REMOTE CONTROLLED MEASUREMENT RECEIVING SYSTEM

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ABSTRACT

This article is discussed about proposal and realization remote controlled measurement receiving system with receiver YAESU VR–5000, which can remote measurement quality of signals from 100 kHz to 2,6 GHz. This system is possible to control by Internet in any Internet browser.

1. INTRODUCTION

Receiver YAESU VR–5000 [1] is possible to use from 100 kHz to 2,6 GHz in mode CW, SSB (LSB and USB), AM and FM. The receiver has low-frequency output, which is possible to connect with sound card of PC. The receiver is possible to control via serial interface RS-232. By the help of this interface is possible to set up frequency, modulation and bandwidth (see fig. 1 for block diagram remote controlled measurement receiving system).
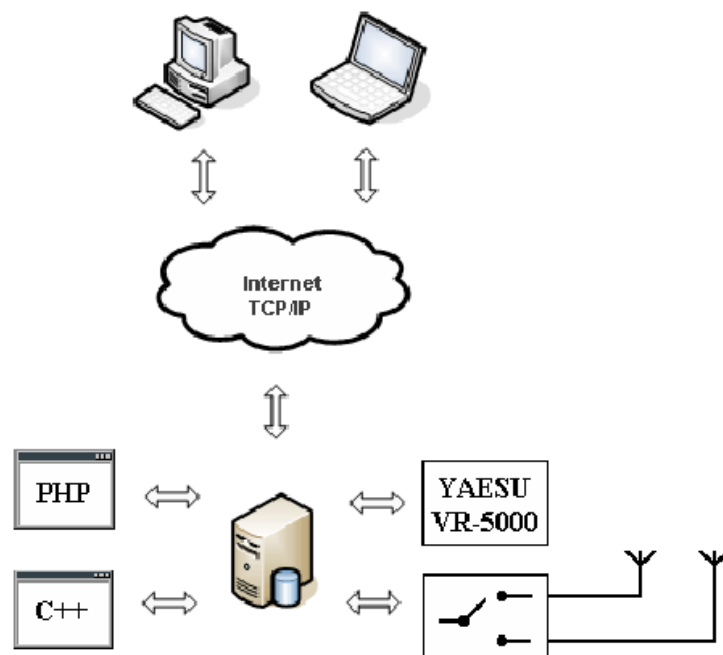

Figure 1: Block diagram remote controlled measurement receiving system.

2. SYSTEM DESCRIPTION

2.1. COMMUNICATION YAESU VR–5000 WITH PC

Serial data is passed via the RS-232 of the radio at 4800, 9600, or 57600 bits/sec.

Command Tittel	Parameters				Opcode	Comments
CAT ON/OFF	X	X	X	X	P1	P1=00: ON, P1=80: OFF
Set Frequency	F1	F2	F3	F4	P1	P1=01: MAIN VFO P1=31: SUB VFO
Receiving Mode	M1	M2	X	X	P1	P1=07: MAIN VFO P1=37: SUB VFO
Receiving Status	X	X	X	X	E7	S-Meter, Squelch, etc.

Table 1: Opcode Command Data.

M1			
00	LSB	44	WAM
01	USB	48	WFM
02	CW	84	AM-N
04	AM	88	FM-N

M2							
21	20 Hz	43	5 kHz	05	100 kHz	34	25 kHz
02	100 Hz	53	6,25 kHz	45	500 kHz	44	50 kHz
42	500 Hz	63	9 kHz	14	12,5 kHz	-	-
03	1 kHz	04	10 kHz	24	20 kHz	-	-

Table 2: Receiving Mode/Channel Step Parameter Codes.

For example if frequency is set up to 439.70 MHz, is necessary to parameters are set up to F1=02, F2=9E, F3=ED, F4=D0 via the RS-232 (see tab. 1 for opcode command data).

For example if receiving mode is set up to WFM with 100 Hz channel step, is necessary to parameters are set up to M1=48, M2=02, via the RS-232 (see tab. 2 for receiving mode/channel step parameter codes).

