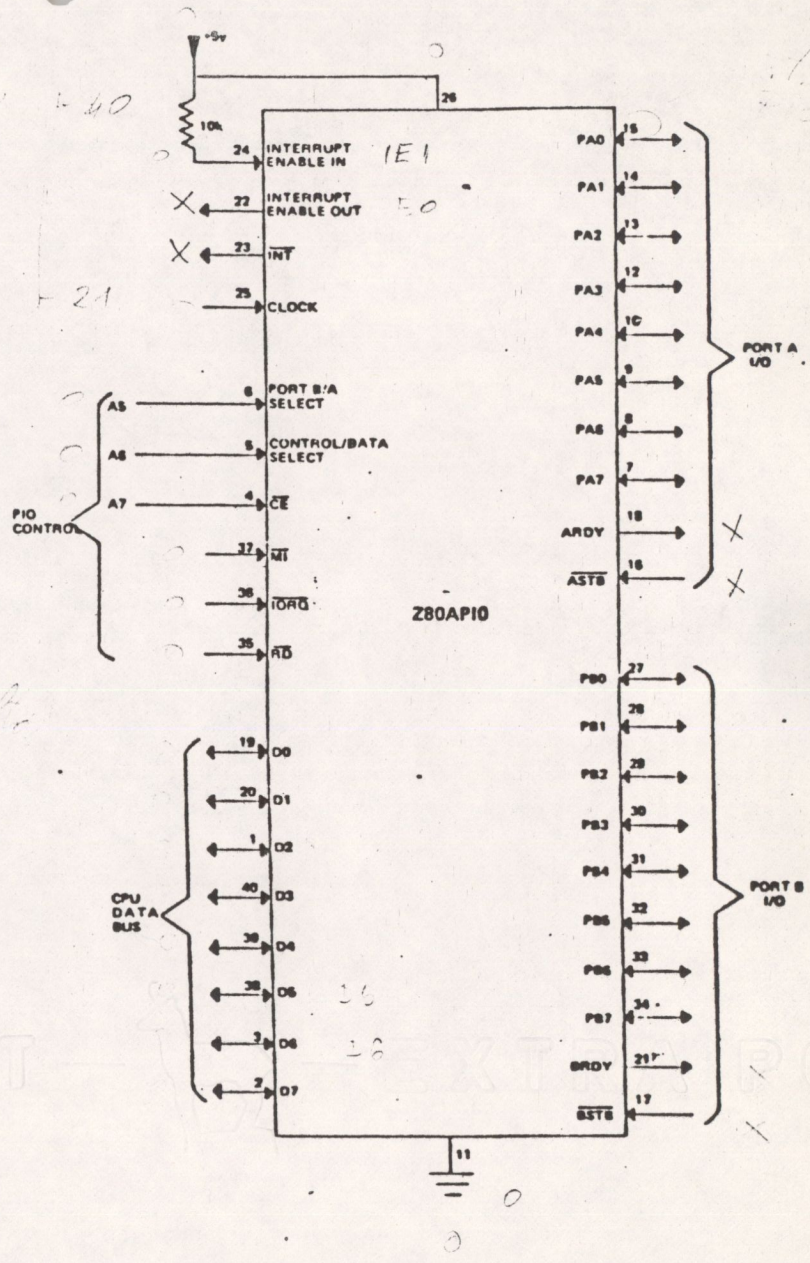

FIG 11a – Z80A PARALLEL INPUT/OUTPUT CHIP

Before the PIO chip can begin to operate as we desire, it must be told what it is expected to do. This is carried out by writing a control word to it. The format of a control word is:

D7	D6	D5	D4	D3	D2	D1	D0
M1	M0	x	x	1	1	1	1

mode word — signifies mode to be set.

x = not used by the PIO so it can be 0 or 1.

The mode word can be any number from 0 — 3 inclusive.

mode 0 = byte output with handshaking
mode 1 = byte input with handshaking
mode 2 = byte input/output with handshaking
mode 3 = control mode

Since we will be using the control mode, the mode word must be set to 3. The control word is therefore:

1 1 1 1 1 1 1 1 = 255 decimal

This is sent to the control port for port A. OUT CA,255 can be used in BASIC. CA = control port address for port A and depends upon how the PIO chip is connected to the address bus (see later).

The PIO chip now needs to know which lines of port A are to be used for input and which lines are to be used for output. Another control word is therfore written to port A with the relevant data bit set to 0 for output or 1 for input. So

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0	1	1

written to CA will set D0 — D1 as inputs and D2 — D7 as outputs. You can use OUT CA,3 in BASIC.

Before you can actually write any of the BASIC IN and OUT commands given above, you must define CA and DA plus CB and DB if you want to use port B. The Spectrum itself does not use A7, A6 or A5 for I/O devices, so these are used to operate the PIO chip. A7 as wired in fig 11a is used to enable the PIO chip when it is set to 0. A6 selects whether a control (A6 = 1) or data (A6 = 0) word is being sent to the PIO. A5 selects whether port A (A5 = 0) or port B (A5 = 1) is being used. A4 to A0 should be left at logic 1 throughout, so that ordinary Spectrum I/O functions are not disrupted.

Selected	Binary	Decimal	Token
Port A data	0 0 0 1 1 1 1 1	31	DA
Port A control	0 1 0 1 1 1 1 1	93	CA
Port B data	0 0 1 1 1 1 1 1	63	DB
Port B control	0 1 1 1 1 1 1 1	127	CB