

CT-01  
19.03.24

Slide - 1, 2, 3 → Pin diagram,  
description → Architecture, Purpose, functionality, difference.

## Lecture - 6

11.03.24

### Chapter - 8

## Semiconductor Memory and Interfacing

Memory [ Primary  
          [ Secondary

RAM - volatile

ROM - non-volatile

OTP

One type Programmable

OTP  
↓  
manufacturer  
21 बार फिट  
करे बने,

- PROM - Programmable ROM
- EPROM
- EEPROM
- Shadow RAM/NVRAM
- Flash ROM

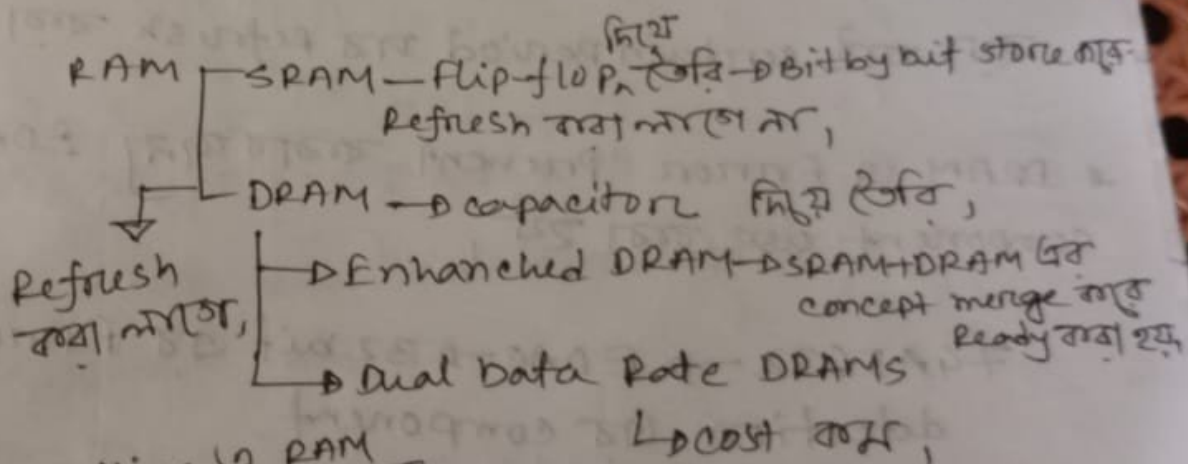
↳ manufacturer बने फिट  
but user एकरा बार  
मेरे, second time बार  
21 बार मेरे,

Bit by bit  
 EPROM — Electrically — certain time पश्चात् काटा जाता, circuit board पर आसानी से काटा जा सकता है, ultra-violet ray पर सही तरह से Expose करके Erase कराता, bit by bit

EEPROM — ON Board के साथ साथ आता है, circuit पर ठीक-ठीक Data Erase कराता,

Flash ROM — ON Board के Erase कराता, Block by block Data erase कराता आता है,  
 ↳ Pen drive.

Shadow RAM / NVRAM — Power on करते ही Data लिखा जाता है, Power off करने पर EPROM के आता है,



+ Positive के RAM काम करता है,  
 DRAM +ve & -ve पूरे सिस्टम को काम करता है,

### Hamming code

- Parity position =  $2^n$
- Data bit 11 = other than  $2^n$

Ex - 10110

— — 1 — 011 — 0

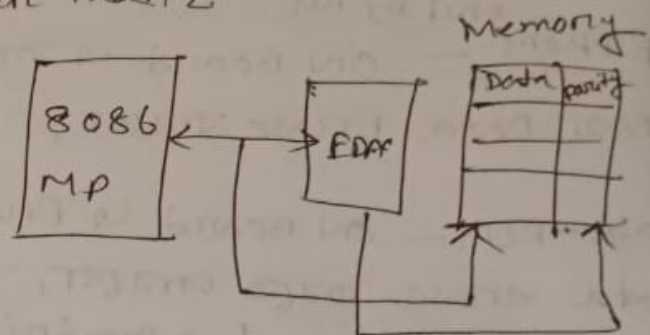


Fig: 8.10 (नया)

DRAM सबसे कम है जिस use करा रहा computer system  
में, capacitor use कराया जाता है charge leakage  
है, उसे certain period पर refresh करा रहा है,

\* DRAM में Error prevent कराया जाता है EDAC  
component use करा रहा है,

74A5632 → EDAC → 32 bit का Error  
detection का component.

