LG

SPECIFICATIONS

1. PICTURE TUBE

Size	: 22 inch (20 inches viewable) Natural Flat Tube
Deflection Angle	: 90°
Neck Diameter	: 29.1 mm
Grille Pitch	: 0.24 mm
Diagonal Size	: 507.6mm
Face Treatment	: Sputter coating, ARASC Coating

2. SIGNAL

2-1. Horizontal & Vertical Sync

1) Input Voltage Level	: Low≤0.8V, High≥2.1V
2) Sync Polarity	: Positive or Negative

2-2. Video Input Signal

1) Voltage Level	: 0~0.7 Vp-p
a) Color 0, 0	: 0 Vp-p
b) Color 7, 0	: 0.467 Vp-p
c) Color 15, 0	: 0.7 Vp-p
2) Input Impedance	: 75 Ω
3) Video Color	: R, G, B Analog
4) Signal Format	: Refer to the Timing Chart

2-3. Signal Connector

15 Pin D-Sub / 5 BNC Connector

2-4. Scanning Frequency

Horizontal	: 30~124kHz
Vertical	: 50~160 Hz

3. POWER SUPPLY

3-1. Power Range

AC 100~240V 50/60Hz, 2.0A.

3-2. Power Consumption *( ) : with USB

MODE	H/V SYNC	POWER CONSUMPTION	LED COLOR
NORMAL	ON/ON	less than 115W(130W)	GREEN
Stand BY	OFF/OFF	less than 8W(20W)	YELLOW
Suspend	OFF/OFF	less than 8W(20W)	YELLOW
OFF	OFF/OFF	less than 3W(18W)	YELLOW

4. DISPLAY AREA

4-1. Active Video Area

- Max Image Size - 406.4 x 304.8mm(16.00" x 12.00")
- Preset Image Size - 390 x 293mm(15.35" x 11.53")

4-2. Display Color	: Full Colors
4-3. Display Resolution	: 2048 x 1536 / 75Hz
4-4. Video Bandwidth	: 350 MHz

5. ENVIRONMENT

5-1. Operating Temperature	: 5°C~35°C (41°F~95°F) (Ambient)
5-2. Relative Humidity	: 10%~90% (Non-condensing)
5-3. Altitude	: 5000 m

6. DIMENSIONS (with TILT/SWIVEL)

Width	: 503 mm (19.8")
Depth	: 477 mm (18.8")
Height	: 509 mm (20.4")

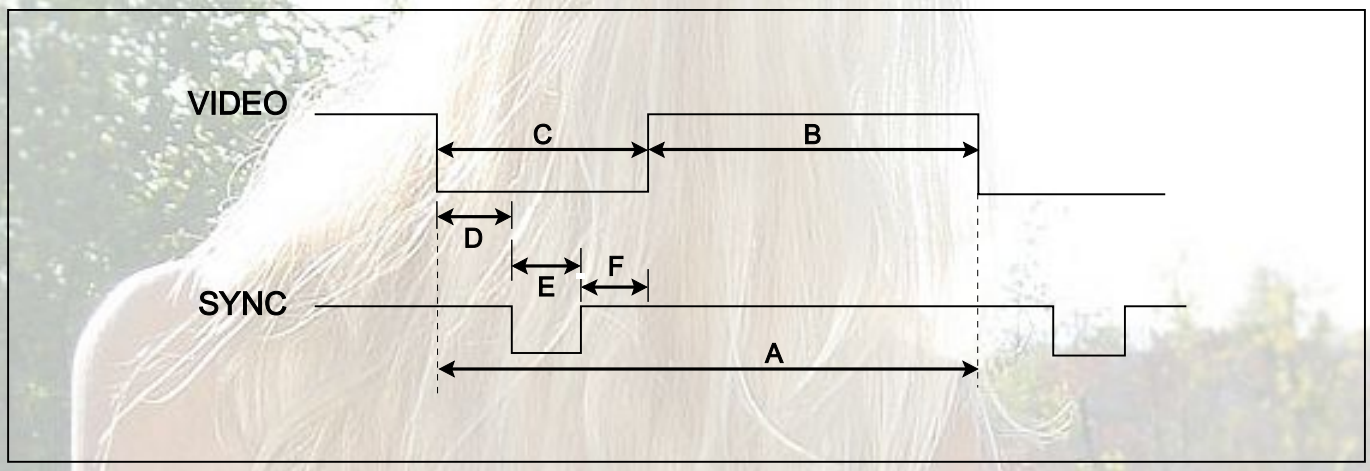
7. WEIGHT (with TILT/SWIVEL)

Net Weight	: 31.3 kg (69.01lbs)
Gross Weight	: 35.5 kg (78.27lbs)

8. USB

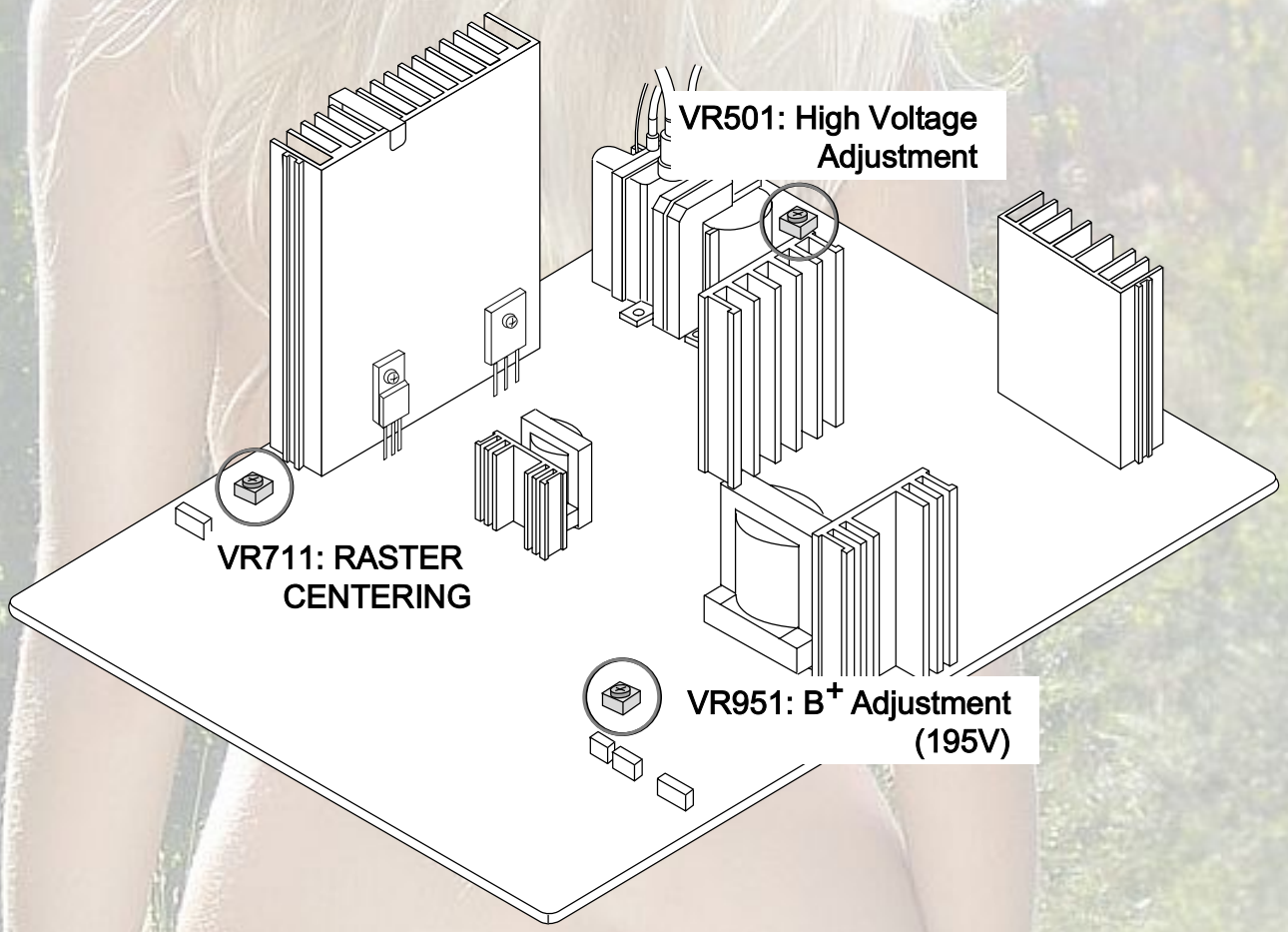
USB standard	: Rev 1.1complied BUS-powered hub
Downstream power supply	: 500mA for each (MAX)
Communication speed	: 12 Mbps (full), 1.5 Mbps (low)
USB port	: 1 Upstream port / 4 Downstream ports

