SERVICE MANUAL

KTN-2001 / KTN-1401

Rev. No. : “A”

Total Display Solution

Kortek Corporation

CONTENTS

1.PRECAUTIONS

1-1 SAFETY PRECAUTIONS

WARNINGS : Service should not be attempted by anyone unfamiliar with the necessary precautions on this monitor. The following precautions are necessary during servicing.

1) For continued safety, do not attempt to modify the circuit board.
2) Disconnect the AC Power before servicing.
3) When the Monitor is operating, do not touch any heatsink on the Chassis as it is self-heated.

1-1-1 FIRE & SHOCK HARZARD

1) During servicing, pay attention to the original wires whether it is uncoated or undressed, especially the wires in the high voltage circuit section. If there is any uncoated or melted wire is found, then please do not try to replace the related parts, and contact a qualified service person.

2) Many electrical, mechanical parts in this monitor have special safety-related characteristics for protection against shock hazard and others. These characteristics are often passed unnoticed by a visual inspection and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage wattage, etc.
Replacement parts which have these special characteristics are identified in the manual and supplements by shading on the schematic diagram and the parts list.

3) When replacing Chassis, always be certain that all the protective devices are installed properly.

4) leakage current check (figure 1)

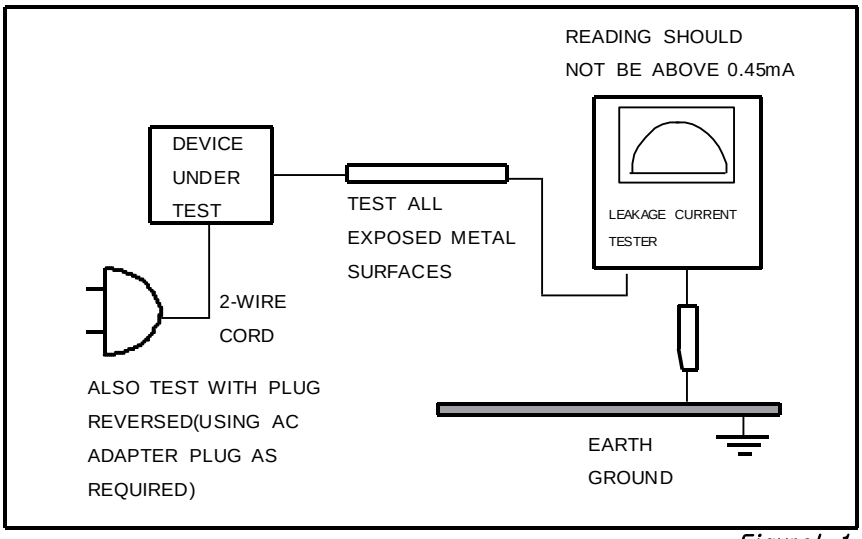


Figure1 1

(TEST METHODE)

1-1-2. X-RADIATION

WARNING : The only potential source of x-radiation is the picture tube, however when the high voltage circuitry is operating properly, there is no possibility of an x-radiation problem. The basic precaution is to keep the high voltage at the factory recommended level.

1) To measure the high voltage, use a high-impedance high-voltage meter.
Connect(-) to chassis and (+) to the CRT anode cap.

2) Turn the contrast control max. clockwise.

3) Measure the high voltage. The high voltage meter should indicate the following factory recommended level

4) If the actual level exceeds the max. factory set level, then immediate service is required to prevent the possibility of premature failure of components

5) To prevent X-RADIATION possibility, it is essential to use the specified picture tube.

6) The nominal high voltage is 24KV and not to exceed 27KV at zero beam current at rated voltage.

1-2. SERVICING PRECAUTION

WARNING 1 : First, reading "safety precaution" section of this manual. If unforeseen circumstances create conflict between the servicing precautions and safety precaution, always follow the safety precautions.

WARNING 2 : A high voltage VR replaced in the wrong direction may cause excessive X-RAY Emitting.

WARNING 3 : An electrolytic capacitor installed with the wrong polarity might explode.

1) Servicing precautions are printed on the label, and should be followed closely.

2) Always unplug the AC power cord from the AC power source before attempting to remove or reinstall any component or assembly, disconnect PCB plugs or connectors, connect any test component in parallel with an electrolytic capacitor.

