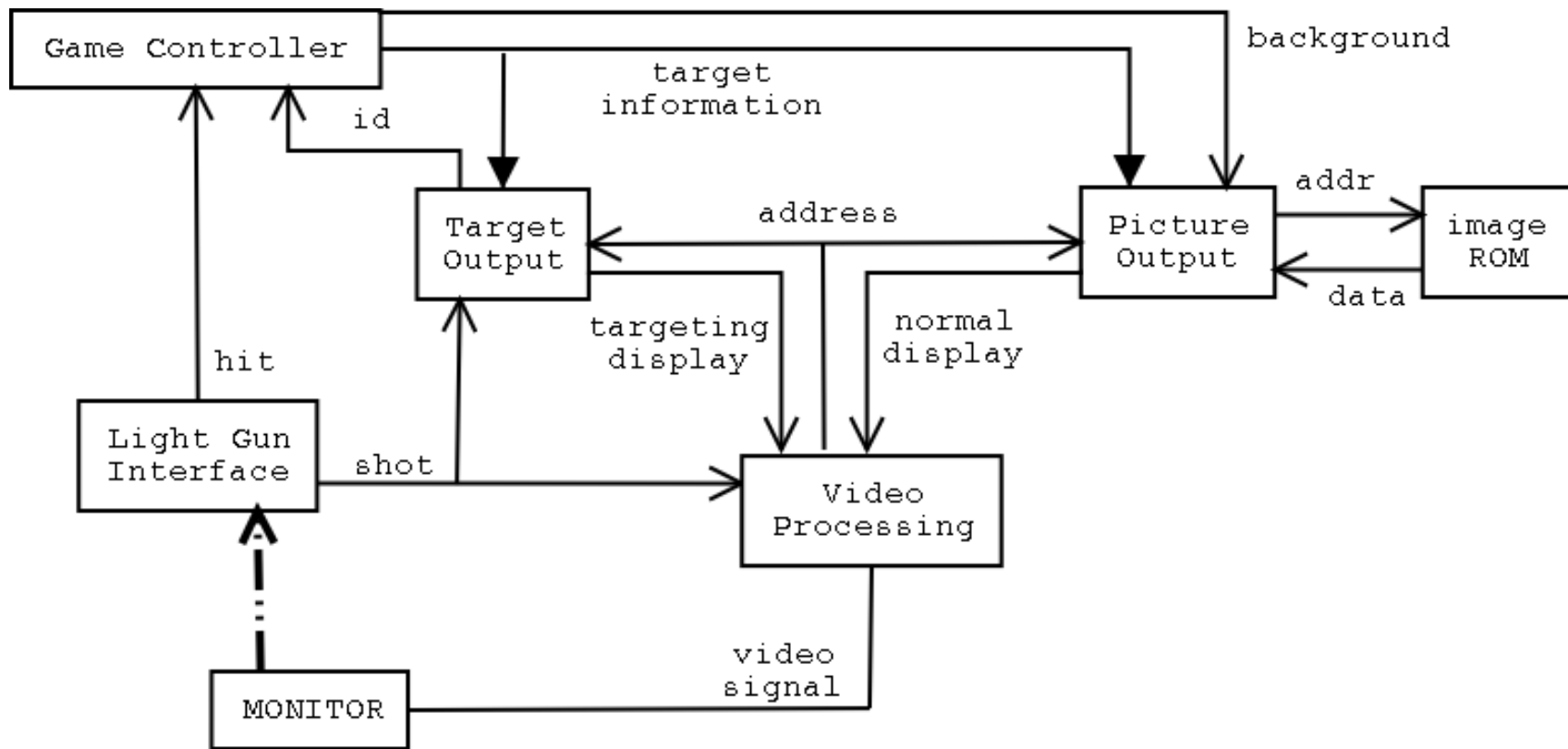




Video Target Shooting

- An interactive target practice game.
- What's in it:
 - Nintendo Zapper Gun
 - Video Display, MC6847, and associated wiring
 - Game Controller

