Display control signals LINECL, DATACL, DTCLA, M1, FRAME

These signals are used to control the LCD. The LCD picture is constructed from these display control signals and the data signals and sent to the LCD via the LCD driver outputs.

DATACL clocks the data into the driver buffer of D1406, DTCLA clocks the data into the driver buffers of D1404 and D1405.

The FRAME signal is the data signal for the column drivers D1401, D1402 and D1403.

LINECL clocks one complete line (column) into the LCD.

The M1 signal is described furtheron (see "M-randomize section" below).

LCD supply section

The pulse modulated signal, CONTR (contrast), comes from the D-ASIC. CONTR is filtered by R1430 and C1430 to get a DC voltage. The value of this voltage depends on the duty cycle of the CONTR signal. Via V1435, divider resistors R1420...R1424 and buffer opamps N1420, the CONTR signal controls the value of the voltages V1, V3, V4, V5 and V6. The LCD contrast depends on the value of these voltages.

As long as the signal LCDPWR, coming from the microprocessor, is "low" (0V), transistor V1435 does not conduct, and voltage V2 is approximately zero. As a result the LCD is blanked. After the microprocessor invokes a software reset, the LCDPWR line is made "high". Then V2 becomes approximately -20V.

The voltages V1...V6 are temperature corrected to compensate for the temperature dependency of the LCD (80 mV/°C). These voltages have to be corrected by the same amount to get a constant (over a temperature range) brightness and contrast of the LCD. This temperature compensation done by Positive Temperature Coefficient (PTC) resistor R1433. If the value of this resistor changes, also V2 changes. Voltage V2 is made out of the -30V voltage, coming from the Analog A2 PCB. Transistor V1432 limits the current through V1433 to approximately 30 mA. If the current exceeds 30 mA, the voltage drop across R1439 causes V1432 to start conducting.

M-Randomize section

The signal M ("LCD backplane modulation signal"), generated by the D-ASIC, has a time relation with the display control signals. The M-Randomize section in the M-ASIC converts M into M1, which is not time related to other display control signals. The M1 signal is used by the LCD drivers to convert all DC voltages into AC voltages without any DC component, able to drive the LCD. A DC component of the LCD drive voltage can cause memory effects on the LCD.

Backlight circuitry

The backlight circuitry is based on the Hartley oscillator principle. Components V1443, T1440, and C1441 form the oscillator. Transistor V1440 supplies the current to the circuit. This transistor is switched on/off by the LIGHT signal (backlight on/off), coming from the microprocessor.

The output voltage is regulated via transistor V1441 and diodes V1340B, V1442, V1444 and V1445. If the backlight voltage becomes more than 200V peak-to-peak, V1441 will draw away current (energy) supplied to the oscillation circuit.

3.3.6   M-ASIC

The M-ASIC D1210 contains a number of more or less independent circuits:

Address latch

The multiplexed Microprocessor AD bus (AD0...AD15) is supplied to the M-ASIC. The M-ASIC latches the address bits, and supplies them to the address outputs A00...A14.

Memory manager

The memory manager is a collection of circuits, mainly intended to control the ROM and RAM memories.