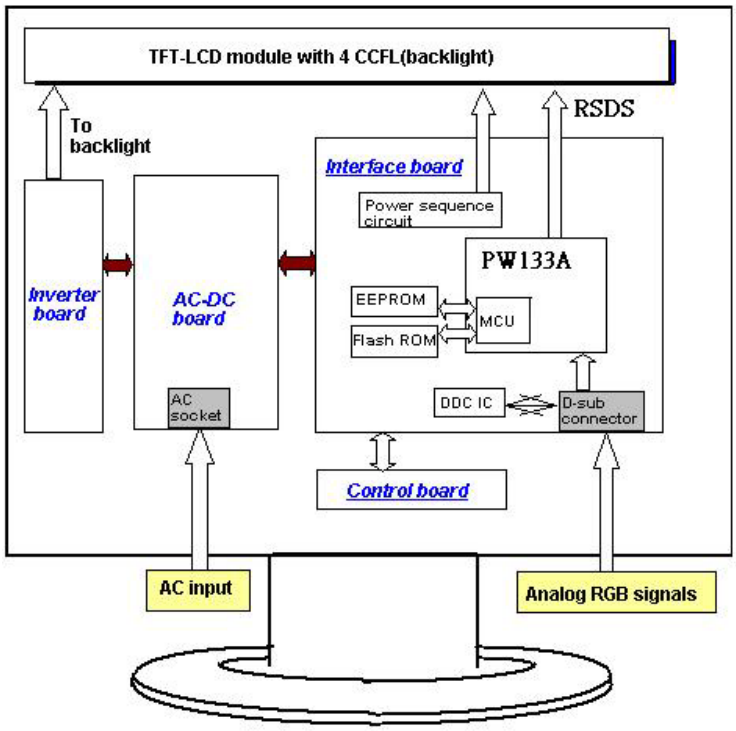
I. Introduction:

The Q7C3 (FP756) is a 17" SXGA (1280x1024) , 262 K colors(R, G, B 6-bit data) TFT LCD monitor without multi-media function. It's an analog interface LCD monitor with a 15 pins D-sub signal cable and it's compliant with VESA specification to offer a smart power management and power saving function. It also offers OSD menu for users to control the adjustable items and get some information about this monitor, and the best function is to offer users an easy method to set all adjustable items well just by pressing one key, we called it "Auto key" which can auto adjusting all controlled items. Q7C3 (FP756) also offer DDC2 function to meet VESA standard.

II. Block diagram

The Q7C3 (FP756) consists of a head and a stand (base). The head consists of a LCD module with 4 lamps, a power board (include AC/DC, DC/DC and inverter board), a control board and interface BD. The block diagram is shown as below.

