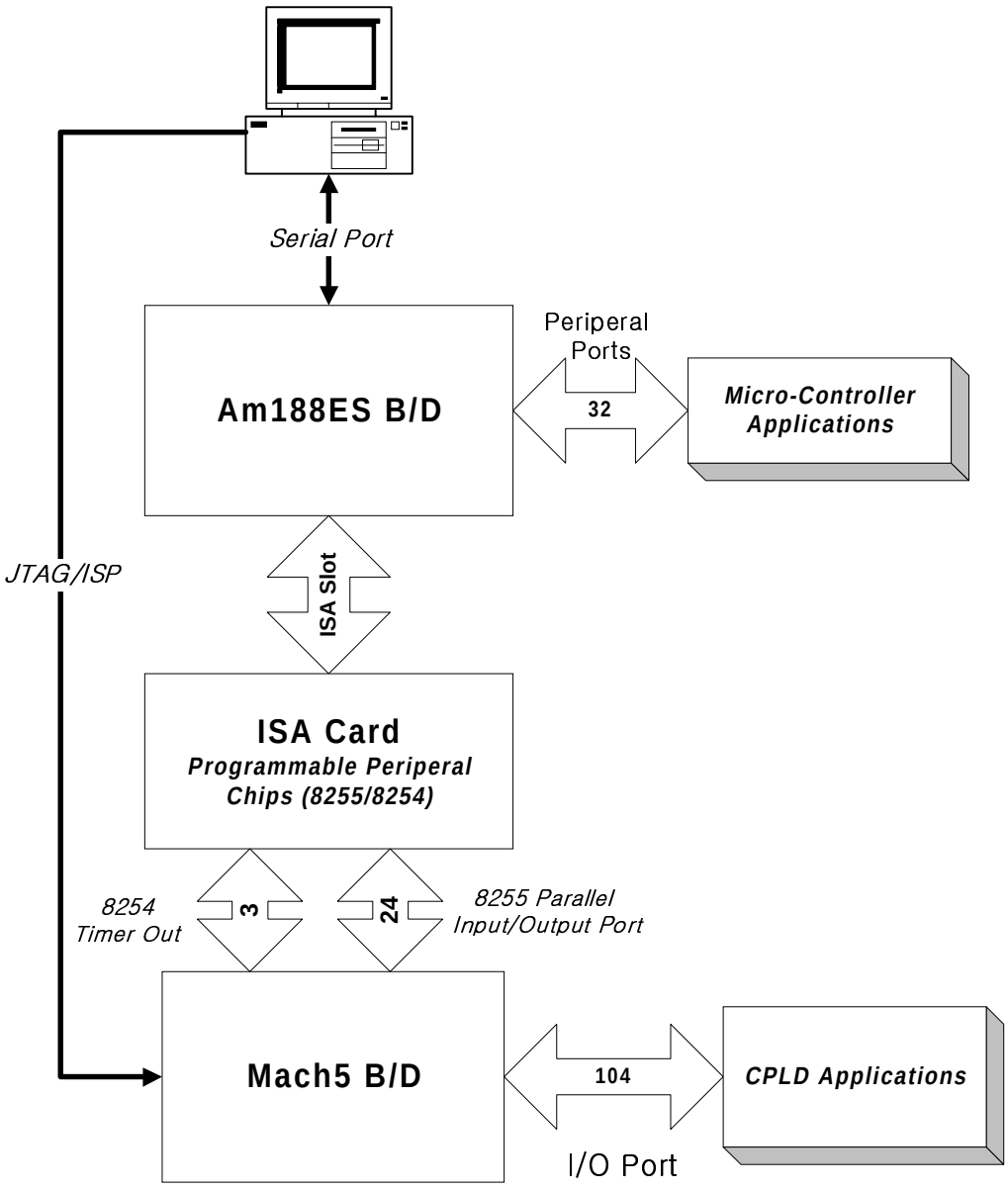
Mach5-ISA IO-Am188 Board Application

Purpose:
- Understanding Micro Controller Development
- Understanding System Interface with Programmable Peripheral Chips
- Understanding Programmable Logic Design from Schematic to HDL method