TIMING CHART



MODE			MARK	VESA								GTF
				MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7	MODE 8	MODE 9
HORIZONTAL	Sync Polarity			—	+	+	+	+	+	+	+	—
	Frequency	kHz		31.469	53.674	60.023	68.677	79.976	91.146	93.750	106.250	121.950
	Total Period	µs	A	31.778	18.631	16.660	14.561	12.504	10.971	10.667	9.412	8.200
	Video Active Time	µs	B	25.422	14.222	13.003	10.836	9.481	8.127	7.901	6.972	5.864
	Blanking Time	µs	C	6.356	4.409	3.657	3.725	3.022	2.844	2.765	2.441	2.336
	Front Porch	µs	D	0.640	0.569	0.203	0.508	0.119	0.406	0.316	0.279	0.504
	Sync Duration	µs	E	3.810	1.138	1.219	1.016	1.067	1.016	0.948	0.837	0.664
	Back Porch	µs	F	1.906	2.702	2.235	2.201	1.837	1.422	1.501	1.325	1.168
VERTICAL	Sync Polarity			—	+	+	+	+	+	+	+	+
	Frequency	Hz		59.940	85.061	75.029	84.997	75.025	85.024	75.000	85.000	75.000
	Total Period	ms	A	16.683	11.756	13.328	11.765	13.329	11.761	13.333	11.765	13.333
	Video Active Time	ms	B	15.253	11.178	12.795	11.183	12.804	11.235	12.800	11.294	12.595
	Blanking Time	ms	C	1.430	0.578	0.533	0.582	0.525	0.527	0.533	0.470	0.740
	Front Porch	ms	D	0.318	0.019	0.017	0.015	0.013	0.011	0.011	0.009	0.100
	Sync Duration	ms	E	0.064	0.056	0.050	0.044	0.038	0.033	0.032	0.028	0.025
	Back Porch	ms	F	1.049	0.503	0.466	0.523	0.475	0.483	0.490	0.433	0.615
Resolution				640 x 480 60Hz	800 x 600 85Hz	1024 x 768 75Hz	1024 x 768 85Hz	1280 x 1024 75Hz	1280 x 1024 85Hz	1600 x 1200 75Hz	1600 x 1200 85Hz	2048 x 1536 75Hz
Recall				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

CONTROL LOCATIONS



ADJUSTMENT

GENERAL INFORMATION

All adjustment are thoroughly checked and corrected when the monitor leaves the factory, but sometimes several adjustments may be required.
Adjustment should be following procedure and after warming up for a minimum of 30 minutes.

- Alignment appliances and tools.
  - IBM compatible PC.
  - Programmable Signal Generator.
    (eg. VG-819 made by Astrodesign Co.)
  - EPROM or EEPROM with saved each mode data.
  - Alignment Adaptor and Software.
  - Digital Voltmeter.
  - White Balance Meter.
  - Luminance Meter.
  - High-voltage Meter.

AUTOMATIC AND MANUAL DEGAUSSING

The degaussing coil is mounted around the CDT so that automatic degaussing when turn on the monitor. But a monitor is moved or faced in a different direction, become poor color purity cause of CDT magnetized, then press (DEGAUSSING) on the OSD menu.

ADJUSTMENT PROCEDURE & METHOD

- Install the cable for adjustment such as Figure 1and run the alignment program on the DOS for IBM compatible PC.
- Set external Brightness and Contrast volume to max position.

1. Adjustment for B^+ Voltage.

1) Display cross hatch pattern at Mode 8.
2) Adjust C970 (+) voltage to 210±0.5V with **VR951.**

2. Adjustment for High-Voltage.

1) Display cross hatch pattern at Mode 8.
2) Adjust CDT Anode voltage to 27kV±500V with **VR501.**

3. Adjustment for Factory Mode (Preset Mode).

1) Display cross hatch pattern at Mode 9.
2) Run alignment program for NB230A on the IBM compatible PC.
3) EEPROM →MODE CLEAR→Y(Yes) command.
   <Caution> *Do not run this procedure unless the EEPROM is changed. All data in EEPROM (mode data and color data)will be erased.*
4) COMMAND →PRESET START→Y(Yes) command.
5) DIST. ADJ. → FOS. ADJ command.
6) Adjust V-SIZE as arrow keys to 290±1mm.
7) Adjust V-POSITION as arrow keys to center of the screen.
8) Adjust H-SIZE as arrow keys to 390±2mm.
9) Adjust H-POSITION as arrow keys to center of the screen.
10) Adjust SIDE-PIN (Side-Pincushion) as arrow keys to be the best condition.
11) Adjust TRAPEZOID as arrow keys to be the best condition.
12) Adjust TILT as arrow keys to be the best condition.
14) Save of the Mode.
15) PRESET EXIT → Y (Yes) command.

4. Adjustment for White Balance and Luminance.

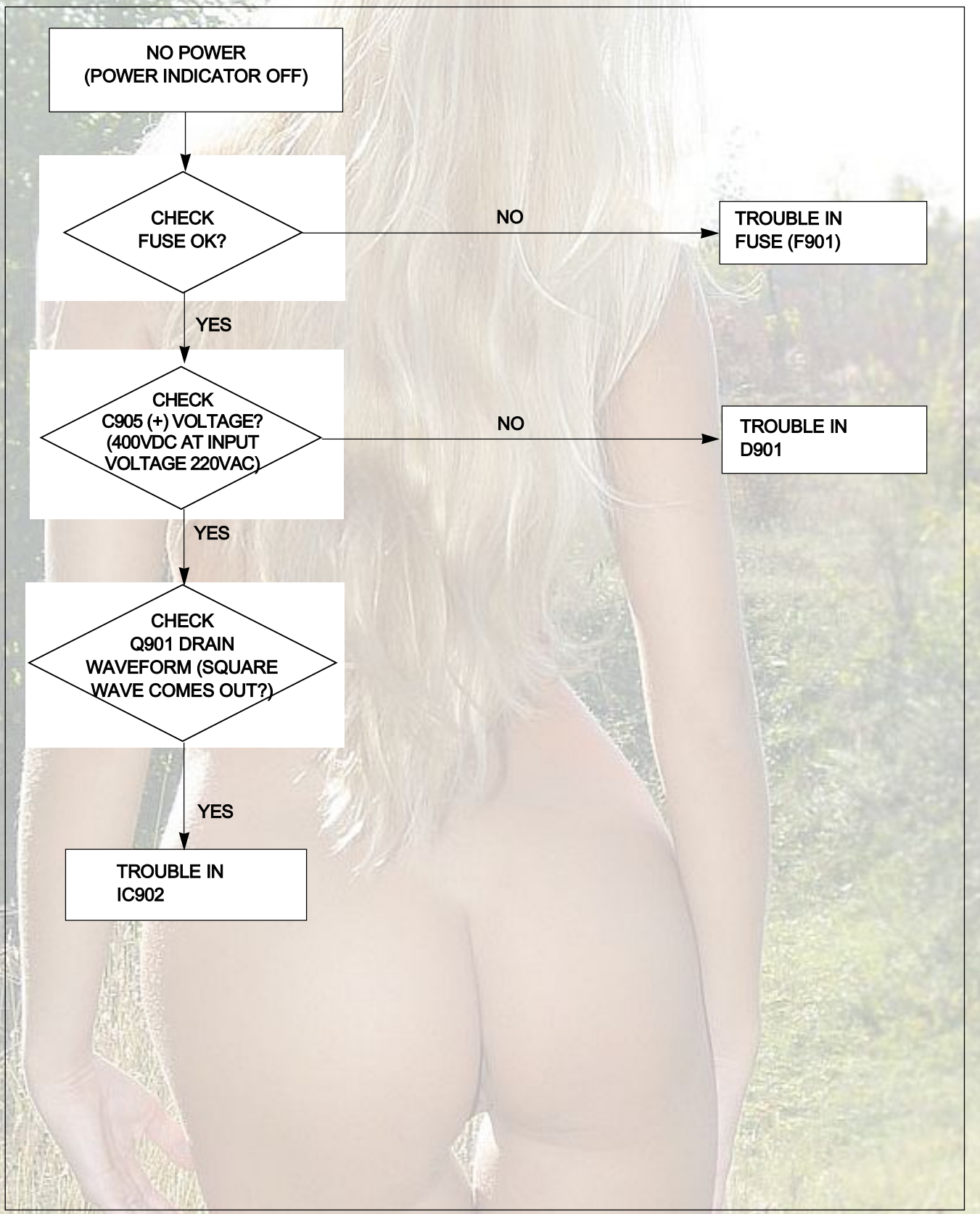
1) Set the White Balance Meter.
2) Press the (DEGAUSSING) on the OSD menu for demagnetization of the CDT.
3) Display color 0,0 pattern at Mode 7.
4) Set Brightness and Contrast to max position.
5) COLOR ADJ. → BIAS ADJ. command of the alignment program.
6) Check whether blue color or not at R-BIAS and G-BIAS to min position and B-BIAS to 80 (decimal) position at Sub-Bright to 80 (decimal). If it's not blue color, the monitor must to be repaired.
7) Adjust Screen control on the FBT to 0.1±0.02FL of the raster luminance.
8) Adjust B-Bias to 80(decimal) position.
9) Adjust R-BIAS and G-BIAS command to x=0.283± 0.006 and y=0.298±0.006 on the White Balance Meter with PC arrow keys.
10) Adjust SUB-Brightness command to 0.5±0.1FL of the raster luminance.
11) Display color 15,0 box pattern (70x70mm) at Mode 7.
12) Set Brightness and Contrast to Max position.
13) DRIVE ADJ command.
14) Set B-DRIVE to 210 (decimal) at DRIVE of the alignment program.
15) Adjust R-DRIVE and G-DRIVE command to white balance x=0.283±0.003 and y=0.298±0.003 on the White Balance Meter with PC arrow keys.
16) Adjust SUB-CONTRAST command to 35±1FL of the raster luminance.
17) Display color 15,0 full white patten at Mode 9.
18) Set Brightness and Contrast to Max position.
19) COLOR ADJ. → LUMINANCE → ABL command.
20) Adjust ABL to 30±2FL of the luminance.
21) Exit from the program.

