LITEON

Service Manual

17-inch Color Monitor
C1770NSL/T

Service Manual Versions and Revision

No.	Version	Release Date	Revision
1.	1.0	May 4, 2001	Original release
2.	1.1	Aug. 10, 2001	append section 5-8 Blank EEPROM Trouble-shooting

C1770NSL/T Service Manual.

Printed in Taiwan.

Table of Contents

1 Precautions

Follow these safety and servicing precautions to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1-1 Safety Precautions

1-1-1 Warnings

1. For safety purpose, do not attempt to modify the circuit board, and always disconnect the AC power before performing servicing on the monitor.
2. Operation of the monitor outside its cabinet or with the cover removed involves the risk of shock hazard. Repair work on the monitor should only be attempted by service personnel who are thoroughly familiar with all necessary safety precautions and procedures for working on high voltage equipment.
3. Do not lift the CRT by the neck. After completely discharging the high voltage anode, handle the CRT only when wearing shatterproof goggles. Try to keep the CRT away from the body during handling.
4. High voltage should always be kept at the rated value, no higher. Only when high voltage is excessive are X-rays capable of penetrating the shell of the CRT. Operation at high voltages may also cause failure of the CRT or high voltage circuitry.
5. The CRT is especially constructed to limit X-ray emission to 0.5mR/HR at 300 microamperes anode current. To ensure continued X-ray protection, replace the CRT with only the same or equivalent type as the original, and adjust the anode's voltage to the designated maximum rating, never to exceed.

1-1-2 Safety Checks

Before returning the monitor to the user, perform the following safety checks:

1. Inspect to make certain that each lead dress is not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. AC Leakage Current Check

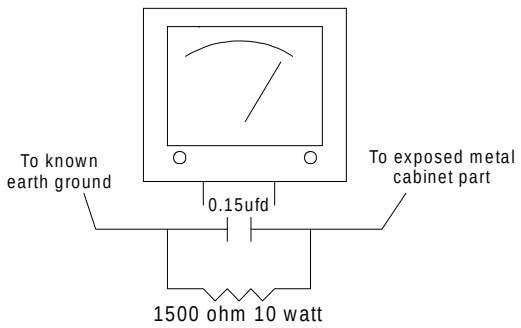
   Always perform the AC Leakage Current Check on the exposed metal parts, including metal cabinets, screwheads and control shafts, as follows:

   a) Plug the AC line cord directly into a rated AC outlet. Do not use an isolation transformer during the check.

   b) Use an AC voltmeter with at least 5000 ohms per volt sensitivity as follows:

   Connect a 1500 ohms, 10 watt resistor paralleled by a 0.15uF AC capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduct or electrical ground connected to earth ground, as shown in the Figure 1-1. Measure the AC voltage across the combination of resistor and capacitor.

Figure 1-1. Set Up For AC Leakage Current Check



   c) Reverse the AC plug at the AC outlet and repeat the steps for AC voltage measurements for each exposed metal part.

   d) Voltage reading must not exceed 0.3 volts RMS, equivalent to 0.2 milliampere AC. Any value exceeding this limit ill constitute a potential shock hazard and must be corrected immediately.

1-1-3 Product Safety Notices

Many electrical and mechanical parts in this chassis have special safety-related characteristics which are often not evident from visual inspection, the protection afforded by them may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Before replacing any of these components, consult the Recommended Spare Parts List given at the end of this manual. Any of the replacements that do not provide the same safety characteristics may result in shock, fire, X-ray emission or other hazards.

1-2 Servicing Precautions

Warning: An electrolytic capacitor installed with the wrong polarity might explode.

Caution: Before performing servicing covered by this service manual, read and follow the Safety Precautions section of this manual.

Note: If unforeseen conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions

1. Follow closely the servicing precautions printed on the monitor cabinet and chassis.
2. Always unplug the AC power cord from the AC power source before removing or installing any component or assembly, disconnecting PCB plugs or connectors and connecting a test component in parallel with a capacitor.
3. When replacing parts or circuit boards, clamp the lead wires around the component before soldering.
4. When replacing a high wattage resistor (>0.5W metal oxide film resistor) in the circuit board, keep the resistor about 1 cm (1/2 inch) away from the circuit board.
5. Keep wires away from the high voltage or high temperature components.
6. Keep wires in their original positions so as to minimize interference.
7. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

> After putting the rear cover back and make sure the monitor is working properly, the Hi-Pot & Ground Continuity tests **MUST BE** performed before the monitor is returned to user.

1-3 Hi-Pot Test

1. Test Equipment

   Puncture test model PM5530 ADT or KIKUSU TOS-8750 voltage tester or equivalent approved equipment.

Note : The test equipment must be calibrated in regular period.

2. Test Setup
   a) Apply voltage : DC 2100 VDC
   b) Test duration : 3 seconds
   c) Cutoff current should be set to 3 mA
3. Test Procedure
   a) Unplug power cord from AC source.
   b) Put the power switch of the monitor in the "ON" position.
   c) Leave signal cable un-connected.

d) Plug monitor power cord to the Hi Pot tester terminals.
e) Turn on tester and watch the indicator or beeper.
f) If the indicator lamp lighten, or beeper beeps, the test fails.

1-4 Ground Continuity Test

1. Test Equipment

   AC low ohm tester TOS-6100 or equivalent approved equipment.

Note : The test equipment must be calibrated in regular period.

2. Test Setup
   a) Test duration : 3 seconds
   b) Set current limit at 25 A
   c) The grounding resistance must be less than 0.1 ohm.
3. Test Procedure
   a) Plug the monitor power cord to the tester terminals.
   b) Make sure all connections are well-contacted.
   c) Turn on monitor power and tester power.
   d) Press “Test” button.
   e) If green light shows up, means test OK.
      If red light shows up, means test fails.
   f) If the Tester has a digital display, the resistance value must not exceed 0.1 ohm.

Note : Be sure not to touch the metal portion of the signal cable head during testing.

2 Product Specifications

2-1 Specifications

Picture Tube	17-inch (16-inch Visual image area), sloted mask, 90 degrees deflection, dot type black matrix, medium short persistence phosphor, dark tint, non-glare/ anti-static screen, 0.28 mm dot pitch
Scanning Frequency	VGA, Super VGA, 1024x768@60/70/75/85 Hz 1280x1024@60Hz
Maximum Resolution	1280 dots (H) x 1024 lines (V) @60Hz refresh rate
Display Area	306 mm (H) x 230 mm (V) typical
Display Characters	80 char. x 60 rows on a 10 x 10 matrix
Display Colors Analog Input	Unlimited Colors
Synchronizatin Signals	Separate Sync: horizontal/vertical, TTL, positive or negative
Synchronization Frequencies	Horizontal : 30 to 70 kHz Vertical : 50 to 160 Hz
Signal Connectors	15-pin, D-shell connector
Video Signals	Analog : 0.7 Vp-p, RGB positive
Power Input	75 Watts (maximum) AC rated voltage, 100VAC to 240VAC
Misconvergence	Center Area : $\leq$ 0.3 mm; Corner Area : $\leq$ 0.4mm
User Controls	Power On/Off, Contrast, Brightness, Horizontal Size, Horizontal Position, Vertical Size, Vertical Position, Pincushion, Trapezoid, Rotation, Color temperature, Language, Display Frequency, Degauss, Recall, H. Moire, V. Moire
Service Controls	PWB-1552 PWB-1563 : power voltage adjust (VR801), high voltage adjust
Preset Modes	8 (see Table 2-2. Timing Chart)
Environmental Considerations	Operation temperature : 10°C to 40°C ambient Operation Humidity : 20% to 80% ambient Storage temperature : -40°C to 65°C ambient Storage Humidity : 10% to 90% (non-condensing) Altitude : Non operating 40,000 feet sea level operating 10,000 feet sea level

Note: Above specifications are subject to change without prior notice.

2-2 Signal Cable Pin Connections

Table 2-1. Signal Cable Pin Assignment

Pin	Signal	Pin	Signal
1	Red video	9**	+5V
2	Green video	10	Digital Ground
3	Blue video	11	Ground
4	Ground	12	SDA
5*	NC	13	H-Sync
6	Red ground	14	V-Sync/VCL
7	Green ground	15	SCL
8	Blue ground		

Note * This pin is used for selftest detection. Connect this pin to ground at the PC end.

** For PC 99: This pin will provide +5V from PC side.

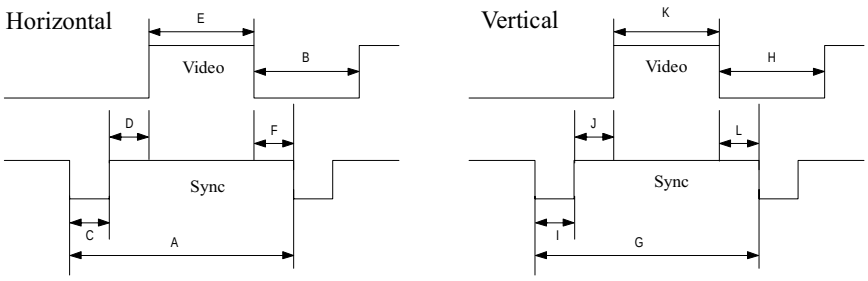
2-3 Timing Chart

This section describes the timings that the computer industry recognizes as standard for computer-generated video signals.

Table 2-2. Timing Chart

Mode	1	2	3	4	5	6	7	8
H. Dots	640	640	640	800	800	1024	1280	1024
V. Dots	480	480	480	600	600	768	1024	768
H-freq (kHz)	31.47	37.5	43.3	46.8	53.67	60.02	63.98	68.68
Sync Polarity	-	-	-	+	+	+	+	+
A period us	31.78	26.666	23.111	21.333	18.63	16.66	15.63	14.56
B Blanking us	6.356	6.35	5.33	5.172	4.409	3.657	3.778	3.725
C Sync us	3.81	2.03	1.556	1.616	1.138	1.219	1.037	1.016
D B.P. us	1.907	3.81	2.222	3.232	2.702	2.235	2.296	2.201
E Active us	25.42	20.32	17.778	16.162	14.22	13	11.852	10.836
F F.P. us	0.636	0.51	1.556	0.323	0.569	0.203	0.444	0.508
V-freq (Hz)	59.95	75	85	75	85	75.03	60	85
Sync Polarity	-	-	-	+	+	+	+	+
O Period ms	16.68	13.33	11.764	13.333	11.76	13.33	16.661	11.77
P Blanking ms	1.43	0.533	0.67	0.533	0.578	0.533	0.656	0.582
Q Sync ms	0.064	0.08	0.069	0.064	0.056	0.05	0.047	0.044
R B.P. us	1.02	0.427	0.578	0.448	0.503	0.466	0.594	0.524
S Active us	15.25	12.8	11.093	12.8	11.18	12.8	16.005	11.18
T F.P. us	0.35	0.026	0.023	0.021	0.019	0.017	0.016	0.015

Seperate Sync



H.Parameters:

A: Period
B: Blanking Time
C: Sync Width
D: Back Porch
E: Active Time
F: Front Porch

V.Parameters:

G: Period
H: Blanking Time
I: Sync Width
J: Back Porch
K: Active Time
L: Front Porch

2-4 Display Power Management Signal (DPMS)

Note: These power-saving states exceed the Environmental Protection Agency (EPA) Energy Star requirements and the Video Electronics Standard Association (VESA) for Display Power Management Signal (DPMS) .

Table 2-3. Display Power Management Signal (DPMS)

State	LED Color	H-Sync	V-Sync	Power Consumption
ON	Green	Pulse	Pulse	Normal*
OFF	Amber	No Pulse	Pulse	<5 watts
OFF	Amber	Pulse	No Pulse	<5 watts
OFF	Amber	No Pulse	No Pulse	<5 watts

* For power consumption : 75W Max. (@ 230V AC, preset size and maximum light output condition)

2-5 TCO Version (Optional)

The monitor meets the TCO 95/99, NUTEK energy saving, electric and magnetic field requirements. Also it is compliant with TCO 95/TCO 99 labelling scheme.

