

;PALASM Design Description

----- Declaration Segment -----

TITLE TEXT20 - Character Generator Timing Controller
PATTERN U111 of Control Board
REVISION 2.0
AUTHOR Joel Tarback, A. Koebel
COMPANY ELECTROHOME LTD.
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CHIP TEXT MACH110

----- Description -----

; This IC provides many of the timing signals required to scan characters
out to the display. It contains an up-counter clocked by PIXCLKB that
divides the active horizontal scan time into 64 time slots (columns). It
also contains a vertical counter clocked by VLTC, from the vertical RAM
circuit (U102 etc.), that divides the raster into 24 rows. In addition,
it outputs signals which are used to generate a grayscale test pattern.
Text is displayed on-screen in a 64 column by 24 row matrix. A 16-bit word
is stored for each screen location in RAMs U97 and U98. During the first
half of each horizontal time slot, U111 generates a column address
(CG0-CG5) and a row address (CG6-CG11) for the RAMs to specify one of the
screen locations. It also drives CG12 low to address the lower half of the
RAM space. The RAMs then each output a byte. These are loaded into latches
U89 and U91 using FONT_CLK (FONT-CLK).
During the second half of the horizontal time slot, the data in U91 is fed
back to the RAMs on CG4-CG11. CG12 is driven low to address the upper half
of the RAM space. This address selects one of the character bitmaps.
OEFONT (OEFONT*) is driven low to mux address data from the vertical RAM
circuit onto CG0-CG3, selecting which line of pixels in the bitmap will be
displayed on the current scan line. In response to the combined address on
CG0-CG12, the RAMs each output another byte. These are loaded into shift
registers U88 and U99 using LDSHIFT (LOADSHIFT*). The pixels in these
registers are shifted out for display during the next horizontal time slot.
The three most significant bits of the horizontal count are output as GRO,
GR1, and GR2 (HCOUNT5*, HCOUNT6*, and HCOUNT7*). These are used to create
the grayscale test pattern. MIDV from the vertical RAM circuit inverts
these outputs midway down the raster.

; Revision History:

- 1.X - all 1.X versions were based on a pin-compatible MACH 210 device
and implemented variable width characters (8,12 or 16 pixels).
2.0 - first version for MACH 110, with fixed width characters (8 pixels)

----- PIN Declarations -----

;CLOCKS AND INPUTS:

PIN 35 PIXCLKB COMBINATORIAL ; INPUT pixel clock (buffered)
PIN 13 HEN2 COMBINATORIAL ; INPUT from pin 4 (HEN1) and used as clock
PIN 10 OE244 COMBINATORIAL ; INPUT enable for row and column addresses
PIN 11 VDRIVE COMBINATORIAL ; INPUT video field reset for row counter
PIN 32 OE COMBINATORIAL ; INPUT global tristate for all outputs
PIN 33 HCLK COMBINATORIAL ; INPUT same as PIXCLKB but combinatorial