5. Adjustment for Focus.

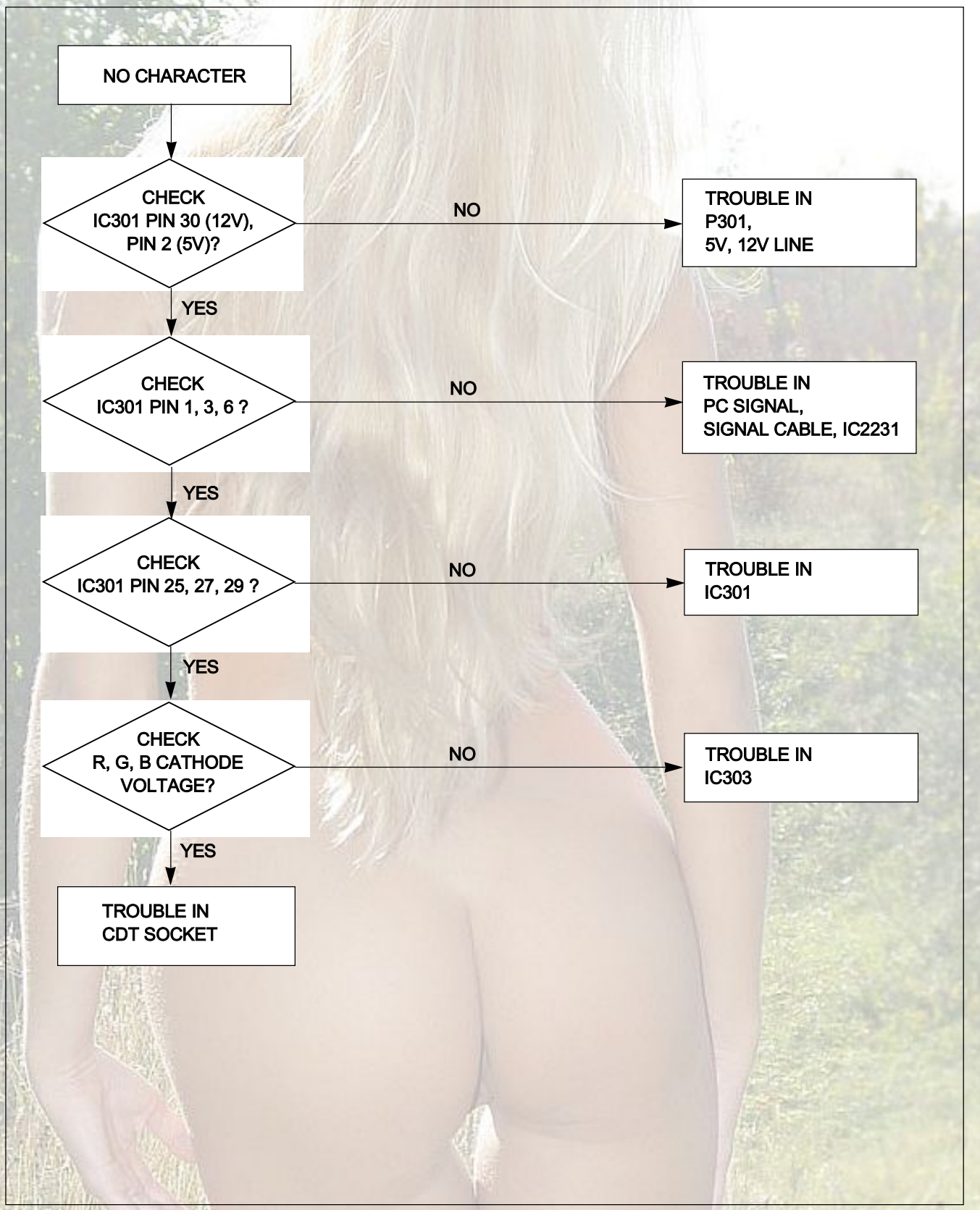
1) Display H character in full screen at Mode 9.
2) Adjust Focus control on the FBT that focus should be the best condition.