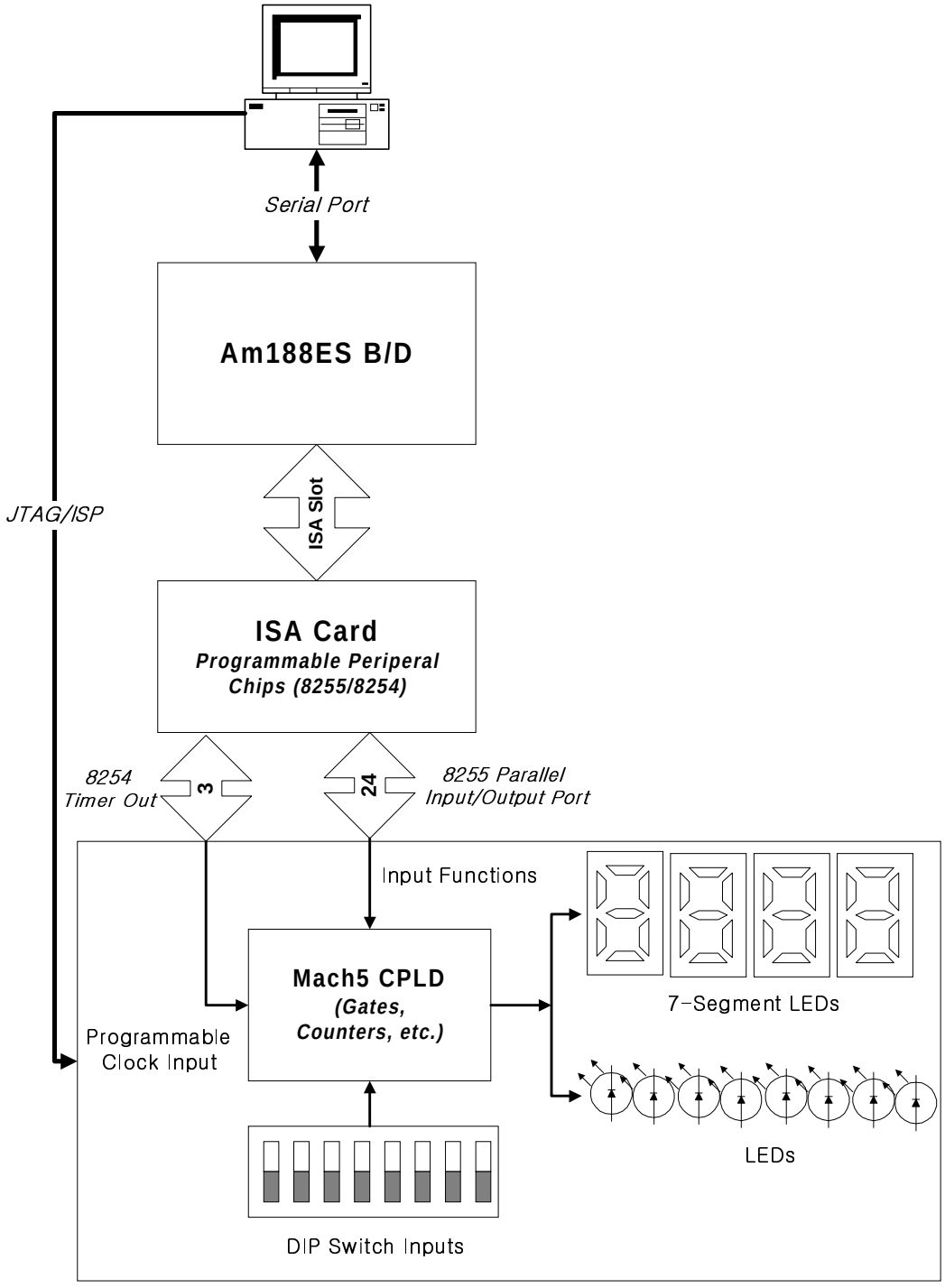
System Configuration:



Basic Level Applications:

Purpose :

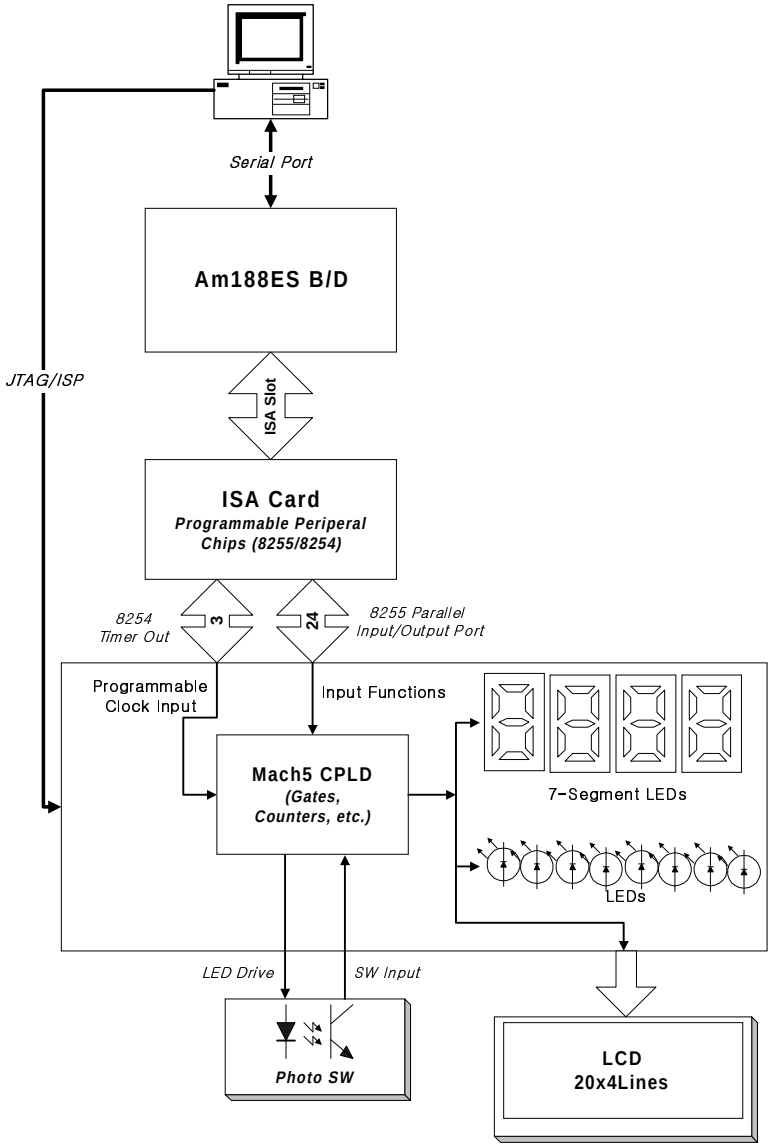
- Understanding ISP CPLD and Micro-Controller Programming
- CPLD Design Method : Schematic
  - Basic Digital Circuit Expr. (Gates, Counters, etc.)
- Use On-Board 7-Segments LEDs, DIP SWs



VHDL Design Entry Level Applications:

Purpose :

- Understanding MDS (Serial Monitor) and System Interface (ISA)
- Understanding and Using Programmable Peripheral Chip
- Understanding VHDL Design Flow
- CPLD Design Method : VHDL
- Digital Circuit Design with VHDL (Gates, Counters, etc.)
- PREP Examples
- FSM Design with VHDL
    - Simple Game Machine (Black Jack, Craps, etc.)
    - LCD Controller
    - Traffic Light Controller Example
- Use On-Board 7-Segments LEDs, DIP SWs and Ext. LCD, Photo SW(Interrupter) Appl.



