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The Conference .

Files

Version 2.

DiSEqC 1.2 positioner.

The proposed self-manufacturing unit (hereinafter - the positioner) is intended for automatic pointing antenna receiver satellite TV on your pre-programmed positions when switching channels. The positioner is working with receivers supporting DiSEqC 1.2 protocol and can store up to 30 satellite positions. Antenna mounted on a polar suspension.



The principle of operation of the positioner is based on the transfer of a receiver for the end device (slave) defined commands Protocol DiSEqC 1.2. This protocol uses pulse width modulation carrier frequency of 22 kHz to transmit commands to reduce the cable from the antenna. In this case '0' and '1' is encoded as shown in Figure 1.

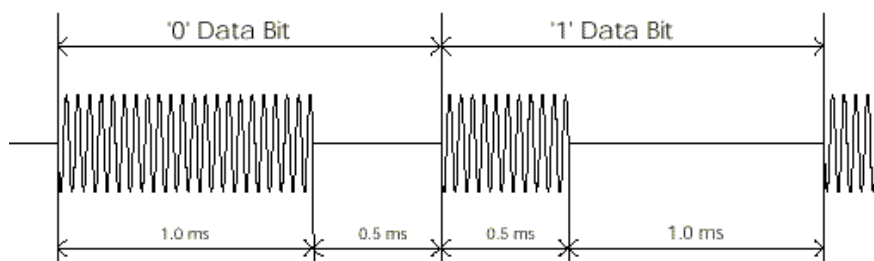


Figure 1

DiSEqC command contains a few bytes of data. According to protocol, the team consists of the following bytes (each of which terminates in a parity bit):

- 1 - 'Framing byte' - specifies the command source (master or slave), as well as whether you want to answer (reply) to the source (eg, "E0h" - from the master, the answer is not required);
- 2 - 'Address byte' - indicates which of the devices on the bus is a command (eg, "31h" - for the positioner);
- 3 - 'Command byte' - determines the action that should be addressed to implement a device (eg, "6Ah" - to keep the position);
- 4 and all subsequent bytes - 'Data bytes' - contain data relating to the command (for example, the command "E0 31 6A 02" means to preserve the current position as number 2 in the positioner memory);

Bytes are transferred one after another, in this case, the high bit is transmitted first (Most Significant Bit first).

More protocol is described in [Functional Specification Bus](#) .

The design is simple to manufacture and does not contain scarce components. Schematic diagram of the positioner is shown in Fig. 2.

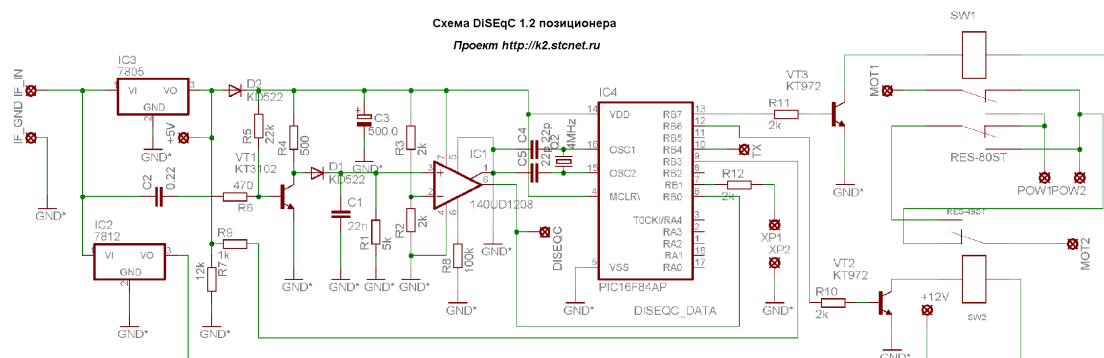


Figure 2

The components of VT1, D1, C1, R1 assembled detector tone of 22 kHz. IC1 (K140UD1208) - enabled by the comparator circuit, causes the signal at the detector output to logic levels. Since the comparator output (pin 6) input signal is applied to PIC-controller IC2, where proshodit subsequent signal processing. Actuator motor is controlled by two switches: RES-49 enables / disables the engine, REF-80 switches its direction of rotation. Both relays are designed for 12V operating voltage.

To supply the e-mail. motor actuator using two separate wires connected to the points POW1, POW2 (see diagram). Contact MOT1, MOT2 connected to the engine. Standards will now be possible to supply the motor signal cable (modern receivers are able to provide load 400-500 mA), however, to avoid possible overloads, use separate wires. When you turn off the engine, his findings are closed on themselves, which ensures a sharp stop at the expense of current self-induction.

Two high-frequency connector on the body of the positioner connected in parallel with the center connector connected to the input through the inductor IF_IN 10-20 uH (not shown), to screen IF_GND (see diagram).