The emission from magnetic and electric field must comply with the limits specified by the Swedish Board for Measurement and Testing, commonly known as MPR 1990 recommendations. These limits are summarized in the Table 2-4.

Table 2-4. TCO 95 Emission Requirements

	VLF/TCO	ELF/TCO
Magnetic Field	25 nT	200 nT
Electric Field	1 V/m	10 V/m
Frequency Range	2~400 kHz	5~2000 Hz
Value	RMS	RMS
Distance	30 cm	30 cm
Electrostatic Potential	+/- 500 V	+/- 500 V

The monitor is designed with selected CRT and carefully routed wires around CRT, make sure exactly the

same routing scheme is used when doing CRT replacement.

2-5-1 TCO 95 Version (Optional)

The TCO 95 scheme is for international and environmental labelling of personal computers. The labelling scheme was developed as a joint effort by the TCO (The Swedish Confederation of Professional Employ ees), Naturskyddsforeningen (The Swedish Society for Nature Conservation) and NUTEK (The National Board for Industry and Technical Development in Sweden).

1)`Scope

TCO 95 touches on ergonomic qualities, emissions (electrical and magnetic fields), energy efficiency and ecology (with demands for environmental adaptation for both the product and the production processes at the manufacturing plant).

2) Environmental Requirements

The monitor abides by the environmental demands concerning restrictions on the presence and use of heavy metals, brominated and chlorinated flame retardants, CFCs (freons), and chlorinated solvents, among other things. The monitor is also recyclable.

3) Energy Requirements

The monitor also follows the energy requirements that, after a certain period of inactivity, the monitor shall reduce its power consumption to a lower level in one or more stages.

4) Others

The monitor meets the strict environmental demands for the reduction of electric and magnetic fields, physical and visual ergonomics and good usability.

Table 2-5. TCO 95 Visual Ergonomics

Feature	Standard	Description
Linearity	1% or less	Difference in length of columns or rows compared to the corresponding lengths through the center of the monitor.
Display Luminance	100 cd/m2 (at least)	
Luminance Uniformity	1.7:1 or less	The ratio is between the max to min luminance within the whole active area.

2-5-2 TCO 99 Version (Optional)

TCO 99 will append the color temperature and energy efficiency specification, also cover the environmental requirement.

3 Operation Theory

This is a fully digital controlled multi-sync color monitor that is compliant with DDC1 and 2B Plug and Play VESA standard and offers the following main features.

3-1 Main Features

1. Simplified design with minimum components.
2. The MYSON MTV212 M(A) 32 processor-- that has I²C BUS controlled geometric correction, contrast and brightness-- offers the functions for: (a) Contrast, (b) Brightness, (c) H-size, (d) H-position, (e) V-size, (f) V-position, (g) Pincushion, and (h) Trapezoid.

   In addition, it also offers more functions as: (a) Sync. processor, I/P and O/P, (b) Mute, (c) Power saving - Suspend & Stand-By, (d) Power saving override, (e) DDC1/2B, (f) I²C Bus for auto-alignment through signal cable (g) CS1/CS2/CS3/CS4 for linearity and size compensation.
3. Stores up to 10 factory preset modes and offers 8 user modes. There are 16 function icons at OSD. They are controlled by [1] ◄ ► [2] keys on front panel.
4. Powerful PHILIPS TDA4863 and TDA4841 present the following useful functions: (a) Pincushion, (b) Trapezoid, (c) V-Position, (d) V-Size, (e) Vertical's "C" and "S" correction -- factory adjust, (f) Pincushion's V. position correction, (g) Corner correction -- factory adjust, (h) Pincushion unbalance correction -- factory adjust, (i) Parallelogram distortion -- factory adjust, (j) Moire cancellation, (k) X-ray protection, and (l) Full horizontal and vertical auto sync capability.
5. Software controlled auto shut off function activated if fH < = 29 kHz and fH > = 70 kHz.
6. Full range AC input and simplified line filter design.

3-2 Microcontrol Section

1. This monitor uses MYSON MTV212 M(A) 32 CPU. It contains a 8051 8-bit CPU core, 256 bytes of RAM used as working RAM and stack area, 32k bytes of OTP ROM, 13-channel 8 bit PWM D/A converter, 2-channel A/D converters for key detection saving I/O pins, internal H. sync and V. sync signals processor providing mode detection, and an I²C bus interface. When H/V sync through D-Sub signal cable enter pin 41 and pin 42, the CPU performs frequency / polarity detection and calculate and send to H/V sync OUT. Then CPU reads the data from I703 and transfer to device 4841 and some DAC in CPU, above operation takes about 500 ms.
2. There allowed 8 factory preset modes and 8 user modes. There are 11 functions, Contrast, Brightness, H. Size, H. Position, V. Size, V. Position, Pincushion, and Trapezoid, Rotation, H. Moire, V Moire, all controlled by OSD icon which can be adjusted by user.
3. The pin 27 and pin 28 are used for ATE function. When CPU receives C6 as slave address, it will operate in ATE mode which is used for auto-alignment. After alignment the data will be stored in I703.
4. The user control parameters are selected by OSD icons, through [1] ◄ & ► [2] keys, they are detected by sensing the voltage through R710, R740, R741, R743, R716, R717 to pin 25 and 26 of I701.

3-3 Deflection Section

1. I²C -- autosync deflection controller is TDA4841.
2. The TDA4841 is a high performance and efficient solution for autosync monitors. All functions are controllable by I²C bus. SDA and SCL signals coming from microprocessor feed to pin 19 and pin 18 to control all functions.

3-3-1 Horizontal Section

1. The oscillator is driven by the currents in R419 and R420. The minimum oscillator frequency is determined by R419 and the maximum frequency is determined by R420.
2. Horizontal sync goes into pin 15 through R318. And horizontal flyback pulse goes into pin 1 through R401 and bypass filter C403 from pin 6 of FBT and R496 for HFLB loop.
3. Horizontal driver (pin8) O/P to Q401 via C410.

3-3-2 Vertical Section

1. Vertical sync goes into pin 14 through R317.
2. The free running frequency is determined by R301 and C301.

3-3-3 Vertical O/P section

1. The differential output currents from pin 13 of Vout1 and pin 12 of Vout2 can be directly coupled to the vertical deflection booster pin 1 and pin 2 of TDA4863.
2. The TDA4863 has two output stages which are current driven in opposite phase and operate in combination with the deflection coil in a full bridge configuration.
3. This IC is powered by two sets of positive voltage and one set of negative voltage. (+12V at pin 1, -12V at pin 4, +35V at pin 2).

3-3-4 E-W/Trapezoid and H. Width Controls

1. The horizontal O/P stage uses diode modulator D419, D433, C411, C412, L409 and C418 for East-West (Pincushion) Trapezoid and H. width controls.
2. The scan current is determined by B^+ minus Vm (the voltage of C418) values and the pincushion control is accomplished by Darlington pair Q418 and Q419 by coupling a parabola waveform from pin 11 of TDA4841. The H. width / corner and trapezoid correction are also accomplished by this pin 11. The DC level controls H. size. The AC level is combined with side pin and trapezoid corners functions.

3-3-5 X-Ray Protection

1. To avoid X-ray hazard, a DC voltage generated at pin 6 of FBT and rectified by D408, C432 and divided by R403, R404 and R405 come into pin 2 of TDA4841.
2. If this voltage is higher than 6.39 V, then TDA4841 will be activated to float HUNLOCK (pin17), H. DRV(pin 8), B DRV (pin 6), VOUT1 (pin 12), VOUT2 (pin13). After that all deflection circuit stop working.

3-3-6 G1, Blanking and Brightness

1. The vertical blanking signal comes from two ways. One is from pin 8 of I301 (TDA4863), the other is from vertical sync (pin 32 of I701). These two positive vertical pulses through Q405 amplified and converted into negative pulse and sent to G1 for vertical blanking.
2. In protection mode or an out-of- range situation HUNLock will send 5 V pulse to cutoff Q407, then G1 will go down to -150V. During the mode change, Mute acts as same as HUNLock's.

3-3-7 Contrast Section

1. Contrast is controlled by I701 through I^2C bus to I501 (LM1267) directly.
2. Beam current is detected through T402 (FBT) pin 7, C429, R449 and detected voltage feeding into Q432,

Q433, R436, R497, R459, C482 to control I501 pin 22 voltage. When I501 pin 22 voltage drops below 4.1 V, the ABL function will happen.

3-3-8 H/V size breathing compensation

1. Beam current is sensed as above section (3-3-7 item 2) and this voltage routes through R451, R468, C470 then through R437 to I401 pin 31 for H. size compensation.
2. HV voltage is detected through T402(FBT) pin 11. C481, R4F4, R4F8, R4F9, Q428, R4G0, Q431, R4G1, then through R302 to I401 pin 21 for V. size compensation.

3-3-9 Dynamic focus circuitry

The dynamic focus is applied to improve the corner focus performance, it includes horizontal and vertical dynamic focus.

1. Horizontal dynamic comes from C413 through R435, C450, T401, R434, C448 and feed to FBT dynamic focus pin (T401 pin 12).
2. Vertical dynamic comes from I401 pin 32 through C315, R322, R326, R321, R323, Q301, R324, R325 and feed to FBT dynamic focus pin.

3-4 Power Supply Section

3-4-1 AC Rectifier

The circuit can accept 90 V to 264 V AC input through D801~D803 bridge diodes and C808 filtering to get DC 126 V~364 V for power conversion in T802.

3-4-2 Line Filter

It consists of C803, T801, C804, C805, C808, C819, C807, C817 and meets EMI regulation.

3-4-3 Power LED Status

1. The LED has 3 leads with common cathode to emit green and amber color light for different power saving states. It is controlled by CPU.
2. Normal : Green light

   Amber LED is off because CPU pin 30 is 1.96V and pin 31 is 0.45V, only green LED is turned on.
3. Off Mode : Amber light

   CPU pin 30 is 1.87V and pin 31 is 0.46V, then green is off and amber is illuminated.

3-4-4 Auto Degaussing

When S801 turns on, pin 14 of I701 will send a signal to Q802 and turns on RL801 for degaussing. After 4 seconds, it will turn off RL801 automatically.

3-4-5 PWM Control

1. Start Up

The I801 (5S0765C) gets power from R807, R808, C830 and pin 3 voltage reaches 15 V for starting up. The I801 starts oscillation at 20 kHz, pin 1 output to drive T802. Switching on, R819 set up an 15 V to keep I801 working through D809 auxiliary voltage.

2. Regulation

   The DC O/P voltage is proportional to the auxiliary voltage, so I801 pin 4 senses the feedback voltage from the divider D806, R809, C810, VR801, Q803, Q801 and R821 to compare with the built-in 1.5 volts reference voltage for error amplifier operation. Finally pin 6 can modulate the different duty cycle by VR801 setting to achieve regulation purpose.

3-4-6 Synchronization

1. Normal Mode

   The sync pulse from FBT (31 kHz~69 kHz) via R812, R811 and C815 to pin 5 of I801 to keep I801 synchronized with horizontal sync input frequency.

2. Power Saving Modes: Standby/Suspend

   Because there is no pulse from FBT, so the free-run frequency SMPS works at 20 kHz by I801 itself.

3. Override

   The horizontal free run frequency is about 63.2 kHz under override condition, SMPS is synchronized to this frequency.

3-4-7 O.V.P.

If the auxiliary voltage is higher than 25 volts makes pin 3 of I801 is limited to have the OVP activated.

3-4-8 O.P.P.

The excess current of T802 through I801 pin 1, 2, make Vs>1.1V internal of I801, then limite the power.