TROUBLESHOOTING GUIDE

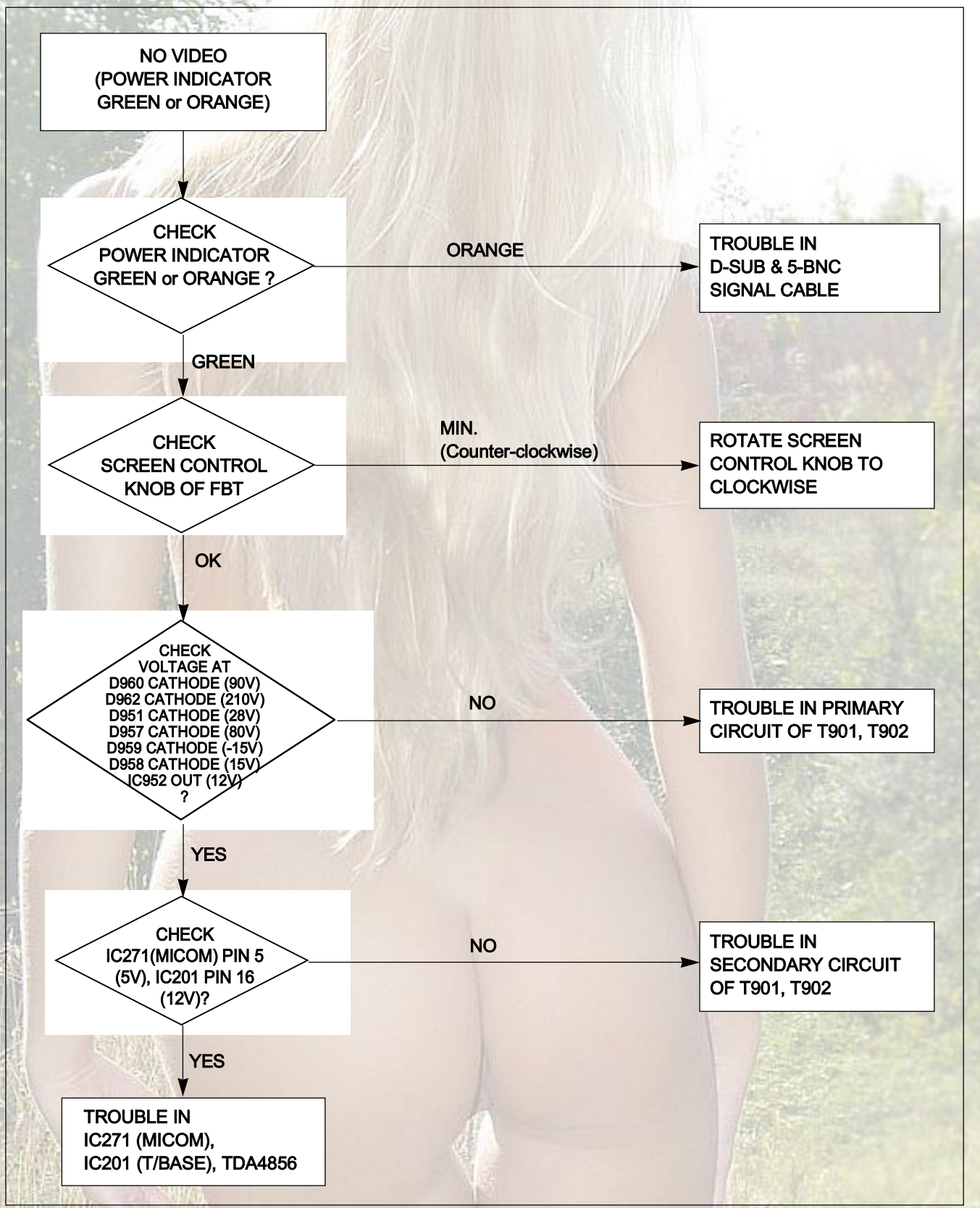
1. NO POWER



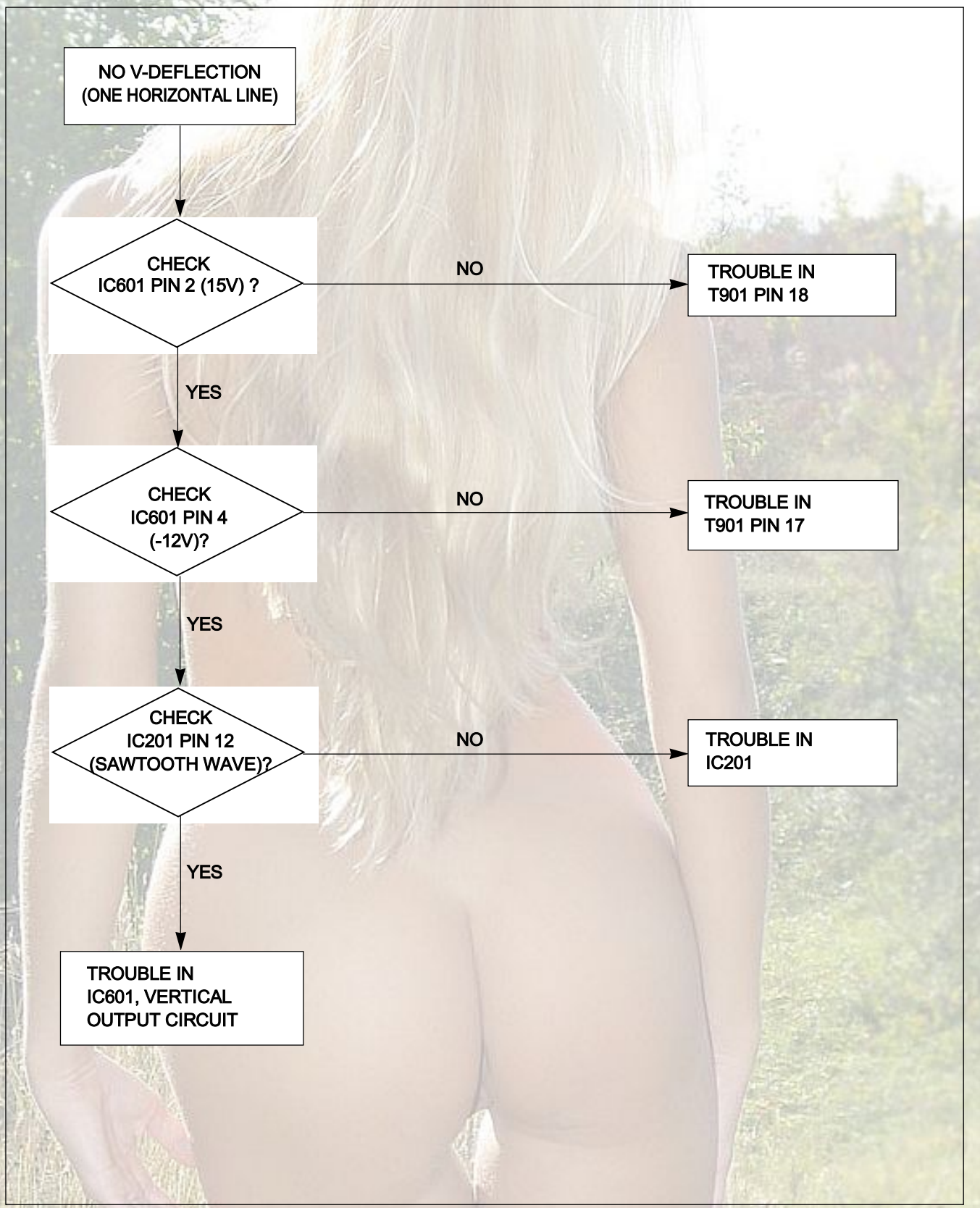
2. NO CHARACTER



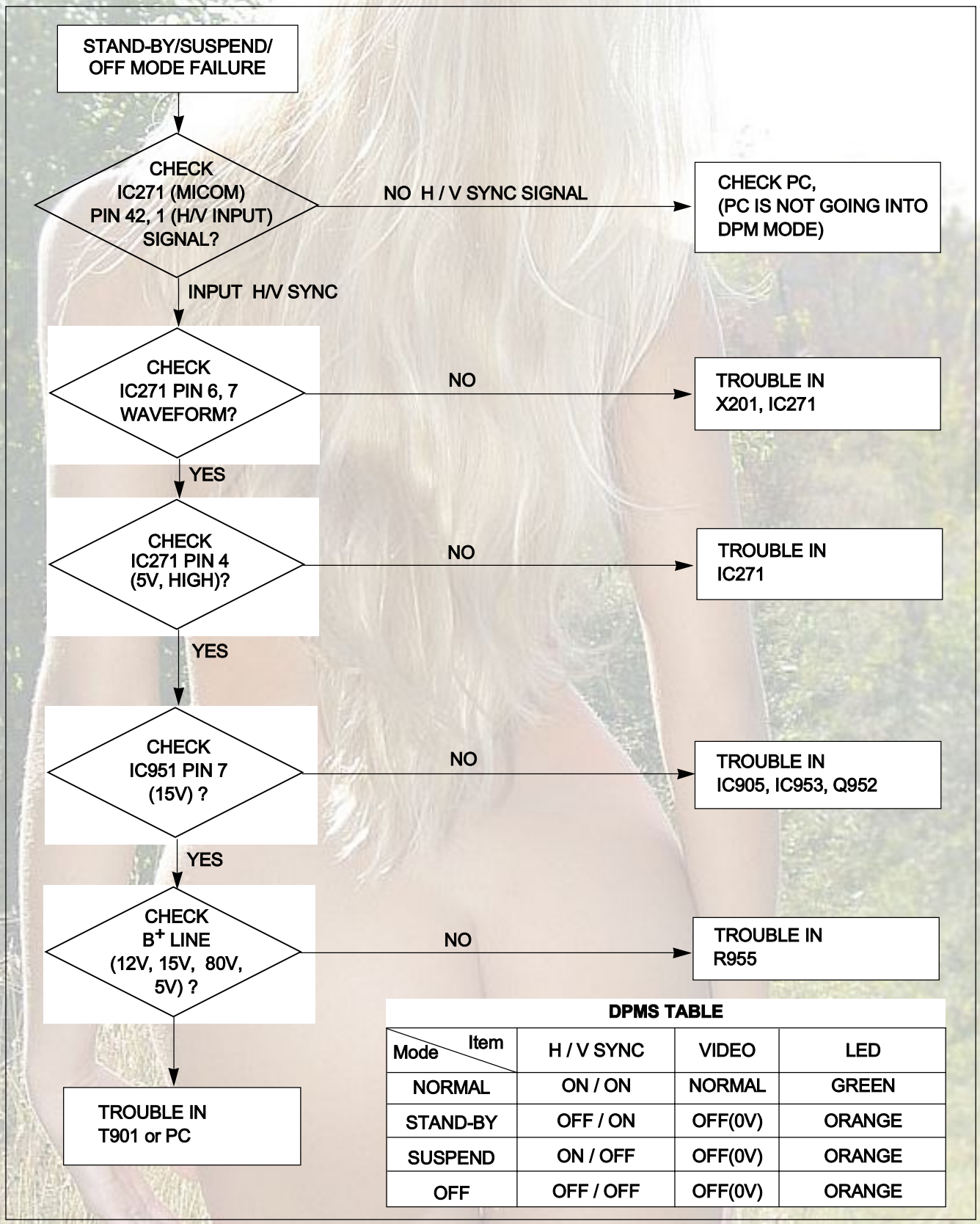
3. NO RASTER


NO VIDEO
(POWER INDICATOR
GREEN or ORANGE)
CHECK
POWER INDICATOR
GREEN or ORANGE ?
ORANGE
TROUBLE IN
D-SUB & 5-BNC
SIGNAL CABLE
GREEN
CHECK
SCREEN CONTROL
KNOB OF FBT
MIN.
(Counter-clockwise)
ROTATE SCREEN
CONTROL KNOB TO
CLOCKWISE
OK
CHECK
VOLTAGE AT
D960 CATHODE (90V)
D962 CATHODE (210V)
D951 CATHODE (28V)
D957 CATHODE (80V)
D959 CATHODE (-15V)
D958 CATHODE (15V)
IC952 OUT (12V)
?
NO
TROUBLE IN PRIMARY
CIRCUIT OF T901, T902
YES
CHECK
IC271(MICOM) PIN 5
(5V), IC201 PIN 16
(12V)?
NO
TROUBLE IN
SECONDARY CIRCUIT
OF T901, T902
YES
TROUBLE IN
IC271 (MICOM),
IC201 (T/BASE), TDA4856