3) After servicing, always check that the screw, components and wiring have been correctly reinstalled. Make sure that the area around the serviced part has not been damaged.

4) Check the insulation between the blades of the AC plug and accessible conductive parts(example : metal parts, input terminals)

5) Never touch any of the locked B+ voltage. Do not apply AC power to the unit (or any of its Assemblies) unless all solid-state heatsinks are correctly installed.

6) 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.

2.Product Specifications

2-1 SPECIFICATIONS

1) KTN-2001

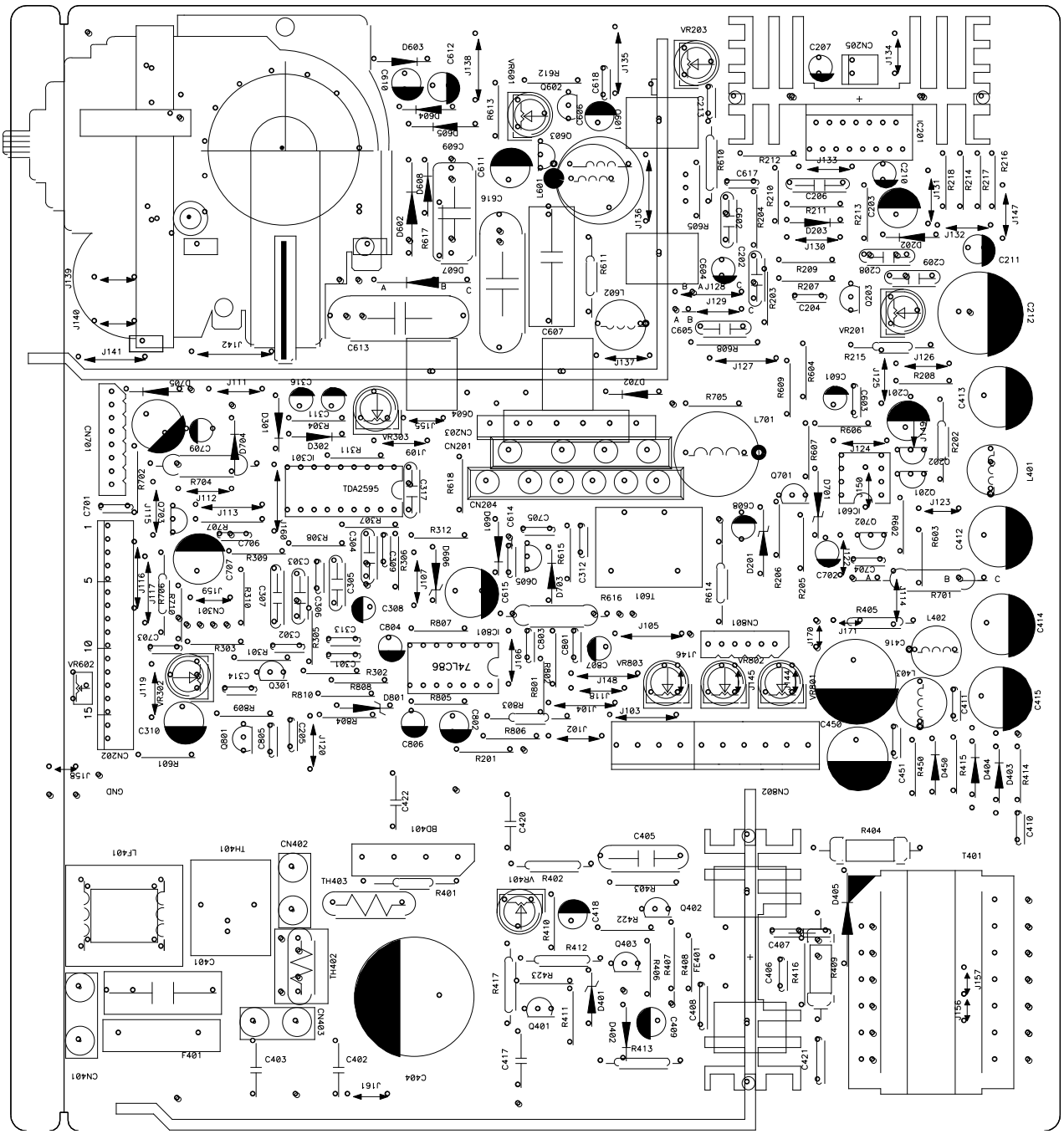
PARAMETER	MIN	TYP	MAX	UNITS
OPERATING VOLTAGE	100	115/230	230	VAC
OPERATING POWER	50	60	70	WATTS
LEAKAGE CURRENT TO CHASSIS GNG AT250VAC,50/60Hz(LINE/NEUT,IN COMMON)		< 0.40	0.45	mA