3-4-9 Step Up Power Supply For FBT

1. The B+ of FBT is proportional to horizontal frequency, that is the higher frequency, the higher voltage. The basic voltage is 58 volts from T802 pin 10 via L811, D813, C824 and the gate control of Q451 comes from I401 pin 6 via Q450, Q434, D435 and R4E5. The duty cycle is controlled by I701 pin 33 (PWM pin Adj.) via R719, C741, R4F6, R4F5, R4F1.
2. The regulation and boost up (from 68 V to 160 V or more, on demand). The H.V. is set at 25.6 kV (zero beam) by I301 pin 33 which senses the secondary O/P from FBT. The booster comprises Q451, L410, L411, D450, C425 and T802 to offer the required B+ for different frequency modes.

3-5 Video Amplifier Section

1. RGB signal inputs are terminated by R501, R531 and R561 then pass through the coupling capacitors C503, C533 and C563 to IC501 LM1267 preamplifier.
2. The amplifier RGB signals (0~3 Vpp) are adjusted by I^2C bus, I501 pin 23 is for clamp pulse which comes from pin 16 of TDA4841 to set up equal clamp level.
3. The video output stages are amplified by I502 (LM2469).
4. The RGB cathodes cut off are adjusted by I503 (LM2479) pin 8, 7, 6, which comes from I501 pin 16, 15, 14 to adjust cut iff voltage level by I^2C bus.

5. Under override condition, “NO SIGNAL” will show up on the screen.

3-6 OSD (On Screen Display) Circuit

1. The I504 MTV021-21 is OSD IC. The OSD signals are worked by positive vertical pulse from I701 pin 34 that goes through R720 to I502 pin 10, and positive horizontal pulse from T402 pin 5 goes through R496 to I502 pin 5. CPU I701 pin 13, 12 (I^2C bus) transfers information to I502 pin 7, 8.
2. The OSD R. G. B signals and blanking signal are terminated at I502 pin 15, 14, 13, and 12 to I501 pin 1, 2, 3 and 4 then the OSD picture appears.

4 Alignments and Adjustments

This section of the service manual explains how to make permanent adjustments to the monitor settings.

4-1 General Adjustments

4-1-1 Adjustment Conditions

a) Power Supply

Apply AC 115 V or 220 V

b) Warm-up Time

The monitor must be powered on for 15 minutes before starting any alignment, but requires 30 minutes of warm-up time for convergence adjustment.

c) Signal Input

1. Video: RGB Analog, 0.7 Vp-p, positive
2. Synchronization: Horizontal and vertical TTL signal, separate, positive or negative
3. All adjustments should be made using a signal of FH = 68.68 kHz, FV = 85 Hz, unless otherwise defined.

4-1-2 Equipment Required

The following equipments are necessary for adjustment procedures:

1. Volt-ohm-A meter (Sanwa FD-750C or equivalent)
2. 30 kV high voltage probe (HP34111A)
3. Oscilloscope (TEK2235 or equivalent)
4. Minolta Color Analyzer II
5. Signal generator (IBM PC with proper display cards or Chroma 2000)
6. Screwdriver

4-1-3 Switching Power Supply and Regulator Adjustment

a. The regulated B+ control has been preset in the factory and needs no adjustment. However, if any repair is made on the power supply section, the following readjustment procedures are recommended:

1. Allow the monitor to warm-up for about 15 minutes.
2. Apply VGA (1024 x 768 @ 68.68 kHz/85 Hz) signal to the monitor.
3. Connect a DC voltage meter to TP001 (on the Main board), and adjust VR801 for 11.7 ± 0.1 Vdc
4. If a fuse is broken during adjustment, remember to replace it with the exact same type of fuse.

b. If necessary, follow the following procedures to enter the factory mode.

1. Press both [1] key and [2] key simultaneously then power ON.
2. After turn the power off, this monitor will go back to normal mode.

4-2 Alignment Procedures

4-2-1 High Voltage Adjustment

CONDITION

Press [1] and [2] buttons simultaneously when switching the power "On".

Display image : No video (68.68kHz Mode)

PROCEDURE

Connect DC meter to TP002 and adjust HV (i)

R802 to obtain a DC voltage of -152.2 ± 0.2 V DC (Sampo FBT) or -153 ± 0.2V DC (LCE FBT) for CPT CRT M41AGE93X46 (TCO) or M41AGE83X46 (MPRII) .

4-2-2 Screen and White Balance Adjustment

CONDITION

Press [1] and [2] buttons simultaneously when switching the power "On".

Display image : No video (68.68kHZ Mode)

PROCEDURE

1 Raster color setting

1-a. Set brightness max. to 77 (OSD cursor) and 563 ± 5 at G2.

1-b Adjust R and B cutoff to min.

1-c Adjust G cutoff to about 0.45FL

1-d Adjust B cutoff to get y=280 ± 5, R cutoff to get x=280 ± 5 and Y=0.65 ± 0.05 FL.

1-e Adjust brightness cutoff to raster 0.01-0.02 FL.

CONDITION

Display image : 50 mm x 50 mm white block pattern

PROCEDURE

2 6500^0K color temperature setting

2-a. Set brightness to cutoff and Contrast to maximum.

2-b Move cursor on OSD to choose color temperature icon.

2-c. With green block pattern, adjust G gain to get Y about 32FL.

2-d Adjust R.B. gain to get x=313 ± 5, y=329 ± 5; and Y=43 ± 0.5FL

3 9300^0K color temperature setting

3-a. Set Brightness to cutoff and Contrast to maximum.

3-b Move cursor on OSD to choose color temperature icon.

3-c. With green block pattern, adjust G gain to get Y about 32FL.

3-d Adjust R.B. gain to get x=283±5, y=297±5; and Y=43±0.5FL

4 Full white ABL setting

CONDITION

Display image : full white pattern

4-a Set Brightness to cutoff and Contrast to maximum.

4-b. Adjust ABL to Y=29.5FL ± 0.5FL.

4-c. Check the white balance at 5FL and 28FL.

4-d. Repeat all the procedures in 4-2-2 section until the best white balance is obtained.

4-2-3 Focus Adjustment

CONDITION

Display image : "me" character pattern (68.68 kHz Mode)

PROCEDURE

1. Set brightness to cutoff and contrast to maximum.
2. Adjust focus 1 at T402 (static focus VR) to make vertical line clear.
3. Adjust focus 2 at T402 (static focus VR) to make horizontal line clear.
4. Repeat above procedures to get best focus.

4-2-4 Static Convergence Adjustments

Static convergence involves alignment of the red, blue and green lines in the center area of the display.

Note : The monitor requires 30 minutes of warm-up time for convergence adjustment.

CONDITION

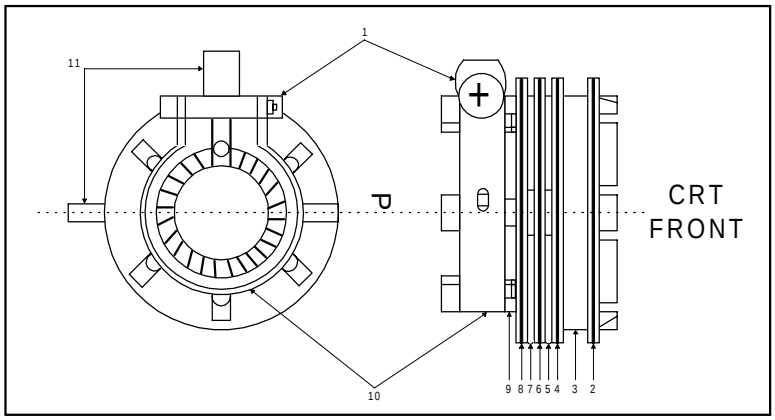
Display image : Crosshatch pattern

Warm-up Time : 30 minutes

PROCEDURE

1. Set brightness and contrast to display a well-defined pattern.
2. Ensure the convergence magnet rings are correctly positioned on the CRT.

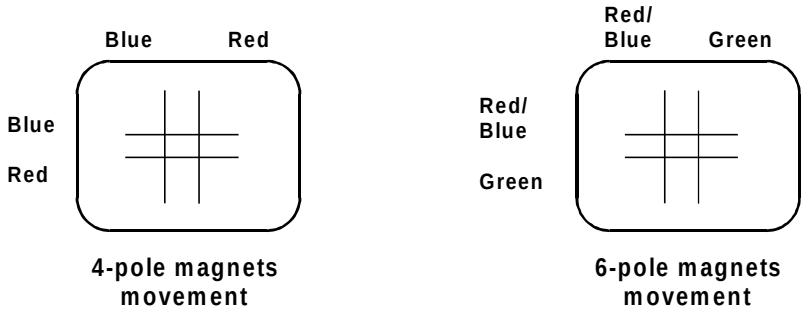
Figure 4-1. Convergence Magnets on the CRT



1) Setup Bolt	2) Bow Magnet	3) Band	4) 2-Pole Magnet
5) Spacer	6) 4-Pole Magnet	7) Spacer	8) 6-Pole Magnet
9) Holder	10) Band	11) Tabs	

3. Rotate the individual rings of 4-pole convergence magnets by changing the spacing between the 2 tabs to converge the vertical red and blue lines at the center of the screen.
4. Rotate the pair of rings of 4-pole convergence magnets by maintaining spacing between the 2 tabs to converge the horizontal red and blue lines at the center of the screen.
5. Rotate the individual rings of 6-pole convergence magnets by changing the spacing between the 2 tabs to converge the vertical red, blue and green lines.
6. Rotate the pair of rings of 6-pole convergence magnets by maintaining spacing between the 2 tabs to converge the horizontal red, blue and green lines.
7. Repeat the steps from 3~6 until the best convergence is obtained.

Figure 4-2. 4-pole and 6-pole Magnets Movement



Note : The 4-pole magnets and the 6-pole magnets interact, making dot movement complex.

4-2-5 Degaussing

Degaussing is required when poor color impurity appears on the screen. This monitor uses an automatic degaussing circuit that is activated when the power is on. The automatic degaussing will be fully functional again after the monitor has been in operation for 20 minutes.

The degaussing effect is confined to the picture tube since the coils are mounted at the back of the tube. Should any part of the chassis or cabinet becomes magnetized, it is necessary to degauss the affected area with a manual degaussing coil.