4. NO VERTICAL DEFLECTION



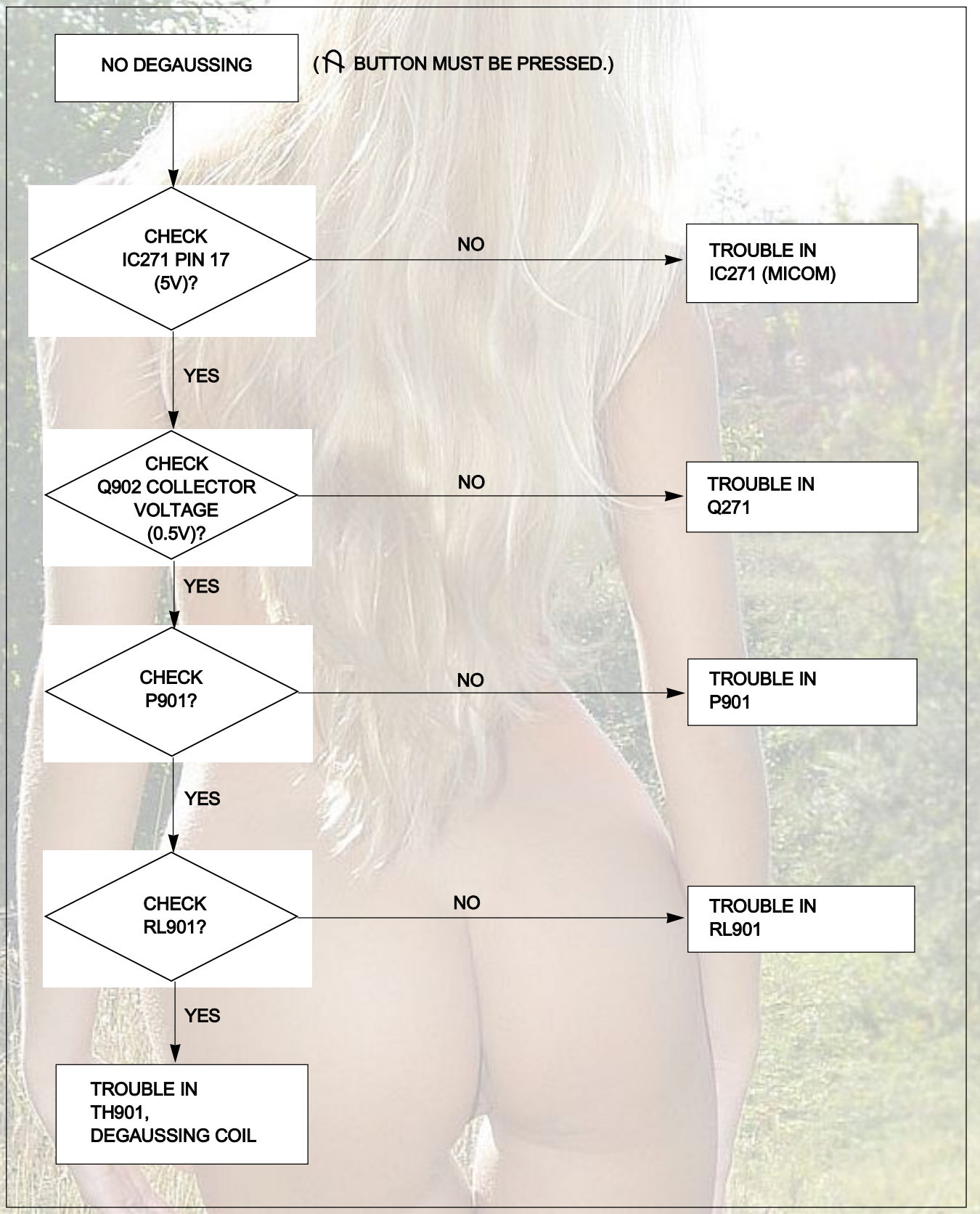
5. TROUBLE IN DPM



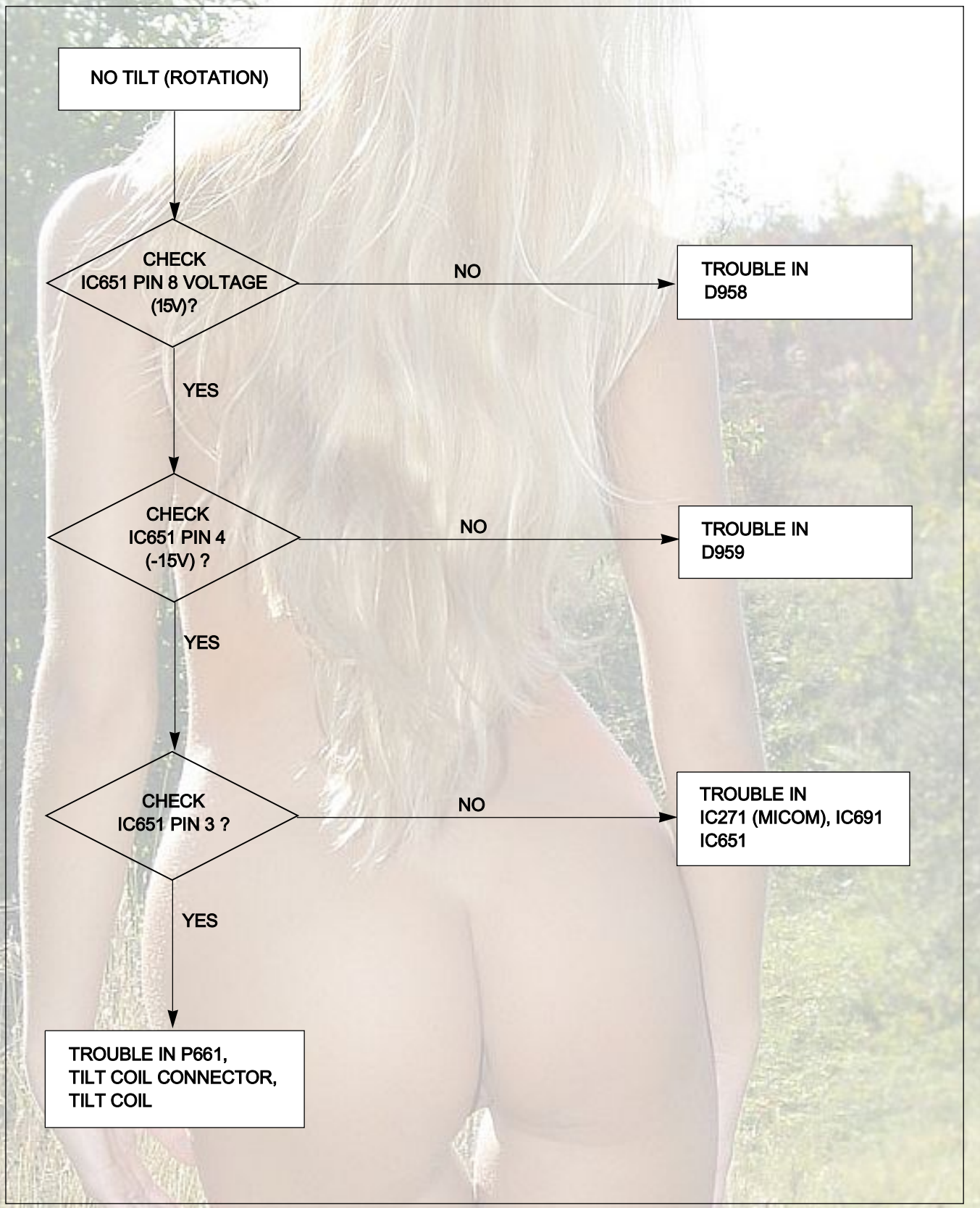
DPMS TABLE

Item / Mode	H / V SYNC	VIDEO	LED
NORMAL	ON / ON	NORMAL	GREEN
STAND-BY	OFF / ON	OFF(0V)	ORANGE
SUSPEND	ON / OFF	OFF(0V)	ORANGE
OFF	OFF / OFF	OFF(0V)	ORANGE