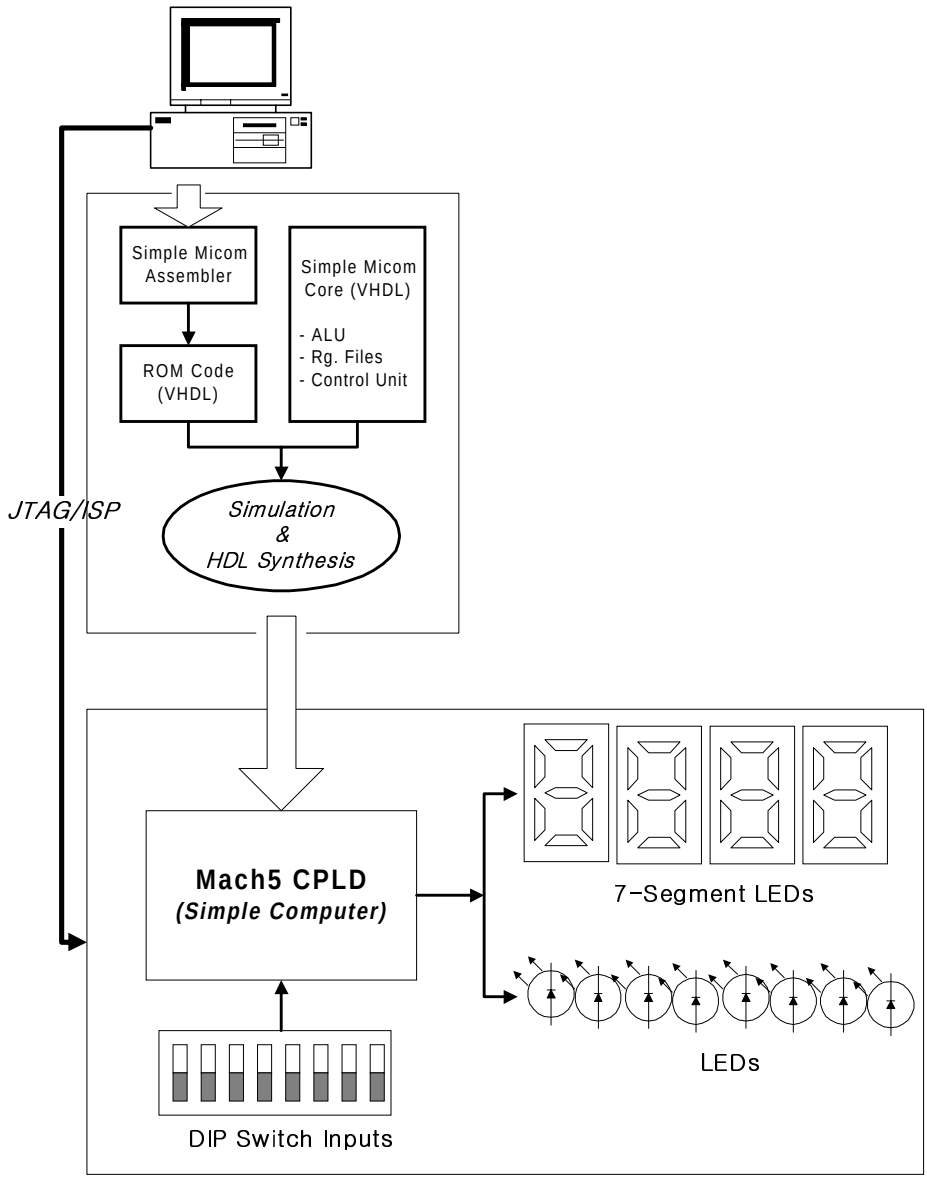
System Level Application

Purpose:

- Advanced Micro-Controller Programming
  - Interrupt Service Routines on Serial Monitor (Ex. INT 21h Functions…)
  - C-Start-Up Code
  - Embedded Peripheral Programming (PIO, Interrupt, Timers, PWD, etc.)
  - ISA Bus Implement and Use
  - Other Examples (Ex. Flash Memory Writer, Barcode Reader, etc.)
- Advanced CPLD Design using VHDL
  - Simple 4/8-Bits Micro Controller Design
  - Simple Controllers (Door Sensor, Thermal Controller, etc.)
  - ROM Emulator
  - DC Motor Controller (PWM)
  - Stepping Motor Driver
  - Simple DSP Example (Voice CODEC, Digital Filters, etc.)
  - Video Signal Generator
  - Peripheral Chip Implement Example (UART, Parallel IO, Programmable Interval Timer, etc.)
  - TOY Example

