there are many things that cause the equipment off, both internal factors such as the condition of older equipment and the condition of the components are not functioning properly, as well as external factors such as lightning. Given such conditions, should be in charge of electronics technicians constantly monitor the status DVOR. However DVOR, the lack of adequate manpower, while the amount of equipment that is under the responsibility of electronics so much that it is not possible to always be in the equipment that is located very DVOR far as non workshops electronics technician. All this to determine whether or not an operating DVOR pilot to report through the ATC (Air Traffic Control). Thus, the flight safety can be compromised. In addition, the presence of complaints - complaints that often occurs can lead to decrease in the company's image as the manager of airport services in the eyes of the domestic flights, and airport image in the eyes of the international flight. From the description above, one solution to determine if it is operating normally DVOR or not, is to create a design DVOR status monitoring.

II. BASIC THEORY

A. DVOR (Doppler VHF Omnidirectional Range

DVOR is an air navigation aid that can provide directional information to aircraft on the airport to provide information bearing aircraft of the marionette DVOR. This equipment works at a frequency of 108- 118 MHz, in addition to bearing the data, beacon transmitter also transmits data to the identity of the three-letter code or voice identification that will be accepted by the recipient on the plane. Besides, it is a function of DVOR Indicates the position of the aircraft station transmitter so as to know the area in its path, and shows the radial direction so as to Run Way. Run Way towards specified. Reference signal is 30 Hz AM signal emitted by the instantaneous phase uniformly in all directions resulting from the RF carrier signal (fc) are modulated AM signal with 30 Hz. The resulting signal is then emitted by the antenna carrier see figure 1(a).

The variable signal is a signal generated from the modulation frequency from the simulation of movement or rotation of non directional RF signal source (fc ± 9960 Hz) around the circle with a speed of 1800 rpm which cause modulation frequency of 30 Hz, this is done by connecting the electronic switching sequentially at each sideband antenna located on the antenna around the carrier signal variable pattern formation is shown in figure 1(b).

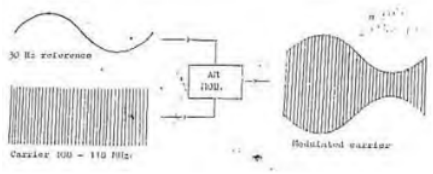

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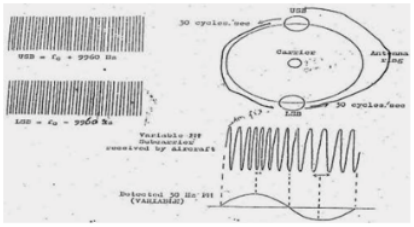
Figure 1 (a) AM Modulation between reference 30 Hz and carrier signal



(b)Pattern formation variable signal

Mixing between the reference signal and the variable signal occurs in the air, a combination of variable reference signal and the signal power radiated into the air will produce a carrier frequency modulated by a 9960 Hz AM (Subcarrier). Further 9960 Hz subcarrier FM modulated with 30 Hz, because of the Doppler effect see Figure 2. Reference signal and the signal is generally used as a pattern variable instantaneous phase, the phase difference between the signal and reference signal to the variable direction see figure 3.

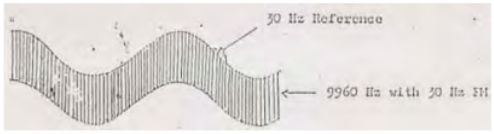


Figure 2. Signals emitted from DVOR

DVOR transmits all directions antenna DVOR have 1piece of antenna carrier and subcarrier antenna 48 pieces. DVOR antenna signals emitted a high frequency, so any solid objects can reflect signals. Ground bounce signal power radiated by the antenna DVOR. Therefore the receiver aircraft to obtain two signals emitted signals (direct) and the signal beam reflectance (reflected). Both have the same frequency but have different emission lines. The lines transmit the reflected signal is longer than the direct signal transmission lines.