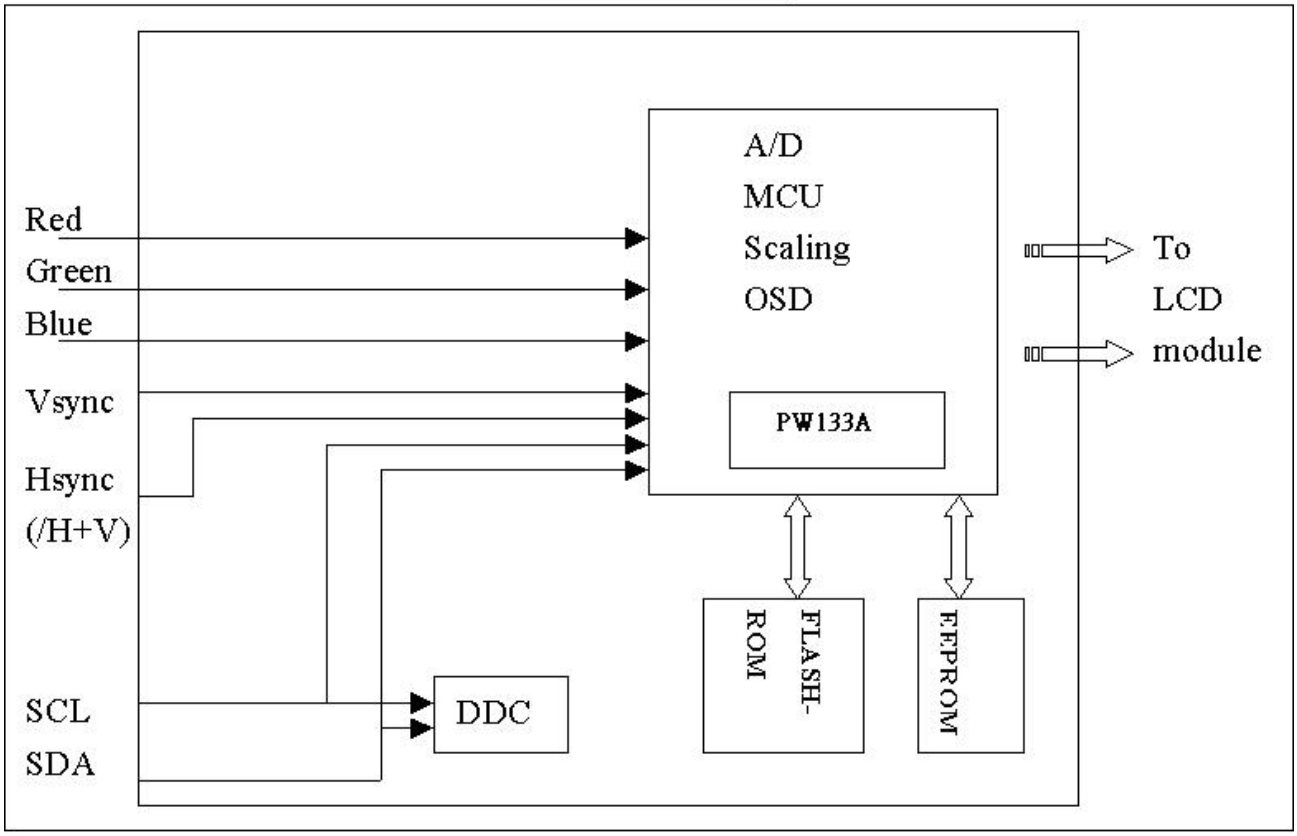


III. Circuit operation theory:

A.) HEAD:

A-1.) Interface board diagram:

Interface Board



(a) Circuit operation theory:

A basic operation theory for this interface board is to convert analog signals of Red, Green, Blue. The scaling IC has internal A/D converter, internal OSD and auto detect input timing functions. A/D converter is convert analog signal to digital data. OSD is offering adjustable functions to end-user. Detect timing is for detect change mode. Scalar finally output the digital RGB data, the Hsync, Vsync and pixel clock to LCD panel driver IC by RSDS interface. MCU also embedded in PW133A controls system processing. EEPROM is stored DDC data, OSD common data and user mode data. Flash-Rom is stored the source code which is accessed by MCU to run program.

(b) IC introduction:

1.) DDC (Display Data Channel) function: We use DDC IC to support DDC/2B function. DDC data is stored in 24C02(EEPROM). Those data related to LCD monitor specification. PC can read them by “SDA” and “SCL” serial communication for I^2C communication for DDC2B.

2.) PW133A IC : There are A/D, Scaling, OSD, MCU functions in the PW133A IC. Scaling IC is revolutionary scaling engine, capable of expanding any source resolution to a highly uniform and sharp image, combined with the critically proven integrated 8 bit triple-ADC and patented Rapid-lock digital clock recovery system. It also support detect mode and DPMS control. MCU

control unit, it controls all the functions of this interface board, just like the OSD display setting, the adjustable items, adjusted data storage, the external IIC communication, support DDC2B.

3.) EEPROM: We use 24C16 to store all the adjustable data and user settings.

4.) FLASH ROM: To stored the source code which is accessed by MCU to run program.

A-2.) Power board diagram:

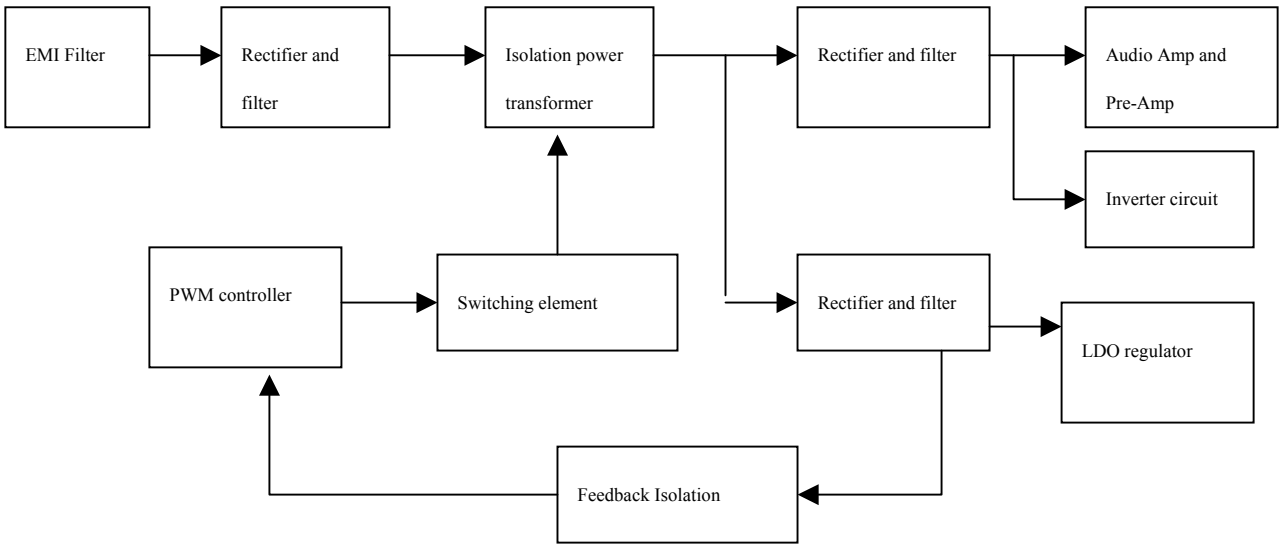


Fig.1

#1 EMI Filter

This circuit (fig. 2) is designed to inhibit electrical and magnetic interference for meeting FCC, VDE, VCCI standard requirements.

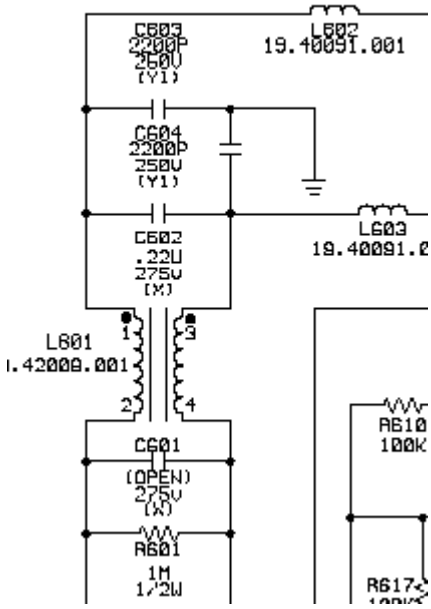


Fig. 2

#2 Rectifier and filter

AC Voltage (90-264V) is rectified and filtered by BD601, C605 (See Fig 3) and the DC Output voltage is 1.4*(AC input). (See Fig.3)

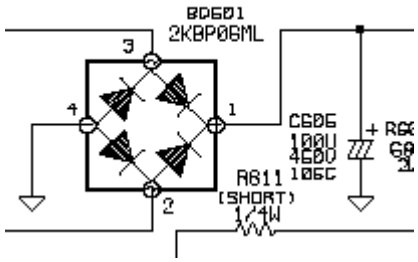


Fig. 3

#3 Switching element and Isolation power transformer

When the Q601 turns on, energy is stored in the transformer. During Q601 turn-off period, the stored energy is delivered to the secondary of transformer. R607, C607 and D601 is a snubber circuit. R615 is current sense resistor to control output power. (See Fig.4)

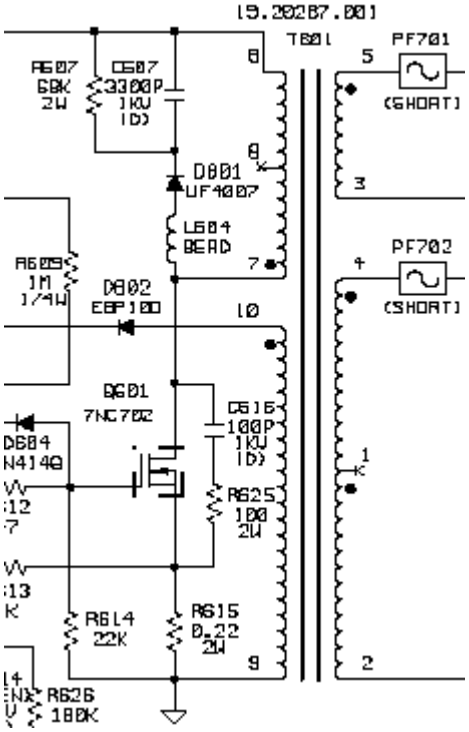


Fig. 4

#4 Rectifier and filter

D701 and C703 are to produce DC output. L701 and C704 are to suppress high Frequency switching spikes. (See Fig.5)

