

A Real-Time Video Processor

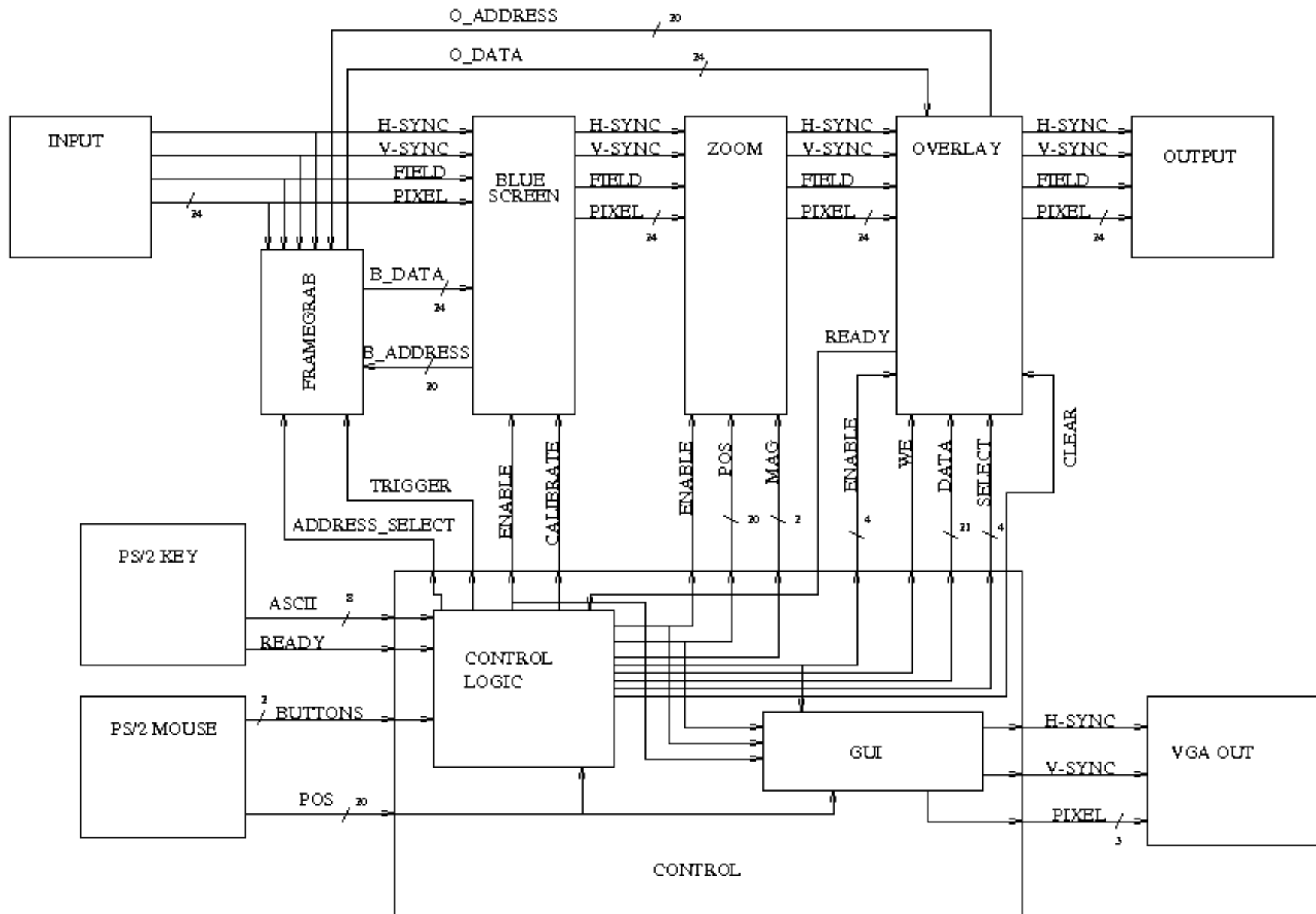
Venkat Chandar and Ben Gelb

Wednesday, November 15th

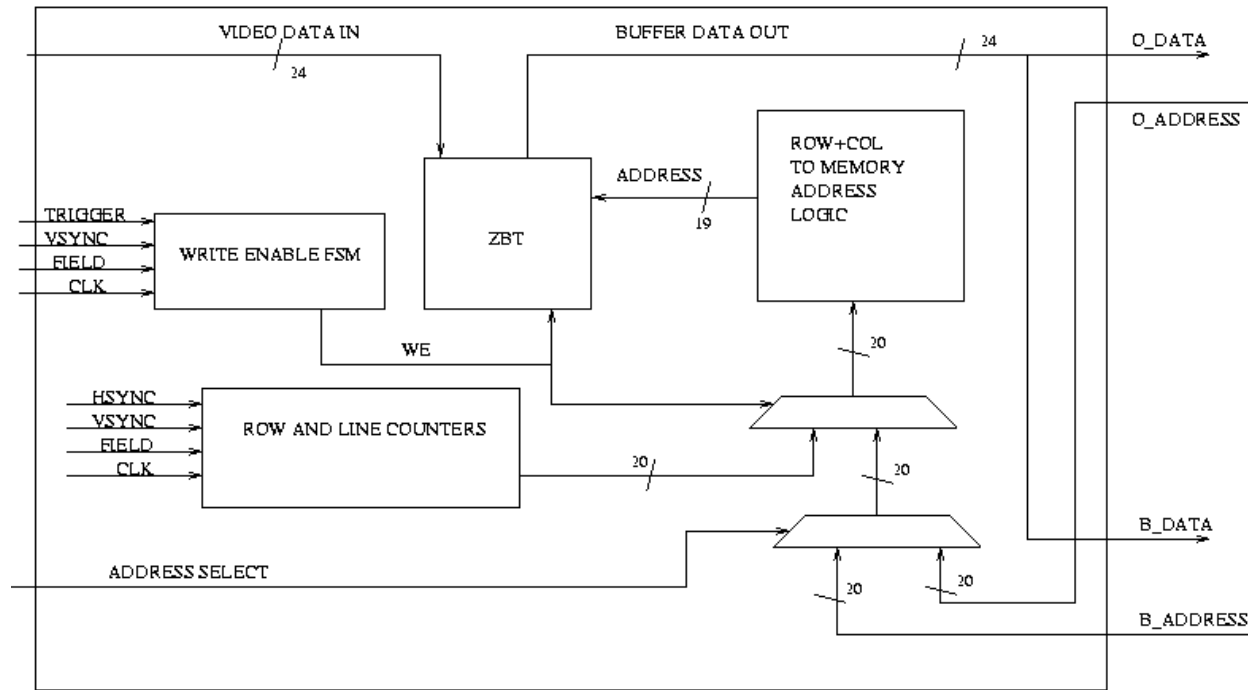
Overview

- Applies overlay, zoom, and blue screen functionality to video signal
- Used for news or sports broadcasts
- Input and output NTSC signals
- PS/2 mouse and keyboard and VGA monitor for control interface