\* Processor data EDAC का साथ में memory  
में store कराया, EDAC parity bit generate  
कराया memory में Data का साथ में store  
कराया,



Hamming  
code  
use  
egs

single bit

10110

$$z^n = 0 - \infty$$

1, 2, 4, 8, 16, 32, 64, ...

$$\text{data} + \text{parity} = \text{codeword}$$

$$\frac{P}{\uparrow} \quad \frac{P}{\uparrow} \quad \frac{D}{\uparrow} \quad \frac{P}{\uparrow} \quad \frac{P}{\uparrow}$$

10 1 1 0

Step-1

0 1 1 — 0 1 1 — 0  
↑ × ↑ × ↑ × ↑ × ↑

→ position wise data consider and skip then parity calculate krskrt.

$$p_b = 0$$

Step - 2

0 1 1 — 0 1 1 — 0

$$p b = 1$$

Step-3

$\underline{0} \quad \underline{1} \quad 2 \quad \underline{0} \quad 011 \quad \underline{\quad} \quad \underline{0}$   
 $\uparrow \quad \uparrow \uparrow \uparrow \quad \times \quad \times$

Even  $p_3 = 0$

sq : 0 1 1 0 0 1 1 0 0  
 $P_4 = 0$

CW : 0 1 1 0 0 1 1 0 0

D : 1 0 1 1 0

CW: 0 0 1 1 0 0 1 1 0 0

Bit change:

0 1 1 0 0 0 1 0 0

$P_1 = 0$

$P_2 = 1$

$P_3 = 1$

$P_4 = 0$

High থেকে low  
 - নিচ থেকে উপরে,

(0110)  $\left[ 2^2 + 2^1 + 2^0 \right] = 6$  then decimal convert করে,

Flag, Hamming  
 সবুজ  
 Odd parity  
 ক্রমিক

corr: 0 1 1 0 0 1 1 0 0

Output value 0 হলে অর্থাৎ Parity 0 অর্থাৎ

Error হবে না,

corr: 0 1 1 0 0 1 1 0 0

Data: 1 0 1 1 0

14.03.29

Peripheral device

- I/O device
- controller
  - General DC
    - Basic task for
    - Ready task
  - Special DC
    - ↳ special task
    - task for

Programmed (Simple) — Request & feedback/অনুরোধ  
dis: slower device কন কন স্লো ডিভাইস প্রস্তুত  
হয়, যখন processor idle থাকে

Interrupt (সহজতম বসি use হয়) — INT, INTR, NMI এর মাধ্যমে controller করে থাকে

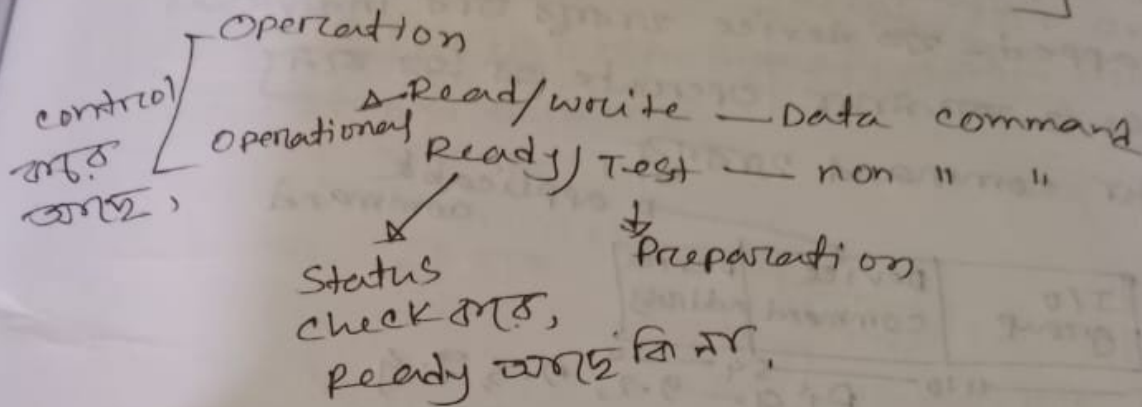
costly  $\rightarrow$  I/O channels  $\rightarrow$  [channeling 225]

↓ I/O processor → [ Processor এর মধ্যে  
বাজার, Device control  
করা জন্য Extra  
Co-processor যুক্ত  
করা ]

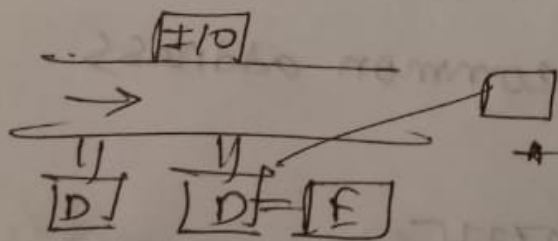


Addressing [ I/O mapped  
Memory "