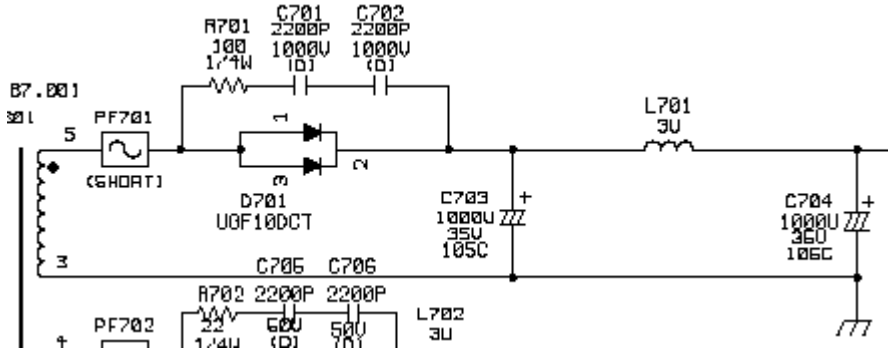


Fig. 5

#5 PWM Controller

The PWM controller NCP1200A implements a standard current mode architecture. With an internal structure operating at a fixed 40KHz. Where the switch time is dictated by the peak current set-point. When the current set-point falls below a given value. The output power demand diminishes, the IC automatically enters the so-called skip cycle mode and provides excellent efficiency.

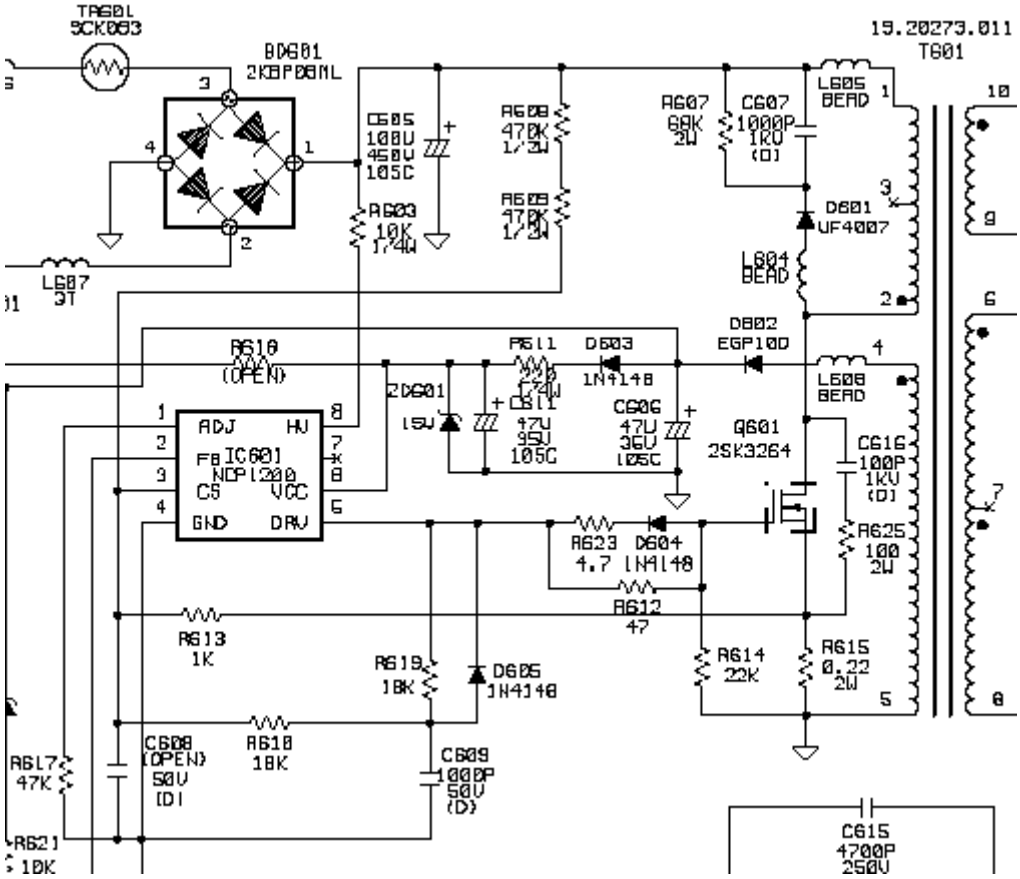


Fig. 6

#6 Feedback circuit

PC123 is a photo-coupler and TL431 is a shunt regulation. They are used to detect the output voltage change and be the primary and secondary isolation. When output voltage changes, the feedback voltage will be compared and duty cycle will be decided to control the correct output voltage. (See Fig.7)