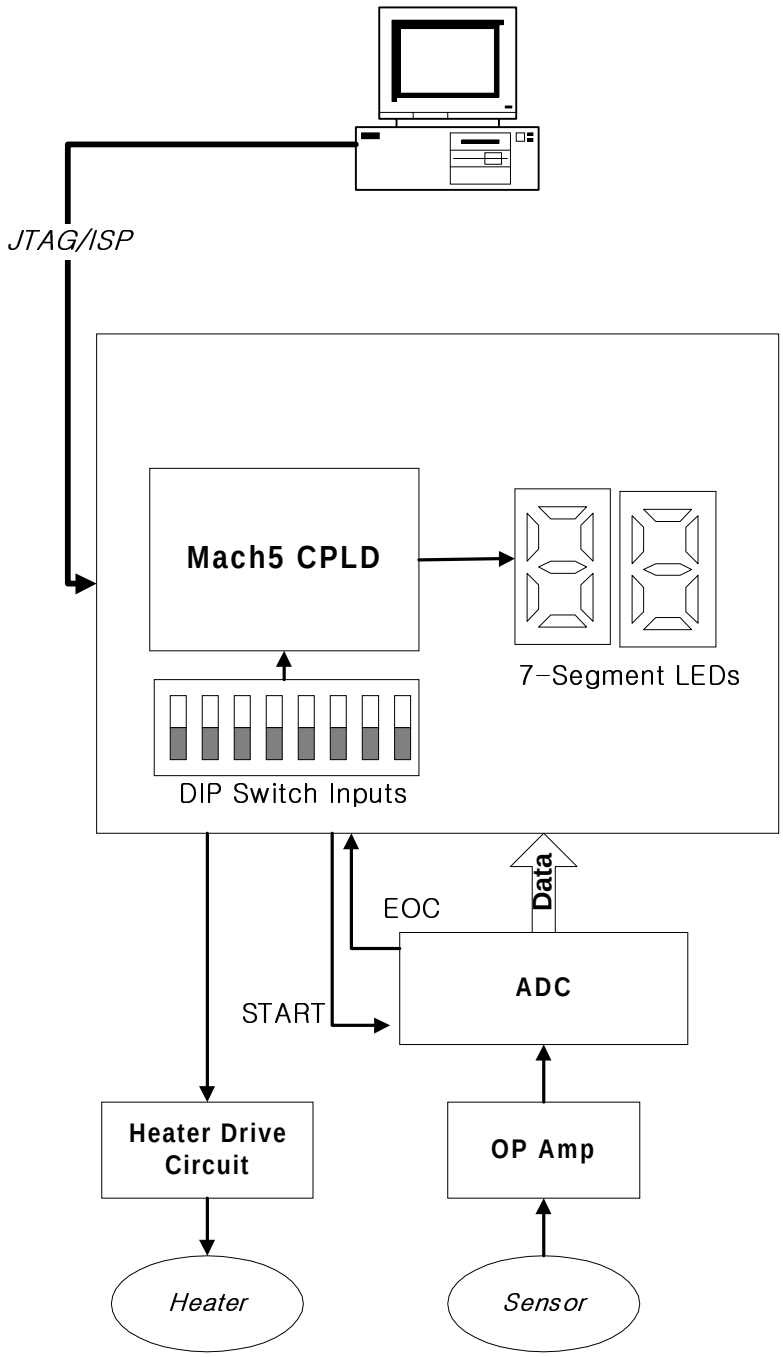
Simple 4-Bit Micro Computer

- Instructions (8-Bit)
  - ALU Function (4-Bit) : ADD, SUB, SHIFT, ROTATE,AND,OR,XOR,NOT)
  - JUMP (CONDITIONAL, UNCONDITIONAL)
  - In/Out
  - Interrupt
- Control Unit (FSM)
- Rg. File : 16 x 4-Bits



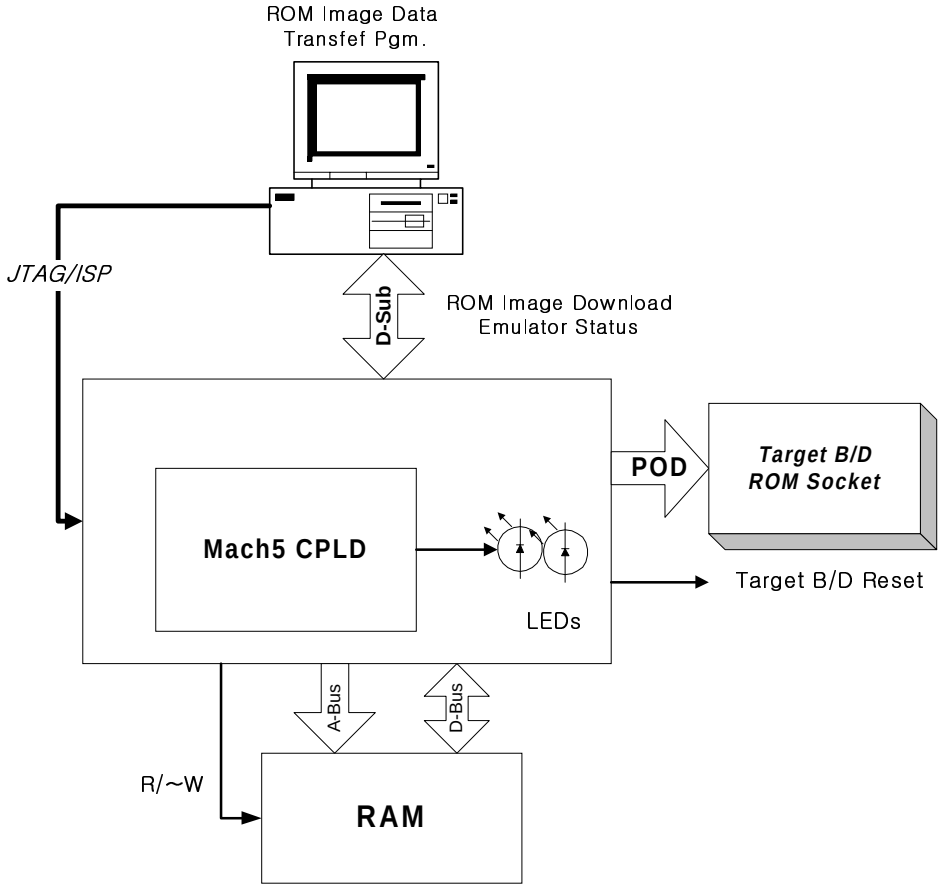
Simple Controllers (Door Sensor, Thermal Controller, etc.)

- ADC Controller (Start ADC, EOC, Latch AD Data)
- 8-Bit Comparator
- Therm. Display (2-digit 7-Segment LED)
- Heater On/OFF