System Block Diagram

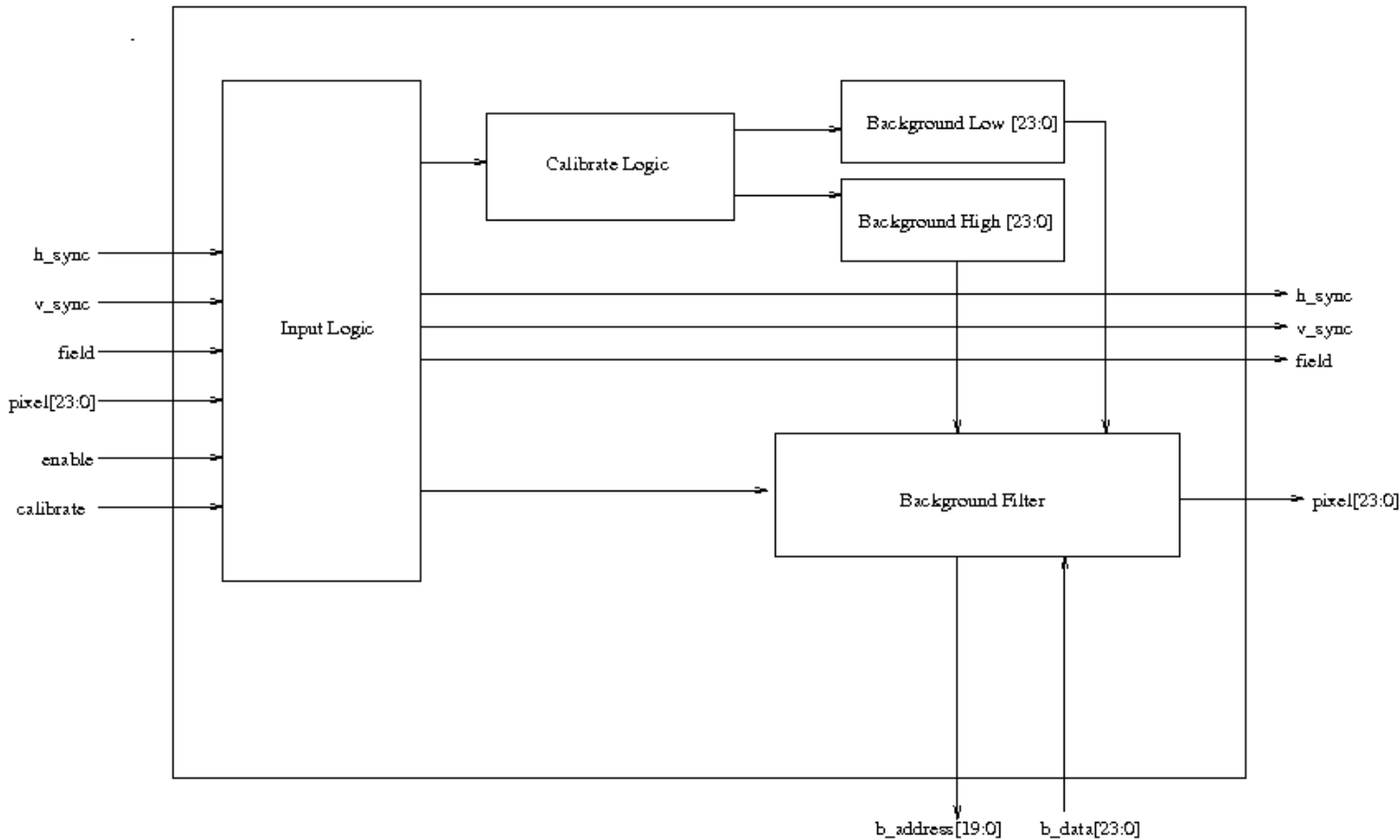


Framegrab Module



- Stores one frame (both fields) of video
- Starts at vertical sync following trigger
- Read by overlay and blue screen modules