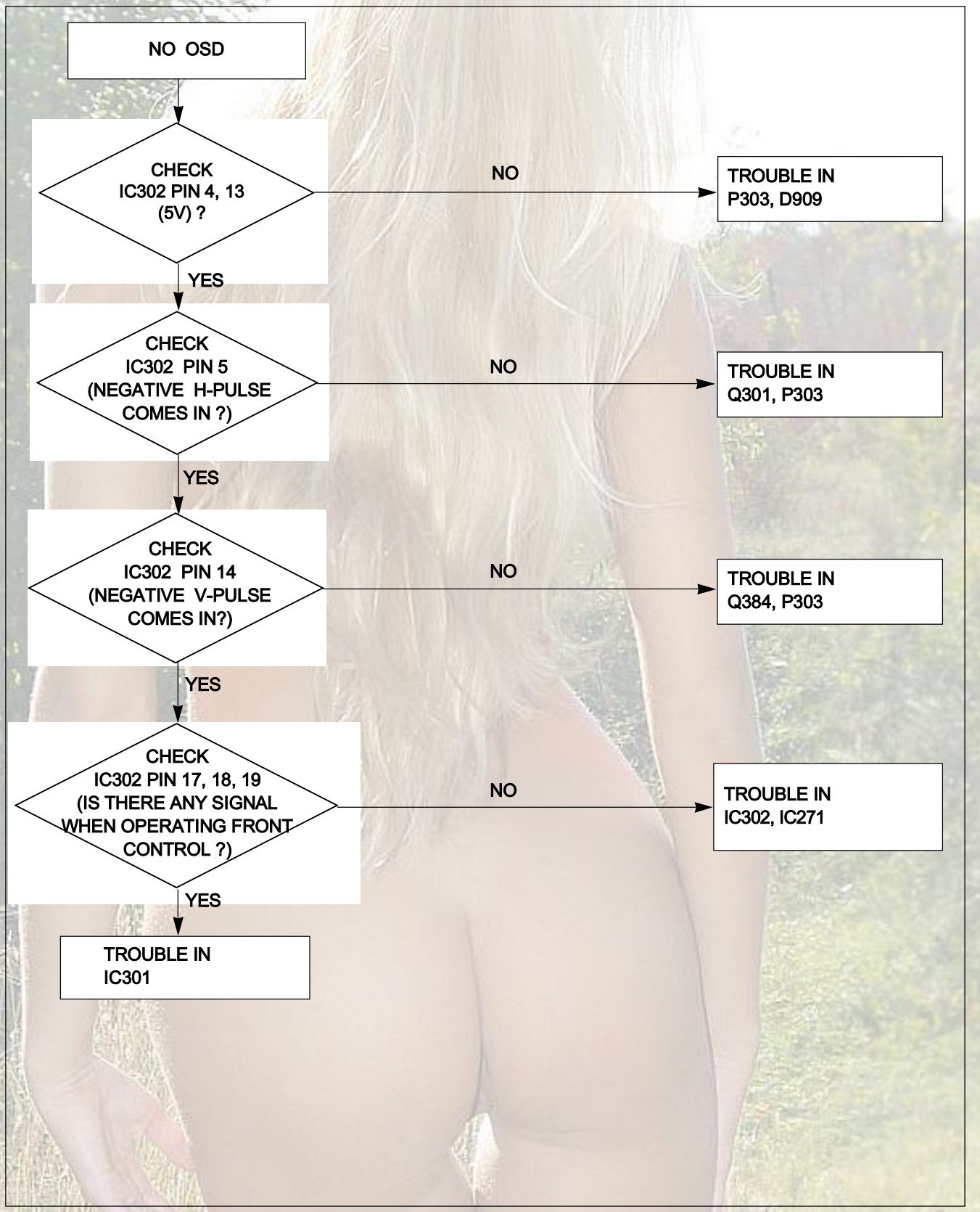
6. NO DEGAUSSING



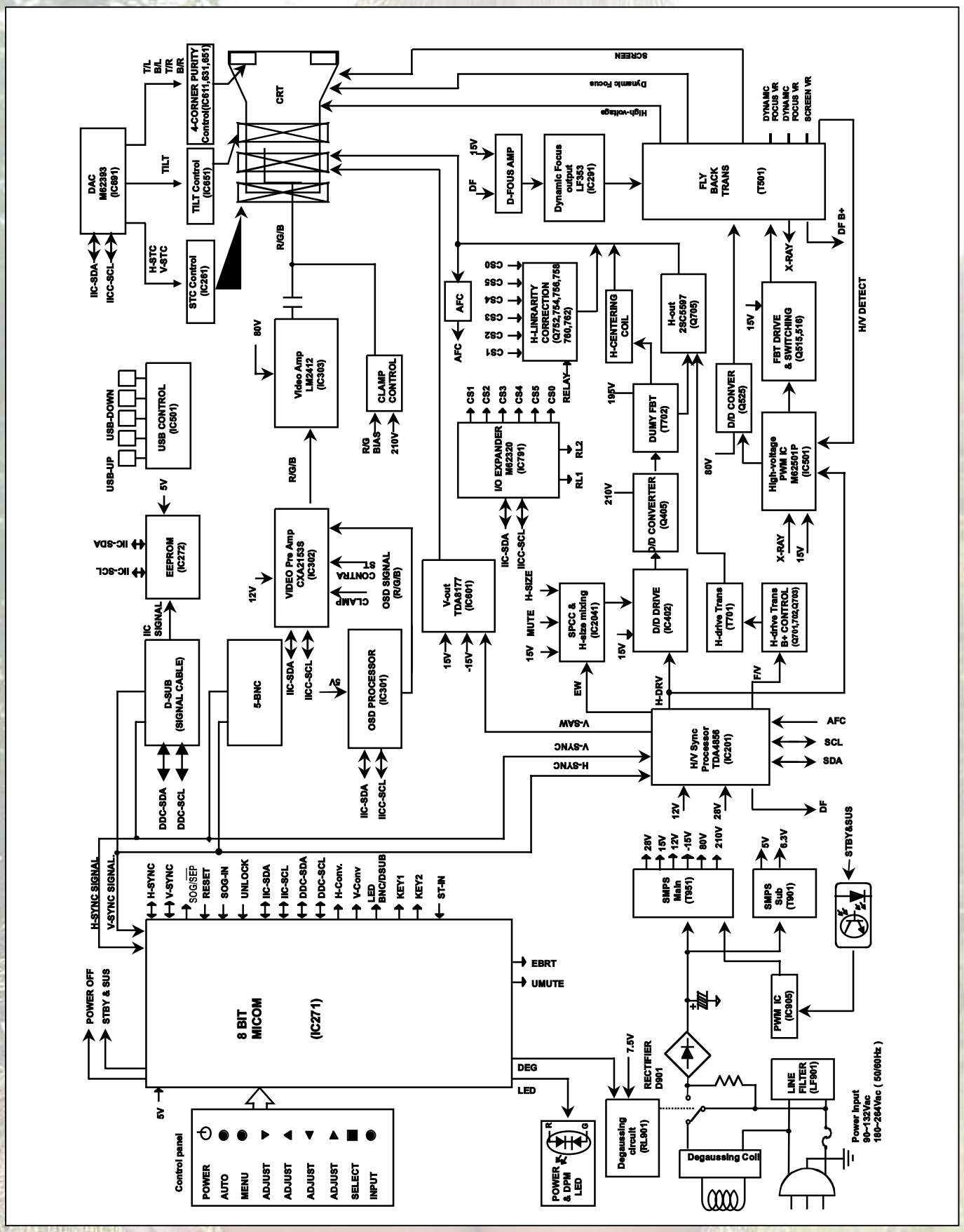
7. NO TILT (ROTATION)



8. TROUBLE IN OSD



BLOCK DIAGRAM



DESCRIPTION OF BLOCK DIAGRAM

1. Line Filter & Associated Circuit

This is used for suppressing noise of power input line flowing into the monitor and/or some noise generated in this monitor flowing out through the power input line. That is to say, this circuit prevents interference between the monitor and other electric appliances.

2. Degauss Circuit & Coil

The Degauss circuit consists of the degaussing coil, the PTC (Positive Temperature Coefficient) thermistor (TH901), and the relay(RL901). This circuit eliminates abnormal color of the screen automatically by degaussing the slot mask in the CRT when turn on the power switch. When you need to degauss while using the monitor select DEGAUSS in the SPECIAL on the OSD menu.

3. SMPS(Switching Mode Power Supply).

This circuit works with power of 90~264Vac(50/60Hz). The operation procedure is as follows:

1) AC input voltage is rectified and smoothed by the bridge diode (D901) and capacitors (C905).
2) The rectified voltage (DC voltage) is applied to the primary coil of the transformer (T901,T951)
3) The control IC (IC951) generates switching pulse to turn on and off the primary coil of the transformer (T951) repeatedly.
4) Depending on the turn ratio of the transformer , the secondary voltages appear at the secondary coil of the transformer (T951).
5) These secondary voltages are rectified by each diode(D957,958,951,959,960,961,962) and operate the other circuits. (Deflection , Video Amplifier ,..... etc.)

The switching IC (IC951) controls input-pulse-width and generates secondary voltages by sub-transformer (T901)

4. Display Power Management Circuit.

This circuit control power consumption of the monitor by detecting H and V sync signal.
There are Stand-by and suspend mode.
When no horizontal or vertical sync signal input, the circuit consists of IC903 becomes stand-by and suspend mode. Its power consumption is below 8W.

5. X-ray Protection.

This circuit detects the rectified DC voltage comes from the FBT pin 6. If the high volltage of the FBT reaches up to about 30kV (abnormal state) , high voltage control PWM IC (IC501) detects it. And PWM IC (IC501) prevent output voltage to the gate of switching FET(Q525).It stops operating primary circuit of the FBT (T501), and high voltage is not be generated.(In the normal state, the high voltage is about 27kV.)

6. Micom (Microprocessor) Circuit.

The operating procedure of Micom (Microprocessor) and its associated circuit is as follows:

1) H and V Sync signal is supplied from the D-sub to the Micom (IC271).
2) The Micom (IC271) distinguishes polarity and frequency of H and V sync.
3) The Micom controls each OSD function signals.(H-size, H-position, V-size, etc.)
4) The controlled data of each mode is stored in itself. User can adjust screen condition by each OSD function. The data of the adjust screen condition is stored automatically.

7. Horizontal and Vertical Synchronous Processor

This circuit generates the horizontal drive pulse and the vertical drive pulse by taking sync-signal form the D-SUB (P208). This circuit consists of the TDA4856 (IC201) and the associated circuit.

8. Oscillating Circuit for D/D Converter.

This circuit generates the saw-tooth wave which has the horizontal period by taking the output of the TDA4856 (IC201).

9. D/D (DC to DC) Converter.

This circuit supplies DC voltage to the horizontal deflection output circuit by decreasing DC 210V which is the secondary voltage of the SMPS in accordance with the input horizontal sync signal.

10. Side-Pincushion Correcting Circuit.

This circuit improves the side-pincushion of the screen by mixing east-west wave to the output of the horizontal deflection D/D converter which is used for the supply voltage source (B+) of the deflection circuit.

11. D/D Drive & Convert Circuit.

This circuit is used for supplying B+ voltage to horizontal deflection output transistor(Q705). This circuit makes to add side-pincushion correcting signal to B+ voltage.

12. Horizontal Deflection Output Circuit.

This circuit makes the horizontal deflection by supplying the saw-tooth current to the horizontal deflection yoke.

13. High Voltage Output & FBT (Fly Back Transformer).

The high voltage output circuit is used for generating pulse wave to the primary coil of the FBT (Fly Back Transformer (T501)). A boosted voltage (about 27kV) appears at the secondary of the FBT and it is supplied to the anode of the CRT. And there are another output voltages such as the dynamic focus frequency.

14. H-Linearity Correction Circuit.
This circuit corrects the horizontal linearity for each horizontal sync frequency.

15. Vertical Output Circuit.
This circuit takes the vertical ramp wave form the TDA4856(IC201) and performs the vertical deflection by supplying the saw-tooth wave current form the TDA8177 (IC601) to the vertical deflection yoke.

16. Dynamic Focus Output circuit.
This circuit takes H and V parabola wave from the TDA4856(IC201) and amplifies these waves to offer to the FBT(T501).

17. H & V Blanking and Brightness Control.
This circuit eliminates the retrace line by supplying a negative pulse to the G1 of the CRT. The brightness control circuit is used to control of the screen brightness by changing the DC level of G1.

18. Tilt (Image Rotation) Circuit.
This circuit corrects the tilt of the screen by supplying the image rotation signal to the tilt coil which is attached to the CRT near the deflection.

19. Static Convergence Control Circuit.
This circuit corrects the convergence of the screen by supplying the convergence signal to the 4H(STC) coil which is attached to the CRT near the deflection.

20. Moiré Reduction Circuit.
This circuit reduce interference between the periodical display pattern and the CRT's slot (or dot). The positions of every other one dot video signal beams (red, green and blue beam) are shifted finely, thus reducing interference.