Contact XP1 and XP2 poklyuchayutsya to the contact sensor actuator (normally open). In their closing and subsequent opening of the positioner "thinks" that the position of the antenna has changed in step. The resolution of the positioner - 65536 steps. The device requires no external power supply - power is supplied through a cable connected to the input of high-frequency receiver.

For testing the electrical part of the positioner, and debugging software was assembled model unit (Fig. 3).

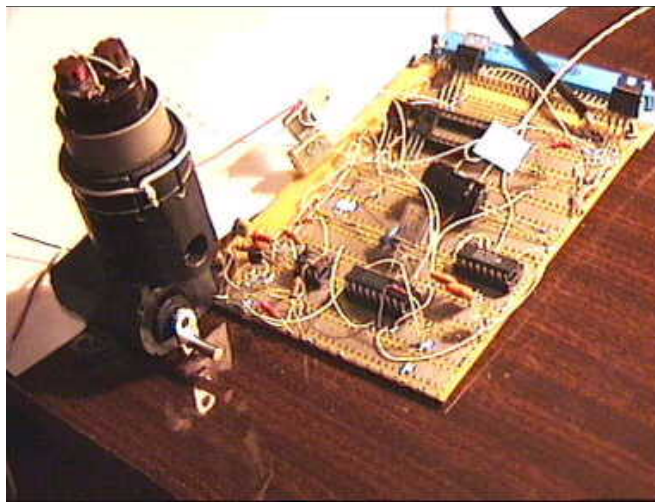


Figure 3

As an actuator used gear on the output shaft of the arrow which has been strengthened, "pointing to the satellite." At the intermediate shaft gear fortified magnet, closing kotnakty reed, to calculate the rotational speed and determination, so the antenna. The debug information from the PIC-controller was deduced on COM-port.

When connected to a point DISEQC (see Fig. 2) The computer sound card and issue the command receiver positioner, signal is observed (Fig. 4).



Figure 4 (click image to listen to the signal).

On closer examination, the signal in accordance with the method of encoding information, see the following.

The first byte transmitted 11100000 (E0h), behind him - 00,110,001 (31h), etc. Thus, the transmitted command E0 31 6B 01 (GOTO 01), tells the positioner the need to rotate the antenna to the position 01.

A complete set of commands the positioner is shown in [Application Note Positoner](#) . The printed circuit board unit is made of fiberglass foil-known method of "laser-printer technologies." The layout is shown in Fig. 5. The card has a jumper (shown in the figure in red). Microcontroller mounted on the socket for future firmware update.

Correctly assembled to set schema does not need ^a. Before turning on the positioner mounting is recommended to check the absence of fault, especially in the inlet part. To verify that the circuit output TX (Fig. 2) PIC-controller connected via a resistor to the input 2k RX COM-port of the PC (HEX, 38 400 8N1). When submitting DiSEqC command receiver, taking them can be seen at the terminal. Also see the current position of the antenna (double-byte integer) for the closure of contacts XP1 and XP2. Along with this, the relay are verified by issuing the appropriate commands.

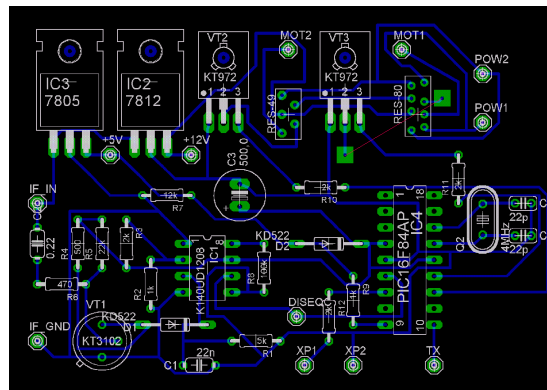


Fig.5

Connection scheme of the positioner with the other devices shown in Fig. 6. At present, the power supply switched manually, but its inclusion in future plans to produce automatically (along with the inclusion of the receiver) using the output 12v/50mA, available in the receiver HUMAX VACI-5300 (red wire on the rice). Exit 12v/50mA will be connected to the relay, which includes BP.