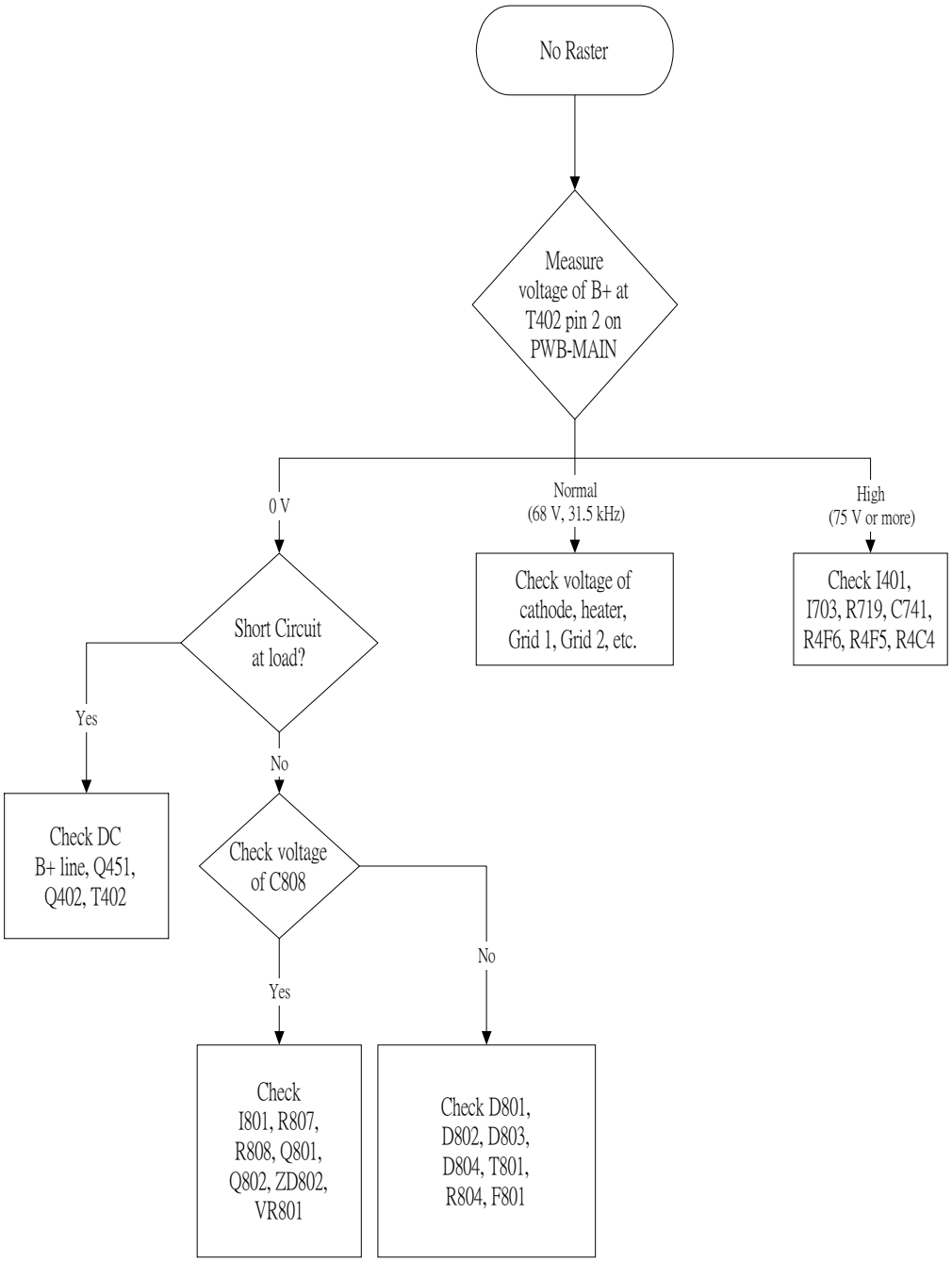
4-2-6 Manual Degaussing

1. Apply line voltage to the degaussing coil and move it in a rotary motion over the front, sides, and top of the monitor. The coil should be kept away from the rear of the monitor to avoid damaging the magnetic neck components.
2. Slowly rotate and move the coil away from the monitor to about 6 feet beyond the point where no effect on the CRT will be noticeable.

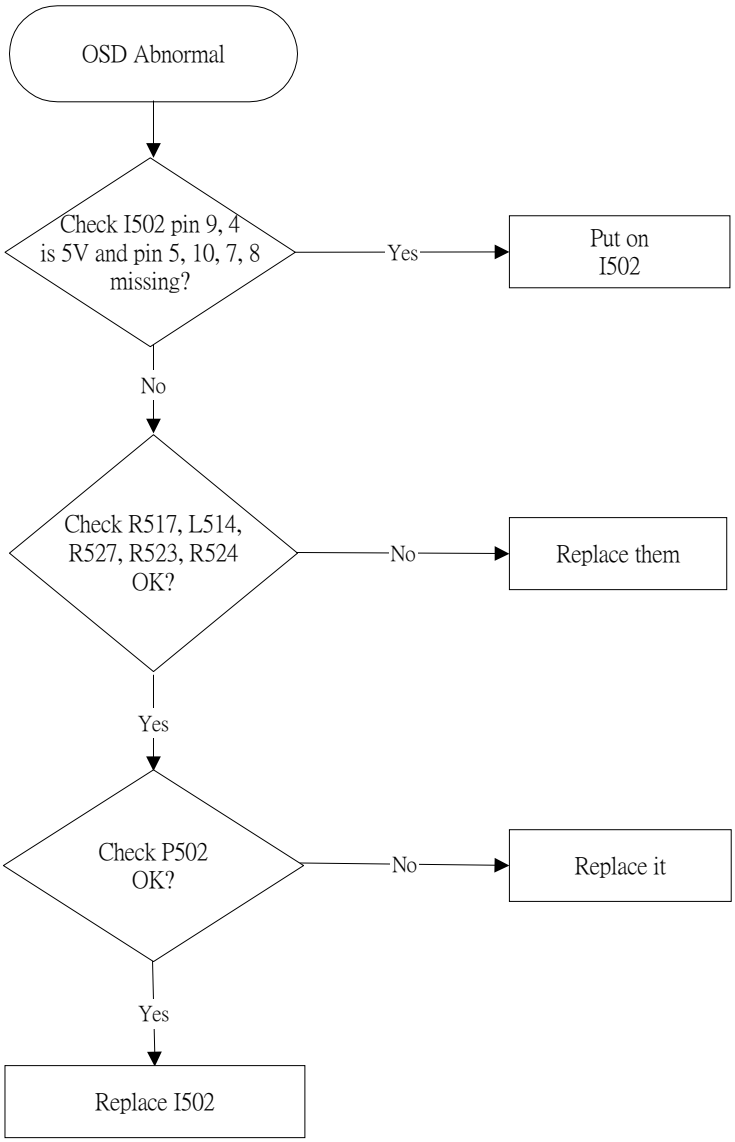
For proper degaussing, it is essential that the field be gradually reduced by moving the coil slowly away from the monitor. The degaussing coil must never be shut off or disconnected while near the monitor, as this would introduce a strong field instead of canceling the effect of the stray fields.