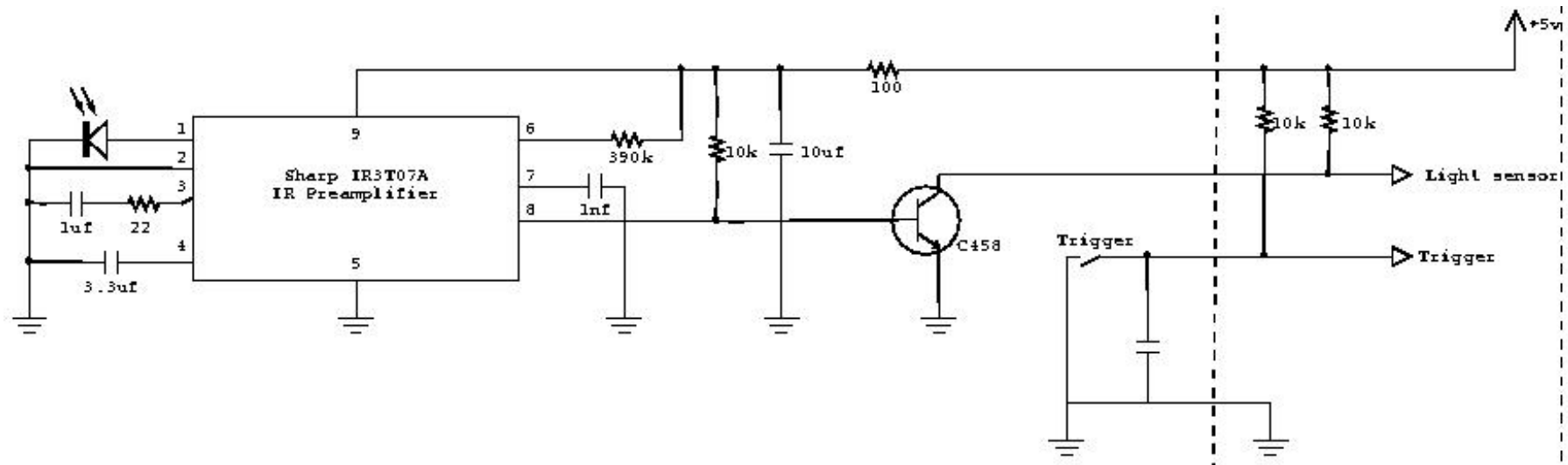
Video Target Shooting



The Zapper Gun Interface

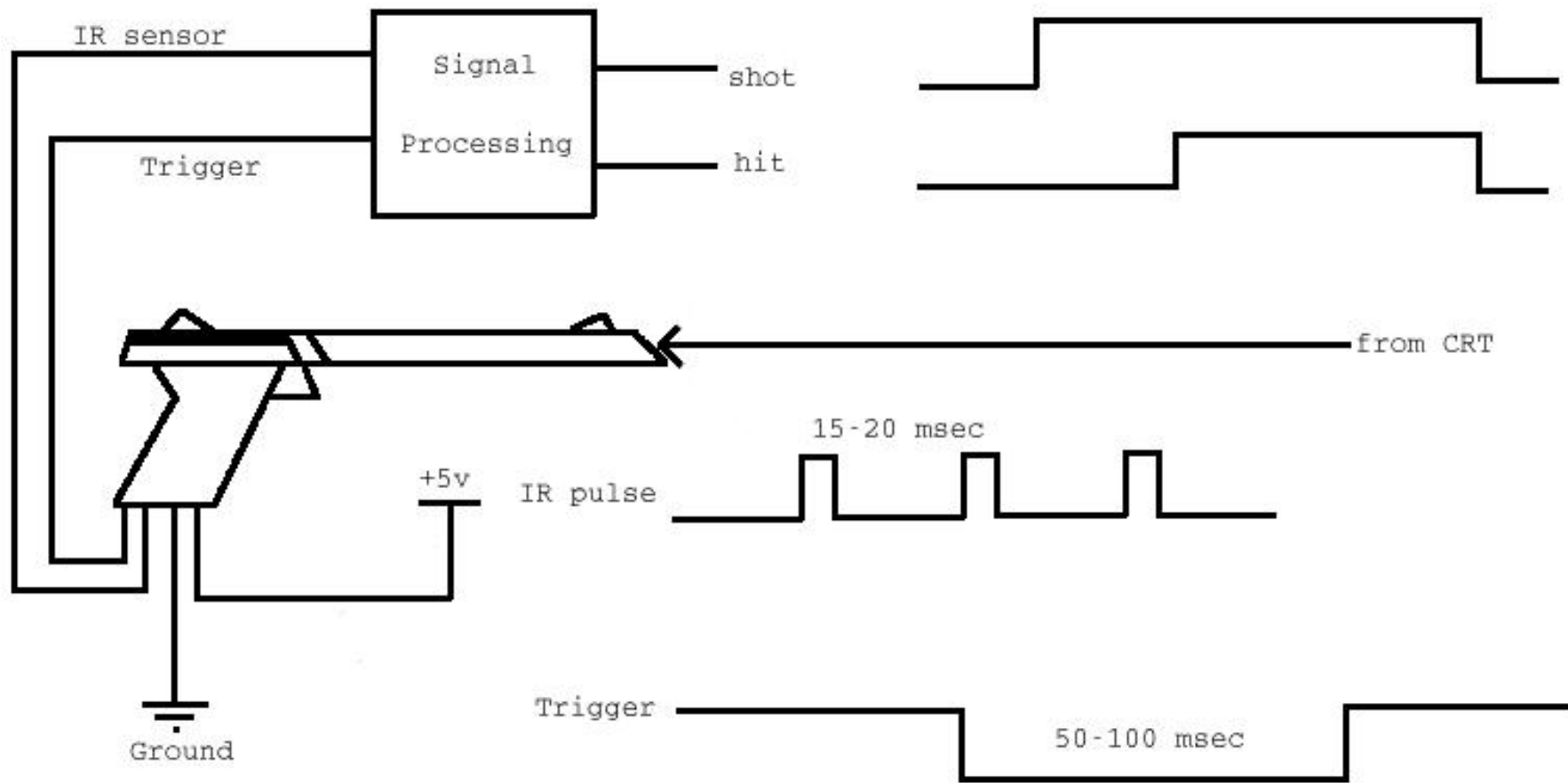


The Zapper Gun Interface



Source: Schematic Diagrams for the Nintendo Entertainment System
Copyright © 1992 Electronix Corp.