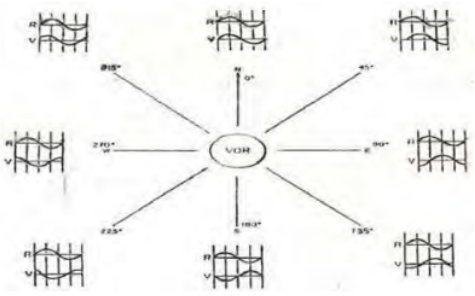


Figure 4. Variable phase difference between the signal and reference signal

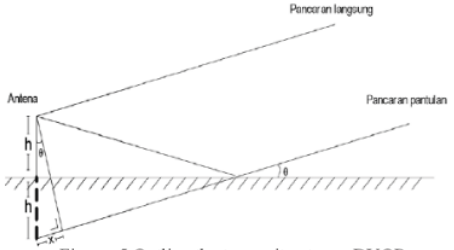


Figure 5 Outline the transmit antenna DVOR

Figure 5. seen that reflected signal transmission line is longer than the direct beam transmission lines are marked by the addition of whole X. Antenna DVOR in principle is to emit 30 Hz variable signal is FM modulated and the reference signal 30 Hz modulated AM. Two signals having the same frequency emitted together but separated from each other. The results of the combination of the two signals emitted form the carrier frequency of 30 Hz. This frequency is obtained from the playback DVOR antenna 30 times rev / sec. In one pair of antennas such as antenna 1 to antenna 25 has a frequency USB (upper sideband) and LSB (lower sideband). Antenna 1 is USB while the antenna 25 is LSB.

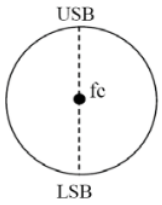


Figure 6. LSB dan USB pada antena DVOR

The resulting radiation pattern DVOR the radiation pattern that has 3 main lobe to the center in 8^0, 28^0 and 50^0. Figure 7 shows there is a considerable distance between the lobe with one another, leading to the absence of radiation (due to the removal of the direct signal and the reflected signal.) To overcome this it will be installed Counterpoise DVOR additional antenna mounted just below the act as an additional reflective area. If the antenna is mounted above ½ λ .Counterpoise it will result in major energy lobe wide and centered at 30^0. The combination of radiation signals coming from the ground and from the reflection of the overall radiation produced Counterpoise DVOR which will result in wider coverage at an angle of between 0^0 to 60^0, while the area

just above DVOR (angle of more than 60^0) there is no radiation and is called the area Cone of Silence as shown in figure 9.

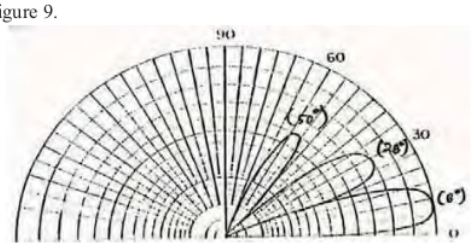


Figure 7. Three major lobe centered

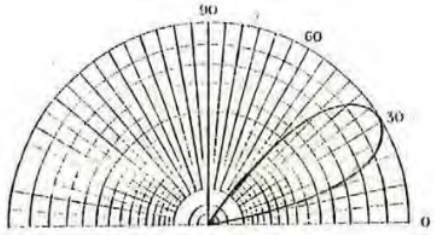


Figure 8. Major lobe centered using the counterpoise

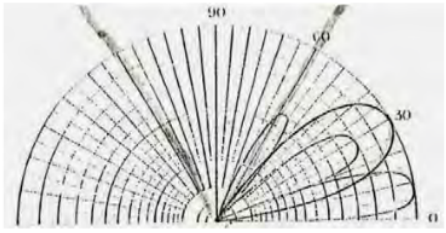


Figure 9 The area of the emission cone of silence

Size of Counterpoise effect on the radiation pattern that will act as a reflector or reflector above a certain angle. While the point of the reflector is ground level. This angle is called the critical angle. Therefore, the low-angle coverage resulting from surface reflection while for high angle coverage resulting from the reflection counterpoise.

B. *Remote Control and Status Equipment*

In control DVOR there is a unit that can control the RCSE DVOR (Remote Control Status Equipment) is a module that can control DVOR, while the information that can be provided by the RCSE are as follows: Status transmitter is used, help the transmitter is used, select or move the transmitter is used, select equipment that will be on the controls of (DVOR or DME). RCSE can also be connected via the PC to see DVOR and DME equipment parameters, as well as full control equipment via a data output on a block SIB (Serial Interface Board).

III. SYSTEM DESIGN

A. *Hardware Design*

Overall block diagram design DVOR Status Monitoring. At the Desk Tower at Halim Perdanakusuma Airport Using SMS as a block below

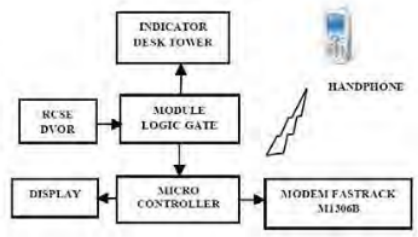


Figure 10. Block System Design

The workings blocks are designed, at RCSE DVOR is off then at that time on the logic gate output LED will turn red on the desk next to that tower will enable the microcontroller, the microcontroller will activate Fastrack M1306B modem and transmit data in the form of SMS to the person in charge DVOR and microcontroller will display the same phone number charge. If when RCSE DVOR under normal conditions the output of the logic gate module only turn green LED on the desk and does not activate the microcontroller.