5 Troubleshooting

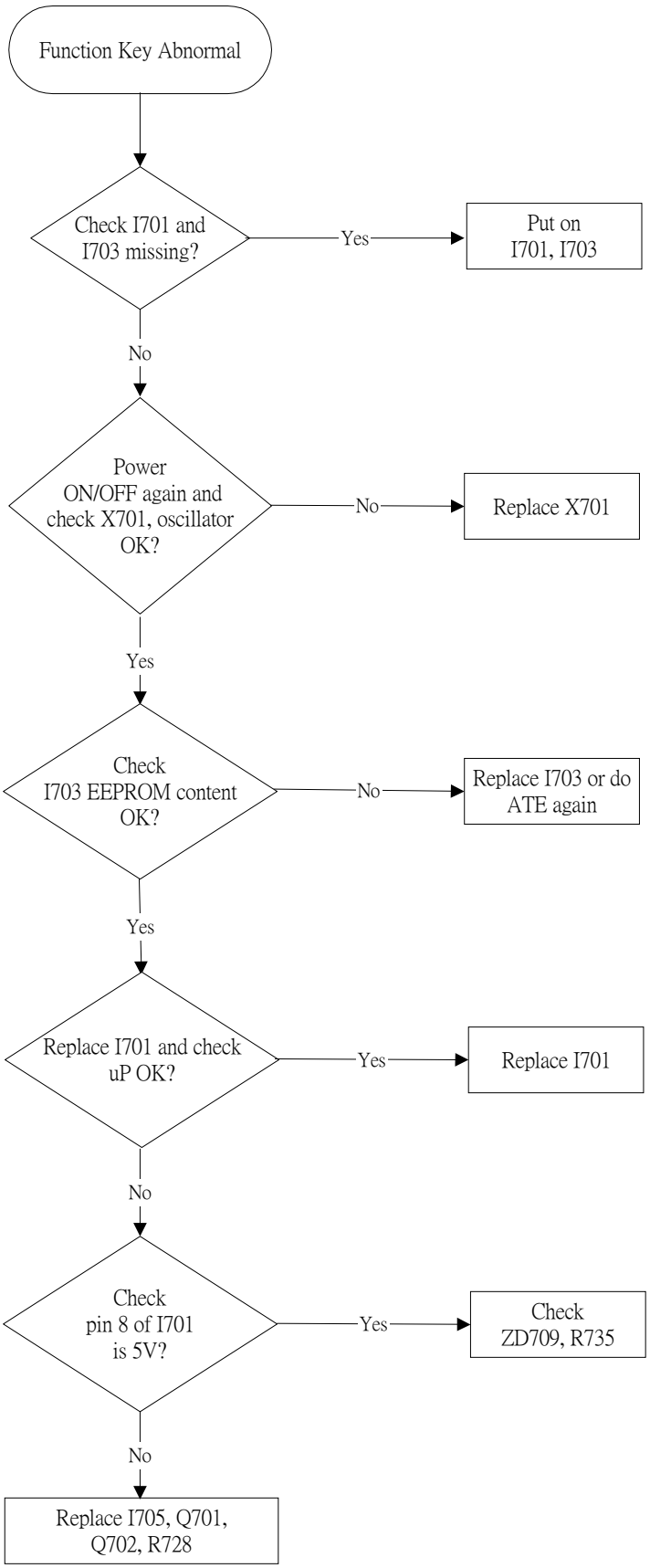
5-1 No Raster



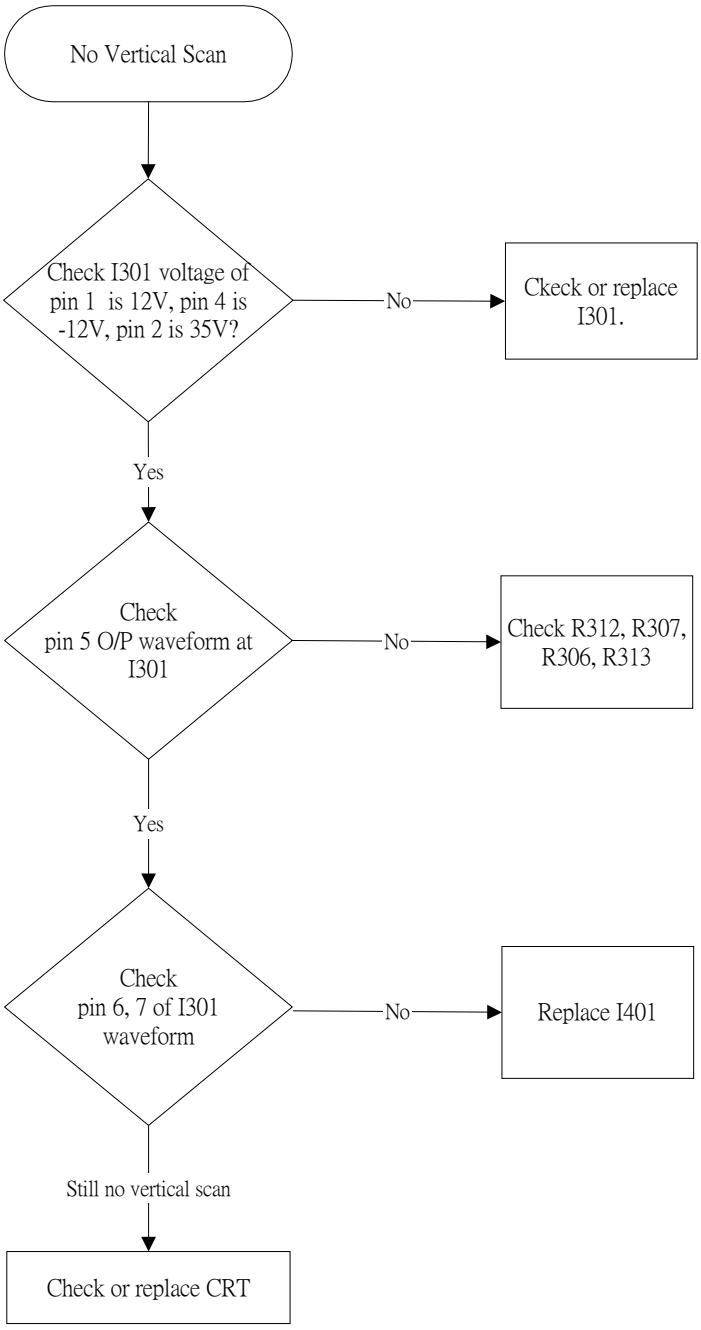
5-2 OSD Abnormal



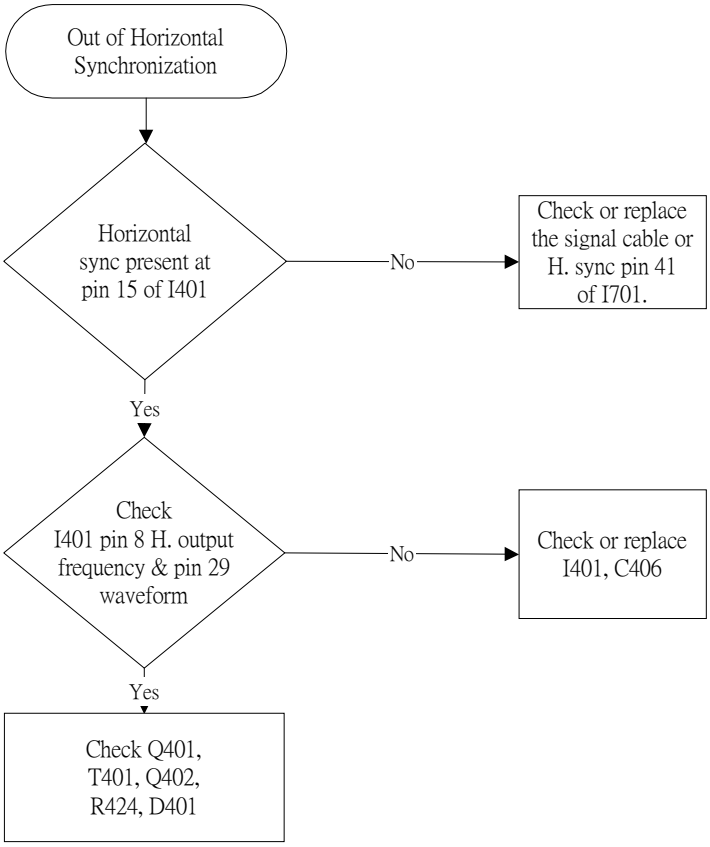
5-3 Function Key Abnormal



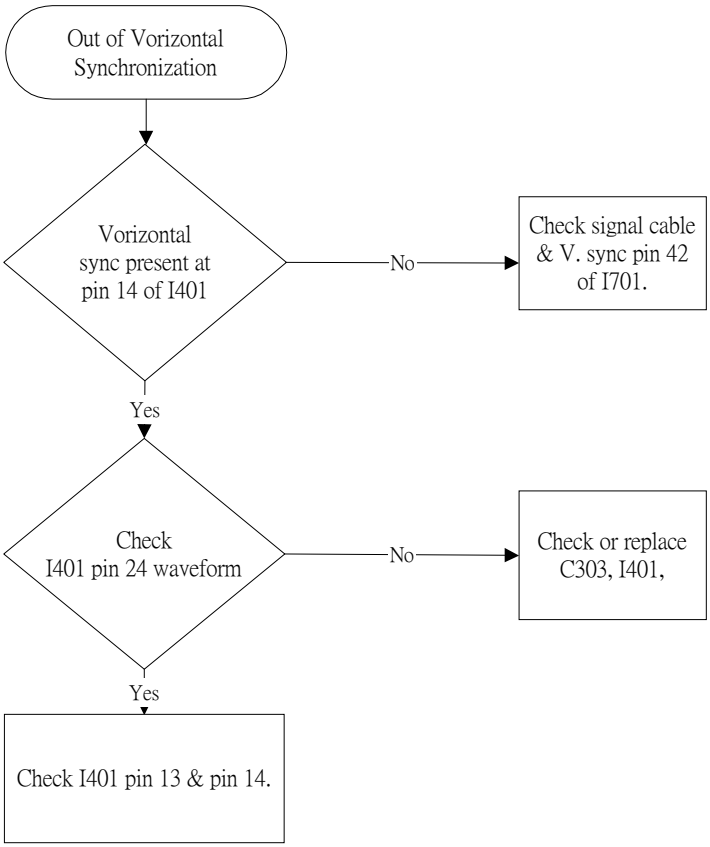
5-4 No Vertical Scan (Raster is one horizontal line)



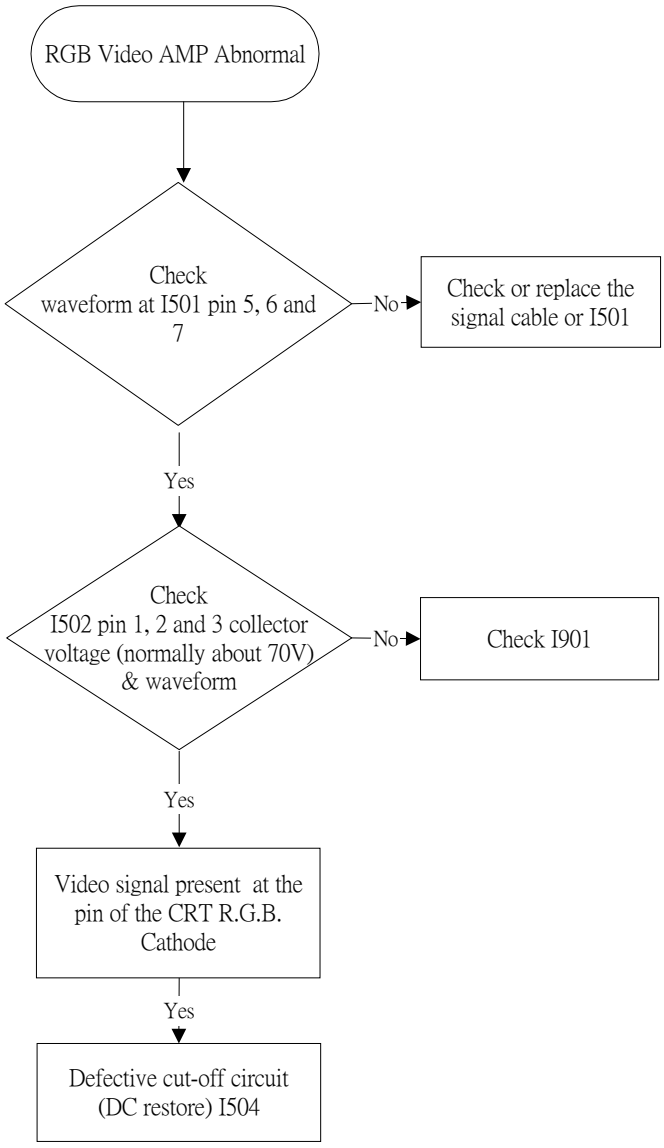
5-5 Out of Horizontal Synchronization



5-6 Out of Vertical Synchronization



5-7 R.G.B. Video Amplifier Abnormal



5-8 Blank EEPROM Trouble-shooting:

Description of functions for models under C1770 series EEPROM DATA AUTO-RELOAD

The function allows plant staff to pre-write and customer service personnel to use blank EEPROM through the pre-write EEPROM function whenever the CPU is implemented. The method of operation is as follows:

First, press the HOT KEY, start after C1770 turns to (<&>) KEY. At this point of time, the CPU is capable of detecting the first 8 DATA of each page that EEPROM contains. When the reading goes to 00H or FFH, the EEPROM PAGE will turn to blank; instead, the pre-set value is being written into the EEPROM through CPU. Otherwise, it shall be deemed an effective value and that the pre-write function shall not be activated.

6 Recommended Parts List

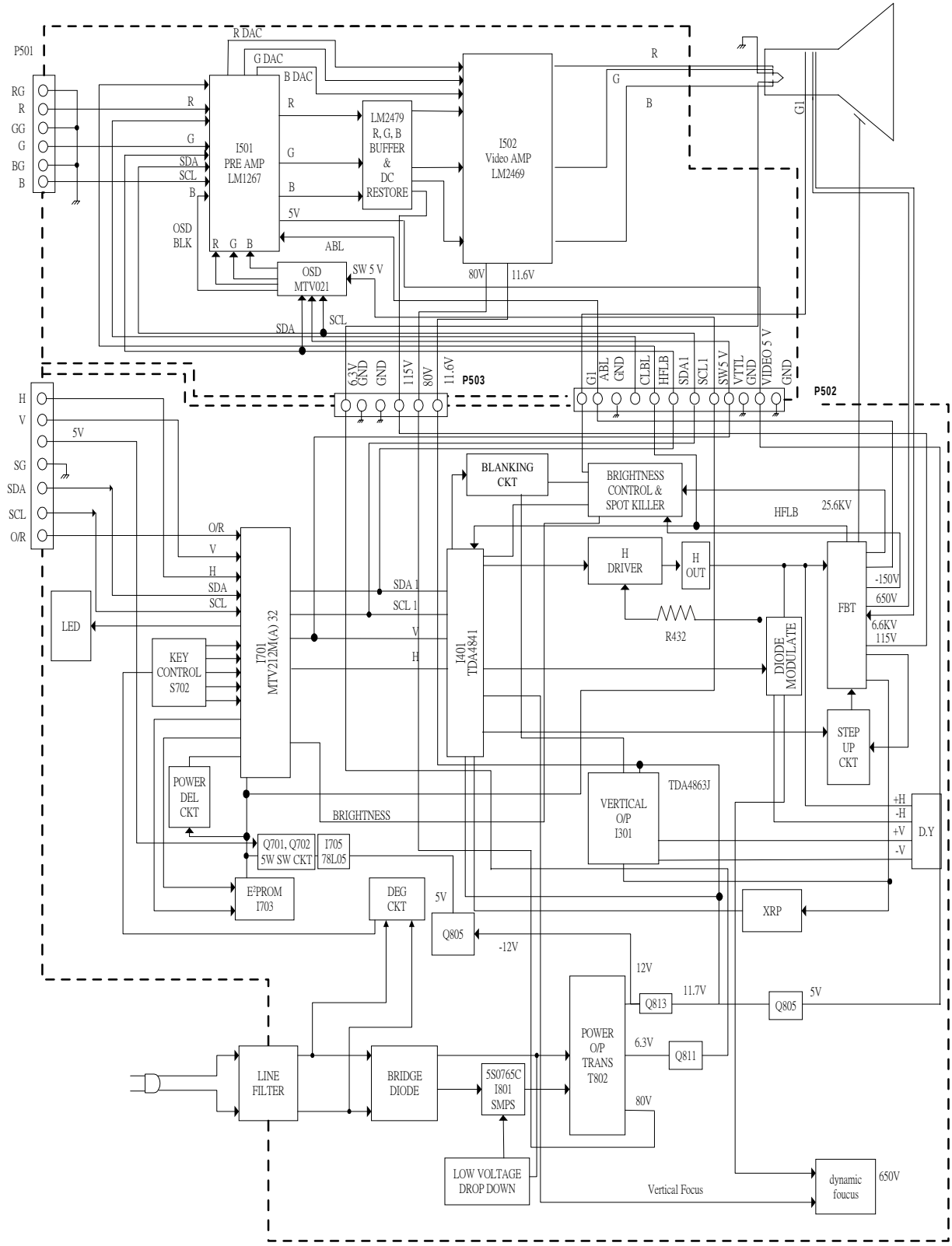
Note:1. The components identified by "⚠" mark are critical for X-ray safety. Replace these with exactly the same parts specified.

2 . There is only OTP IC at the model beginning (FPR stage or before). When it put in mass production and there must be Mask coming out. If you have spart parts need, please use BOM to get the last release part number and related information.