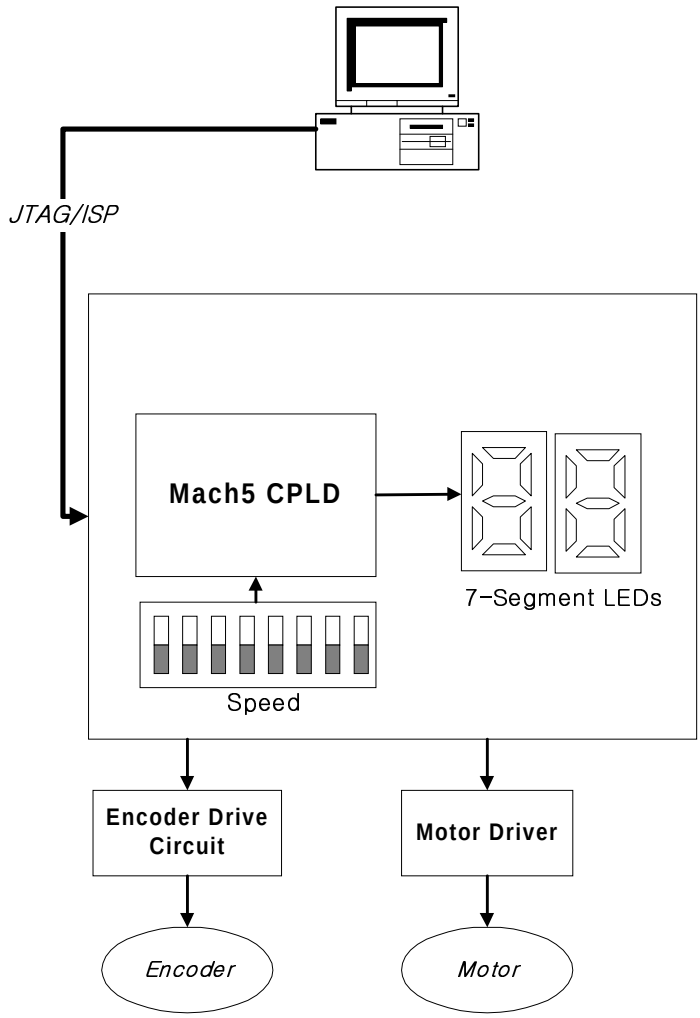
ROM Emulator

- Data Transfer (ROM Image) with PC Printer Port
- Data/Address Bus Isolation Control (Tri-State Buffer Enable/Disable)
- Target B/D Reset



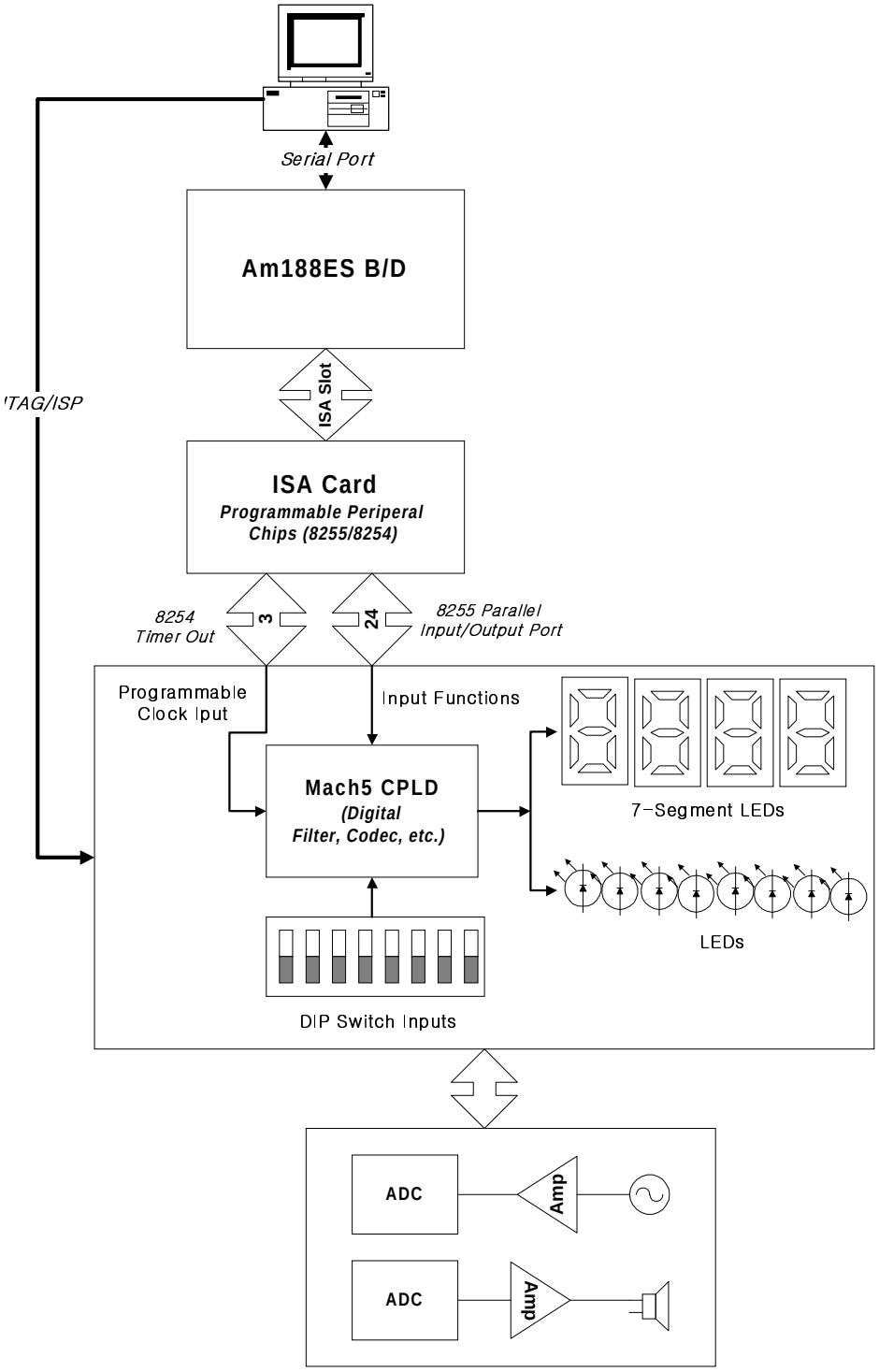
Motion Control

- DC Motor Speed Control (PWM)
- Motor Speed Measure (Encoder)
- Motor Speed Display (7-Segment)
- Stepping Motor Controller (Phase Generator)