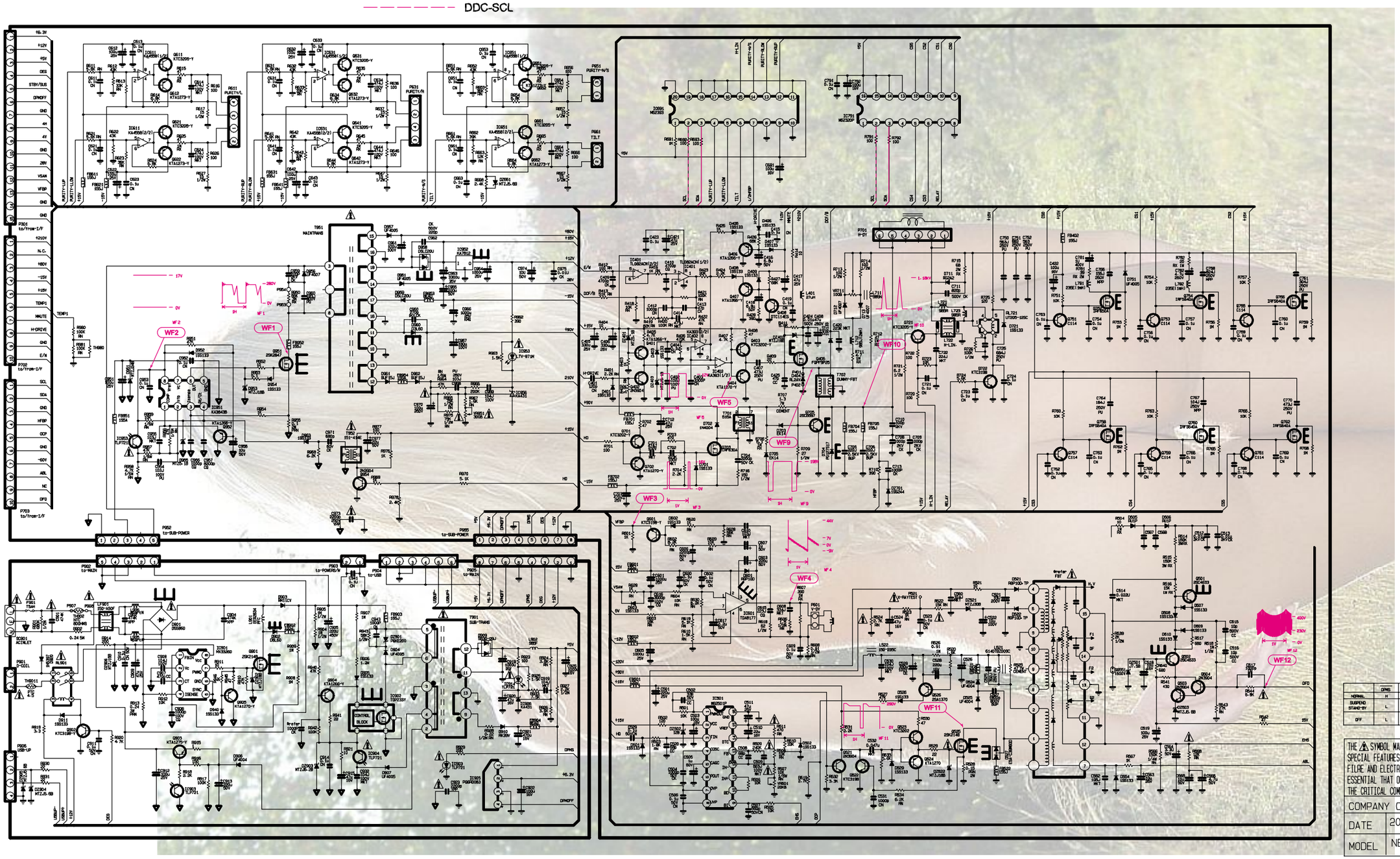
21. OSD Circuit.
This circuit is used for performing the OSD (On Screen Display) function. When a user selects the OSD Select/ Adjustment control, the adjustment status displays on the screen.

22. Video Pre-Amp Circuit.
This circuit amplifies the analog video signal from 0-0.7V to 0-4V. This circuit is operated by taking the clamp, R, G, B drives, and contrast signals from the Micom (IC271).

23. Video Output Amp Circuit.
This circuit amplifies the video signal which comes from the video pre-amp circuit and amplified video signal is applied to the CRT cathode.

SCHEMATIC DIAGRAM

IIC-SDA
IIC-SCL
DDC-SDA
DDC-SCL



	DPMS	DPMF	WATT
NORMAL	H	L	140W
SUSPEND	L	L	8W
STAND-BY		HEATER ON	
OFF	L	H HEATER OFF	3W

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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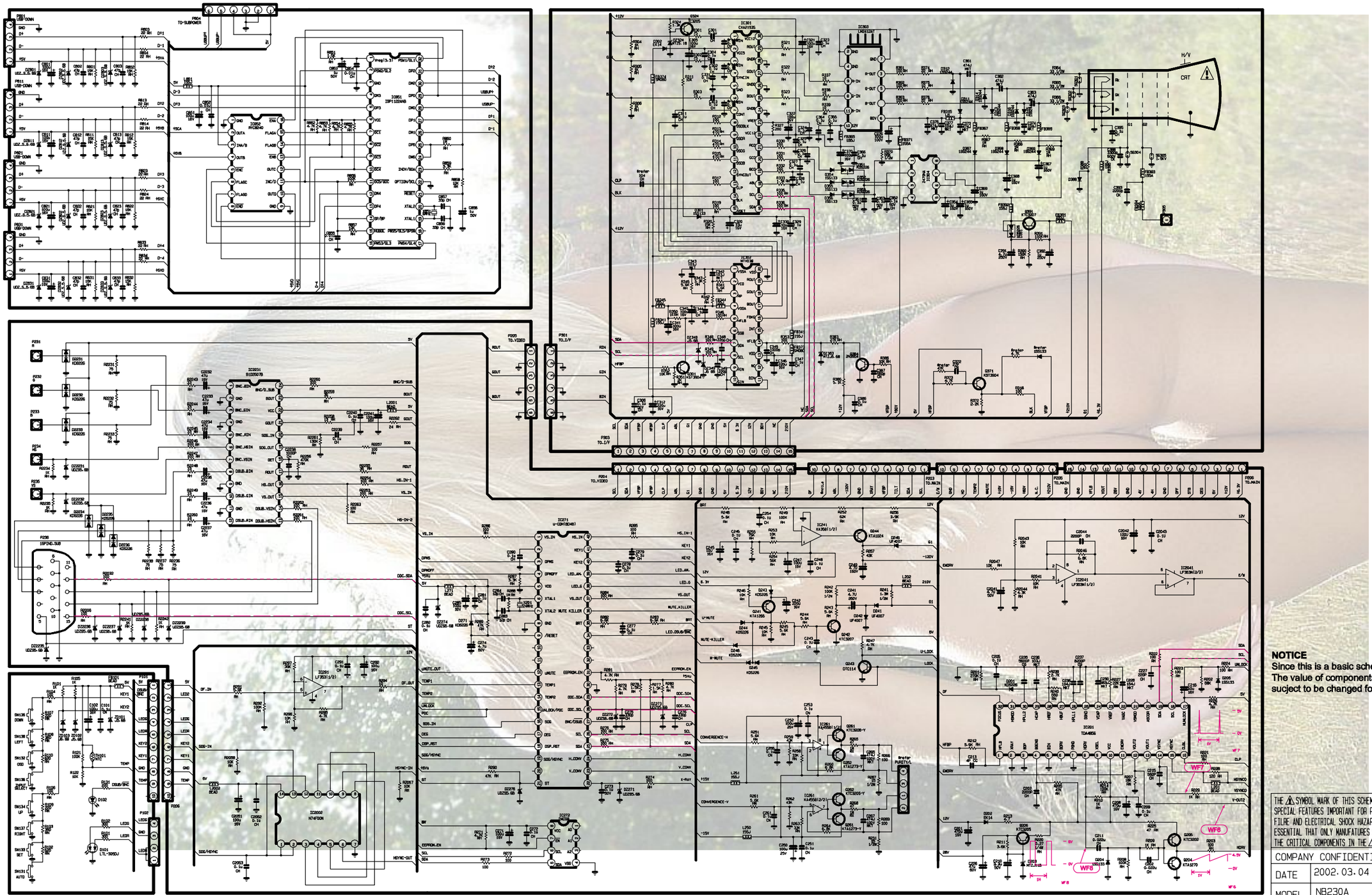
DATE	2002.02.04	REV	02
MODEL	NB230A	Sheet	1 / 1 Page

NOTICE
Since this is a basic schematic diagram.
The value of components and some partial connection are
sucject to be changed for improvement without notice.