Blue Screen Module

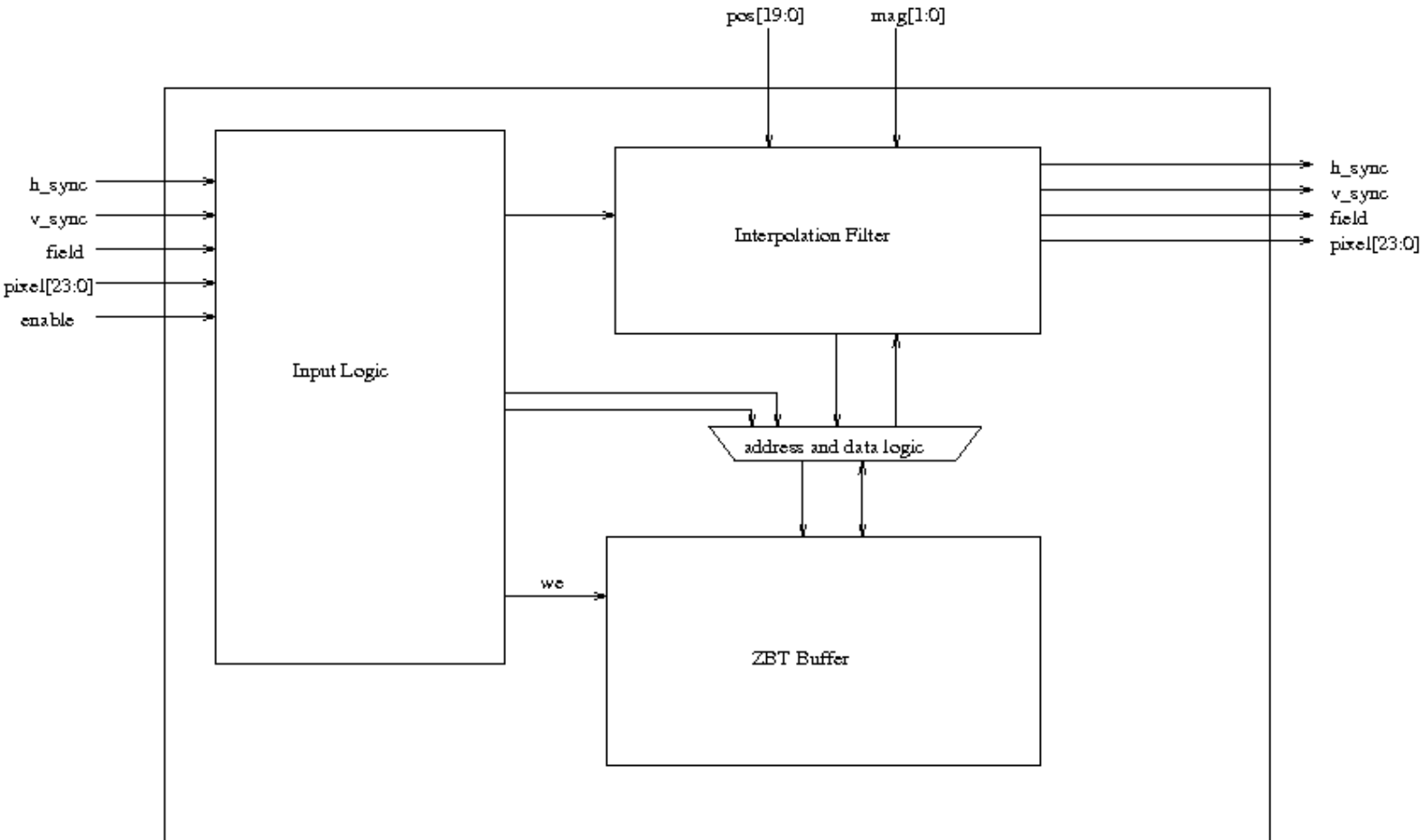


- Calibrate Logic computes correct threshold values to store in registers

- Background filter replaces background with stored frame

- Background filter accesses data from framegrab buffer a cycle early

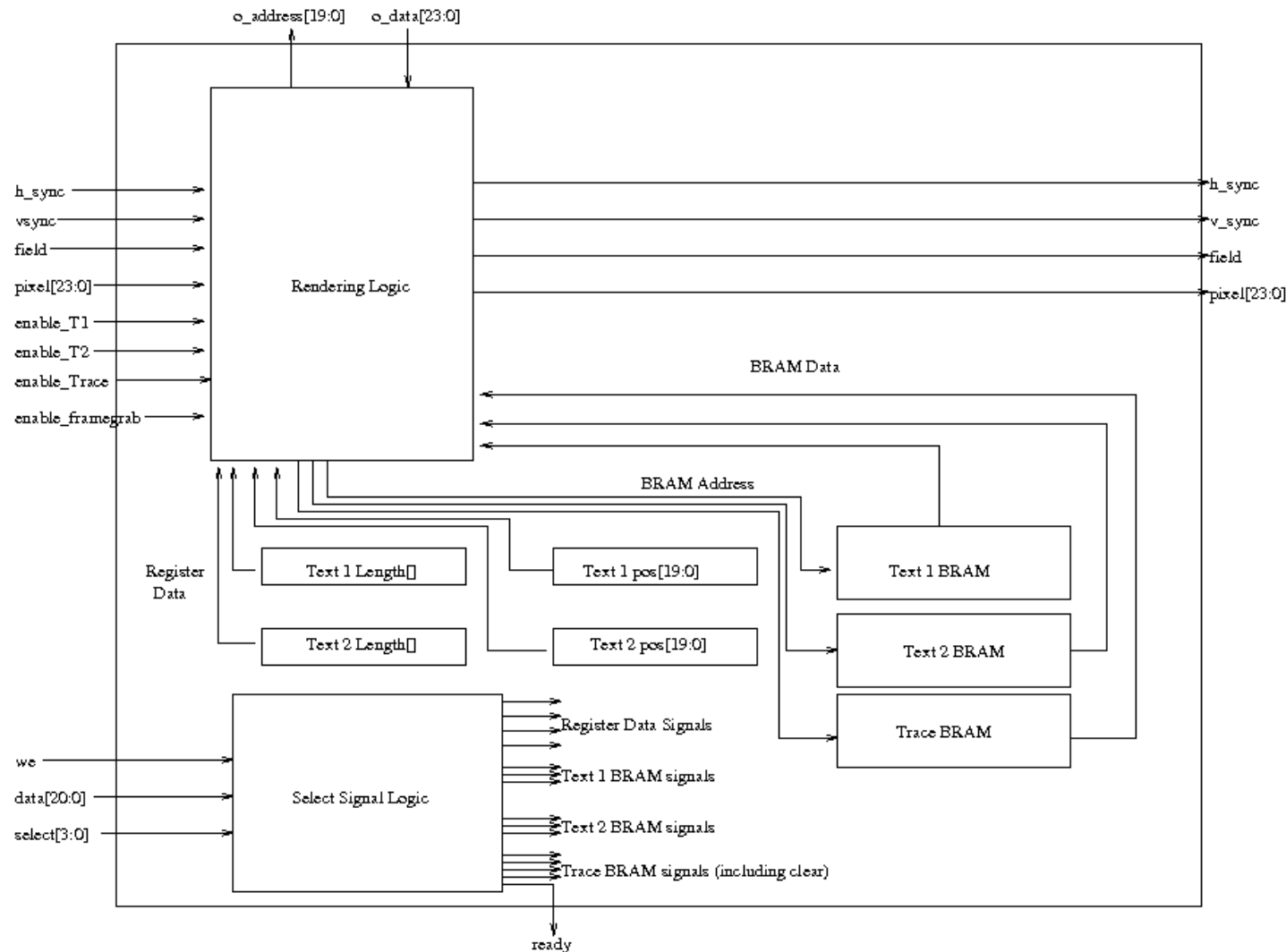
Zoom Module



- ZBT Buffer stores the frame so that it can be enlarged at the next cycle

- Interpolation filter enlarges a specified portion of the image

Overlay Module



- Rendering Logic updates pixel value based on which overlay objects are enabled

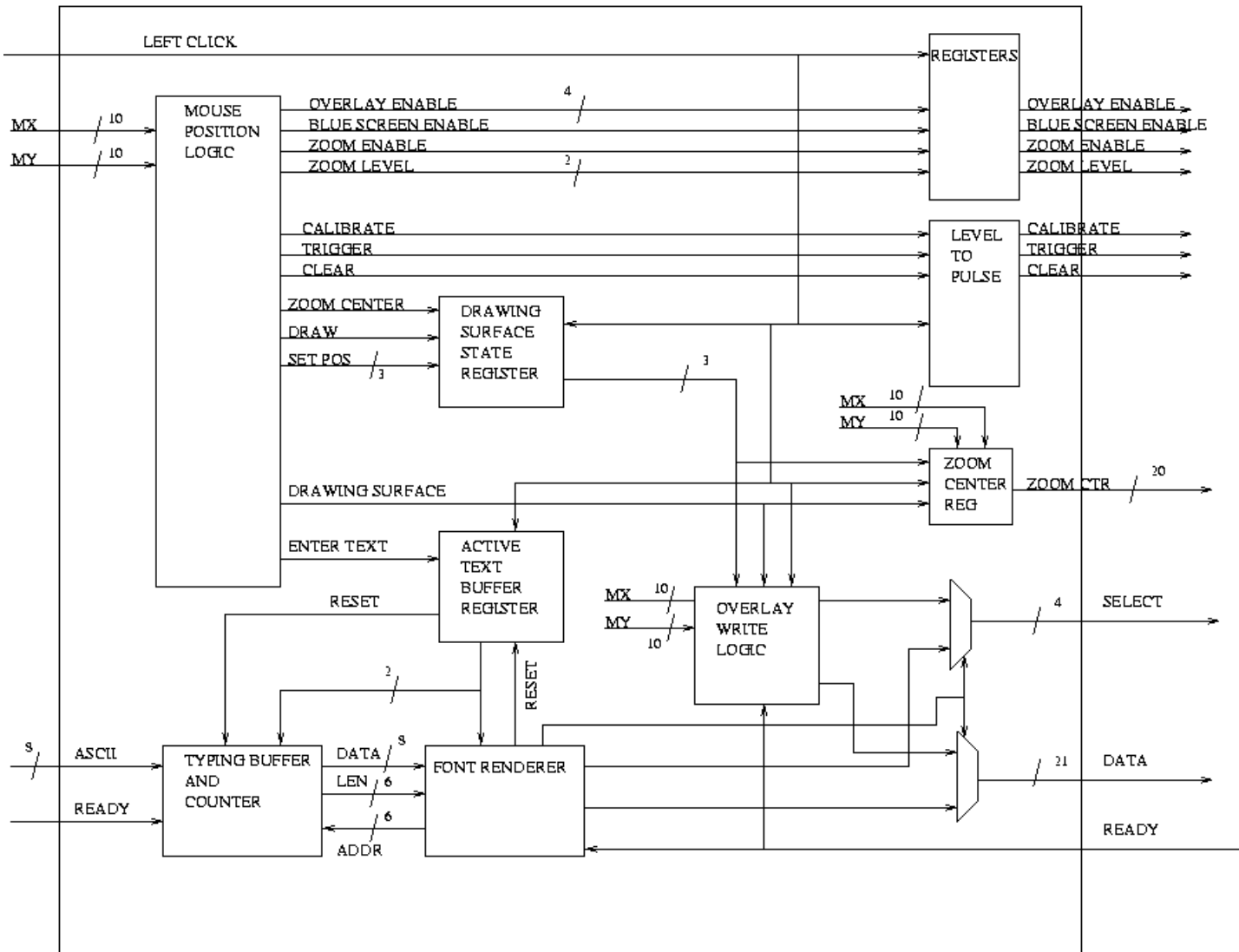
- Select Logic writes to the BRAMs

- BRAMs are dual-port – simultaneous read-write not a problem

Control GUI

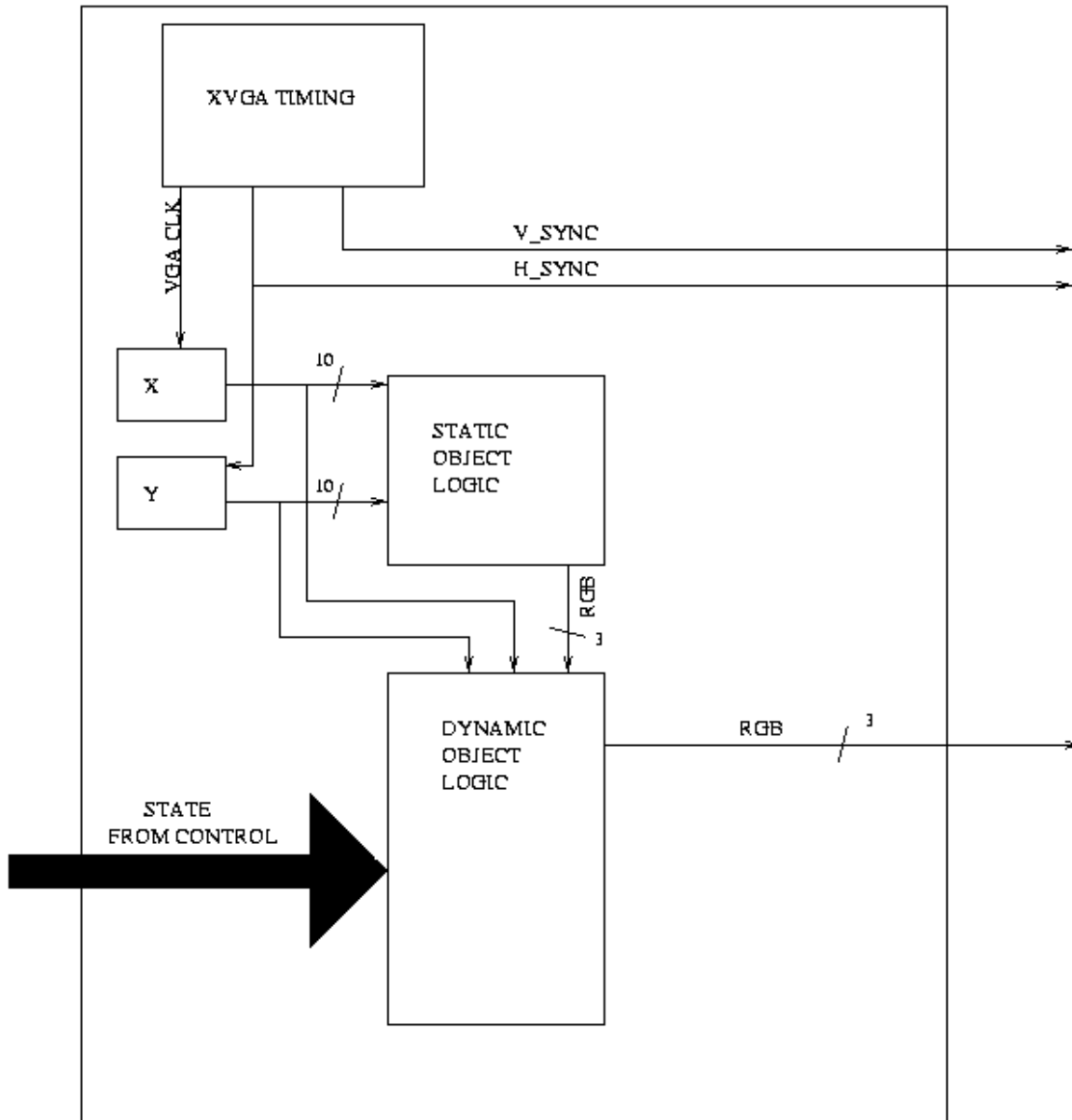
