

How connect to computer a joypad from the game console

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Translated from Russian by author, Sergey Ryumik

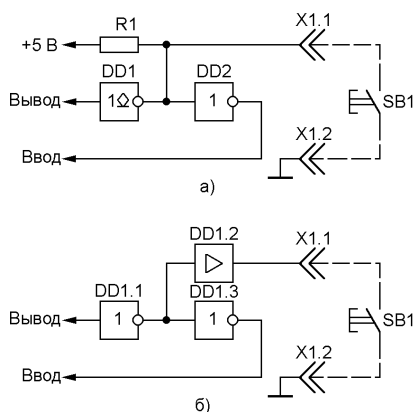
In previous publication under the same name ("RADIO", 2003, № 3, p. 16, 17) author has told how it is possible with the help of joypads from various game consoles and software package DirectPadPro (DPP), developed in 1999 by Earle F. Philhower, III, to control not only computer emulators of console games, but any other application as well. It was mentioned that joypads from the game console "SEGA Mega Drive-II" ("Genesis") do not work with every computer motherboards. Since then the author understood the reasons of incompatibility, changed connection of such joypad to computer's LPT-port and modified some programmes in DirectPadPro package. Incompatibility does not exist any more!

If a joypad from the game console "SEGA Mega Drive-II" is connected to LPT-port as it was recommended by DPP package author, modern IBM-compatible computers do not react to pressing of joypad buttons "UP" ("Z") and "DOWN" ("Y").

According to the circuit diagram of adaptor from the file genesis.gif (it can be found in archive <ftp://ftp.radio.ru/pub/2003/03/dpp/dpadpr50.zip>) the mentioned buttons are connected to lines STROBE# and AUTOFEED# of the LPT port, the state of which is represented by bits 0 and 1 of printer's control registry. For the programmer it is either port 37AH (LPT1) or 27AH (LPT2). The reason why the joypad is not working could not be found in the Internet. It was necessary to study LPT-port adapters of various

generations of personal computers.

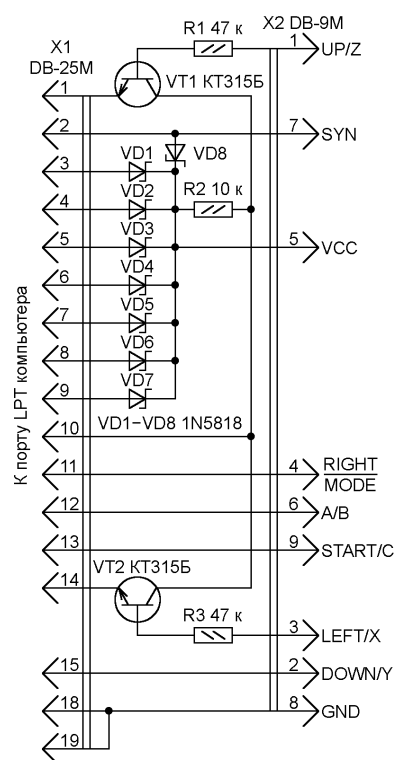
The typical input-output circuit of one bit of the LPT-port control register used in IBM PC/XT and some clones is given in **fig. 1, a**. The output is an open collector of the inverter DD1, loaded with R1 resistor and tied directly to a pin of X1.1 connector. The input of DD2 is connected here also. In standard registry



implementation for printer control signals output the logic level on the output of element DD2 is the same as on the input of element DD1, the level on the pin is inverted.

The program driver of "Sega"-joypad uses an undocumented approach ("hint"). Writing logical 0 to the corresponding bit of the registry sets a high voltage level on the output of DD1. In this state the output transistor of DD1 is closed and does not influence operation of the unit. By pressing the keypad button SB1 connected to contacts of X1 one connects the input of DD2 to the common wire. As a result a computer reads logical 0 for the button released and logical 1 for pressed.