2.2. MODULE FOR CONTROL AND SWITCH ANTENNAS

This module is allowed to switch antennas and control antenna rotator. The module is designed for another changes and upgrades (see fig. 2 for module for control and switch antennas). All inputs and outputs are galvanic protected to 5 kW. Everything is controlled by microprocessor ATMEGA16 [2]. Source code for this microprocessor is written in C language via CodeVisionAVR program. The modul is connected to PC via USB interface. Signal USB from PC is transferred via UMS2 [3] to signal RS-232 and it is fetched to microprocessor. A schema and printed-circuit are designed in program KiCad, which is distributed in GPL licence. The microprocessor is possible to program on board via ISP connector.
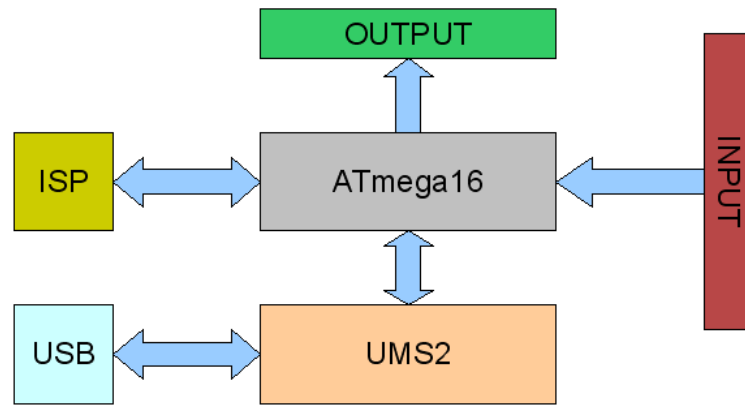
Figure 2: Module for control and switch antennas.

When the microprocessor is connected to power the program is started. Firstly some variables are initialized. Secondly the program is jumped to endless loop in which data are led over from PORTA to RS-232 and data from RS-232 are led over to PORTC.
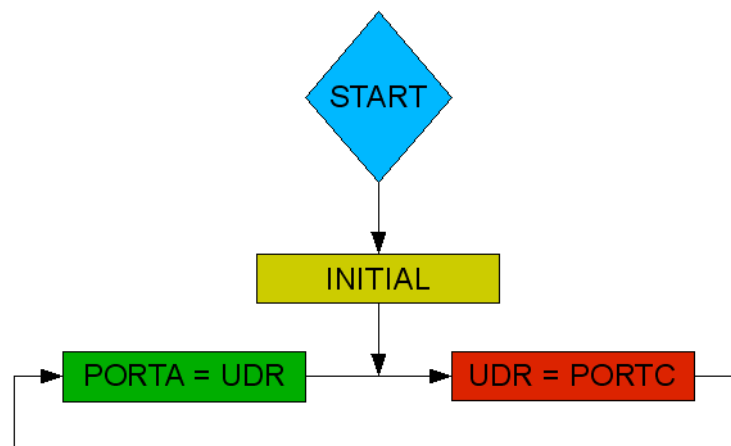

Figure 3: Block diagram of microprocessor

2.3. CONTROLLING PROGRAM

Controlling program is connected all the parts of system (receiver YAESU VR–5000, module for control and switch antennas, PC). The program is generated configuration script for program Apache [5]. On Appache is run PHP [6] script which provides for communication with client. The script also sends dates to Controlling program via TCP/IP protocol on port 7777 and the controlling program sets up receiver and module for control and switch antennas. Then the program starts to record signal from the air and saves record to file. This program is written in C++ language via Borland C++ Builder [4]. Rules in firewall must be set up correctly (a connection on port 7777 must be accepted).

2.4. CLIENT

User (client), who wants to use remote controlled measurement receiving system, needs computer which is connected to the Internet and is taken in sound card for playing records. It can be used any operating system with any Internet browser (Internet Explorer, Mozilla, Firefox, Opera...). In the browser is opened page of server. For example http://127.0.0.1, when application is tested and server is run in localhost (see fig. 4 for client in Firefox browser).

Figure 4: Client in Firefox browser.

New record is created when frequency, modulation, bandwidth, angle of turning rotator, select antenna and select length of record are set up and request is sent. The system is run for few minutes and then the record is played. In the bottom part of page is list of all records. Every record is possible to play again.

3. CONCLUSION

This application is designed for remote measurement quality of signals from 100 kHz to 2,6 GHz. The application is divided into two parts, server and client.

On the server's side is receiver, module for control and switch antennas, PC with sound card and controlling program. The supervisor is had to match these parts together and set up rules in the firewall.

On the client's side is computer, which is connected to the Internet. It can be used any operating system with any Internet browser (Internet Explorer, Mozilla, Firefox, Opera...). If address is submitted into Internet browser, the main www page is showed. Record is created when frequency, modulation, bandwidth, angle of turning rotator, select antenna and select length of record are set up and request is sent.

REFERENCE

[1]   YAESU VR-5000 All Mode 100kHz-2600MHz Communication Receiver. Operating Manual. Vertex Standard Co., Ltd. Tokyo 2000

[2]   Manual of microcontroler Atmel ATMEGA16. Atmel Corporation, Inc. [Online], 2004 - [cit. 20.3.2006], URL: http://www.datasheetcatalog.com

[3]   Manual of UMS2 modules, ASIX s.r.o. [Online], 2005 - [cit. 10.4.2006], URL: http://www.asix.cz

[4]   Grafika Publishing, s.r.o. *Builder*, 1997-2003, URL: http://builder.cz

[5]   The Apache Software Foundation, 1999-2005, URL: http://www.apache.org

[6]   The PHP Group, 2001-2005, URL: http://www.php.net