<p>1024x768</p> <p>FRAMEGRABBER</p> <p><input type="button" value="TRIGGER"/></p> <p>BLUESCREEN</p> <p><input checked="" type="checkbox"/> ENABLE</p> <p><input type="button" value="CALIBRATE"/></p> <p>ZOOM</p> <p><input checked="" type="checkbox"/> ENABLE</p> <p><input type="radio"/> 2X</p> <p><input type="radio"/> 4X</p> <p><input type="radio"/> 8X</p> <p><input type="button" value="CHOOSE CENTER POINT"/></p>	<p>525x720 DRAWING/PLACEMENT SURFACE</p>																
<p>OVERLAY</p> <table><tr><td>TEXT1</td><td><input checked="" type="checkbox"/> ENABLE</td><td><input type="button" value="SET POSITION"/></td><td><input type="button" value="ENTER TEXT"/></td></tr><tr><td>TEXT2</td><td><input checked="" type="checkbox"/> ENABLE</td><td><input type="button" value="SET POSITION"/></td><td><input type="button" value="ENTER TEXT"/></td></tr><tr><td>FRAMEGRAB</td><td><input checked="" type="checkbox"/> ENABLE</td><td><input type="button" value="SET POSITION"/></td><td></td></tr><tr><td>TRACE</td><td><input checked="" type="checkbox"/> ENABLE</td><td><input type="button" value="CLEAR"/></td><td><input type="button" value="DRAW"/></td></tr></table> <p>TEXT BUFFER: NOW IS THE TIME FOR ALL GOOD MEN...</p>		TEXT1	<input checked="" type="checkbox"/> ENABLE	<input type="button" value="SET POSITION"/>	<input type="button" value="ENTER TEXT"/>	TEXT2	<input checked="" type="checkbox"/> ENABLE	<input type="button" value="SET POSITION"/>	<input type="button" value="ENTER TEXT"/>	FRAMEGRAB	<input checked="" type="checkbox"/> ENABLE	<input type="button" value="SET POSITION"/>		TRACE	<input checked="" type="checkbox"/> ENABLE	<input type="button" value="CLEAR"/>	<input type="button" value="DRAW"/>
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Control Logic



- Mouse logic indicates when object is illuminated by mouse
- Output registers/logic actuated by left click and mouse logic output

Control GUI



- Generates XVGA timing signals
- Renders static objects – buttons, etc
- Renders dynamic objects – cursor, checkboxes, etc

Wrap-Up

- Apply overlays, zoom, and blue screen functions to video in real time
- Useful in TV production
- Five modular sub-parts, can be tested independently
- Questions?