

H89PIP PARALLEL INTERFACE PORT (D83a)

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INTRODUCTION

The H89PIP is an add-on circuit card for the Heath/Zenith H89/Z89 series of all-in-one computers. The card uses an 8255 Programmable Parallel Interface chip to provide two 8-bit Parallel Interface Ports. One port is buffered for use as a Centronics™ Printer Interface. The other port is "bare" and may be used for parallel input or output.

The H89PIP may be installed on either the "right side" (P504-P510 or P505-P511) or the "left side" (P501-P507, P502-P508, or P503-P509) internal bus. When installed on the left, a 3-wire cable (included) is run to the right side to bring in needed I/O control signals.

INSTALLATION

A. Right-Side Installation -

To install the H89PIP on the right-side bus, accomplish the following steps:

1. Unplug the computer power and remove the cabinet shell.
2. Remove the accessory mounting bracket.
3. If you have the optional Printer Cable, plug the 26-Pin connector of the cable onto the pins at P4 on the H89PIP. Pin 1 of the cable should align with Pin 1 of P4 as marked on the card. Pin 1 of the cable is identified by the colored (usually blue) stripe on one edge of the ribbon cable.
4. Plug the H89PIP into either the Cassette Interface (P504-P510) or the Serial Interface (P505-P511) position. These two locations are interchangeable.

5. Route the Printer Cable (if any) out the rear of the computer.
6. Replace the accessory mounting bracket.
7. Replace the cabinet shell. Position the Printer Cable (if any) between the shell and the base. If the cabinet shell fits too tightly to close properly, remove the cabinet shell hinges and reinstall with flat washers between the hinges and the shell.

B. Left-Side Installation -

To install the H89PIP on the left-side bus, modifications to both the computer and the H89PIP are required. The modifications are needed because the left-side bus does not have the I/O control signals needed to operate the H89PIP. The signals are brought to the H89PIP from the right-side bus via a 3-wire cable and connector. Before installing the H89PIP on the left-side bus, try it out on the right-side bus and make sure that it operates properly.

To install the H89PIP on the left-side bus, perform the following steps:

1. Unplug the computer power and remove the cabinet shell.
2. Remove the accessory mounting bracket. Unplug any cards on the right-side bus. Remove the CPU Board.
3. Locate the 3-wire cable provided with the H89PIP.

Note: In the next three steps, you will connect the stripped ends of the 3-wire cable to pins on P510 on the CPU Board. Make each connection by wrapping the wire around the bottom of the pin, as near to the CPU Board as possible. When soldering, be careful to not melt the plastic part of P510.

4. Connect the red wire to Pin 6 of P510 and solder.
5. Connect the white wire to Pin 7 of P510 and solder.
6. Connect the blue wire to Pin 9 of P510 and solder.

7. Route the 3-wire cable to the left side of the CPU Board near the left-side bus.
8. Reinstall the CPU Board. Replace the cards removed in Step 1. Replace the accessory mounting bracket. Power up the computer and make sure that it still works properly. If not, check your connections at P510 for possible shorts between pins.
9. Place the H89PIP component-side-down on a well-lighted, flat work surface.
10. Using a sharp knife, carefully sever the circuit board conductors that originate at Pins 6, 7, and 9 of Connector P2. Make the cuts as near to the solder pads of P2 as practical.
11. If you have the optional Printer Cable, plug the 26-Pin connector of the cable onto the pins at P4 on the H89PIP. Pin 1 of the cable should align with Pin 1 of P4 as marked on the card. Pin 1 of the cable is identified by the colored (usually blue) stripe on one edge of the ribbon cable.
12. Push the connector of the 3-wire cable to P5 on the H89PIP. Orient the connector so that the red wire goes to Pin 1 of P5.
13. Plug the H89PIP in to P501-P507 or P502-P508 of the left-side bus.
14. Route the Printer Cable (if any) out the back of the computer.
15. Replace the cabinet shell. If the shell won't close properly, refer to Step 7 of the right-side installation (above).

SERIAL PORT CONFLICT

If your computer has the H-88-3 (or equivalent) Triple RS-232 Serial Interface card installed, there will be a conflict between the H89PIP and one of the serial ports. The conflict occurs because the H89PIP and the serial port both use the same decoded I/O port signal (SERL0, Pin 9 on the bus). To eliminate the conflict, physically remove the Port 320Q 8250 ACE chip (the middle 40-Pin chip one) from the Triple RS-232 Serial Interface card.

DESCRIPTION

The H89PIP uses an 8255 Programmable Parallel Interface chip. The 8255 has three 8-bit Parallel Ports (A, B, and C) which are wired to the pins of the H89PIP Ports P3 and P4 as shown in Table I.