HI-POT LINE/NEUT, IN COMMON		< 2.0	2.4	mA
OPERATING TEMPERATURE	10		60	DEGREE
REL,HUMIDITY OPERATING	10		90	%
MAGNETIC SHIELD	INTERNAL			
DEGAUSSING	MANUAL TYPE			
VIDEO SIGNAL	+0.7Vpp,Ohm MONITOR TERMINATIONS			
RASTER DIM ADJUST RANGE HORIZONTAL	< 360		> 407	mm
RASTER DIM ADJUST RANGE VERTICAL	< 190		> 309	mm
MODE	15.75 Khz			
PINCUSHION(ALL BRIGHTNESS)			3.0	%
MIS-CONVERGENCE CENTER	0.75		0.8	mm
MIS-CONVERGENCE CORNERS		1.2		mm
VERTICAL				
SCAN RATE		60		Hz
HOLD IN RANG			±5	Hz
SYNC +5V 74LS LEVELS		5.0	5.0	VOLTAGE
LOW	0.0	0.0	0.6	VOLTAGE
NON-LINEARITY			5	%
HORIZONTAL				
SCAN FREQUENCY	15.74		15.76	Khz
HOLD IN RANG			±400	Hz
SYNC POLARITY	POSITIVE			
SYNC +5V 74LS LEVELS	5.0	5.0	5.0	VOLTAGE
LOW	0.0	0.0	0.6	VOLTAGE
NON-LINEARITY			5	%
WHITE BAKANCE & LUMINANCE	X= 281 ±20 y= 311 ±20 Y = 30 ±3 F/L Y = 70 ±5 F/L			