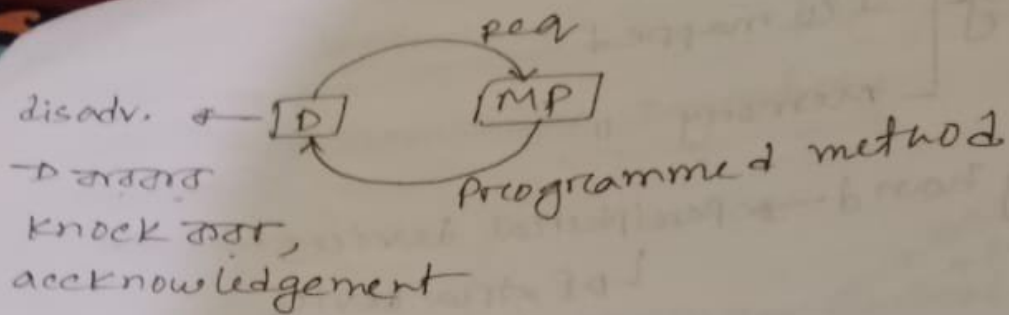
Helping hand → peripheral devices  
↳ Extra device  
[ I/O device ]



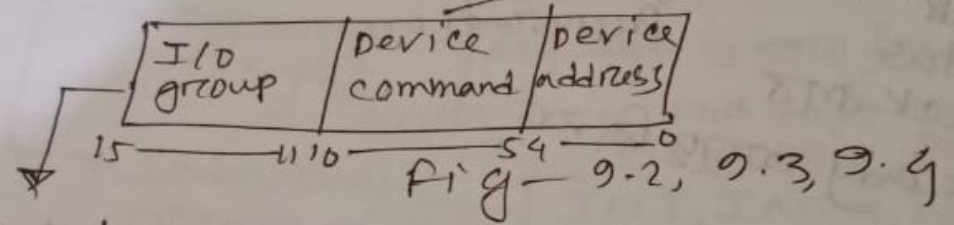
I/O device bus system લગભગ connected થયેલ  
જાણે છે device controller કે ચલાવે છે, પણ  
અન્ય device ચલાવે છે.



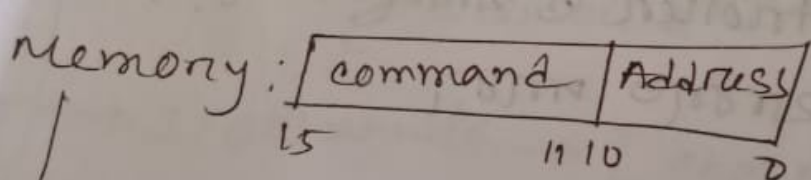
\* Processor લગભગ ચલાવે છે  
addressing લગભગ



- time waste 25,  
 I/O mapped - 20 device address or individual  
 address 3 address operate or 25  
 address command 25, applicable command



Input device  
 or output device



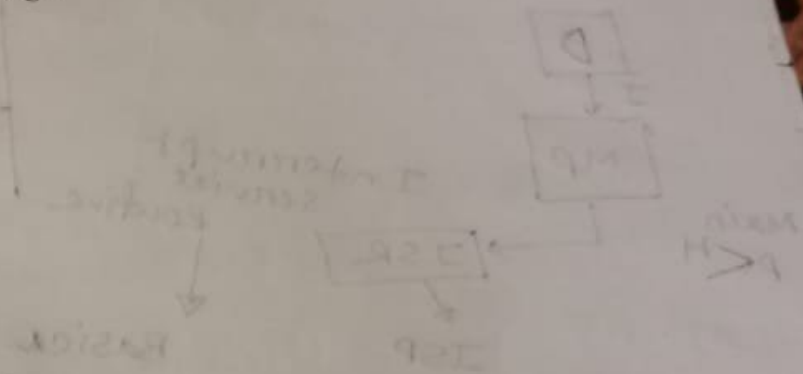
same command 3 common address.  
 use 25, 25, 25

Memory mapped or mapped  
 (each device or same address 25)



- communication ka step use hai,
- server request/initialize
  - analysis and data transfer
  - terminate

Interrupt: एक प्रोग्राम/एप्लिकेशन द्वारा या request processor को मजबूत करने के लिए one time of signal/request signal. इससे processor allow or hold कर सकता है।



lecture-8

Hardware 18.03.24  
Processor (ক)

Interrupt

External

maskable  
non-maskable

Internal (processor এর ভেতর  
গত generate)