Port A of the 8255 is connected directly to Port P4 and may be used as an input or an output. Port B of the 8255 is buffered with non-inverting buffers and connected to Port P4 and must be used as an output.

The lower four bits (0-3) of Port C are inputs and are used for the handshaking signals (HS1 and HS2). The handshaking signals on Port P4 are buffered with noninverting buffers. The upper four bits (4-7) of Port C are outputs. Two of these bit are buffered with noninverting buffers and are used for the STB signals.

P3/P4 Pin	Signal	P3 Source	P4 Source
1	STB (out)	Port C Bit 5	Port C Bit 4
3	Data 1 LSB	Port A Bit 0	Port B Bit 0
5	Data 2	Port A Bit 1	Port B Bit 1
7	Data 3	Port A Bit 2	Port B Bit 2
9	Data 4	Port A Bit 3	Port B Bit 3
11	Data 5	Port A Bit 4	Port B Bit 4
13	Data 6	Port A Bit 5	Port B Bit 5
15	Data 7	Port A Bit 6	Port B Bit 6
17	Data 8 MSB	Port A Bit 7	Port B Bit 7
19		not connected	not connected
21	HS1 (in)	Port C Bit 0	Port C Bit 2
23		not connected	not connected
25	HS2 (in)	Port C Bit 3	Port C Bit 1

Even numbered pins except Pin 26 are signal ground.

TABLE I - WIRING OF PORTS P3 AND P4

PROGRAMMING

The 8255 on the H89PIP looks like three input/output ports and a command register (output only) addresses as shown in Table II.

Name	Octal	HEX	Decimal	Direction
Port A (P3)	320Q	0D0H	208	Input or Output
Port B (P4)	321Q	0D1H	209	Output Only
Port C	322Q	0D2H	210	4-Bit Input 4-Bit Output
COMMAND	323Q	0D3H	211	Output Only

TABLE II - ADDRESSING OF THE H89PIP 8255

Before the H89PIP can be used, the 8255 must be initialized. This is done by outputting a MODE byte to the COMMAND Register. If Port P3 is to be an output, the MODE byte must be 201Q, 81H, or 129. If Port P3 is to be an input, the MODE byte must be 221Q, 91H, or 145.

To output a data byte via Port P3, the byte is output to Port A of the 8255. To output a data byte via Port P4, the byte is output to Port B of the 8255. As soon as the OUT instruction is executed, the data byte appears at the pins of Port P3 or P4.

To input data from Port P3, data is input from Port A. To input the handshaking signals (see Table I) from both P3 and P4, data is input from Port C.

The STB signals for Ports P3 and P4 may be Set or Reset by outputting CONTROL bytes listed below to the COMMAND Register.

Set P3 STB,	013Q or 0BH or 11
Reset P3 STB	012Q or 0AH or 10
Set P4 STB	011Q or 09H or 9
Reset P4 STB	010Q or 08H or 8

Both the Port P3 and P4 STB signals may be setup at the same time by outputting a bits to Port C. Bit 5 of Port C is the Port P3 STB and Bit 4 is the Port P4 STB. The lower bits are ignored.

The 8080 assembly language program fragment (below) illustrates how to use Port P4 with a printer. It assumes that the H89PIP has been properly initialized and that the Port P4 STB signal has been Set.