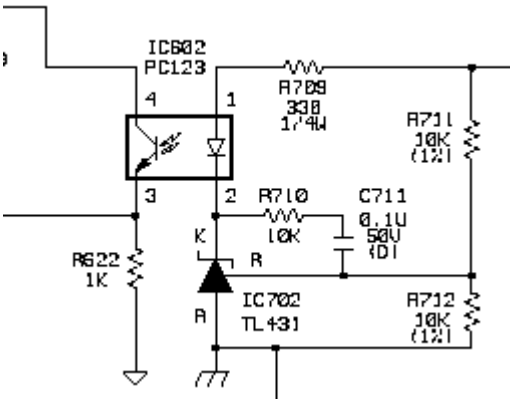
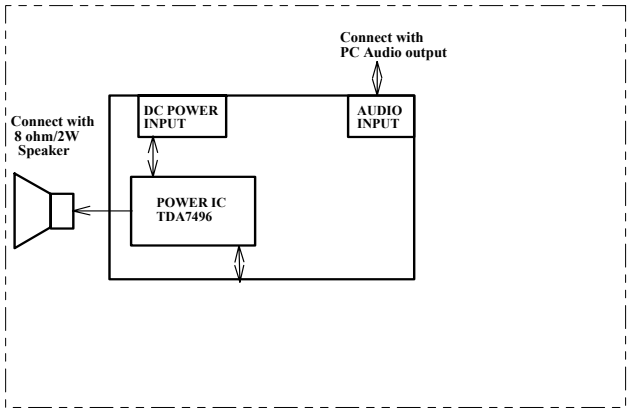


Fig. 7

#7.Audio Speaker:



The Audio Speaker is consisting of an Audio board. The Audio Speaker has DC Volume control, use 28mmX40mm Speaker (2W/per channel), power supply from AC-DC board and Audio input from PC Audio output (Line Out).

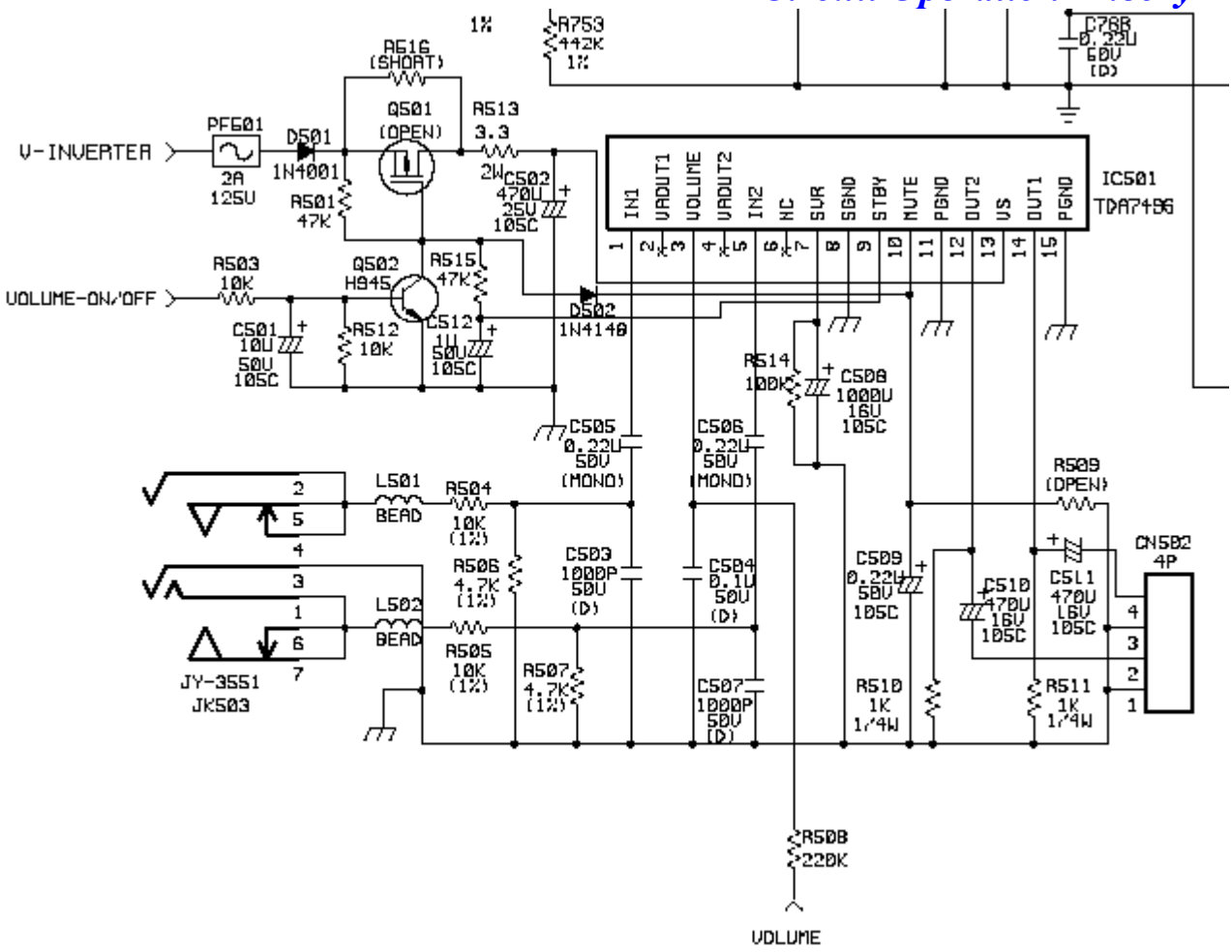
(A) Power IC: Use ST POWER IC TDA7496.The IC are stereo Class AB output amplifiers with DC Volume control. The devices are designed for use in TV and monitor, but are also suitable for battery-Fed portable recorders and radios. Use +15V from AC-DC Board and connect speaker to offer 1W per channel.