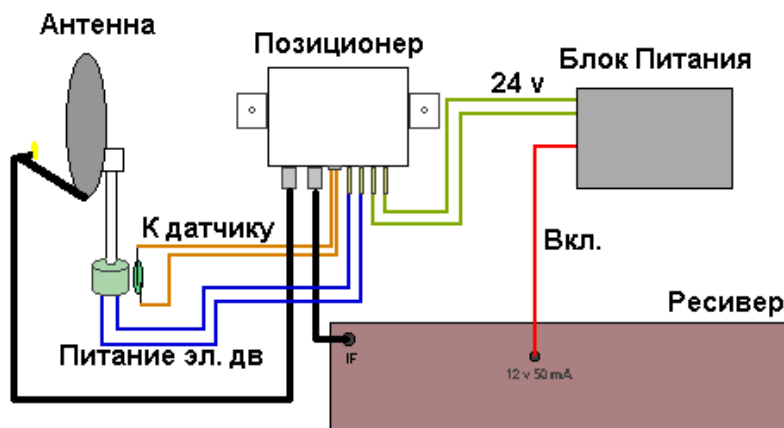
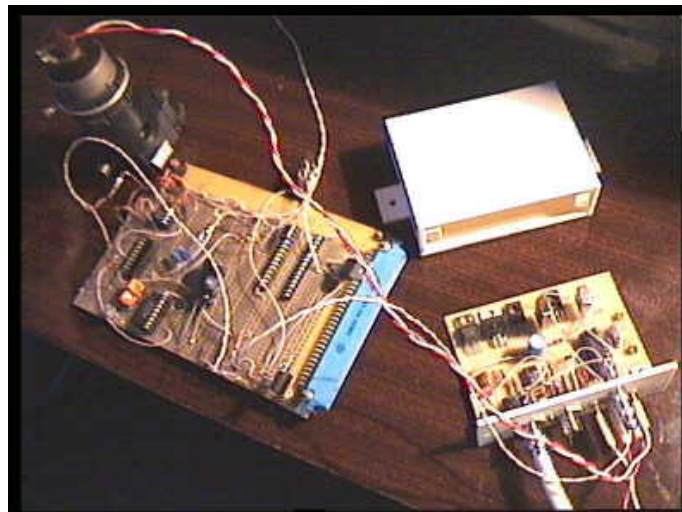


Fig.6

The final version of the positioner was tested on a model antenna (Fig. 7). Device in a plastic waterproof smotirovano housing with bracket for installation.



*Fig.7**Recommendations for use*

It is assumed that the antenna suspension with actuator installed, and the axis of rotation coincides with the ee of the polar axis (for details on installing the antenna suspension can be read [here](#)). The positioner is placed near the antenna. An RF connector is connected to a short piece of cable with the converter is connected to another receiver. Next:

-Bring in the middle of the actuator;

-Orient the antenna in the polar direction of the suspension to the south and to fix it;

And execute the connection, according to the scheme (Fig. 6);

-Turn on the receiver;

- Found in the receiver menu, see "Setting antenna" item "Restart" ("Recalculate") and run this command;

-Turn on the power actuator;

, All subsequent operations to setup the antenna to produce the instructions that came with your receiver.

Note: After issuing the command "Recalculate", in the position of all satellites in the device is prescribed Reference position. In the future, the command "Goto Reference" or "Goto [any untuned satellite]," will be carried out in the middle of the antenna rotation speed (south). In firmware versions below 1.1 is a bug (fixed in later versions) - go astray "Reference" position after the commands that control the actuator limits. If you are using firmware v1.1, and later, after the command "Recalculate" canceled actuator limits.

The positioner is able to store up to 30 (28 in the firmware with support limits) the positions of satellites, which in most cases is sufficient. The positions are stored in nonvolatile memory PIC16F84.

It should be noted that I do not use ready-made actuator. To rotate the antenna (0.9 m) used a homemade design with el. engine (already works ok. 5 years) with a reed sensor as a measure of the angle of rotation. When processing a signal probe delay introduced software for 20ms debounce contacts. I have no information about the frequency with which follow the impulses from the nominal actuator, only to note that if the period of these pulses is less than 25ms, problems can arise with a positioning accuracy of ² .

The possibility of adding to the positioner possible switch antenna (DiSEqC switch). In this case, in addition to controlling the position of the antenna, and would switch between, say, two antennas - one movable and the other - in a fixed position.



Fig.8 The positioner is mounted on the [suspension](#) of the author.

Supports DiSEqC commands.

Command Byte (hex)	Team	Description of commands
60	Halt	Stop motion actuator
63	Limits Off	Cancel the limits of actuator
66	Limit E	Set the eastern limit of the actuator
67	Limit W	Set the western limit of the actuator
68	Drive East	Easting
69	Drive West	Movement to the west
6A	Store nn	Remember nn position and allow the actuator limits
6B	Goto nn	Go to position nn
6F	Set Posns.	Calculate the position