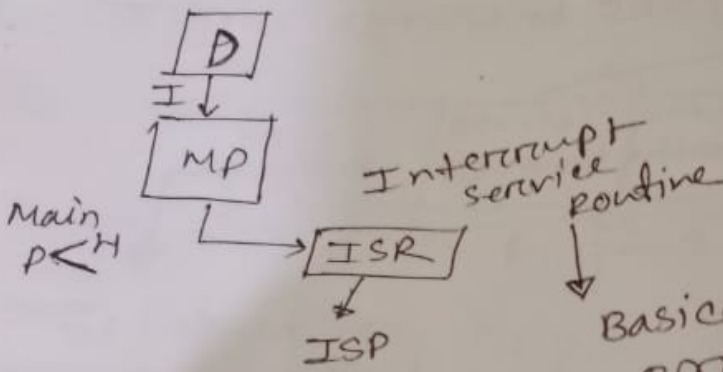
software (ক)  
আমি

software interrupt  
→ one type of coding

special interrupt/others

Invalid operation  
এর জন্য ভেতর  
Interrupt ২২,

power failure এর  
কারণে,



Interrupt service routine

Basic Instruction  
থাক, যেমন বসে থাক  
এ কোমর Interrupt  
আমি লিখতে  
কি ধরনের service  
provide করবে,

Interrupt response time -

Processor এর কাছে

Interrupt আর ও service  
শুরুর আর পর্যন্ত time.

ISP - এতে লিখা থাকে কি ধরনের আর্ডি  
পাবে,

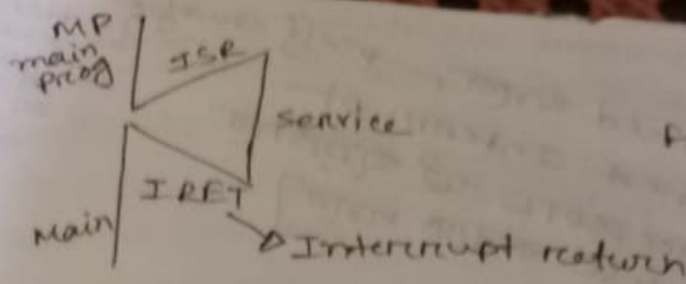


Fig-9.13

CPU status — Register value, Flag value store કરે.

Main Program 6 Return કરે step

1. Stack decrement Flag 6 value store કરે.
2. ~~Flag 6 Register 6 value store~~
3. IF Flag disable કરે.
4. Trap Flag disable ii
5. Stack 6 code segment store કરે. (4 byte)
6. Instruction pointer store કરે. (2 byte)
7. service provide કરે.

ISR 6 address નોડે.

— જો address 6 યાદ ન રહે તો આ કરે.

memory 6 1KB 6 હોડે service routine 6 આ બંને provide કરે. 256 જે interrupt.

Fig-9.14



Lower 16 CS  
upper 16 offset

5-31 for predefined interrupt  
5-31 → reserved Interrupt  
[advanced processor use for interrupt use karite nhe]

32-255  
[user use karite]

- Type-0 [device zero]
- type -
- type2 Non-maskable
- type -
- type4 overflow

karite nhe.

Device MP for interrupt number use karite  
type No use karite,  
 $4 \times 6 = CS$   
 $CS+2 = IP$

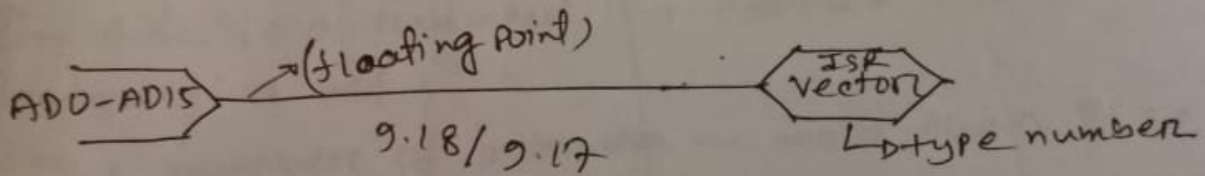
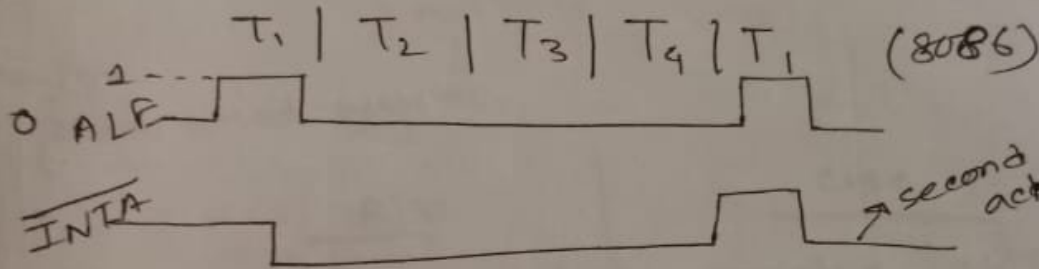
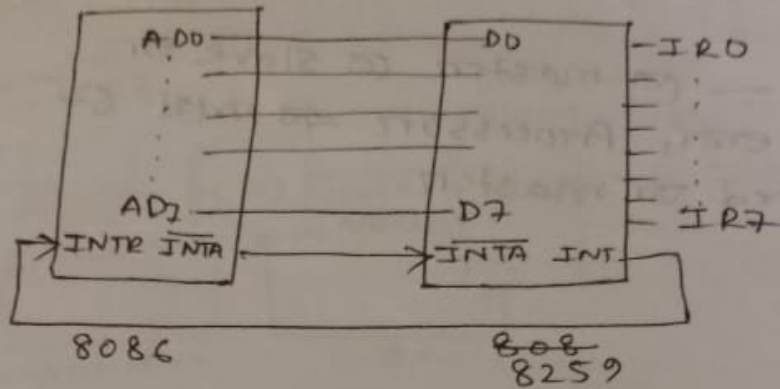
address generate  
interrupt service  
number  
255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Address  
generate  
interrupt service  
interrupt provide  
ET, लायन  
गुड 20