2) KTN-1401

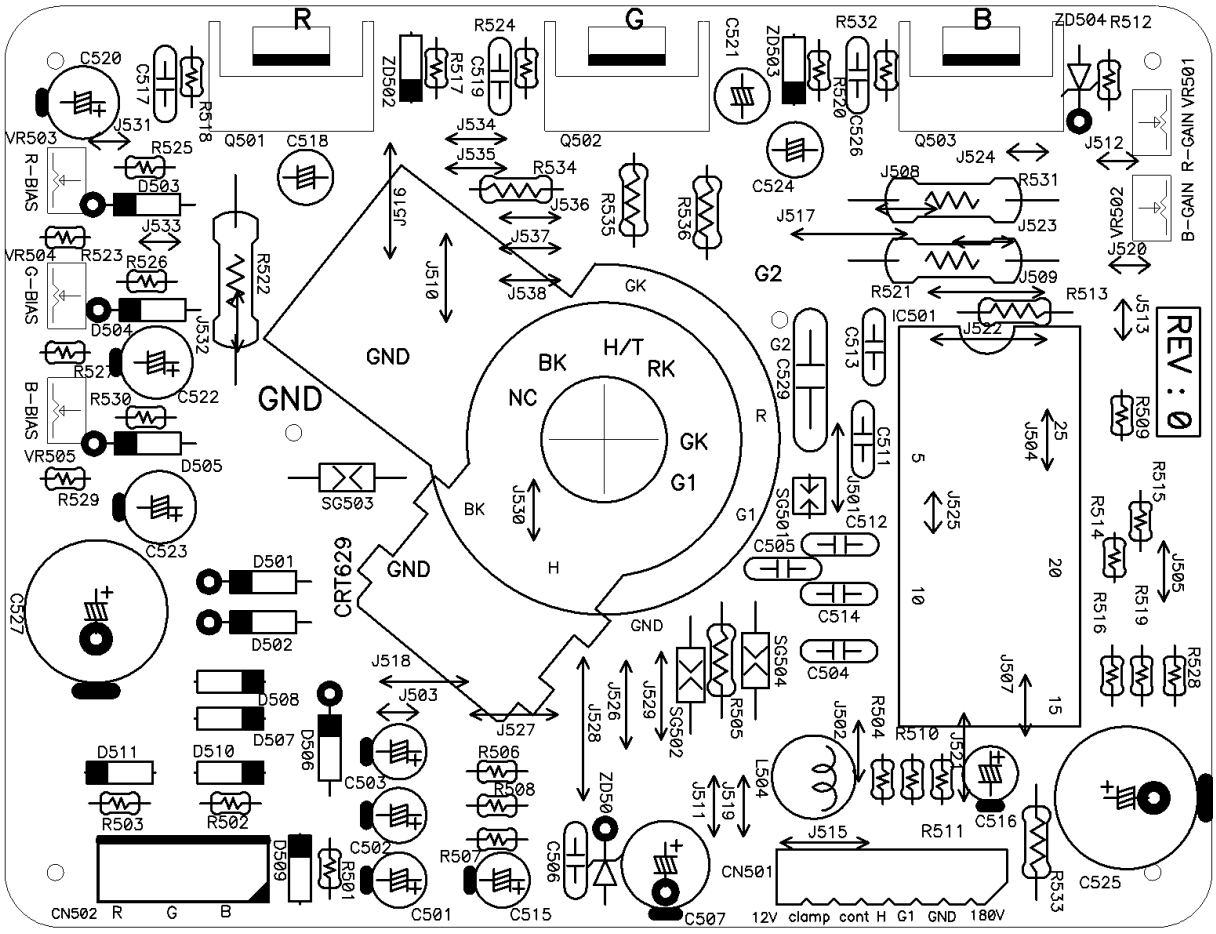
PARAMETER	MIN	TYP	MAX	UNITS
OPERATING VOLTAGE	100	115/230	230	VAC
OPERATING POWER	40	50	60	WATTS
LEAKAGE CURRENT TO CHASSIS GNG AT250VAC,50/60Hz(LINE/NEUT,IN COMMON)		< 0.40	0.45	mA
HI-POT LINE/NEUT, IN COMMON		< 2.0	2.4	mA
OPERATING TEMPERATURE	10		60	DEGREE
REL,HUMIDITY OPERATING	10		90	%
MAGNETIC SHIELD	INTERNAL			
DEGAUSSING	MANUAL TYPE			
VIDEO SIGNAL	+0.7Vpp,75 Ohm MONITOR TERMINATIONS			
RASTER DIM ADJUST RANGE HORIZONTAL	< 250		> 285	mm
RASTER DIM ADJUST RANGE VERTICAL	< 118		> 214	mm
MODE	15.75 Khz			
PINCUSHION(ALL BRIGHTNESS)			3.0	%
MIS-CONVERGENCE CENTER	0.64		0.7	mm
MIS-CONVERGENCE CORNERS		1.0		mm
VERTICAL				
SCAN RATE		60		Hz
HOLD IN RANG			±5	Hz
SYNC +5V 74LS LEVELS		5.0	5.0	VOLTAGE
LOW	0.0	0.0	0.6	VOLTAGE
NON-LINEARITY			5	%
HORIZONTAL				
SCAN FREQUENCY	15.74		15.76	Khz
HOLD IN RANGE			±400	Hz
SYNC POLARITY	POSITIVE			
SYNC +5V 74LS LEVELS	5.0	5.0	5.0	VOLTAGE
LOW	0.0	0.0	0.6	VOLTAGE
NON-LINEARITY			5	%
WHITE BALANCE & LUMINANCE	X= 281 ±20 y= 311 ±20 Y = 40 ±3 F/L Y = 70 ±5 F/L			