B. *Logic Gate Module*

Logic Gate serves as a monitoring status ON or OFF for the case of the condition of the equipment DVOR transmitter 1 and transmitter 2, then you want only two conditions, namely 1 and 0 only. To get the output and the desired condition then use NAND logic gate. So the output of DVOR can be converted into a truth table NAND gate. The circuit for this design is as follows

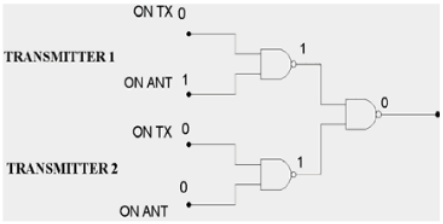


Figure 11. DVOR Transmitter 1 Normal operating conditions and Transmitter 2 Standby

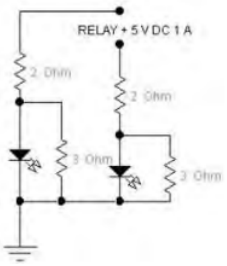


Figure 12.Lowering circuit Voltage and current on Indicator LED Desk Tower

C. Indicator Desk Tower

In the design of the Desk Tower taken from Vcc at 5 Volt DC and 1 A, which is connected to the first switch omron relay, but voltage and current to turn on the LED is too large, while the LED operates at 3 VDC 100 mA. So the decline in the use of voltage and current in the LED, see Figure 12.

D. Microcontroller ATMega 16

In this design ATMega microcontroller used is 16 to control the system, for monitoring system, used in the form of an LCD display and MODEM Fastrack M1306B, transmit information to the condition RSCE DVOR phone number officers, for all the design system see figure 13.

IV. SYSTEM UNDER TEST AND ANALYSIS

A. Desk Tower Data Analysis

The test data on the desk tower begins at 5 Volt DC OMRON relay the switch will be connected so that the voltage on the line green LED will light up with a value of 3 Volt DC voltage on the red LED will otherwise die, otherwise at the time of death DVOR the relay will die so relay switches back to the open position and the switch is connected to the red LED will light up with a 3 Volt DC voltage, see Table 1.

B. Data Microcontroller Test and Analysis

Testing microcontroller begins when the voltage of DVOR logic 0 so that the relay is not working so the relay will switch back to normally open so that at the same time the red LED will light up and the pins 0 and 1 on port B is connected so that it will enable the IC ATMEGA 16 and will work according with

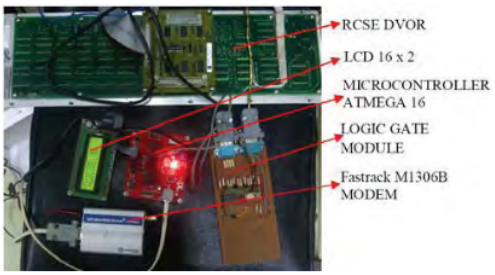


Figure 13. Picture All module in the System

Table 1. LED Indicator on Desk Tower

DVOR	DESK TOWER	
	GREEN LED	RED LED
ON	ON	OFF
OFF	OFF	ON

Table 2. Output Microcontroller

Microcontroller Input	RJ 11
pin 0 and 1 *Short*	0,5 Volt
pin 0 and 1 *Open*	0 Volt

instructions that have been uploaded into the microcontroller ATMEGA 16 and RJ 11 produced in the form of a voltage of 0.5 volts per message delivery takes place, which is then sent to the modem to be broadcast in addition it will produce output on Port C are connected to the LCD display 16 x 2 to display the number of short messages sent purposes.

C. Modem FASTRACK M1306B

Modem FASTRACK M1306 modem B is working on a dual frequency on the 900/1800 Mhz and has an input voltage of 5, 5 Volt minimum voltage, current modem power supply given the time it will turn the whole modem component, after the modem is active, will be in a condition standby waiting for input from the microcontroller, if the microcontroller to provide input on the modem, the modem will send data and destination address in the format that has been in ATMEGA 16 and then radiated through the modem to the phone DVOR charge. see Table 3.