## Interrupt Handle : multiple interrupt लाव (3)(5)

Priority controller

\* Interrupt normally controller वा करत 200, controller mechanism वा मागुम Priority set कराव. Then एकर interrupt processor लाव करत 200,



- First cycle Ready
  - 2nd 11 type number processor लाव कर.
- ACKNOWLEDGEMENT

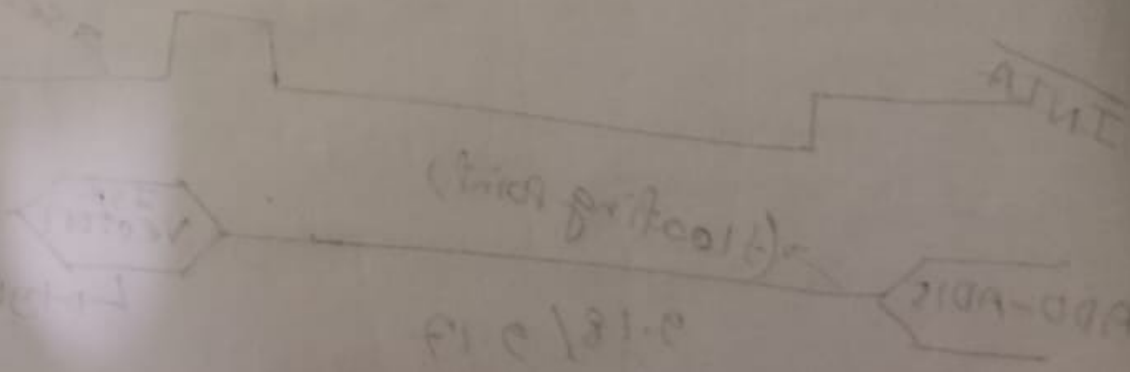
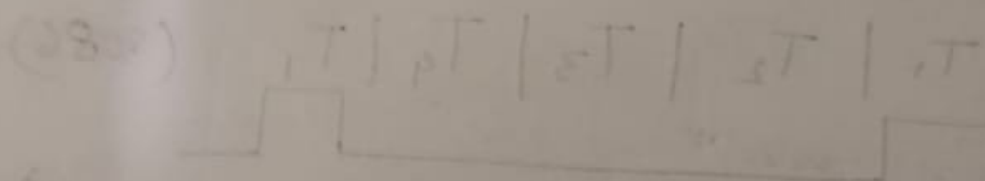
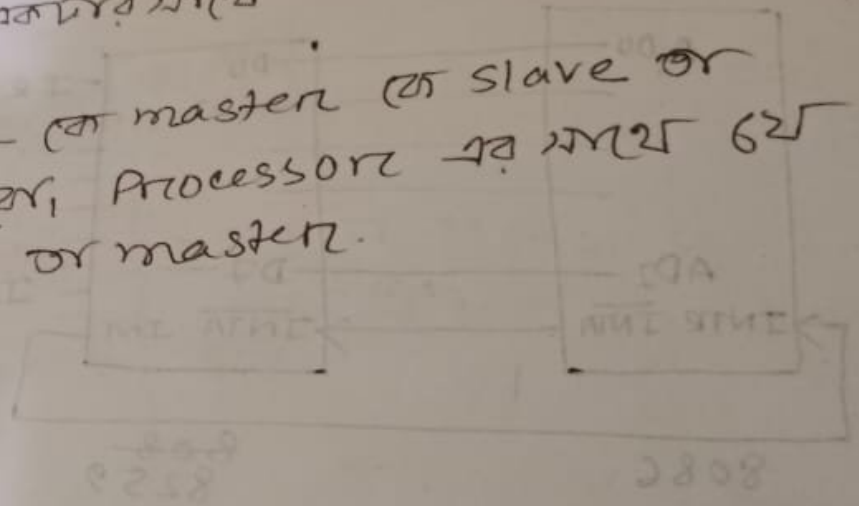
IN service. Reg - 8255 PPI interrupt  
service a can be

$\overline{CS}$  - chip select

$A_0$  - address generate,  
22 bit address select

Cascade - 8255 PPI 8255 PPI  
can be

SP/EN - can master or slave or  
define 8255 PPI 8255 PPI 62  
connected or master.