2-2 PCB DIMENSIONS

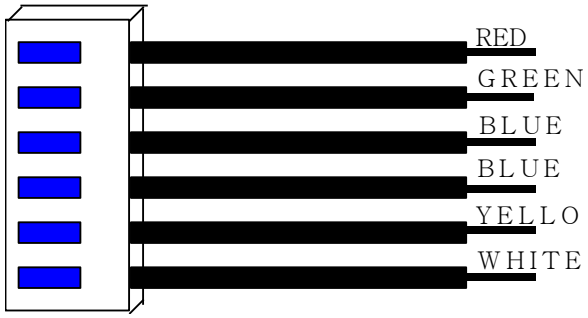
1) MAIN PCB



2) SOCKET PCB



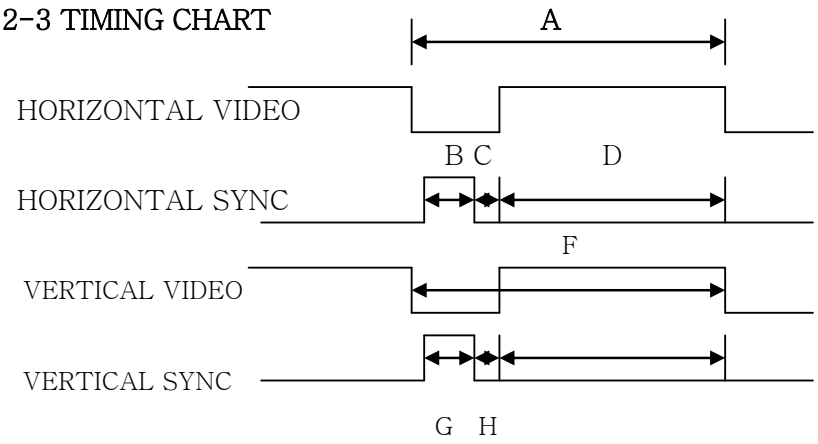
2-2-1 6PIN SIGNAL CABLE CONNECTOR



2-2-2 PIN DESCRIPTION

PIN - NO	PIN-NAME
PIN1	RED
PIN2	BLUE
PIN3	GREEN
PIN4	BLACK
PIN5	YLLOW
PIN6	WHITE

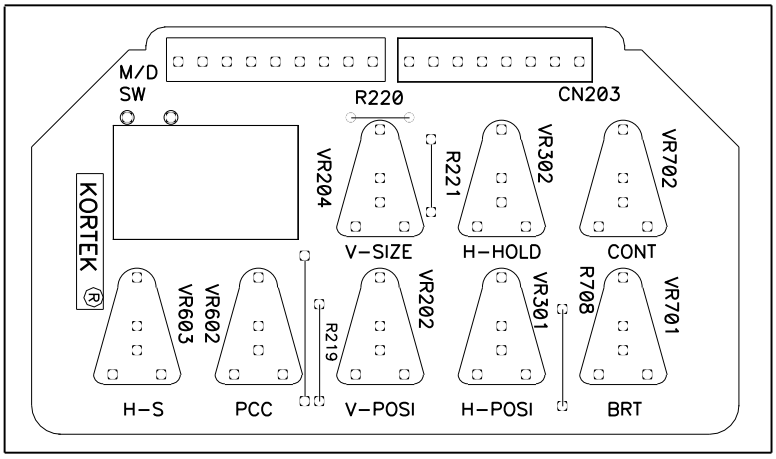
2-3 TIMING CHART



NO				1
MODE				STANDARD
RESOLUTION			H	624
			V	200
SYNC POLARITY			H	POSI
			V	POSI
H	FREQUENCY		㎑	15.750
	PERIOD		㎲	62.4
	SYNC		㎲	5.5
	B/P		㎲	5.8
	ACTIVE		㎲	43.0
V	FREQUENCY		㎐	60
	PERIOD		㎳	16.62
	SYNC		㎳	0.98
	F/P		㎳	1.06
	ACTIVE		㎳	12.94
FIXEL FREQUENCY			㎒	14.465
INTERACE				NO

3. OPERATING INSTRUCTIONS

3-1 LOCATION FUNCTION OF CONTROL PCB ASS'Y



4.DJUSTMENT

4-1 ADJUSTMENT CONTROL

1) Orientation

When servicing, always face the monitor to the east.

2) Warm-up time

The monitor must be on for 30 minutes before starting alignment. Warm-up time is especially critical in color temperature and white balance adjustments.

3) Signal

Analog 0.714vpp positive at 75Ω, internal termination.