No.	Location	Part Number	Description
1	Q401	6421002705	TR NPN KSD1616A G TA
2	C808	6312618102	ALU uF 180 400V F 85C 25x35
3	D801 D802 D803 D804	6412010907	DIODE LT2A06 T52 2A/800V
4	D814	6412021702	DIODE FE30-02BXF06
5	D810	6412004117	DIODE UF2004M 2A/200V 50 nS
6	D815	6412002617	DIODE UF3002M 3A/100V 50 nS
7	D817	6412024404	DIODE HER106 1A/600V 50 nS
8	F801	6851504053	FUSE TIME LAG H-BRK 4A/250V
9	I301	6442026400	IC TDA4863J 7P (PHILIPS)
10	I401	6442030000	IC TDA4841 32P SDIP (PHILIPS)
11	I501	6442031500	IC LM1267 24P SDIP (NS)
12	I502	6442029700	IC LM2469 9P NS
13	I503	6442029900	IC LM2479 8P NS
14	I701	6448014500	IC MTV212 M(A) S32 40P PDIP MYSON
15	I703	6448015720	IC MTV24C08 (MYSON)
16	I705	6442000875	IC KIA78L05 (SAMSUNG)
17 ⚠	I801	6442031600	IC 5S 0765C 5P FAIRCH
18	L404	6111274130	COIL CHOKE 2.7mH K DR8x10
19	L405	6119007701	COIL LINEAR
20	L409	6111155133	COIL CHOKE 150uH DRWW 14x15 LY3B
21	L410	6111155138	COIL CHOKR L=150uH K DRWW 14x15
22	Q402	6421004900	TR NPN 2SC5387
23	Q418	6422002925	TR NPN HBF422T/B TO-92 TAPING

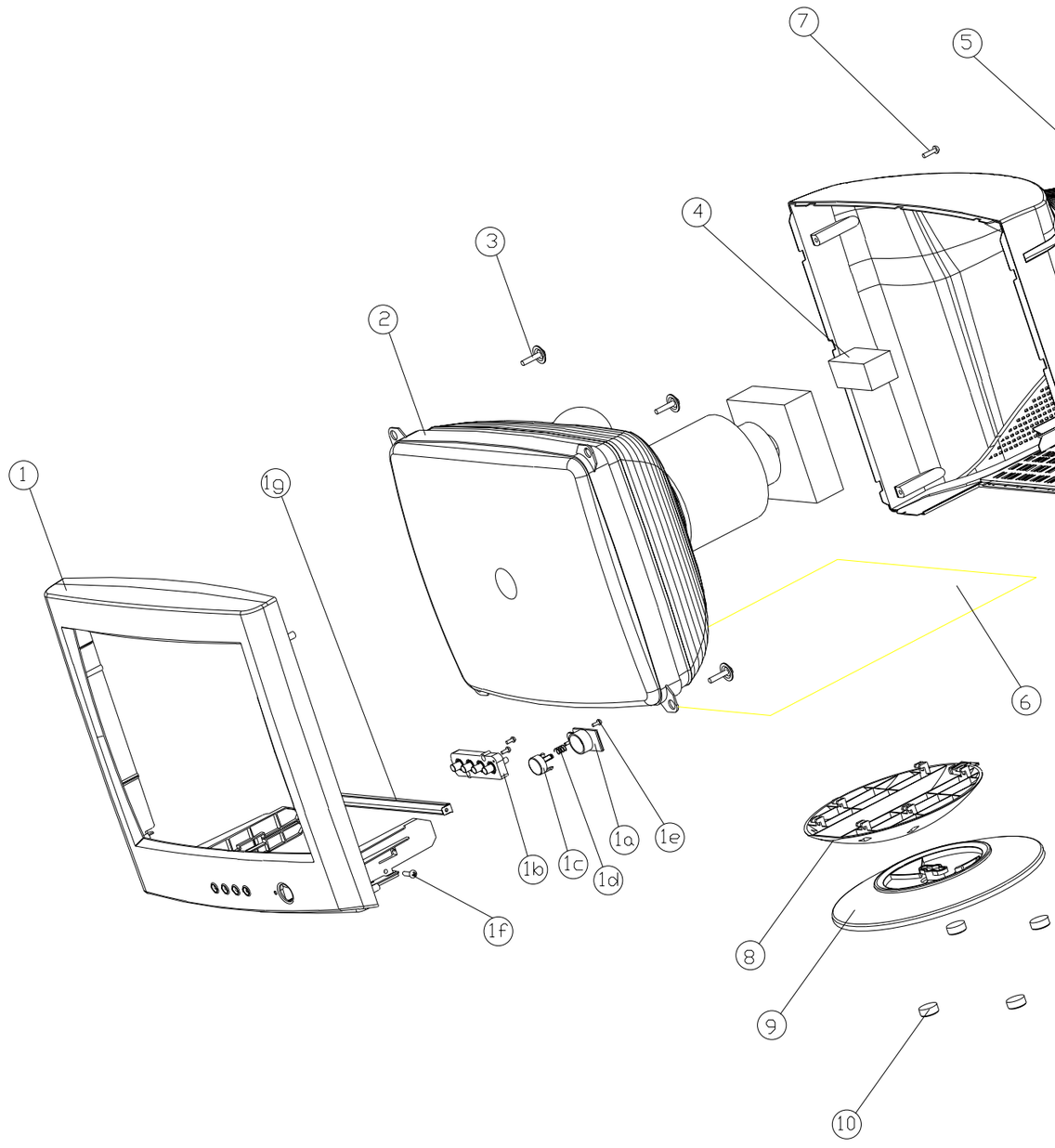
No.	Location	Part Number	Description
24	Q419	6422006000	TR NPN 2SD2012 TO-220(IS)
25	Q420 Q421 Q430	6426010500 (S0) 6426006400 (S1)	FET N-CHNL IRF630MFP/IRFS630A
26	Q451	6426006300	FET N-CHNL IRFS634A FAIRCH 11d
27	R803	6203080017	POSISTOR & OHM DGC2R08M
28	R804	6201100012	THERMISTOR 10 OHM 3A P=5 UEI
29	R802	6221127852	MOF OHM 0.27 1W J HOR
30	R4E3	6221227852	MOF OHM 0.27 2W J HOR
31	T401	6135000801	XFRMER HOR DRIVE THD-1008A EI19
32 ⚠	T402	6133070190 6133070200	FBT TFB-7019 FEA953 SAMPO (S0) FBT TFB-7020 CF1837 LIEN CHANG (S1)
33	T403	6136001300 6136001301	XFRMER DYNAMIC TDF-1012 EI19LSE (S0) XFRMER DYNAMIC TDF-1013 EI19HJC (S1)
34	T801	6138001603	LINE FILTER TLF-1016C 16mH LSE
35 ⚠	T802	6131042221 6131042231	XFRMER PWR TPW-1084A ERL35 LSE (S0) XFRMER PWR TPW-1084A ERL35 HJC (S1)
36	X701	6449006900	CRYSTAL 12.000 MHZ 49U 30PF TOP

7 Block Diagram



LITEON

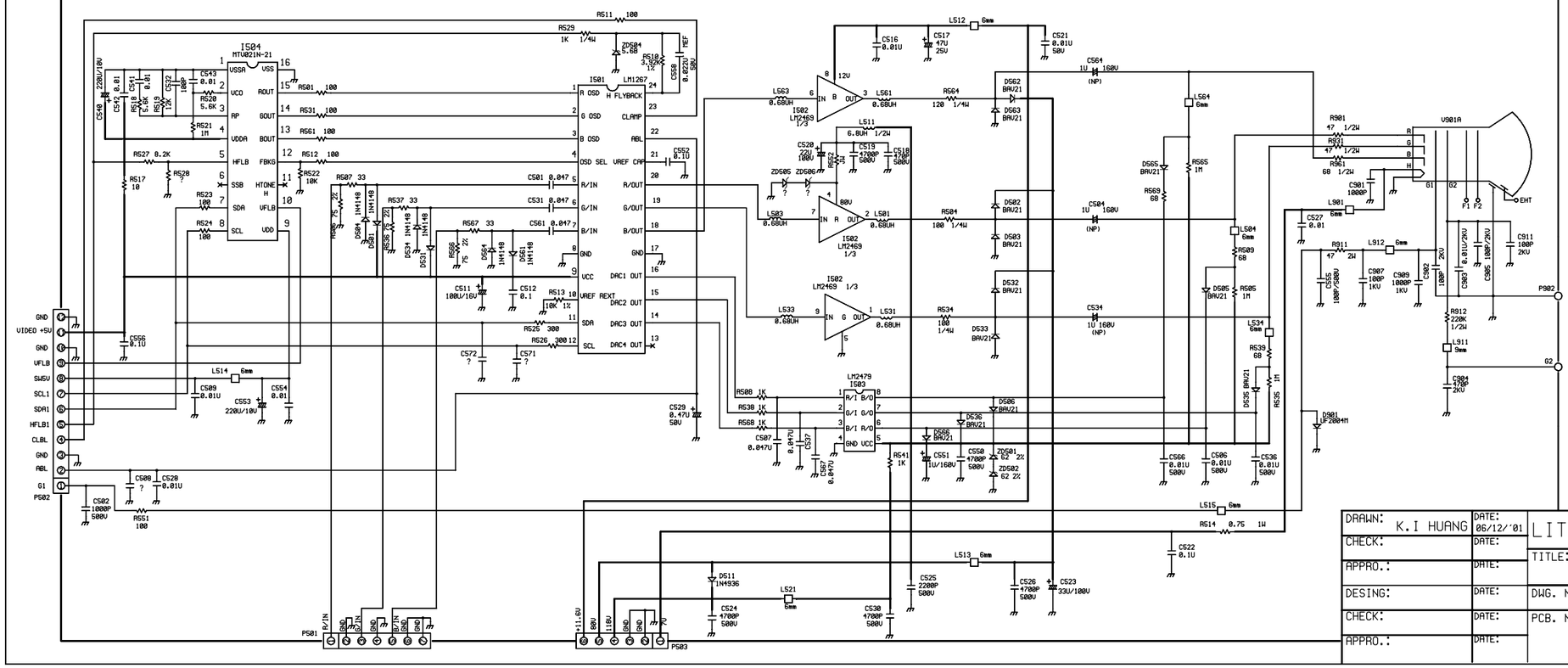
REVISIONS						
AUTH	ZONE	LTR	ECN	DESCRIPTION	DATE	APPROVED
		A		RELEASE FOR PRODUCTION		