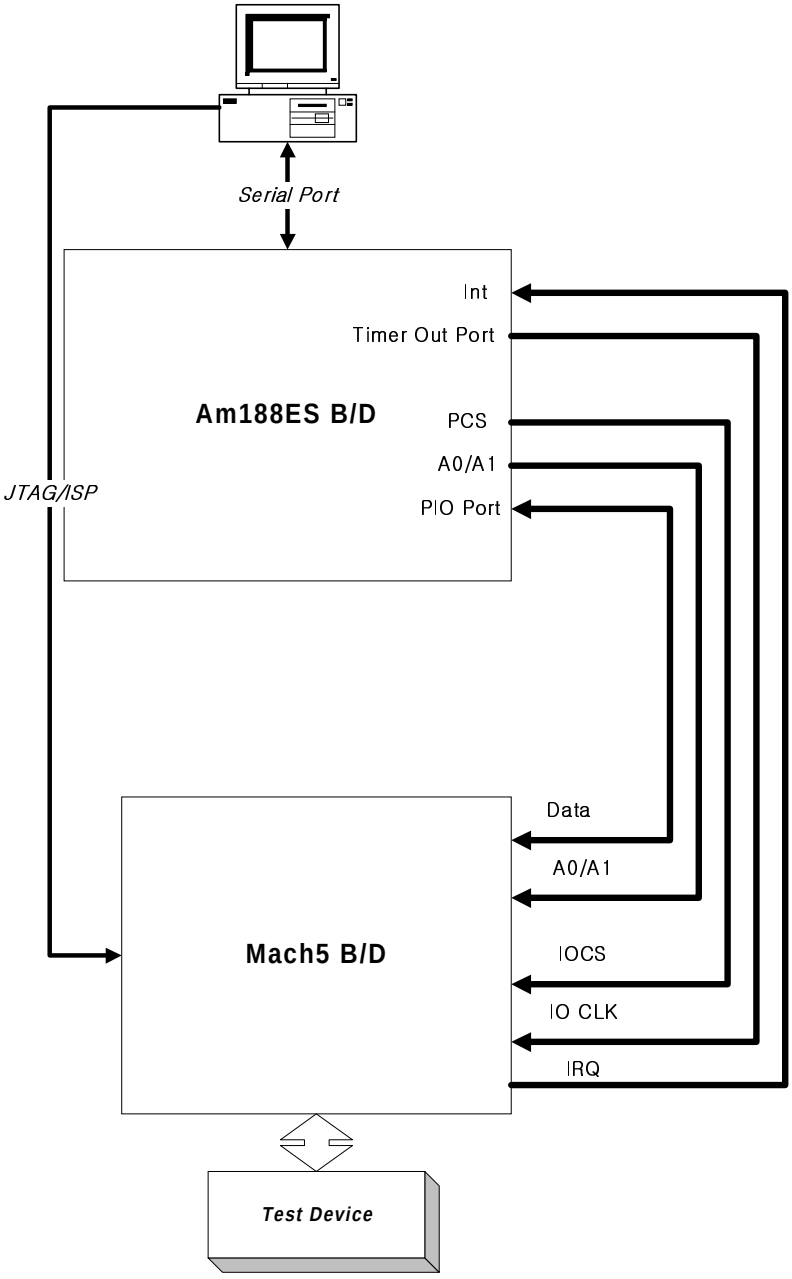
DSP Application

- Simple Digital Filters
- Codec
- ADC/DAC Controller
- Data Transfer



Programmable Peripheral Chip Set Implement

- Programmable Parallel IO Port
- Programmable Interval Timer
- UART



CPLD/Micro Processor Board 구성

1.CPLD Board
- Vantis Mach5 Seriese : 144 Pin PQFP/104 Usable IO, 4Clock Input Dedicate)
- 4x7-Segment LED
- 8xLED
- 8-DIP SW
- 2 OSC
- 2 Push buttons
- CPLD Daughter B/D

2.Microprocessor Board
- AM188ES (100Pin PQFP)
- RAM : 128K
- ROM : Flash 32K x 2, 128Kx1(32 Pin PLCC)
- RS-232C Serial Port (9-Pin D-Sub)
- 14Pin LCD Connector
- 34 I/O
- 62Pin PC-ISA Slot

3.ISA IO Card
- 8255
- 8253

4.Application Board
- 16 Key Matrix
- LCD
- Memory
- DC Motor Driver
- Step Motor Driver
- ADC
- DAC
- IR/Supersonic Sensor
- 9-Pin D-Sub
- 25-Pin D-Sub
- Buzzer

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실험 항목

0. PLD 를 이용한 디지털 회로설계 기초

1. 디지털 공학 기초 실험
- Schematic Editor 사용, 기존의 모든 디지털논리회로 실험을 CPLD 보드로 실험
- 기초 조합 논리회로 (Gates, Adder…)

- 기초 순차 논리회로 (Shift, Counters,….)
- Finite State Machine

2. 마이크로 프로세서
- 원칩 마이크로 프로세서의 기초
- 원칩 마이크로 프로세서 시스템 보드 설계
- 시리얼 모니터 분석 및 제작 (플래쉬 메모리 채용, 제작한 모니터 실험 가능)
- C-언어와 인터페이스(스타트-업 코드 작성 방법, 롬용 응용 프로그램작성)

3. 마이크로 프로세서 인터페이스
- 마이크로 프로세서/ISA IO Card 를 이용한 실험
- 주변 칩셑(Peripheral Chip Set) : 8255 PPI, 8253/8254 PTI
- 원칩 내장 시리얼 포트 응용
- 원칩 내장 인터럽트 컨트롤러 응용

4. VHDL
- VHDL 을 이용한 디지털 논리회로 (조합/순차회로를 VHDL 로 작성후 CPLD 보드로 확인, VHDL 과 디지털 회로 비교)
- VHDL Simulation TestBench
- VHDL Example : PREP 1~9 (MUX, Decoder, FlipFlop 등등 이용한 PLD 설계 예제모음)

5. 전자 시스템 실험
- Application Board/CPLD/Microprocessor 및 사용자 설계회로
- VHDL 을 이용한 디지털 설계/마이크로 프로세서 응용
- 각종 아이디어 실험 유도

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3 가지 Application Board

- Application Board 1 : Digital Interface (Key Pad, LCD, Memory…)
- Application Board 2 : Analog Interface(A/D, D/A, 적외선/초음파 Sensor,, Buzzer/Speaker, DC/Stepping Motor Driver…)
- Application Board 3 : DSP Application