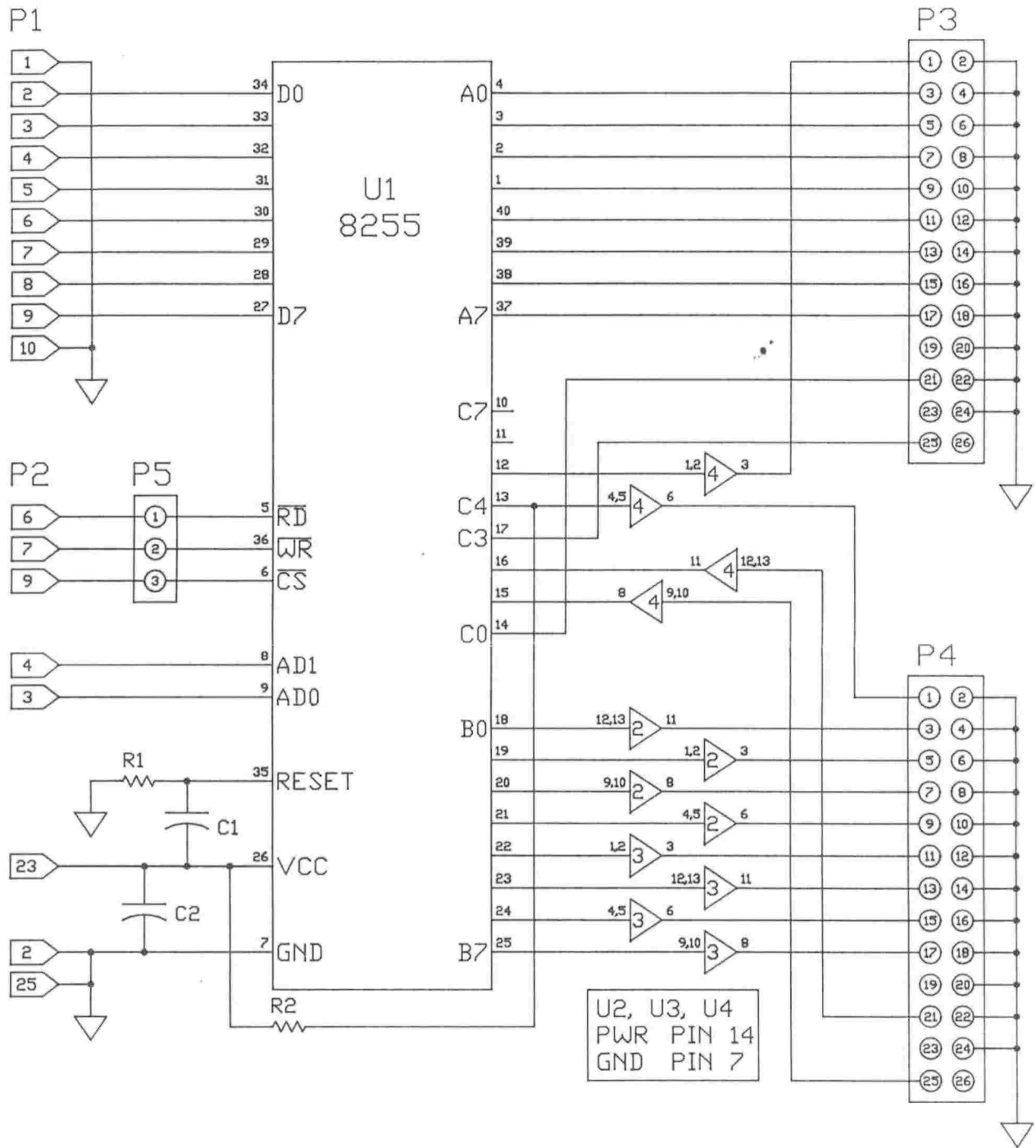
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    ;SUBROUTINE TO OUTPUT A CHARACTER TO PRINTER
    ;
    ; WAIT FOR PRINTER TO BECOME NOT BUSY
    ;
OUTC:  IN 322Q          ;READ PORT C
        ANI 4          ;ISOLATE BUSY BIT (HS1)
        JNZ OUTC      ;LOOP IF PRINTER BUSY
    ;
    ; OUTPUT THE CHARACTER
    ;
        MOV A,C        ;GET CHARACTER
        OUT 321Q       ;OUTPUT TO P4 VIA PORT B
    ;
    ; GENERATE /STROBE PULSE FOR PRINTER
    ;
        MVI A,010Q    ;RESET P4 STB SIGNAL
        OUT 323Q
        MVI A,011Q    ;SET P4 STB SIGNAL
        OUT 323Q
        RET
    ;
```

CENTRONICS™ STANDARD PRINTER CABLE

The Printer Cable wiring is shown in Table III. The cable is made from 26-conductor ribbon cable. The Printer connector is an Ansley 609-36MA (or equivalent). The P4 connector is an Ansley 609-2600M (or equivalent). The * marks signals not used by the H89PIP.

PORT P4 Pin	Signal Name	PRINTER Pin
1	/STROBE	1
2	/STROBE Return	19
3	Data 1 LSB	2
4	Data 1 Return	20
5	Data 2	3
6	Data 2 Return	21
7	Data 3	4
8	Data 3 Return	22
9	Data 4	5
10	Data 4 Return	23
11	Data 5	6
12	Data 5 Return	24
13	Data 6	7
14	Data 6 Return	25
15	Data 7	8
16	Data 7 Return	26
17	Data 8 MSB	9
18	Data 8 Return	27
19	* /ACKNLG	10
20	/ACKNLG Return	28
21	BUSY	11
22	Busy Return	29
23	* PE	12
24	PE Return	30
25	SLCT	13
26	* /INIT	31

TABLE III - STANDARD PRINTER CABLE WIRING



H89PIP PARALLEL INTERFACE PORT