First clock is ready  
- 8255 PPI to 8085 microprocessor



हार्डवेयर task execute कराता है

Processor को knock करके interrupt.

Maskable interrupt } External  
Non-maskable " }

Hardware " } Internal  
Software " }

Interrupt response —

6 steps

Type number → vector table

32 bit int fixed

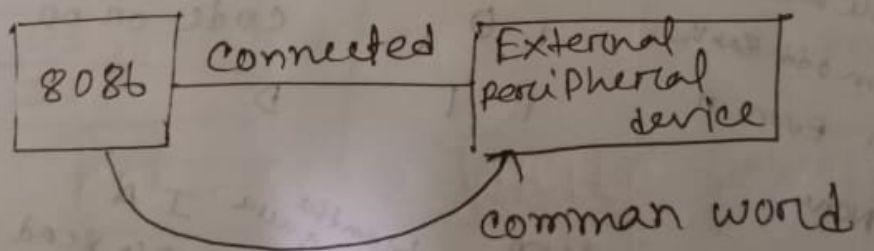
vector table

एकत्रित Interrupt

8259

8 bit का common word पीछे processor का 8259  
External peripheral device को,

fig: 9.39 : 8259 Internal block diagram



# Database buffer का 22 bit  $\leftarrow$  read  
(D0-D7)  $\leftarrow$  write  
common word में, Additional  
Read/Write,

Read write logic - चिप activate करार करे मध्य रहता  
read or write चिप activate करार,

CS: chip select मध्य CS activate करार or मध्य करार,

A0: Addressing purpose के मध्य रहता,

Cascading: प्रमाणिक 8259 मध्य रहता करार,

High SPEN: Master 8259

CS0

Low SPEN: Slave 8259

CS1

CS2

SPEN मध्य multiple 8259

use करार मध्य 1 करार  
Master मध्य slave  
define करार,

IMR: Interrupt MASK REG

कां int के मध्य मध्य  
करार मध्य मध्य मध्य  
मध्य,

IR0 - IR7 मध्य Int मध्य, मध्य IMR on off

करार मध्य, मध्य मध्य on मध्य, मध्य off  
मध्य,

मध्य on मध्य मध्य value 0 मध्य,

IR7	IR6	IR5	...	IR0	mask Reg
0	0	0	0 0 0	0	on: 0
1	0	0	0 0 0	0	off: 1
1	0	1	0 0 0	0	

IN service registers: 8259 को service provide

करने, 2<sup>nd</sup> position पर value 1 को service provide

IR<sub>0</sub> . . . IR<sub>5</sub> . . . IR<sub>7</sub>

0 0 0 1 . . . 0 0 0 → IR<sub>5</sub> को service

करने 8 bit पर 2<sup>55</sup>, परिणाम।

Priority Resolver:

High P को service करे,

Fixed priority basis 2 को करे, 2<sup>nd</sup> serial को  
करे तब Priority करे, 0 को 7 P को 0

2 11 4 P 11 2 को

8086 को service मिले करे, तो service करे  
करे decide करे 8259.

8259 2<sup>nd</sup> acknowledgement करने 8086 को  
service शुरू.

divide by 0, of service. . . .

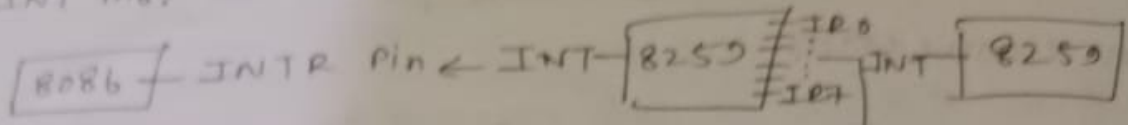
1<sup>st</sup> Ack: 8259 मिले ready करे/Internal करे

2<sup>nd</sup> 11 : 8086 को करे Intra मिले करे,





2 bit interrupt pin  
NMI  
INTR  
INT pin 8086 ( 8259 ) ( 8259 )