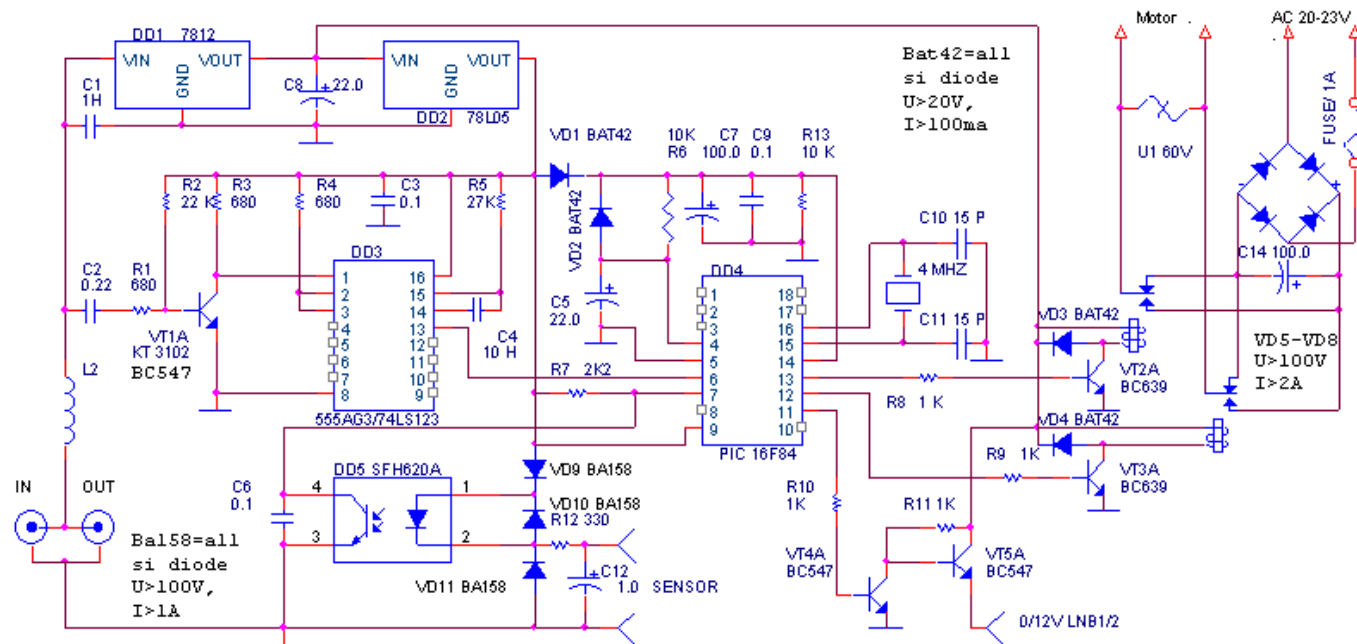
Notes:

- ¹ - In any case, a working version, compiled after the layout work immediately.
- ² - Valery (val@summer.tuapse.ru) reports that the positioner has successfully worked with the finished actuator (in this case we used quartz to 3.58 MHz (!) And installed capacity between 0.1mkF XP1 and XP2).


The modified scheme of the positioner

Submitted by Jonas .

The current version 1.4.



The scheme of connecting devices

Selectable LNB DiSEqC A. Buttons by turning the antenna until  the maximum signal with the desired satellite. Further searched and save the programs, transmitted from the satellite. Selectable LNB DiSEqC B, the same procedure is repeated for the next satellite. Diagram of the buttons shown in the figure. The buttons are mounted so as to prevent them from accidentally pressing simultaneously (at the same position deleted - Recalculate). If the receiver operates on a DiSEqC 1.2, the buttons do not work.

Firmware for circuit Jonas

[v1.1J](#) - Firmware for the scheme [Jonas](#)

[v1.11J](#) - "Nokia patched" version

[v1.2J](#) - Changing foreign key is in position 2 (DiSEqC B)

[v1.21J](#)

[v1.21J_v1](#) - Firmware without turning on the 5th position. Designed to work in conjunction with a fixed antenna that is connected through a switch 12c. The fixed antenna is tuned to the 5th position, and the transition to neJ rotation does not occur, which accelerates the switch between positions.

Fusers: OSC - XT, WDT - off, PWR - on, CP - as you like



Materials:

[Czech site with a description of DiSEqC 1.2 positioner.](#)

[Translation of the description of the Czech positioner.](#) Submitted by Vladimir.

Guidance documents: [Digital Satellite Equipment Control \(DiSEqC\). Bus Functional Specification V4.2 \(pdf\)](#)

[Digital Satellite Equipment Control \(DiSEqC\). Positioner Application Note V1.0 \(pdf\)](#)

Component values in the scheme are subject to change in order to improve design. The author is not liable for any inaccuracy decided to make a device that led to the failure of the receiver.

Many thanks to [the conference ALLSAT](#), in particular, Bogdan, SOLO, Alex Babenko, who gave good advice, useful for the improvement of this design. Thanks to [Jonas](#) for the development of ideas.

Your comments and suggestions [are welcome](#) .

When playing back link is required. Perhaps any change in hardware and software of the device with the notice of the author . For noncommercial use only.



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