The Zapper Gun Interface





The Zapper Gun Interface



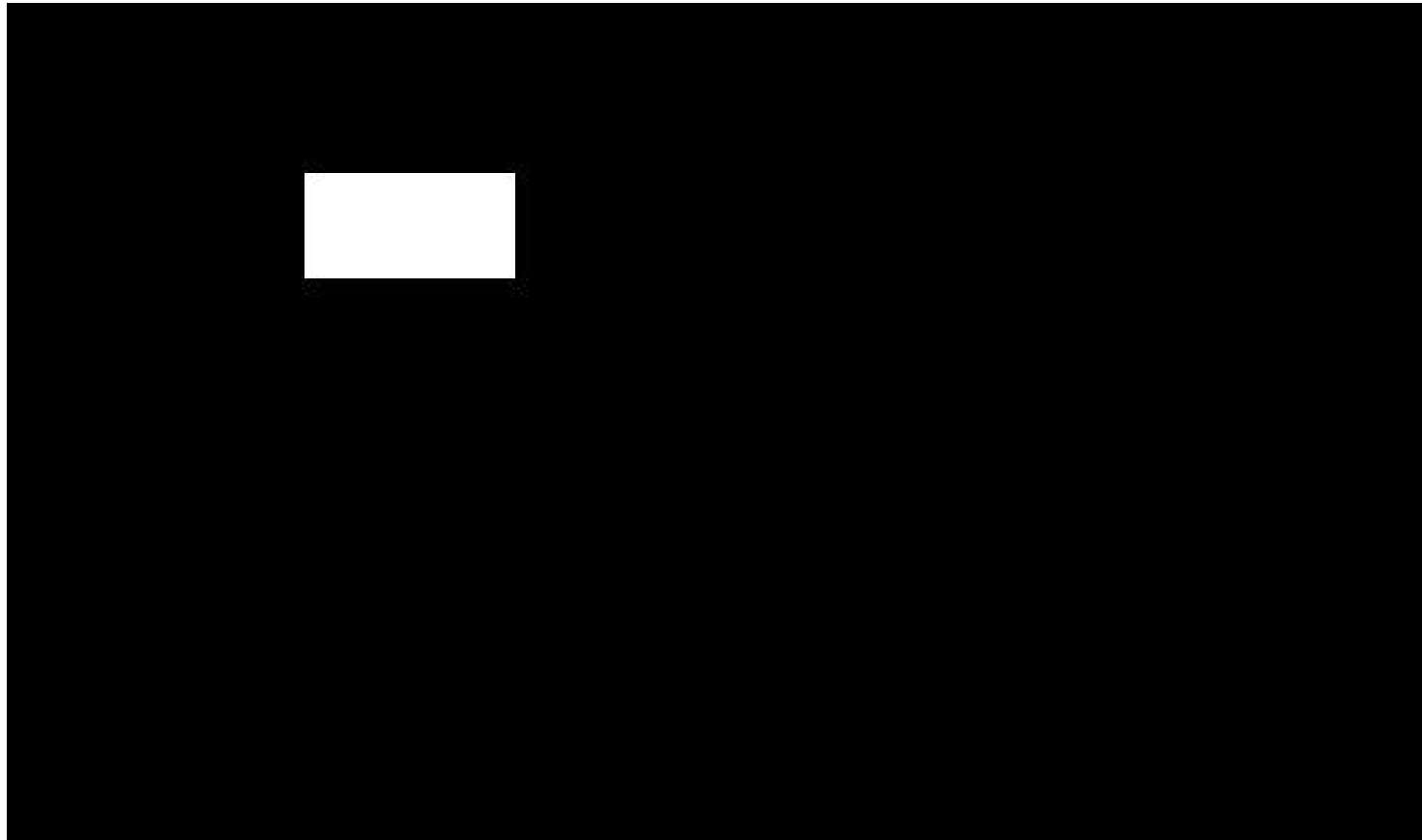


The Zapper Gun Interface



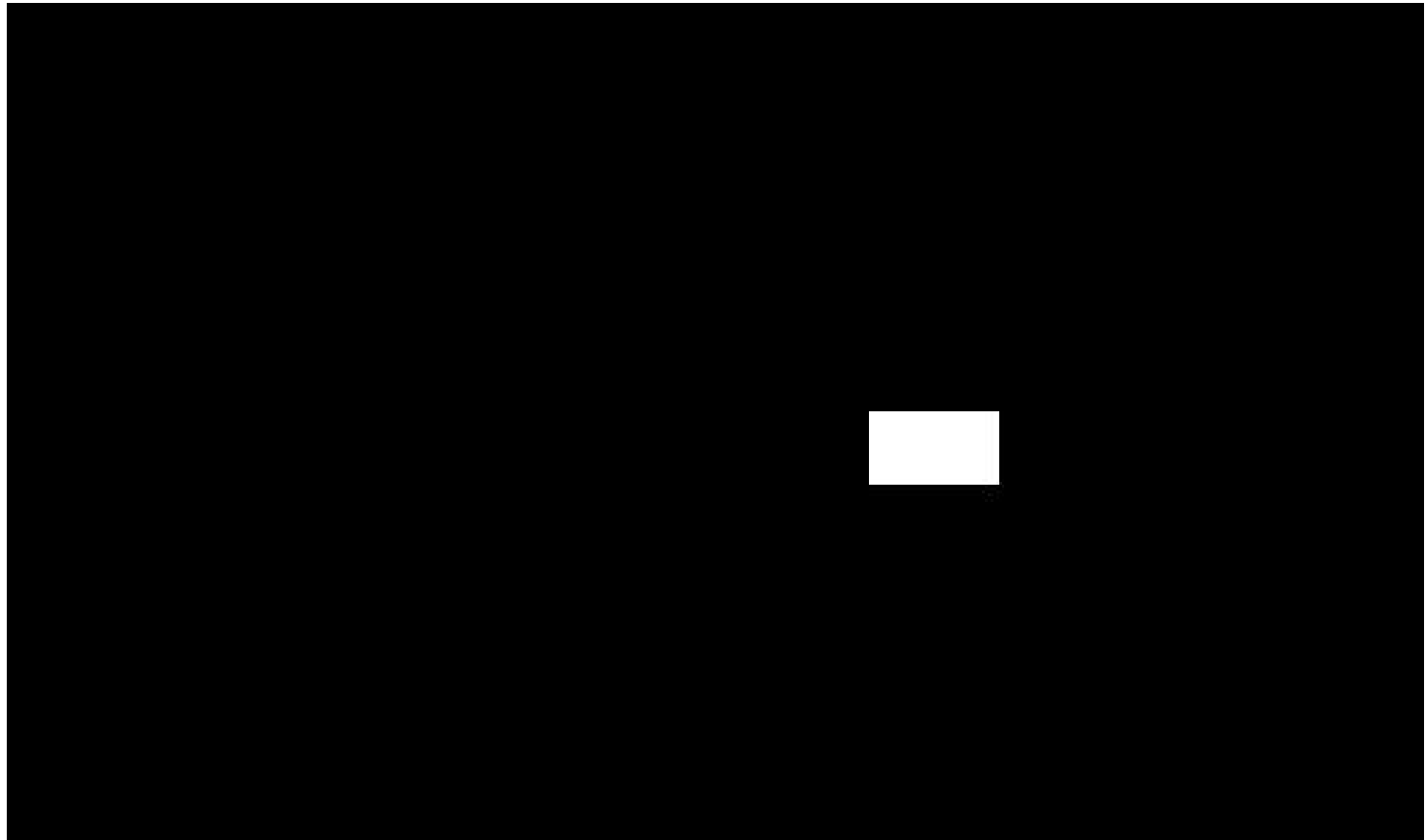


The Zapper Gun Interface





The Zapper Gun Interface





The Zapper Gun Interface





The Video Controller

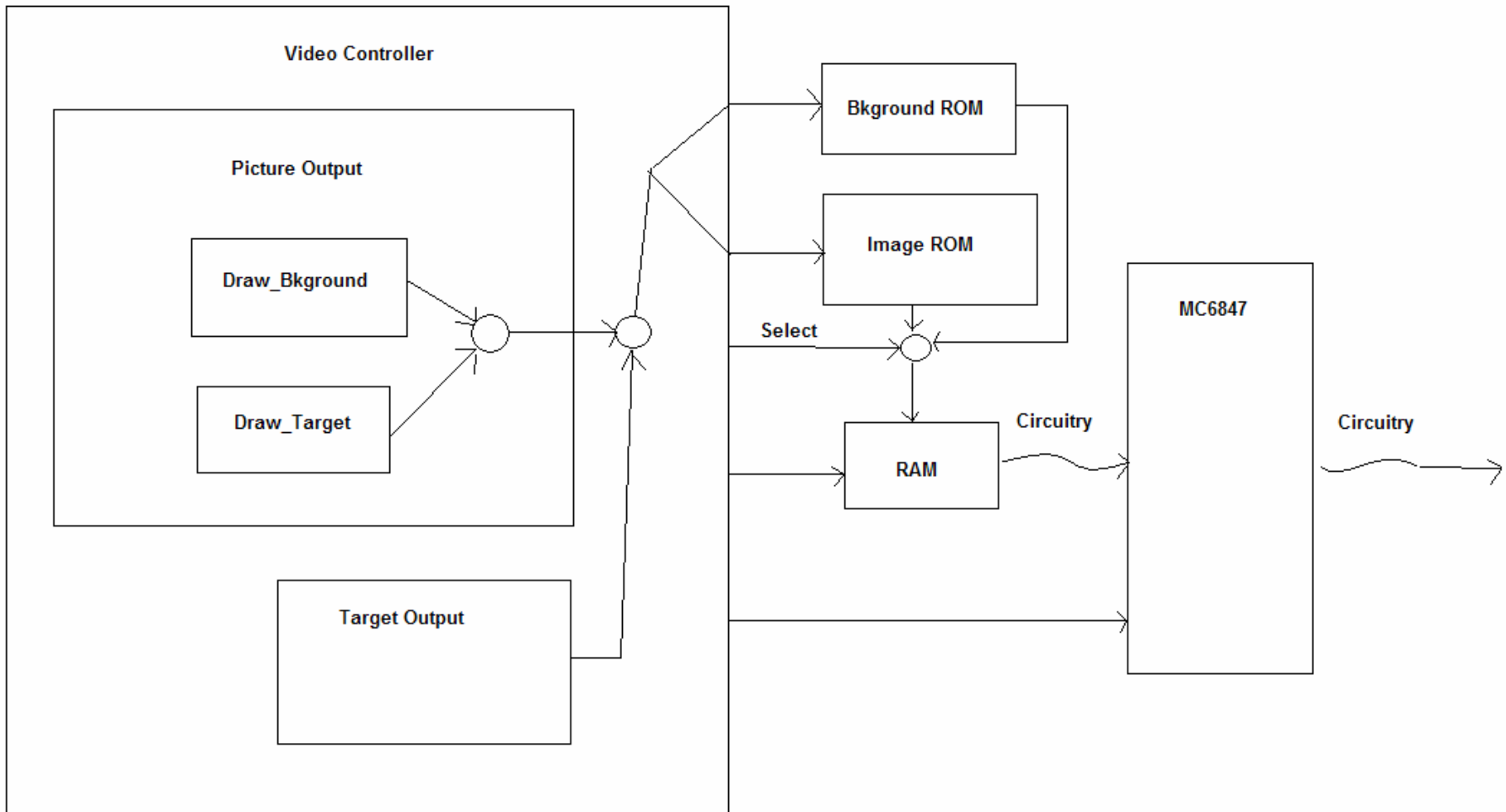