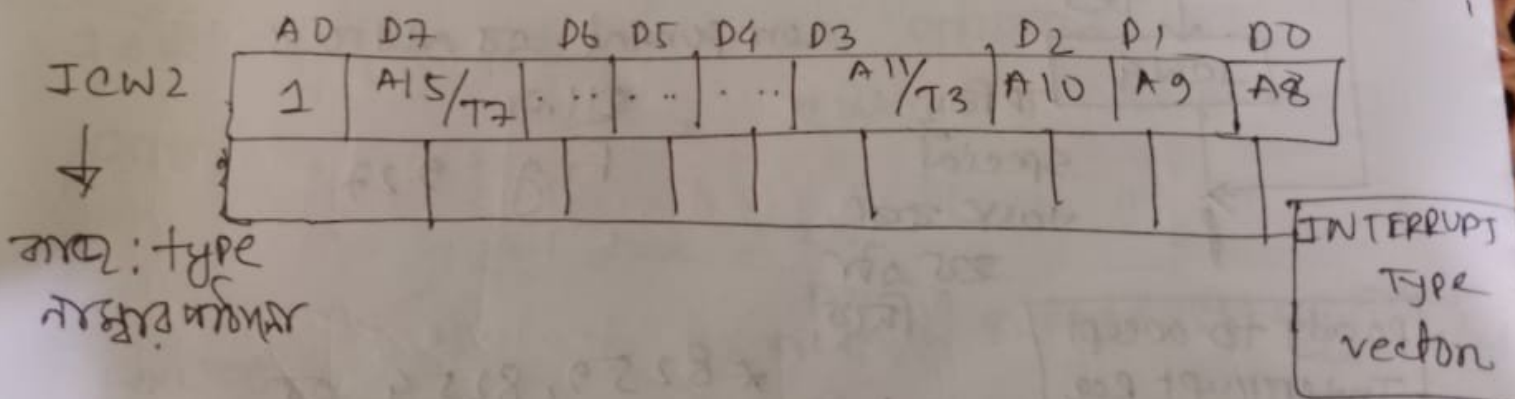
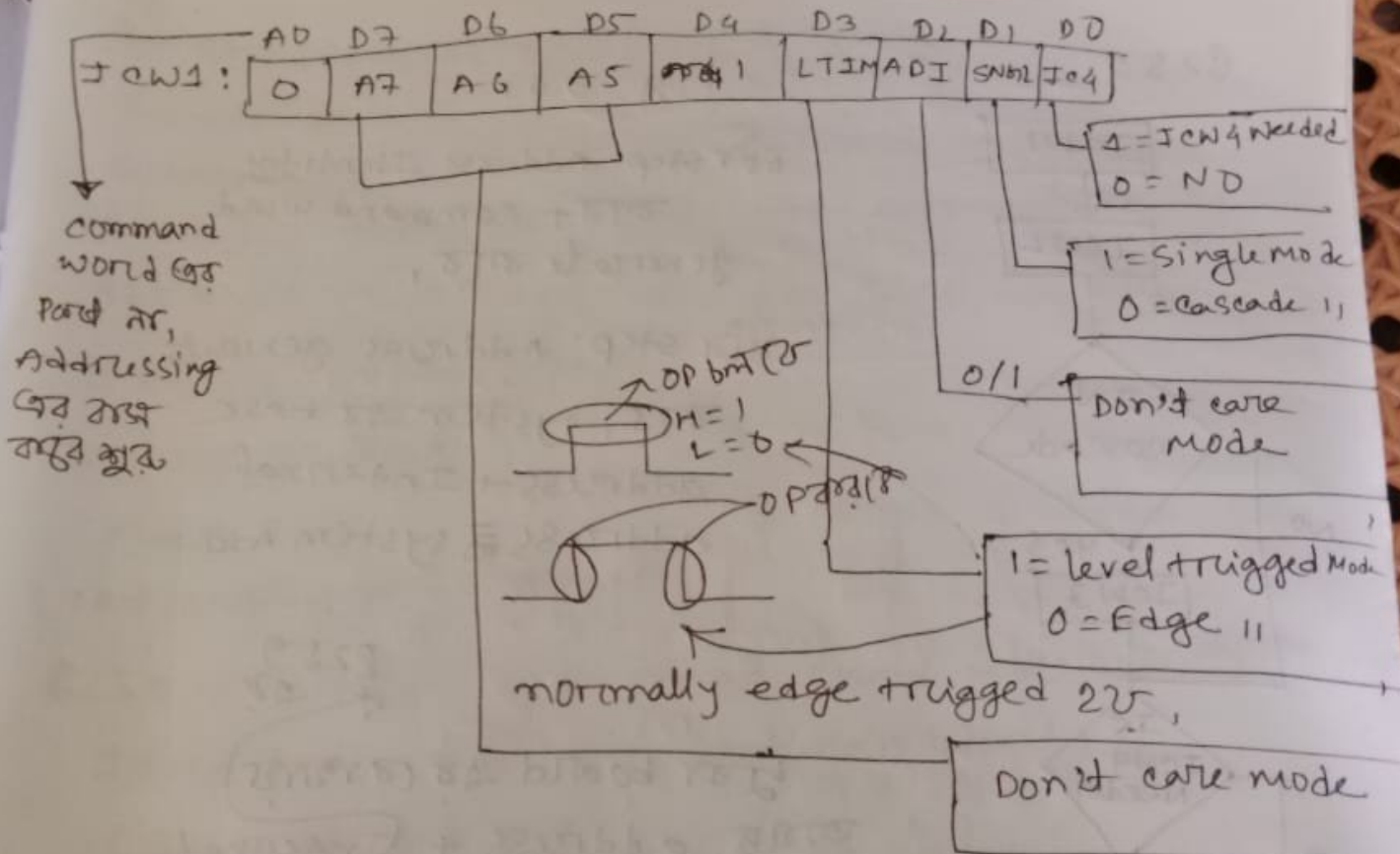
Highest expand કરો  
જાણ, slave 8 થી connect કરો  
જાણ 1 થી master 8259 ના માધ્યમ,  
8086 ના આ 5 type number નીચે આ, master/slave  
આ 8 થી slave ના ID number આ 8 bit ના number  
આ 8 થી, Random આ 8 થી ID number.