(B) DC Power Input: To supply +15V to be VCC source Voltage for TDA7496 and built-in AC-DC board.

(C) Audio Input: connect with PC Audio output in 3.5mm to 3.5mm signal line.

(D) Speaker: Use 8 ohm and 28mmX40mm speaker (2W/per channel)

(E) DC Volume Control: The voltage range is 1 – 3.3 V (From MC)



A-3.) Control board introduction:

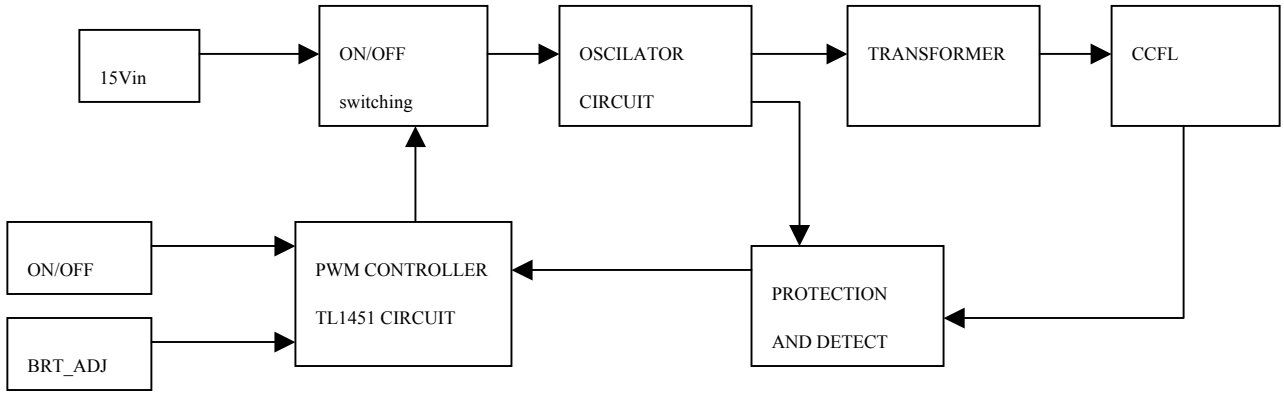
The main parts of the control board are a push button, and a LED.

(a) Push button: It's a simple switch function, pressing it for "ON" to do the auto adjustment function, releasing it for "OFF" to do nothing.

(c) LED: It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition). Amber light means DPMS off (Power off condition).

A-4.) Inverter diagram:

1.**Block Diagram:**



2. General Specification

Input Voltage: 15V

Input Current: 2A max.

ON/OFF Voltage: 3.3V

PWM Duty: 3.3V/47KHz

Output Requirement:

Max. Output Current: 15mA

Min. Output Current: 6mA

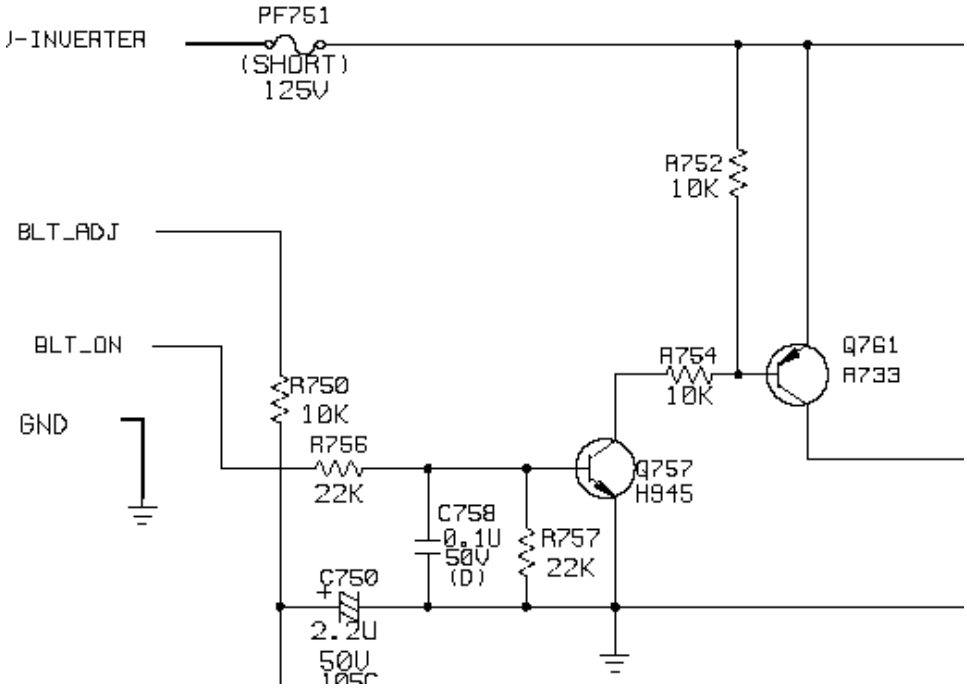
Lamp Working Voltage: 600Vrms

Open Lamp Voltage: 1700Vrms

Frequency: 50KHz

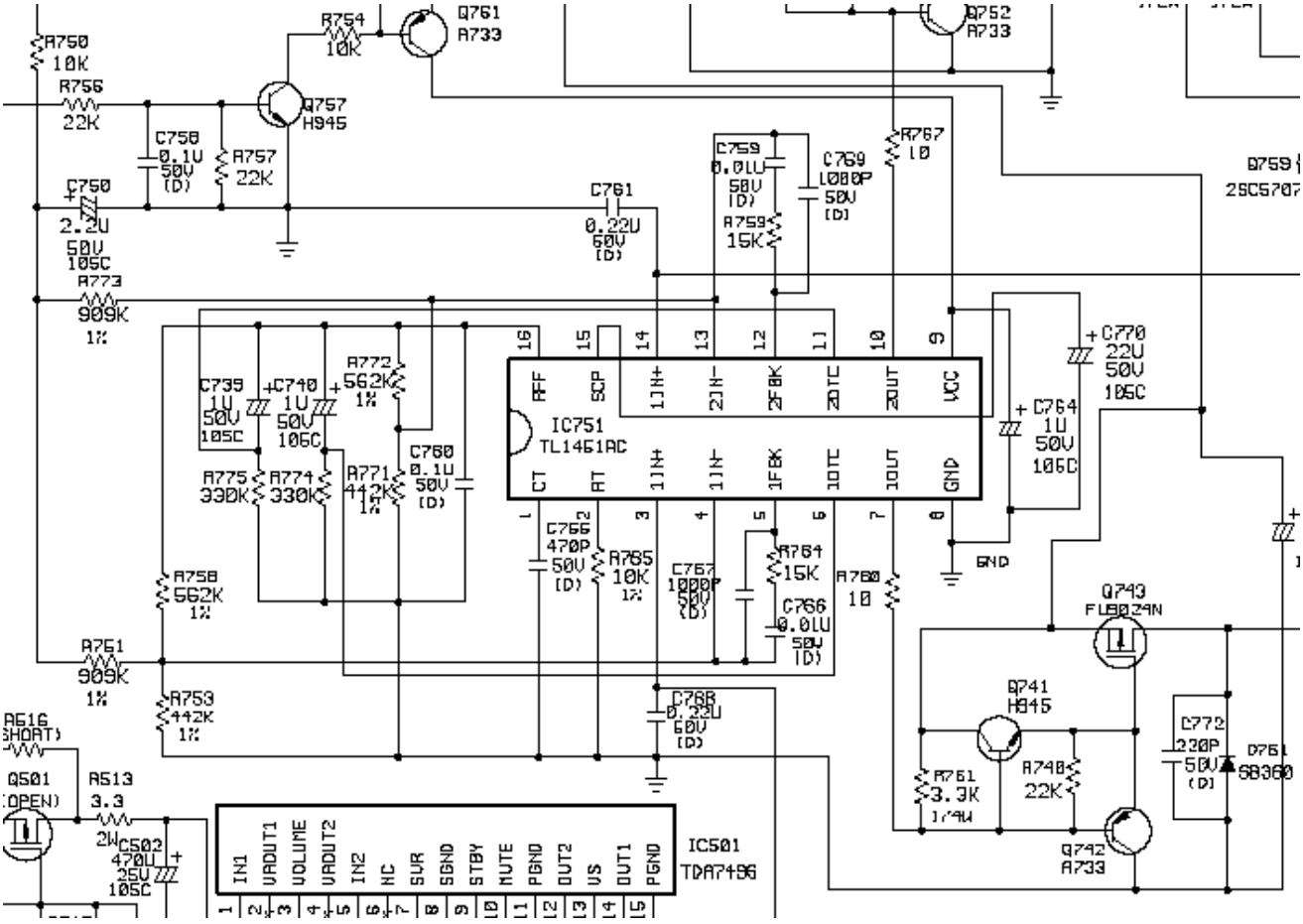
3.Circuit Operation Theorem

3.1 ON/OFF SWITCH



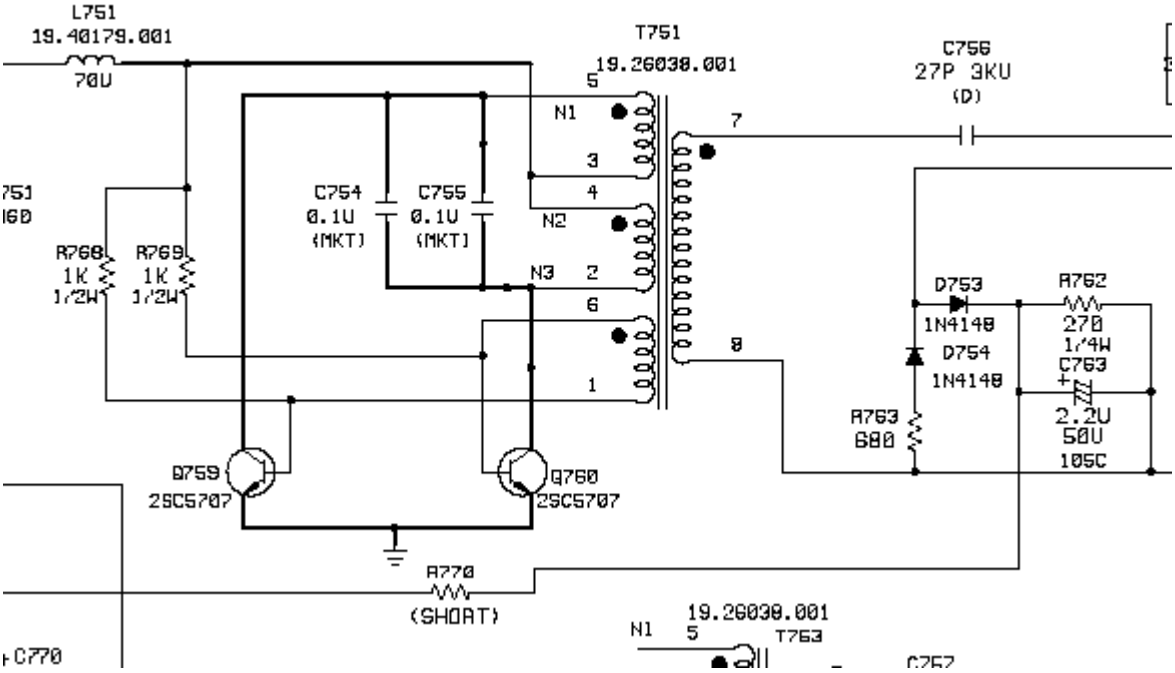
The turn-on voltage was controlled by R756 and R757.The inverter was turned on or off by the switching transistors Q761 and Q757, Also regulator IC751 is control by Q761 and Q757 decide supply 15V to inverter part or instead.

3.2 PWM Control circuit



TL1451 is a dual PWM controller.C765 and R765 decide the working frequency.BLT_ADJ signal is from control board, control pulse width then decide how much energy delivery to CCFL also decide CCFL brightness. Q741 and Q742 be the buffer to rise the drive capability and the totem poles circuit can improve a capable of driving for Q743.C770 decide the striking time delay.

3.3 Oscillator Circuit



Royer circuit uses the characteristic of transformer saturation to oscillate. When the DC power inject, Q759 or Q760 will turns on, and the current Ic increases. After a period, the transistor will leave the saturation status and Vce increase. The result causes the voltage of primary coil get lower. Finally the transistor turn off, and another transistor turn on. These statuses are repeated and the pin7 and pin8 of T751 will get a Sin Wave to turn on CCFL.