- Takes information on target types and locations, and maps them to a video display.
- Components:
 - MC6847 Chip
 - SRAM (62256-12)
 - ROMs (Am28F020)
 - Lots of helper circuits.
 - Video Control Unit (on the FPGA)



The Video Controller

- The MC6847 converts the digital bitmap file on our RAM into an analog output to the display.
- The RAM stores the image to be displayed.
- The Background ROM stores the backgrounds to be displayed.
- The Image ROM stores images to drawn OVER the background on the RAM.

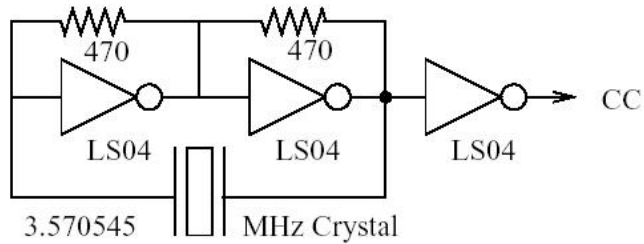
The Video Controller



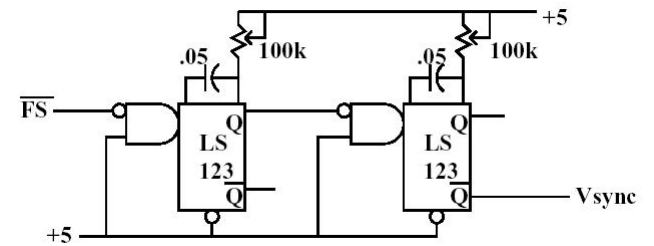
The Video Controller

Circuits for MC6847 (from old 6.111 Lecture notes)