전자 시스템 실험 응용 프로젝트

- Project Ex.1 : Parallel Periperal Port Design (Microprocessor B/D, CPLD B/D 사용하여 8255 와 같은 병렬 입출력 포트를 설계)
- Project Ex.2 : Serial UART Design (Microprocessor B/D, CPLD B/D 사용하여 직렬 통신칩(UART)를 설계)
- Project Ex.3 : Simple Microprocessor Design (간단한 4 비트 정도의 Micom 설계)

- Project Ex..4 : ADC 응용 (센서 입력)
- Project Ex..5 : DAC 응용 (Buzzer, Speaker)
- Project Ex.6 : Traffic Light Controller (교통신호등 제어기)
- Project Ex.7 : 적외선 센서이용 거리측정기
- Project Ex..8 : PWM 을 이용한 DC 모터 제어
- Project Ex..9 : Stepping Motor 제어

위의 프로젝트들을 응용하여 라인-트레이스/마이크로 마우스 등의 설계 가능.
마이크로 마우스/라인트레이서 등을 설계하기 위한 보드 준비

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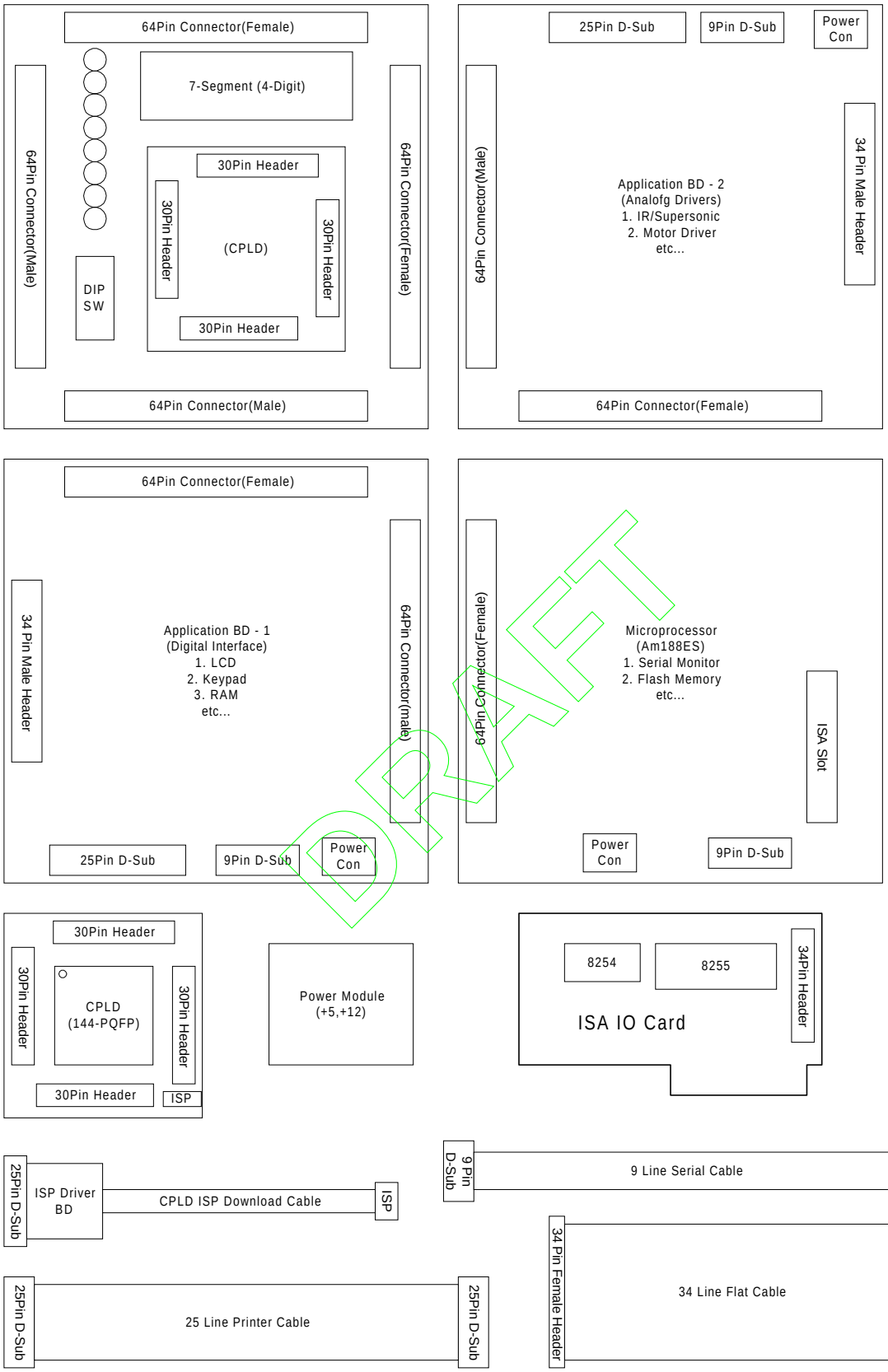
64Pin Connector(Female)
7-Segment (4-Digit)
64Pin Connector(Male)
64Pin Connector(Female)
30Pin Header
30Pin Header
(CPLD)
30Pin Header
DIP SW
30Pin Header
64Pin Connector(Male)
25Pin D-Sub
9Pin D-Sub
Power Con
64Pin Connector(Male)
Application BD - 2
(Analofg Drivers)
1. IR/Supersonic
2. Motor Driver
etc...
34 Pin Male Header
64Pin Connector(Female)
64Pin Connector(Female)
34 Pin Male Header
Application BD - 1
(Digital Interface)
1. LCD
2. Keypad
3. RAM
etc...
64Pin Connector(male)
25Pin D-Sub
9Pin D-Sub
Power Con
64Pin Connector(Female)
Microprocessor
(Am188ES)
1. Serial Monitor
2. Flash Memory
etc...
ISA Slot
Power Con
9Pin D-Sub
30Pin Header
30Pin Header
CPLD
(144-PQFP)
30Pin Header
30Pin Header
ISP
Power Module
(+5,+12)
8254
8255
34Pin Header
ISA IO Card
25Pin D-Sub
ISP Driver BD
CPLD ISP Download Cable
ISP
9 Pin D-Sub
9 Line Serial Cable
9 Pin D-Sub
34 Pin Female Header
34 Line Flat Cable
34 Pin Female Header
25Pin D-Sub
25 Line Printer Cable
25Pin D-Sub

