SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore-35

DEPARTMENT OF BIOMEDICAL ENGINEERING

19BMB303 & Fundamentals of Microprocessors and Microcontrollers

UNIT II – DAC INTERFACING

III Year/ VI Sem

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ASP / BME / SNSCT

DAC Interface

Introduction to DAC

A Digital-to-Analog Converter (DAC) converts digital data into an analog voltage or current, which can be used for real-world applications like audio output, motor control, and signal generation. Since the 8085 microprocessor processes only digital data, a DAC (e.g., DAC0808) is used to convert digital outputs into analog signals.

Interfacing a DAC (Digital-to-Analog Converter) with a microprocessor involves connecting the DAC to the microprocessor's address, data, and control lines to enable communication between them.

DAC0808

Resolution: 8-bit

Output Type: Current (requires an external resistor to convert to voltage)

Conversion Type: Binary-weighted resistor method

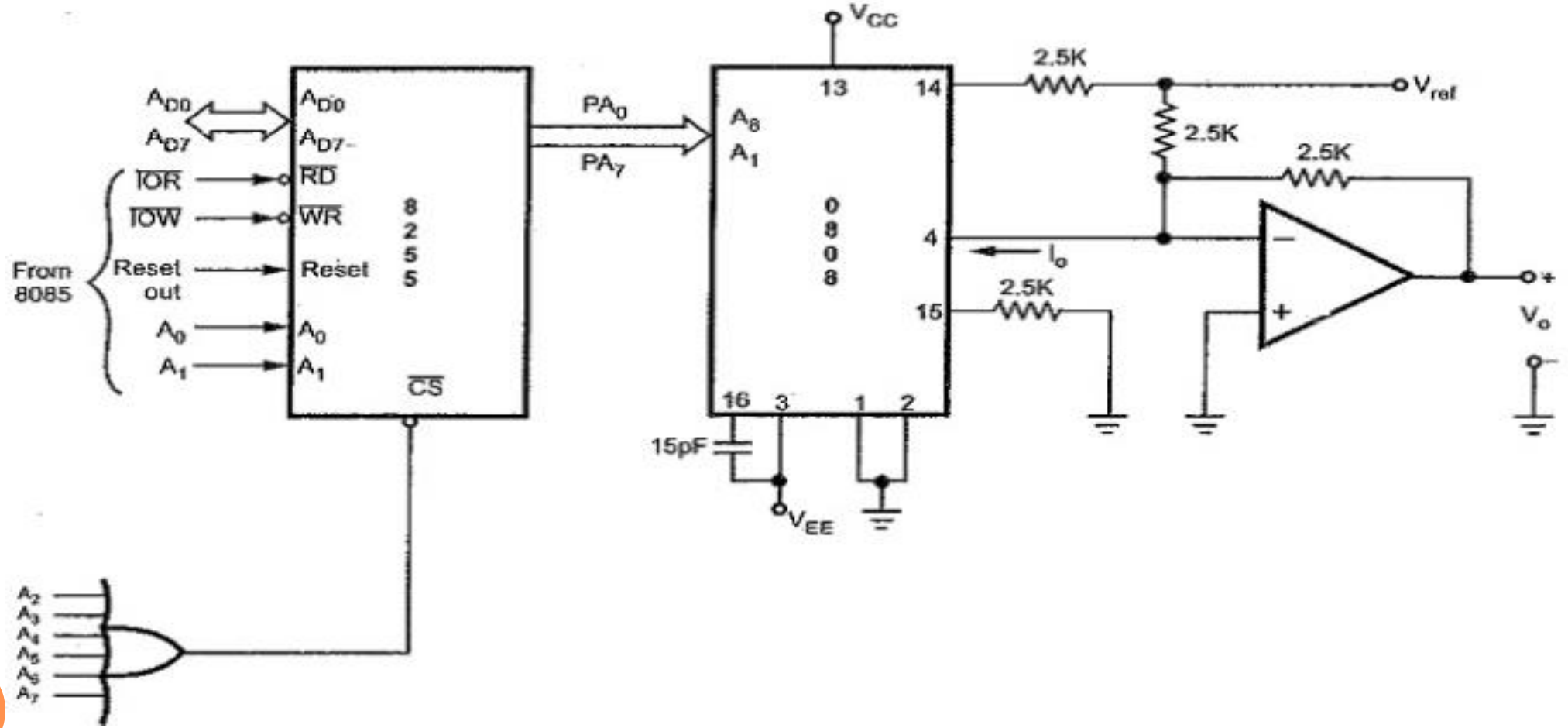
Reference Voltage (Vref): Determines full-scale output

Input Lines (D0-D7): 8-bit digital input

Control Signals:

- **WR (Write Enable)** – Latches data from the microprocessor
- **CS (Chip Select)** – Enables the DAC
- **Vref+ and Vref-** – Set reference voltage

DAC


V_{CC}
2.5K
V_{ref}
2.5K
2.5K
A_{D0}
A_{D7}
PA_0
PA_7
IOR
IOW
From 8085
Reset out
A_0
A_1
RD
WR
Reset
CS
8255
A_8
A_1
0808
13
14
4
15
16
3
1
2
I_o
2.5K
15pF
V_{EE}
V_o
A_2
A_3
A_4
A_5
A_6
A_7

1. **Selecting a DAC**: Choose a DAC that meets your project requirements in terms of resolution, output voltage range, settling time, and interface compatibility. Common DAC types include parallel DACs (such as the DAC0808/DAC0800) or serial DACs (such as the DAC8551/DAC8552).
2. **Address Decoding**: Design a decoding circuit to enable the microprocessor to select the DAC when communicating with it. The decoding circuit ensures that the DAC is only activated when the microprocessor accesses its address space.
3. **Data Bus Connection**: Connect the data bus lines of the DAC to the data bus lines of the microprocessor. This allows the transfer of digital data between the microprocessor and the DAC.
4. **Address Bus Connection**: Connect the address bus lines of the DAC to the address bus lines of the microprocessor. This allows the microprocessor to select the DAC by specifying its address during read or write operations.

1. **Control Signal Connection**: Connect the control signals (such as chip select, read, write, etc.) of the DAC to the appropriate control lines of the microprocessor. These signals control the data transfer and operation of the DAC.
2. **Power Supply**: Provide power to the DAC using appropriate power supply connections. Ensure that the DAC operates within its specified voltage and current ratings.
3. **Clock Signal (if applicable)**: If the DAC requires a clock signal for its operation, provide it from an external clock source or generate it using the microprocessor.
4. **Programming**: Write software routines in assembly language or a high-level language (such as C) to control the DAC from the microprocessor. These routines should initialize the DAC, write digital values to it, and handle any necessary data processing.
5. **Data Processing**: Convert digital data obtained from sensors or generated by the microprocessor into analog voltages using the DAC. This may involve scaling, filtering, or further processing the digital values before sending them to the DAC.

Applications of DAC in 8085

- **Waveform Generation** (Sine, Square, Triangular signals)
- **Audio Signal Processing**
- **Motor Speed Control**
- **Voltage-Controlled Systems**