Must 0 0 0 1 0 0 0 0 with justification

8259

આ peripheral device  
આ આ 8 થી initialization  
stage same.

[Don't care  
0 નો]  
command  
world આ 8 bit





8259

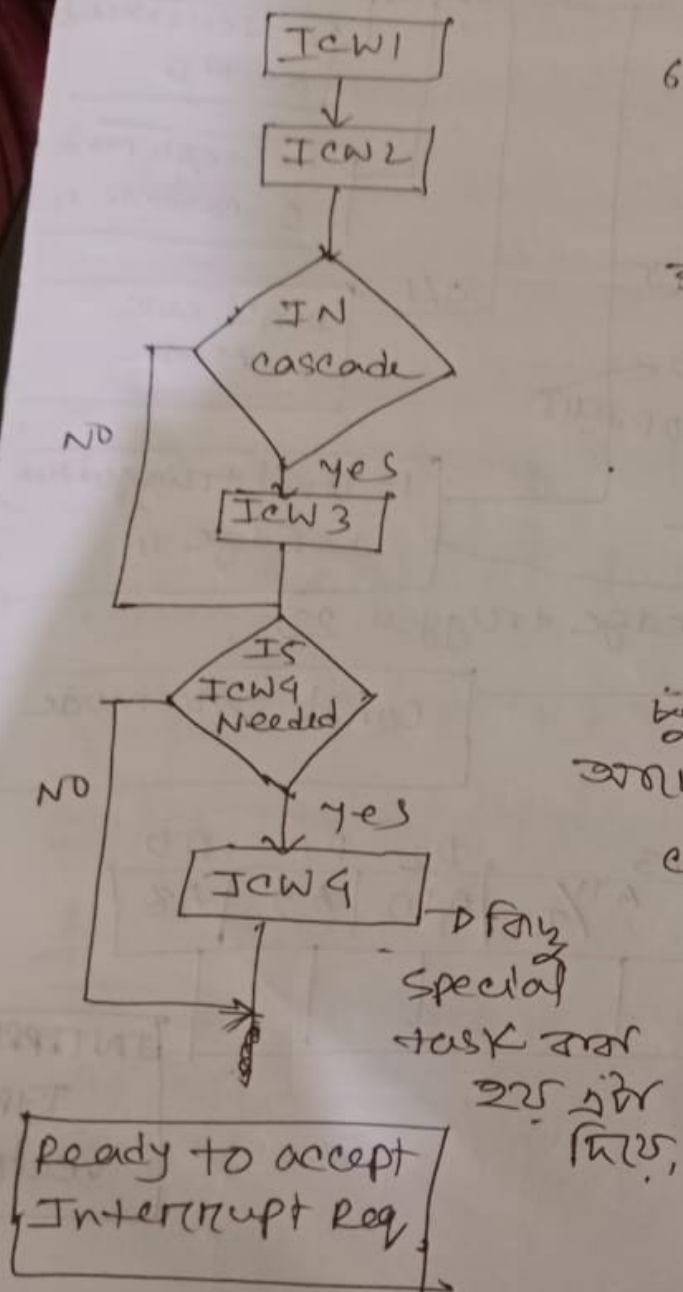


Fig: 9.41

1st step: address identify  
 $INT$  + command word  
 generate  $INT$ .

3rd step: Address generate  
 $INT$ , system  $IO$  base  
 address + Internal  
 address = system Add..

8259  
 $+ INT$

for board to convert  
 $INT$  address + Internal  
 component to address  
 $INT$

Fig: 9.27

\* 8259, 8254 to  
 address must