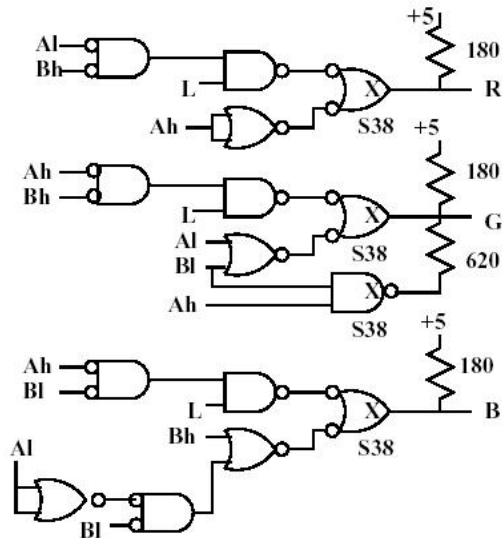
Clock input



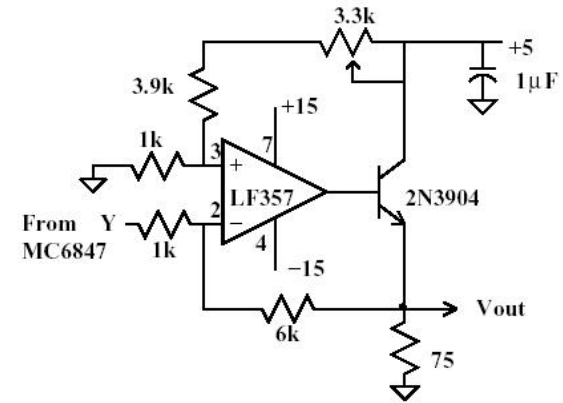
Center display



RGB input circuit (coded on PAL)



Drive monitor



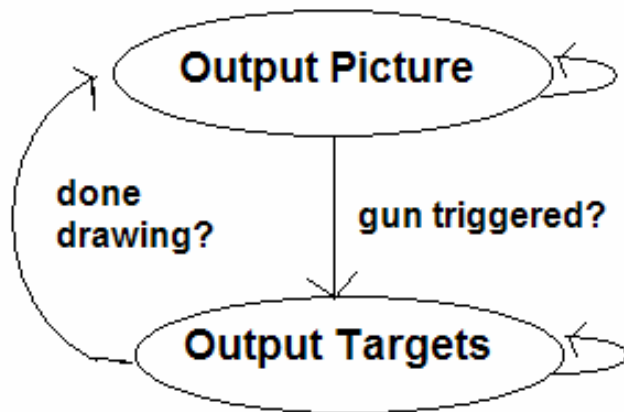


The Video Controller

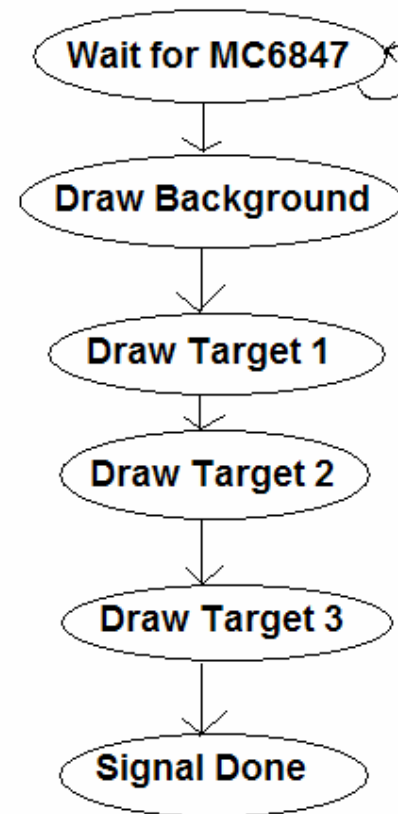
- Major-Minor FSM Scheme:
 - Major FSM, Video_Controller, controls minor FSMs for the different drawing processes.
 - Minor FSMs:
 - Picture_Output– gives the finished bitmap to the MC6847 and allows it to process this information. Contains:
 - Draw_Bkground – writes the basic background to the RAM.
 - Draw_Target – writes a target picture on top of a section of the basic background on the RAM.
 - Target_Output – gives a black background with white squares in place of targets to the RAM, when the gun is triggered.