Table 3.Data form testing for all system

INPUT TX 1 AND TX2		OUTPUT LOGIC GATE	OUTPUT MICROCONTROLLER RJ 11	DESK TOWER INDICATOR	
TX	ANT			GREEN	RED
1	1	0	0	ON	OFF
0	1	1	0, 5 V	OFF	ON
0	0	1	0,5 V	OFF	ON

Testing and analysis of the overall data began in DVOR ie when it is in normal condition and then output to the TX ANT ON, on Transmitter 1 and Transmitter 2 will control the input to the fourth transistor, and the transistor will produce a combination of input NAND gate, the output of NAND gate will be logic 1 or 0, if logic 1 it will activate the transistor and which serves as a direct current switching because of the NAND gate is not able to activate the relay coil. Green LED will light tower on the desk, if NAND gate transistor logic 0 then it does not work that ultimately will make the relay is not working so the Red LED Desk Tower will be blamed, at the same time switch relay to be short so that the two inputs on port B pin 0 and 1 on ATMEGA 16 microcontroller will be connected so that the microcontroller will work according to the instructions that have been uploaded, then the microcontroller ATMEGA 16 will result in the RJ 11 which will then input data on Fastrack M1306B modem which then sends the data in the form of a short message that "DVOR OFF" to 5 numbers DVOR is responsible, "085255525308, 081389597256, 081380211201, 081522572110, 085649599334" who had been in the previous program in microcontroller ATmega16 see Table 4.

Table 4.Data Test in the form of SMS

Modem Input	Destination Number and Location				
	085255525308 Makassar	081389597256 Depok	081380211201 Bogor	081522572110 Halim Perdanakusuma	085649599334 Halim perdanakusuma
0,5 Volt	DVOR OFF	DVOR OFF	DVOR OFF	DVOR OFF	DVOR OFF
0 Volt	-	-	-	-	-

Table 5.Data Test in system design

INPUT TX 1 AND TX2		OUTPUT LOGIC GATE	OUTPUT MICROCONTROLLER RJ 11	DESK TOWER INDICATOR	
TX	ANT			GREEN	RED
1	1	0	0	ON	OFF
0	1	1	0, 5 V	OFF	ON
0	0	1	0,5 V	OFF	ON

V. CONCLUSION

1. If the normal operating status DVOR the logic gate output module = 0 Volt and DVOR in OFF condition when the output of the logic gate = 5 Volt so that control the relay input on the microcontroller and LED Desk Tower will be Active.
2. If DVOR status is in normal condition, the green LED will be on the line desk Tower will produce a voltage of 3 volts DC, when DVOR dead at the transmitter is on one or both transmitter off the line the red LED on the desk tower will produce a voltage of 3 volts DC.
3. If the transmitter 1 and transmitter operate normally DVOR 2 standby or vice versa, then the microcontroller does not work, so that the output on an RJ 11 = 0 volts so that the modem does not work and if the transmitter 1 and 2 on the transmitter is off, it will activate the modem to send data in the form of SMS to 5 numbers that have been programmed in the microcontroller.

REFERENCES

[1]. Alcatel,*RCSE 443*,stutgart ,“ Alcatel Air Navigation System”, GmbH,1999
[2]. Alcal, *Technical Manual DVOR 432*, Stuttgart “ Alcatel Air navigation System” GmbH, 1999
[3]. Texas instruments Incorporated ,”*The TTL data Book For Engineers”* , Second Edition ,Texas,1976
[4]. Daryanto, “Keterampilan Kejuruan Teknik Elektronika”, cetakan pertama, Bandung, 2010
[5]. Budi Eko Purwanto, “Teori dan Aplikasi Sistem Digital”, Edisi Pertama, Graha Ilmu, Bandung, 2011
[6]. H William, Hayrt Jr, Kemmerly, M Steven, Durbin, “Rangkaian Elektronika”, Edisi Ke Enam, Erlangga, 2005
[7]. Budiharto Budi, Firmansyah Sigit, Elektronika Digital Dan Mikroprosesor, CV Andi Offset, Yogyakarta, 2010
[8]. http://www.interscan.com.au, tanggal 15 Jjuli 2011
[3] http://www.datasheatcatalog.com tanggal 15 Juli 2011
[10].http://www.nxp.com/documents/data_sheet/74 F00.pdf Tanggal 5 gustus 2011
[11].www.atmel.com/atmel/acrobat/doc2466.pdf Tanggal 3 Agustus 2011
[12]. http://en.wikipedia.org/wiki/7400_series Tanggal 5 Agustus 2011

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