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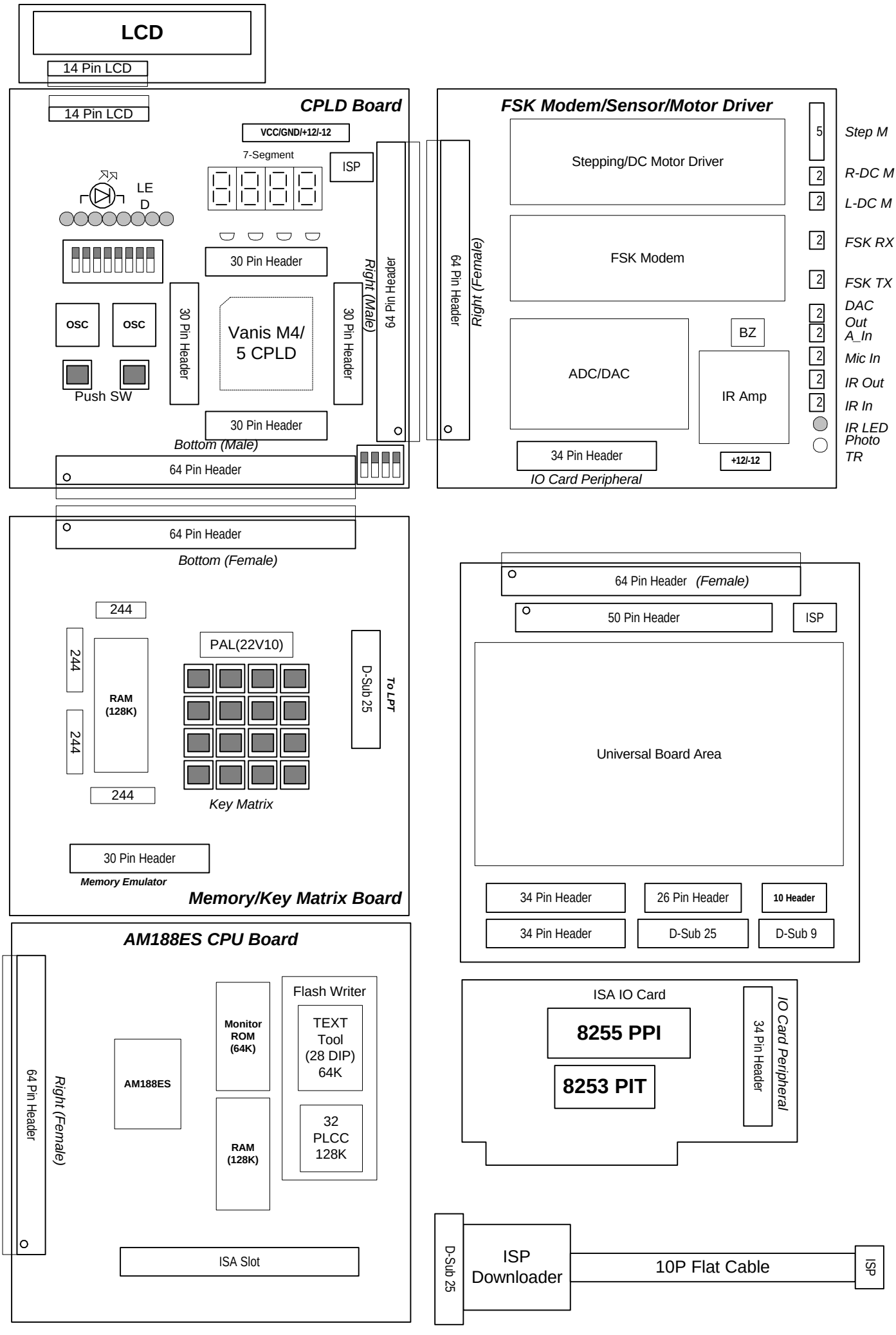
LCD
14 Pin LCD
14 Pin LCD
CPLD Board
VCC/GND/+12/-12
7-Segment
ISP
LED
30 Pin Header
Right (Male)
64 Pin Header
OSC
OSC
30 Pin Header
Vanis M4/
5 CPLD
30 Pin Header
Push SW
30 Pin Header
Bottom (Male)
64 Pin Header
FSK Modem/Sensor/Motor Driver
64 Pin Header
Right (Female)
Stepping/DC Motor Driver
FSK Modem
ADC/DAC
BZ
IR Amp
34 Pin Header
+12/-12
IO Card Peripheral
5
Step M
2
R-DC M
2
L-DC M
2
FSK RX
2
FSK TX
2
DAC Out
2
A_In
2
Mic In
2
IR Out
2
IR In
IR LED
Photo TR
64 Pin Header
Bottom (Female)
244
244
RAM
(128K)
244
244
PAL(22V10)
D-Sub 25
To LPT
Key Matrix
30 Pin Header
Memory Emulator
Memory/Key Matrix Board
64 Pin Header (Female)
50 Pin Header
ISP
Universal Board Area
34 Pin Header
26 Pin Header
10 Header
34 Pin Header
D-Sub 25
D-Sub 9
AM188ES CPU Board
64 Pin Header
Right (Female)
AM188ES
Monitor
ROM
(64K)
RAM
(128K)
Flash Writer
TEXT
Tool
(28 DIP)
64K
32
PLCC
128K
ISA Slot
ISA IO Card
8255 PPI
8253 PIT
34 Pin Header
IO Card Peripheral
D-Sub 25
ISP
Downloader
10P Flat Cable
ISP