The Video Controller

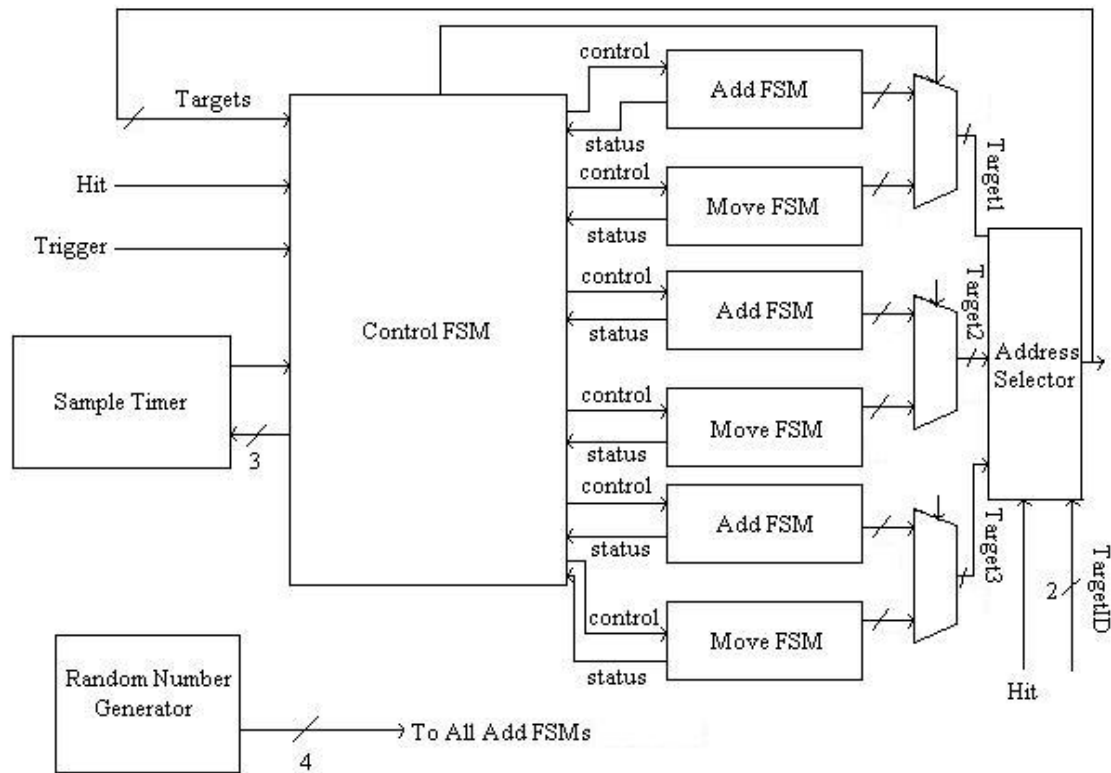
Video Controller FSM



Picture Output FSM

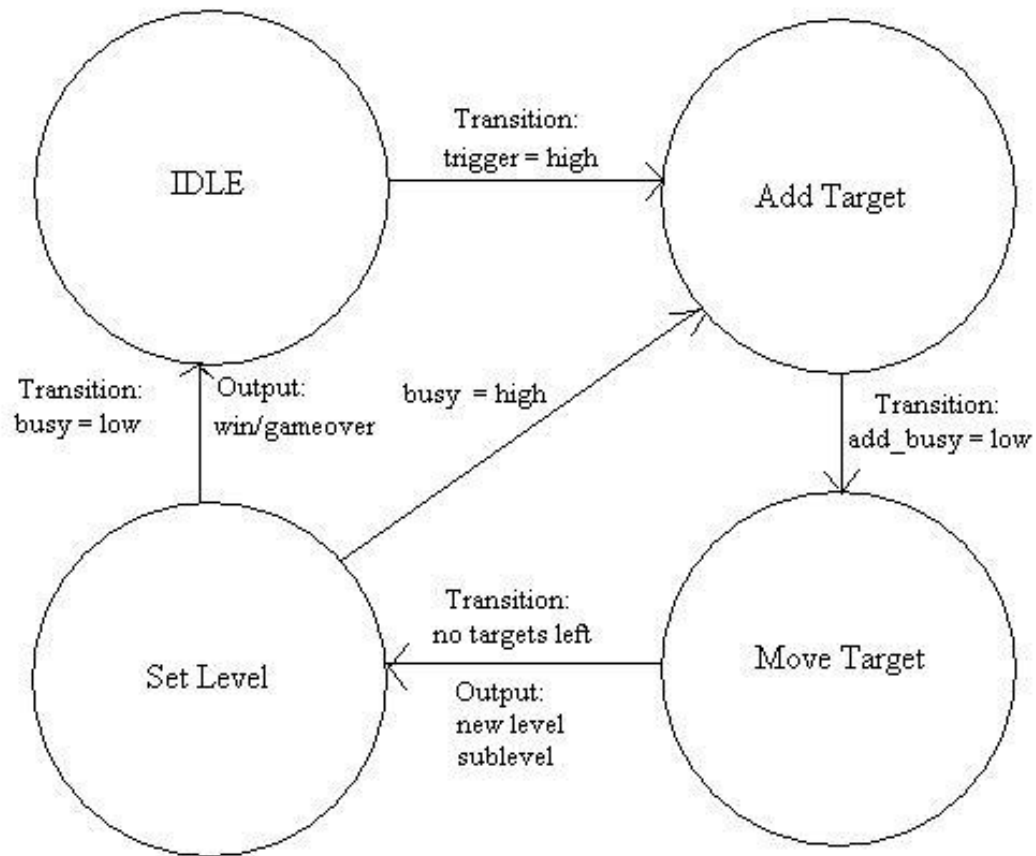


Game Controller



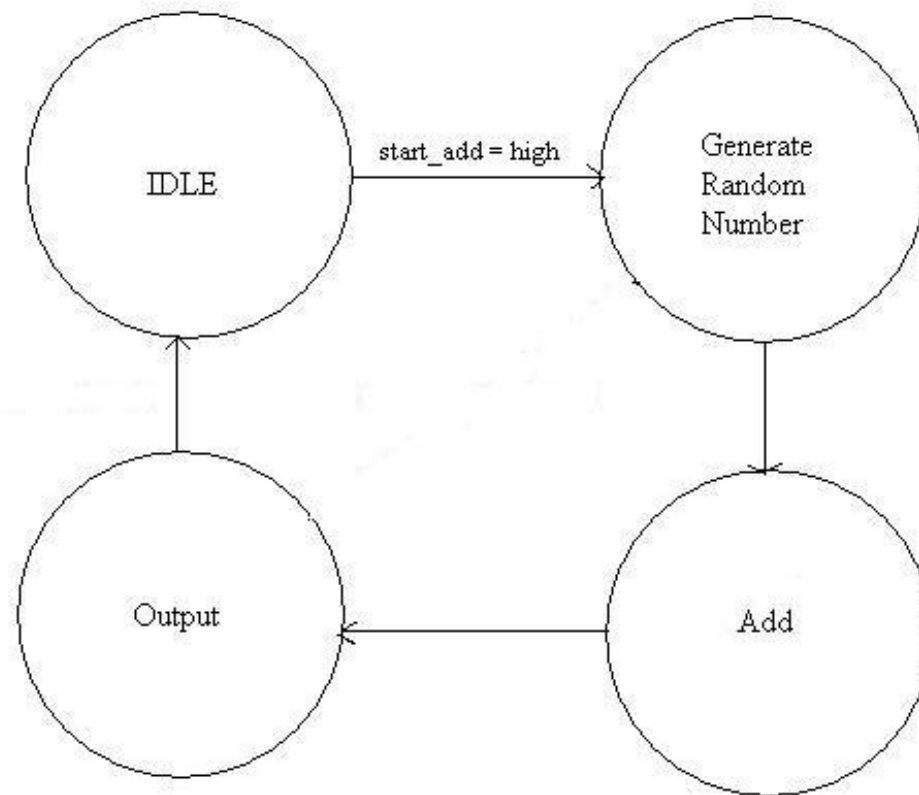
Game Controller Module

Game Controller



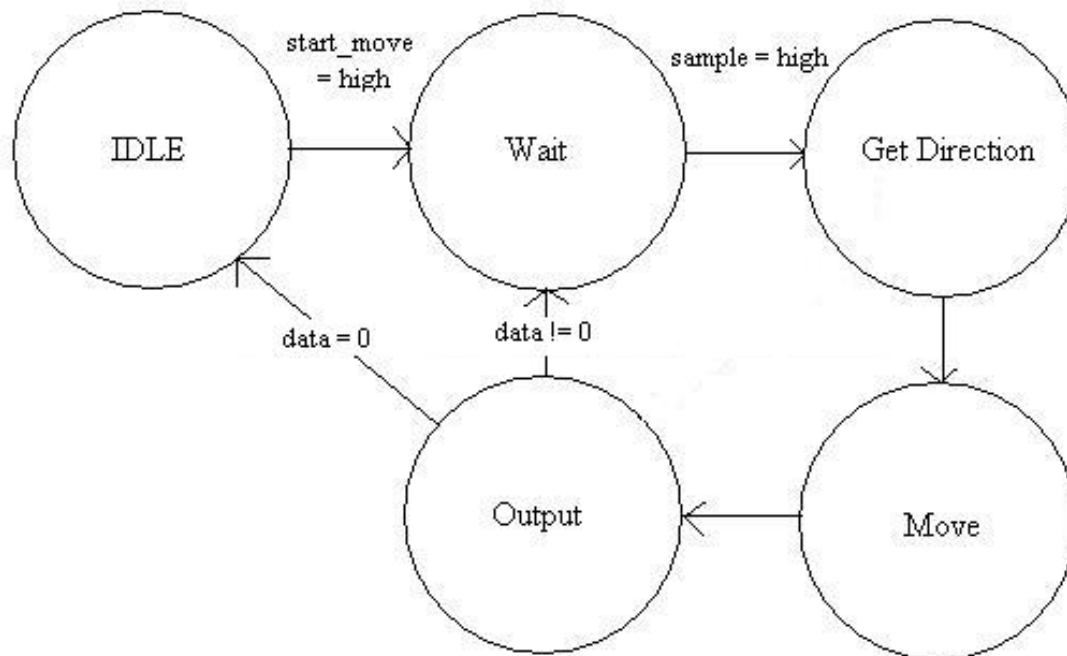
Control FSM Transition Diagram

Game Controller



Add FSM Transition Diagram

Game Controller



Move FSM Transition Diagram



Extra Add-on Features

- Wireless Zapper Interface
 - Simple RF modulation to send Sensor and Trigger signals from light-gun to lab kit.
- Audio
 - Background Music
 - Sound Effects



Questions?