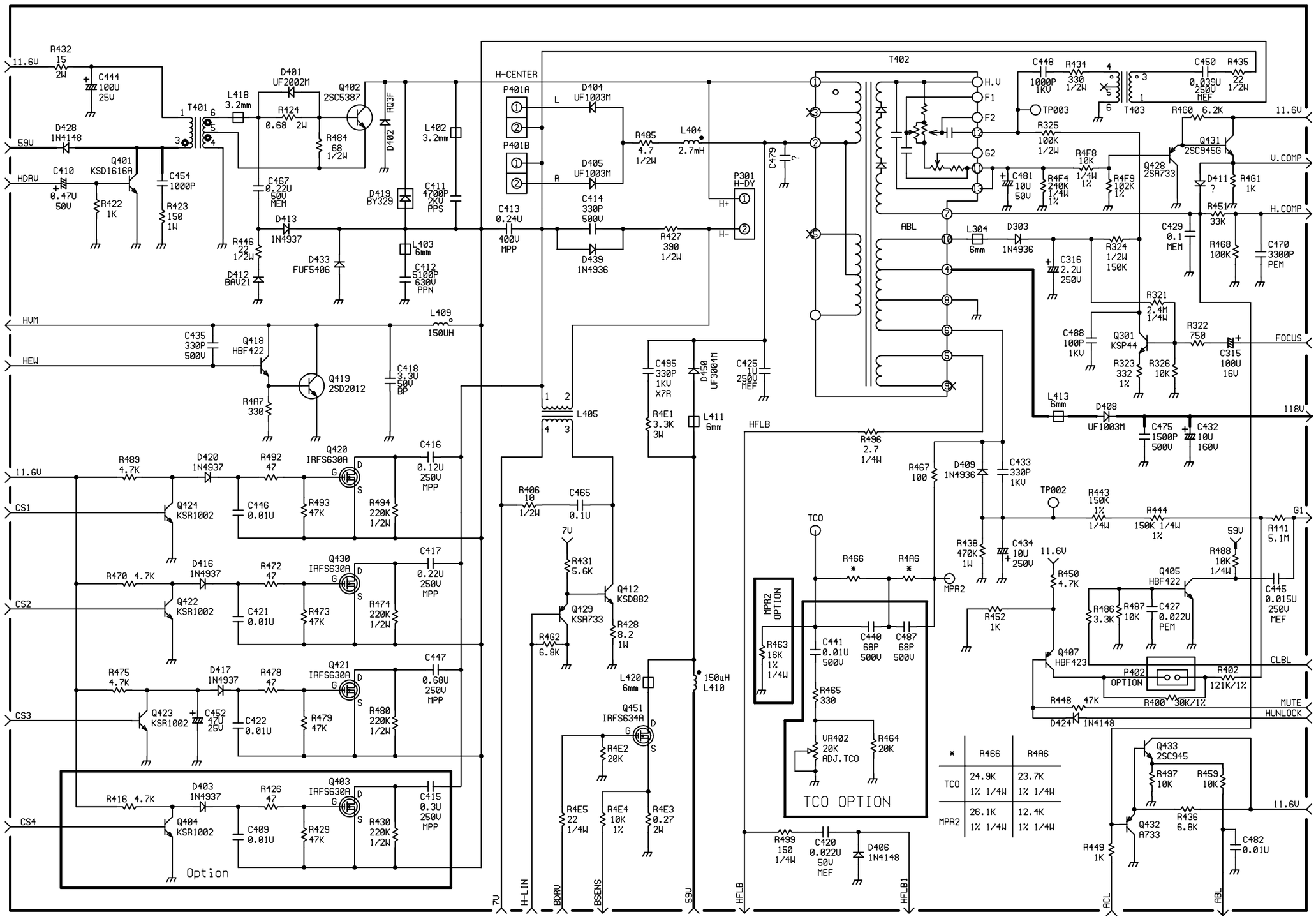
ITEM	PART NO	DESCRIPTION	QTY	REMARK
1	7737506150-0A	F/C ASSY	1	
1a	(7742607100-0A)	(KNOB HOUSING)	(1)	
1b	(7742805140-0A)	(FUNCTION KEY)	(1)	
1c	(7742805150-0A)	(POWER KNOB)	(1)	
1d	(7740300960)	(SPRING)	(1)	
1e	(7140130081)	(DOUBLE THREAD SCREW M3*8)	(3)	
1f	(7120140121)	(DOUBLE THREAD SCREW M4*12)	(2)	
1g	(7748705240)	(BRACKET)	(2)	
2		CRT	1	
3	7142750301	SCREW+STAR WASHER	4	
4	7742002730-0A	SPONGE (CRT BD)	1	
5	7742219500-0A	R/C	1	
6		MAIN BD	1	
7	7140140161	DOUBLE THREAD SCREW M4X16	4	
8	7740407300-0A	SWIVEL BALL	1	
9	7740407350-0A	SWIVEL BASE	1	
10	7742001180	RUBBER	4	

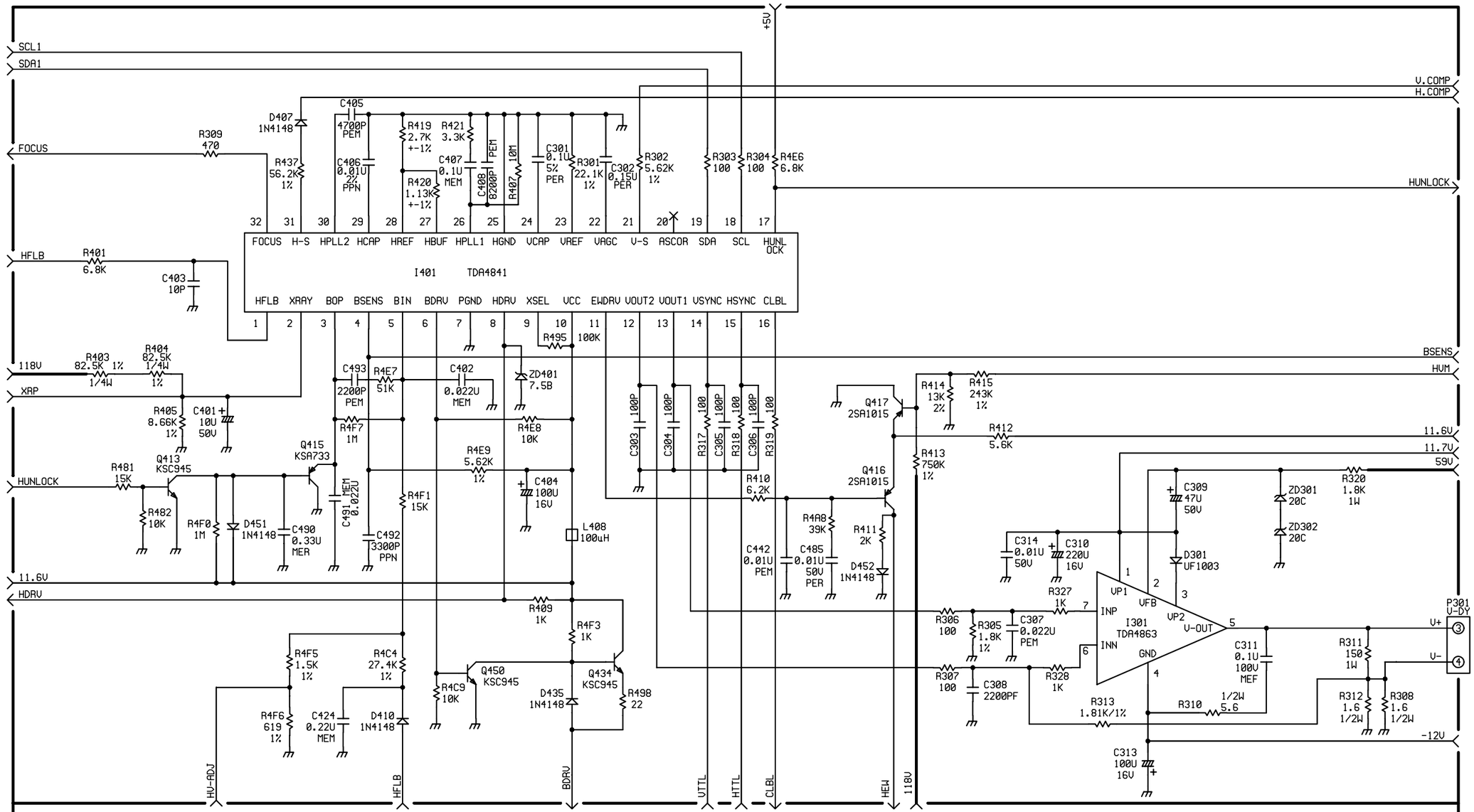
MATERIAL:	LITE-ON TECHNOLOGY CO.
FINISH:	
PROCESS:	TITLE
USED ON:	
DRAWN / DATE	
DESIGN	A4 DWG. NO.
CHECK	PART NO.
APPROVE	SCALE SHEET OF

REMARKS



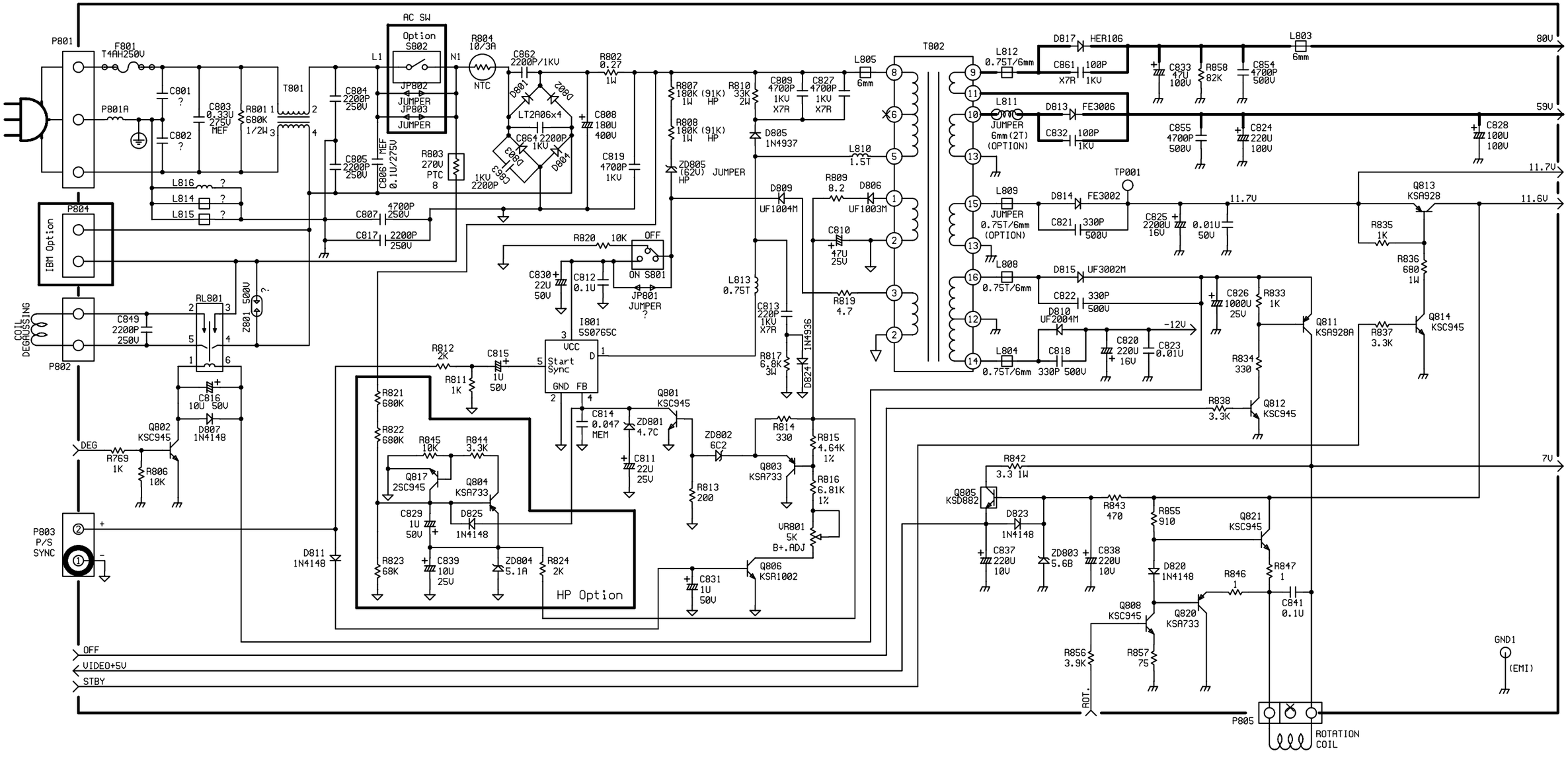
DRAWN: K.I HUANG	DATE: 06/12/'01	LITE-ON TECHNOLOGY CO.	
CHECK:	DATE:	TITLE: C1770 VIDEO CKT.	
APPRO.:	DATE:		
DESING:	DATE:	DWG. NO: 8915520000-01	A2
CHECK:	DATE:	PCB. NO: 6831155200-01	SHEET: 1 OF 1
APPRO.:	DATE:		