SCHEMATIC DIAGRAM

IIC-SDA
IIC-SCL
DDC-SDA
DDC-SCL



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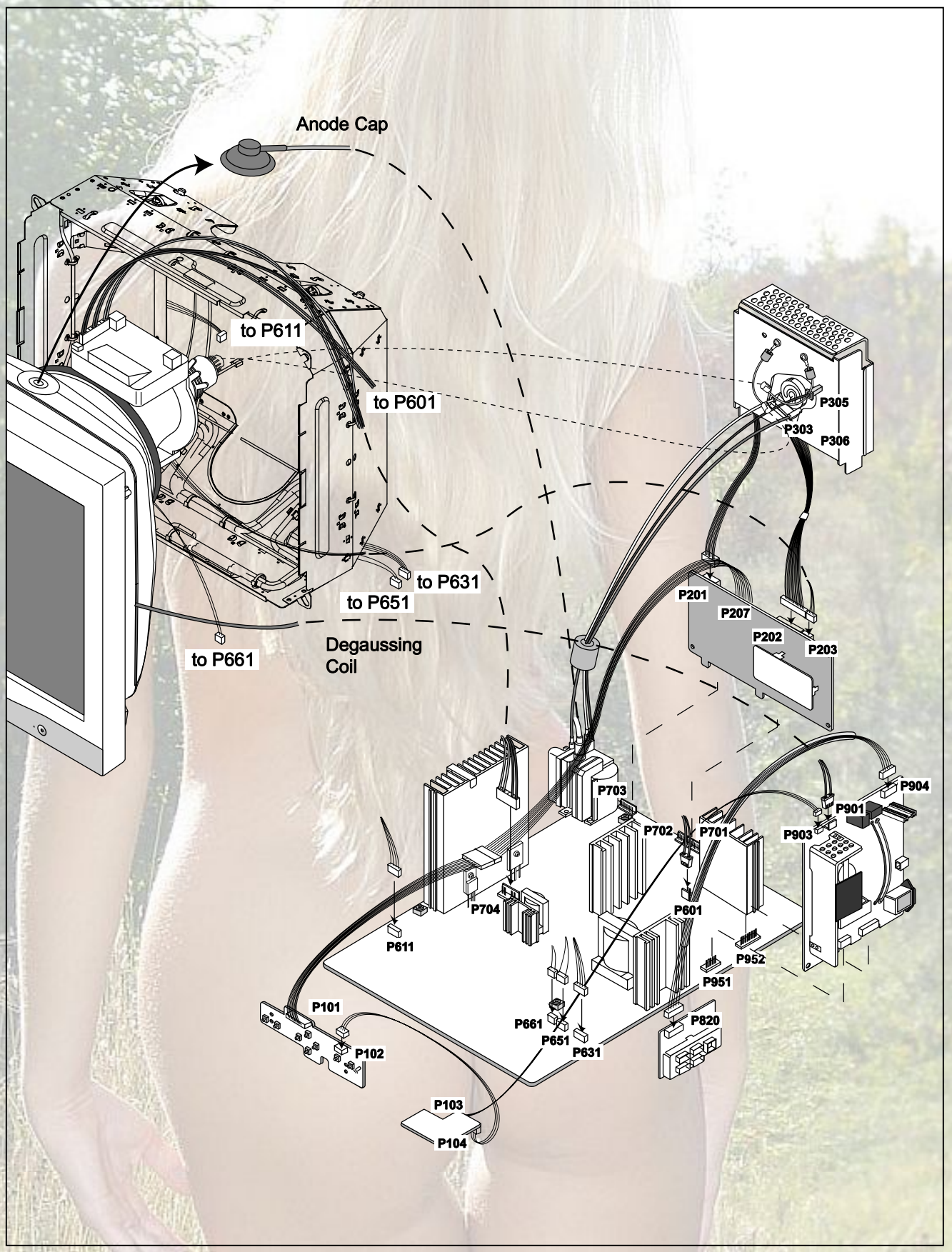
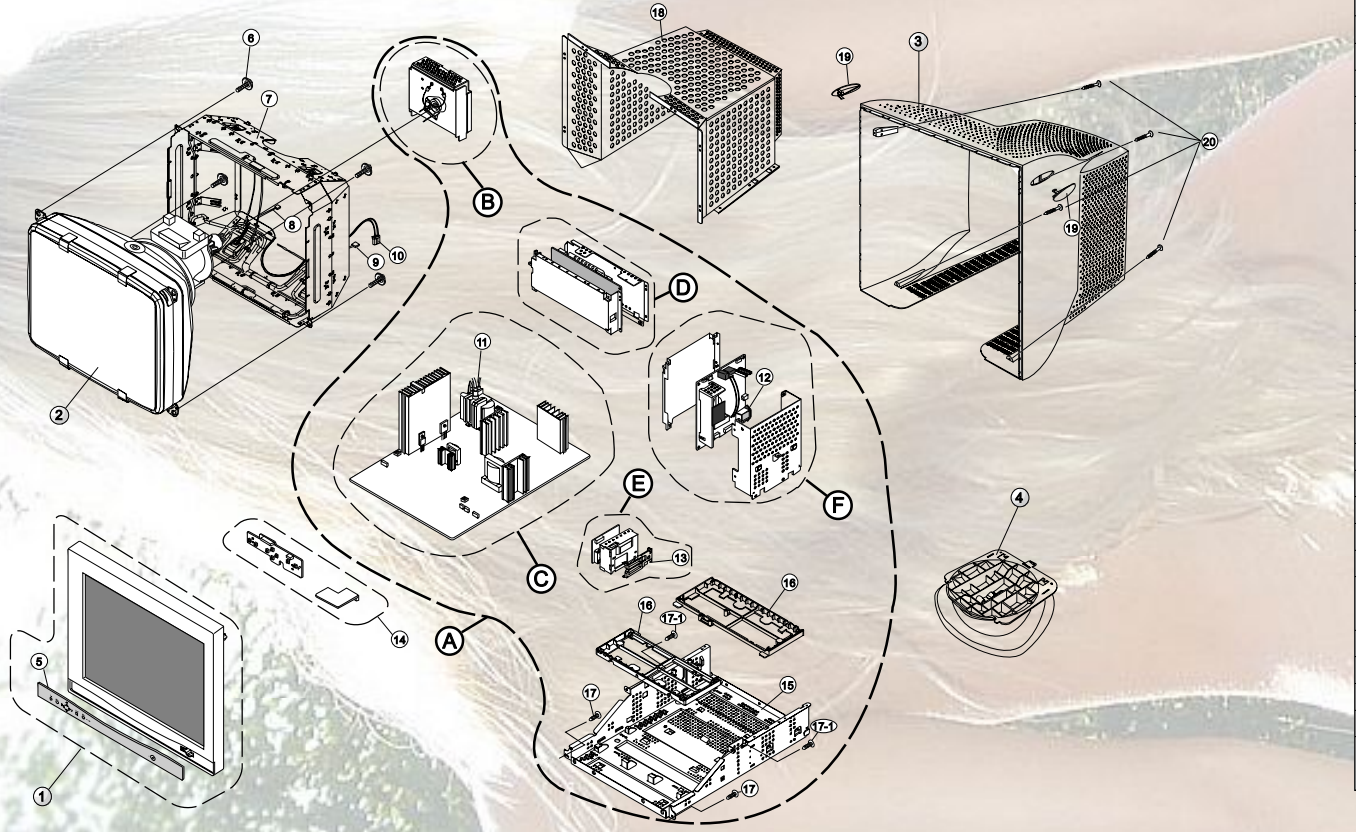
DATE	2002.03.04	REV	03
MODEL	NB230A	Sheet	1 / 1 Page

WIRING DIAGRAM



EXPLODED VIEW



EXPLODED VIEW PARTS LIST

Ref. No.	Part No.	Description
1	3091TKE002C	CABINET ASSEMBLY, NB230A BRAND 3090TKE001A NF22
2	6318B21001A	CDT(CIRC), M51LRY32X62 MITSUBISHI 121KHZ 29.1MM FLAT W/O DDC
3	3809TKE002B	BACK COVER ASSEMBLY, NB230A E001 PC+ABS 8C358
4	3043TKK076B	TILT SWIVEL ASSEMBLY, NB230A T055 PC+ABS 8C358
5	3551TKK019B	COVER ASSEMBLY, NB230A FRONT K181 PC+ABS 8C358
6	339-002J	SCREW ASSY, PHP+5*25 (FZMW1)+GW18
7	4951TKK054B	METAL ASSEMBLY, FRAME NB230A
8	6140TC4003A	COIL,DEGAUSSING, LX31GETPURITY,0.22*130TS,1600MM,NB230A
9	6140TC2013B	COIL,DEGAUSSING, LX31 GET PURITY,61.5 OHM,760MM,NB230A
10	6140TC2016A	COIL,DEGAUSSING, LX31 GET 0.65*60TS,NB230A
11	6174T11003B	FBT (FLY BACK TRANSFORMER), 1054A,NB230A LG-PHILIPS 21"
12	6200TJB004A	FILTER(CIRC), EMI, 03ME3G(3) DELTA FB915B
13	3550TKK180B	COVER, NB230A BACK ABS 8C358
14	6871TST259A	PWB(PCB) ASSEMBLY, SUB, NB230A LED & P/SW TOTAL BRAND CA-94
15	4951TKK091A	METAL ASSEMBLY, SHIELD BOTTOM NB230A
16	4810TKM043A	BRACKET, NB230A MAIN 85964
17	332-102E	SCREW, PTP+4x16(MSWR)
17-1	339-006A	SCREW ASSY, PVS+4*8 (FZMY)+TW4
18	4815TKT014B	SHIELD ASSEMBLY, TOP NB230A
19	3550TKK182B	COVER, NB230A SCREW ABS 8C358
20	332-102E	SCREW, PTP+4*16(MSWR/FZMY)
A	3313T21007A	MAIN TOTAL ASSY, NB230A BRAND CA-94 -For Europe
	3313T21007B	MAIN TOTAL ASSEMBLY, NB230A AXLUU BRAND CA-94 -For U.K
B	6871TVT230A	PWB(PCB) ASSEMBLY, VIDEO, NB230A XIGU BRAND CA-94 TOTAL
C	6871TMT232A	PWB(PCB) ASSEMBLY, MAIN, NB230A XIGU BRAND CA-94 TOTAL
D	6871TKT213A	PWB(PCB) ASSEMBLY, INTERFACE, NB230A INTERFACE TOTAL
E	6871TUT014A	PWB(PCB) ASSEMBLY, USB, NB230A USB TOTAL
F	6871TPT218A	PWB(PCB) ASSEMBLY, POWER, NB230A XIGU BRAND CA-94 TOTAL -For Europe
	6871TPT218B	PWB(PCB) ASSEMBLY, POWER NB230A AXLUU POWER TOTAL BRAND -For U.K