In modern computers the input-output circuits of control register are constructed as shown on **fig. 1, b** with elements DD1.1—DD1.3 located inside the LSIs of a motherboard as a rule. The logic of operation remains unchanged, but described "hint" does not work anymore. Therefore the computer gives no response to pressings of joypad buttons "UP/Z", "DOWN/Y".



The improved circuit for connection the game console "Sega" joypad to a computer is shown on **fig. 2**. It differs from the original in three ways. First, the signal from button "DOWN/Y" is sent to a non-connected earlier contact 15 (ERROR#) of connector X1. Second, there are transistors VT1 and VT2. Signals from buttons "UP/Z" and "LEFT/X" sent to the bases of VT1 and VT2, collectors of VT1 and VT2 connected to each other and to contact 10 (ACKNLG#) of connector X1. Emitters of the transistors are connected to contacts 1 (STROBE#) and 14 (AUTOFEED#) of connector X1 accordingly. Third, diode VD8 added. It reduces probability of occurring "thyristor" effect in a joypad's CMOS-chip.

State of the button "DOWN/Y" is now represented by bit 3 of the printer status register at the address 379H for LPT1 or 279H for LPT2. Position of button UP/Z or LEFT/X is represented by bit 6 of the same register. It depends on the voltage levels programmatically set on emitters of transistors. For example, if on contact 1 is the low level, and on contact 14 is the high level, transistor VT2 is constantly closed, and VT1 is open at high level and is closed at a low level on line UP/Z. At inversion of levels on

contacts 1 and 14 transistor VT1 will be constantly closed, and VT2 open at high level and closed at a low level on line LEFT/X.

A power for joystick is provided via VCC net through dividing diodes VD1-VD8 from eight lines of LPT-port, at seven of which (contacts 3-9 of connector X1) the high logic level is present constantly. The consumption current of joystick depends on number of simultaneously pressed buttons and does not exceed, as a rule, 2...4 mA. The supply voltage of joystick thus does not fall outside the limits 3,5...3,8 V (VD1-VD8 - diodes Schottky specified on the scheme) or 3,1...3,4 V (usual silicon diodes).

All elements of the interface device can be placed inside the plastic case of computer 25-contact connector DB-25M (X1). Leads of the components should be soldered directly to connector pins. Connector DB-9M (X2) is connected to other elements with 1...1,5 meters of nine-wire flat cable.

One can use any small-sized resistors. The values of two of them (R1 and R3) not critical and can be from 22 up to 82 kOhm. Transistors KT315, KT312, KT3117 with any alphabetic indexes are valid as well as any other silicon low-power n-p-n structure transistors. Do not use superbeta ($h_{21} > 250$) transistors. Schottky-barrier diodes 1N5819 may be replaced with KД923А.

If general purpose silicon diodes like КД522Б (1N4148) used, the supply voltage for joystick gets lower, resulting a possible malfunction of some joystick (you must check it out experimentally).

Files "dpadpro.vxd" and "dpadpro.dll" from DPP 5.0 package were modified to provide support for new way of joystick's connection. The modernized package (the version is changed to 6.0) is packed into archive "dpadpr60.zip". The source codes of the new joystick polling procedure are located in "C++" folder.

During installation of the new package on a computer follow the recommendations from the first published article. Select controller type "Genesis" on the appropriate stage of the process (the joystick with buttons "UP", "DOWN", "LEFT", "RIGHT", "A", "B", "C", "START") or "Genesis 6 button" (with buttons "X", "Y", "Z", "MODE" added). For joysticks from other game consoles (NES, SNES, PlayStation etc.) the new version does not differ from the initial one 5.0.

If computer reacts wrongly on buttons pressing during calibration process, the reason is, as a rule, the mistakes in adapter wiring.

Package DPP designed for Windows-9x environment. Operation systems Windows-2000/XP will require the additional driver "NTPAD XP" which may be

downloaded from <http://24.232.29.41/dist/ntpadxp2.01.exe> for free, the size is 175 Kilobytes.

Editor's note. Software package DPP version 6.0 is located on the FTP-server of our magazine at <ftp://ftp.radio.ru/pub/2003/12/dpp6/dpadpr60.zip>