11.6V
R432 15 2W
C444 100U 25V
59V
D428 1N4148
HDRV
C410 0.47U 50V
R422 1K
Q401 KSD1616A
C454 1000P
R423 150 1W
T401
L418 3.2mm
D401 UF2002M
R424 0.68 2W
R484 68 1/2W
Q402 2SC5387
D402 RG3F
C467 0.22U 50V MEM
D413 1N4937
R446 22 1/2W
D412 BAV21
D433 FUF5406
D419 BY329
L402 3.2mm
C411 4700P 2KV PPS
L403 6mm
C412 5100P 630V PPN
H-CENTER
P401A
P401B
L
R
D404 UF1003M
D405 UF1003M
C414 330P 500V
D439 1N4936
C413 0.24U 400V MPP
R485 4.7 1/2W
L404 2.7mH
R427 390 1/2W
P301 H-DY
H+
H-
C479 ?
T402
H.V
F1
F2
G2
C448 1000P 1KV
R434 330 1/2W
C450 0.039U 250V MEF
R435 22 1/2W
T403
TP003
R325 100K 1/2W
R4F8 10K 1/4W 1%
R4F4 240K 1/4W 1%
R4F9 102K 1%
C481 10U 50V
R4G0 6.2K
Q431 2SC945G
Q428 2SA733
D411 ?
R4G1 1K
V.COMP
H.COMP
R451 33K
C429 0.1 MEM
R468 100K
C470 3300P PEM
ABL
L304 6mm
D303 1N4936
C316 2.2U 250V
R324 1/2W 150K
R321 2.4M 1/4W
C488 100P 1KV
Q301 KSP44
R322 750
C315 100U 16V
R323 332 1%
R326 10K
FOCUS
HUM
HEW
C435 330P 500V
Q418 HBF422
Q419 2SD2012
R4A7 330
C418 3.3U 50V BP
L409 150UH
L405
C495 330P 1KV X7R
R4E1 3.3K 3W
D450 UF3004M
L411 6mm
C425 1U 250V MEF
L413 6mm
D408 UF1003M
C475 1500P 500V
C432 10U 160V
118V
HFLB
R496 2.7 1/4W
R467 100
D409 1N4936
C433 330P 1KV
TP002
R443 150K 1% 1/4W
R444 150K 1/4W 1%
G1
R441 5.1M
R438 470K 1W
C434 10U 250V
11.6V
R450 4.7K
59V
R488 10K 1/4W
Q405 HBF422
C445 0.015U 250V MEF
R452 1K
R486 3.3K
R487 10K
C427 0.022U PEM
Q407 HBF423
CLBL
P402 OPTION
R402 121K/1%
R400 30K/1%
R448 47K
D424 1N4148
MUTE
HUNLOCK
Q433 2SC945
R497 10K
R459 10K
R436 6.8K
Q432 A733
R449 1K
C482 0.01U
11.6V
ACL
ABL
TCO
MPR2
R466 *
R4A6 *
MPR2 OPTION
R463 16K 1% 1/4W
C441 0.01U 500V
C440 68P 500V
C487 68P 500V
R465 330
VR402 20K ADJ.TCO
R464 20K
TCO OPTION
R499 150 1/4W
C420 0.022U 50V MEF
D406 1N4148
HFLB1
* | R466 | R4A6
TCO | 24.9K 1% 1/4W | 23.7K 1% 1/4W
MPR2 | 26.1K 1% 1/4W | 12.4K 1% 1/4W
CS1
CS2
CS3
CS4
R489 4.7K
D420 1N4937
R492 47
Q424 KSR1002
C446 0.01U
R493 47K
Q420 IRFS630A
R494 220K 1/2W
C416 0.12U 250V MPP
R470 4.7K
D416 1N4937
R472 47
Q422 KSR1002
C421 0.01U
R473 47K
Q430 IRFS630A
R474 220K 1/2W
C417 0.22U 250V MPP
R475 4.7K
D417 1N4937
R478 47
Q423 KSR1002
C452 47U 25V
C422 0.01U
R479 47K
Q421 IRFS630A
R480 220K 1/2W
C447 0.68U 250V MPP
R416 4.7K
D403 1N4937
R426 47
Q404 KSR1002
C409 0.01U
R429 47K
Q403 IRFS630A
R430 220K 1/2W
C415 0.3U 250V MPP
Option
R406 10 1/2W
C465 0.1U
7V
R431 5.6K
Q429 KSA733
Q412 KSD882
R462 6.8K
R428 8.2 1W
L420 6mm
150uH L410
Q451 IRFS634A
R4E2 20K
R4E5 22 1/4W
R4E4 10K 1%
R4E3 0.27 2W
7V
H-LIN
BDRV
BSENS
S9V
HFLB



DRAWN : BETTY WU	DATE : 06/14' 01	LITE-ON TECHNOLOGY CO.
CHECK :	DATE :	
APPRO :	DATE :	TITLE : C1770NSL/T MPS CKT.
DESING :	DATE :	DWG. NO : 8915630000-02 — A1
CHECK :	DATE :	
APPRO :	DATE :	PCB. NO : 6831156300-02 — SHEET : 1 OF 1

+5V
11.7V
78L05
I705
ZD709 6.8C
R734 4.7K
R710 6.8K
R743 6.8K
R701 100K
R702 100K
R754 4.7K
R724 6.8K
C702 0.1U
C707 ?
C701 220U 10V
R758 4.7K
R735 4.3K
LD701
HUNLOCK
R739 10K
Q705 KSC945
R718 36K
C716 1000P
R705 680
R750 680
I701 MTV212M32
C710 0.01U
RESET
POWER DET
LEDG
LEDA
IRQ
CS5
CS4
CS3
CS2
CS1
DEG
DOWN/F1
UP/F2
DA9
HV-ADJ
SCL
SDA
VIN
HIN
PLUG
VDD
VSS
POWER SW
VTTL
HTTL
H-LIN
ROT
WP
ABL
P2.6
P5.2
MUTE
STBY
OFF
SCL1
SDA1
P5.0
XTAL
XTAL
NC
NC
NC
CS4
CS3
CS2
CS1
DEG
VTTL
HTTL
H-LIN
ROT.
ACL
MUTE
STBY
OFF
SCL1
SDA1
R759 5.6K
C724 1U 50V
R723 5.6K
C706 1U 50V
R768 1K
C725 4.7U 50V
R751 2K
R716 100
R717 100
S703
S704
S705
S706
F1
DOWN
UP
F2
R740 6.8K
R741 6.8K
C713 100P
C715 100P
C726 0.01U
R719 3.9K
R706 33
R707 33
C711 27P
X701 12MHZ
C712 27P
C705 22P
C709 22P
C704 100P
R703 180
R704 180
C703 100P
C741 4.7U 50V
C738 68P
C739 68P
I703
VCC
WP
SCL
SDA
A0
A1
A2
GND
MTV24C08
C740 ?
R714 4.7K
R715 4.7K
C748 ?
C749 ?
R732 2.2K
R731 2.2K
R720 33
C708 0.1U
GND
VIDEO+5V
C743 ?
GND
VFLB
SW5V
C744 ?
SCL1
SDA1
HFLB1
CLBL
GND
ABL
G1
P502A
R752 56
R753 56
SCL
SDA
R721 33
R744 33
R747 10K
D703 1N4148
D704 1N4148
C719 0.01U 50V
C720 22U 50V
I704
VCC
VSYNC
SCL
GND
SDA
24LS211
C717 100P
DDC option
L706 4.7mm
L705 4.7mm
L704 4.7mm
L703 4.7mm
L702 4.7mm
C722 100P
C721 100P
C718 68P
C714 68P
ZD706 5.6B
ZD705 5.6B
ZD704 5.6B
ZD703 5.6B
ZD708 5.6B
ZD702 5.6B
L701 4.7mm
C723 150P
R728 1K
Q701 KSA733
Q702 KSA733
R729 4.7K
R730 4.7K
C747 0.01U
C746 ?
C745 0.01U
P503A
7V
GND
GND
118V
80V
11.6V
DDC5V
HSYNC
VSYNC
GND
SCL
SDA
PLUG
P503


P801
F801
T4AH250V
P801A
C801
?
C802
?
C803
0.33U
275V
MEF
R801
680K
1/2W
T801
C804
2200P
250V
C805
2200P
250V
C806
0.1U/275V
MEF
AC SW
Option
S802
JP802
JUMPER
JP803
JUMPER
L1
N1
R804
10/3A
NTC
C862
2200P/1KV
R802
0.27
1W
D801
D802
LT2A06x4
D803
D804
C864
2200P
1KV
C863
2200P
1KV
C808
180U
400V
C819
4700P
1KV
R803
270V
PTC
8
L816
?
L814
?
L815
?
C807
4700P
250V
C817
2200P
250V
P804
IBM Option
P802
COIL
DEGAUSSING
C849
2200P
250V
RL801
Z801
500V
?
C816
10U 50V
D807
1N4148
Q802
KSC945
DEG
R769
1K
R806
10K
R807
180K (91K)
1W HP
R808
180K (91K)
1W HP
ZD805
(62V) HP
JUMPER
R810
33K
2W
C809
4700P
1KV
X7R
C827
4700P
1KV
X7R
D805
1N4937
L805
6mm
L810
1.5T
T802
D809
UF1004M
R809
8.2
D806
UF1003M
C810
47U
25V
R820
10K
OFF
ON S801
JP801
JUMPER
?
C830
22U
50V
C812
0.1U
L813
0.75T
R819
4.7
C813
220P
1KV
X7R
D824
1N4936
I801
5S0765C
VCC
Start
Sync
GND
FB
R812
2K
R811
1K
C815
1U
50V
R821
680K
R822
680K
R845
10K
R844
3.3K
Q817
2SC945
Q804
KSA733
C829
1U
50V
D825
1N4148
R823
68K
C839
10U
25V
ZD804
5.1A
R824
2K
HP Option
D811
1N4148
C814
0.047
MEM
Q801
KSC945
ZD801
4.7C
C811
22U
25V
ZD802
6C2
R813
200
R814
330
R815
4.64K
1%
Q803
KSA733
R816
6.81K
1%
VR801
5K
B+.ADJ
Q806
KSR1002
C831
1U
50V
L812
0.75T/6mm
D817
HER106
C861
100P
X7R
1KV
L803
6mm
80V
C833
47U
100V
R858
82K
C854
4700P
500V
L811
JUMPER
6mm(2T)
(OPTION)
D813
FE3006
C832
100P
1KV
59V
C855
4700P
500V
C824
220U
100V
C828
100U
100V
TP001
11.7V
L809
JUMPER
0.75T/6mm
(OPTION)
D814
FE3002
C821
330P
500V
C825
2200U
16V
0.01U
50V
11.7V
Q813
KSA928
11.6V
R835
1K
R836
680
1W
Q814
KSC945
R837
3.3K
L808
0.75T/6mm
D815
UF3002M
C822
330P
500V
D810
UF2004M
C826
1000U
25V
R833
1K
Q811
KSA928A
-12V
L804
0.75T/6mm
330P 500V
C818
C820
220U
16V
C823
0.01U
R834
330
R838
3.3K
Q812
KSC945
R842
3.3 1W
7V
Q805
KSD882
D823
1N4148
R843
470
R855
910
Q821
KSC945
C837
220U
10V
ZD803
5.6B
C838
220U
10V
D820
1N4148
R846
1
R847
1
C841
0.1U
Q808
KSC945
Q820
KSA733
R856
3.9K
R857
75
ROT.
GND1
(EMI)
P805
ROTATION
COIL
P803
P/S
SYNC
OFF
VIDEO+5V
STBY

LITE-ON

LITE-ON TECHNOLOGY CORP.
5 F, No. 16, Sec. 4, Nanking E. Road, Taipei, Taiwan
Tel: 886-2-25706999 Fax: 886-2-25706888
URL:// www.liteontc.com.tw

Printed in Taiwan