4) B+ line adjustment

Signal in; adjust to 110 v

5) Screen adjust (FBT) : Adjust G2 V/R for BACK RAST into 0.5F/L at the max of Brightness

4-2 DISPLAY CONTROL ADJUSTMENTS [*( ) for KTN-1401]

A. SELECT H-SIZE FUNCTION, ADJUST TO THE HORIZONTAL SIZE IS
360 mm±3mm ***(250 mm)** ---------- (V/R603)

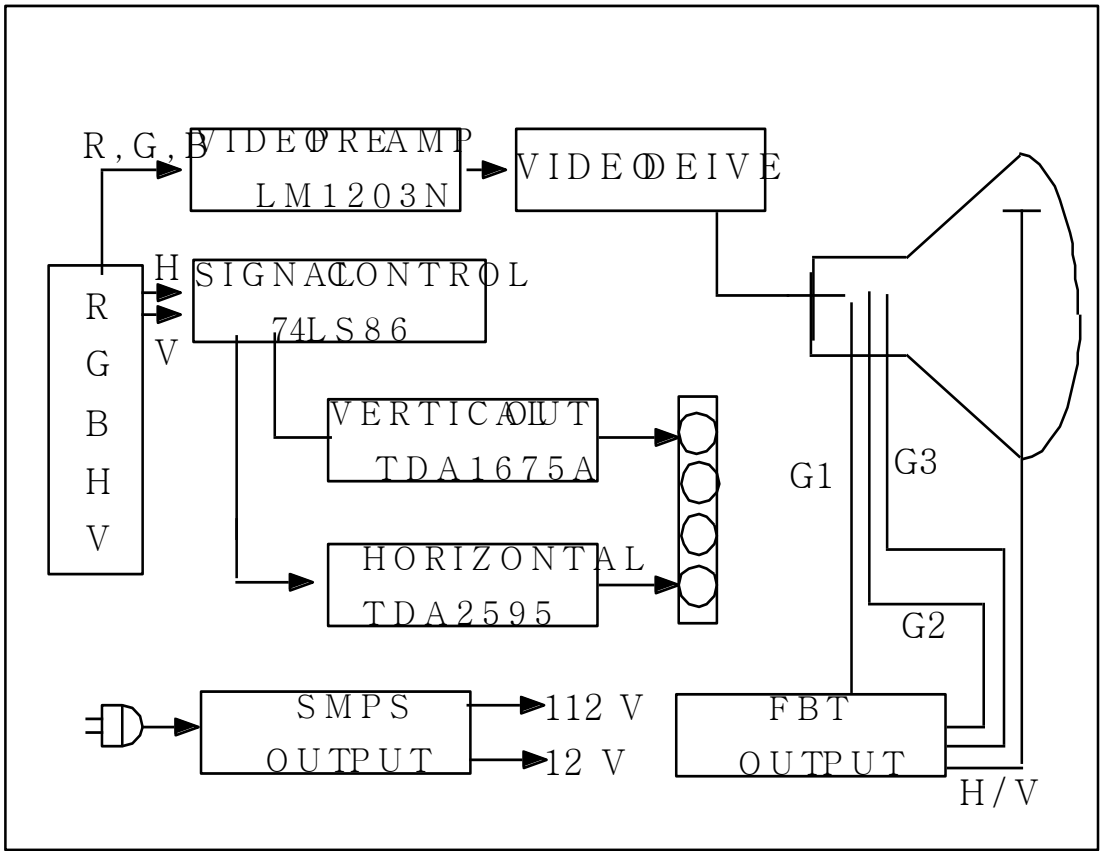
B: SELECT V-SIZE FUNCTION, ADJUST TO THE VERTICAL SIZE IS
190mm±3mm ***(118mm)** ---------- (V/R204)

C. SELECT H-POSI FUNCTION, ADJUST TO CENTER THE PATTERN WITHIN THE RASTER ---------- (V/R301)

D. SELECT V-POSI FUNCTION, ADJUST TO CENTER THE PATTERN WITHIN THE RASTER ---------- (V/R202)

E. ADJUSTMENT FOCUS2 VR ON FBT TO THE OPTIMUM.

5. BLOCK DIAGRAM

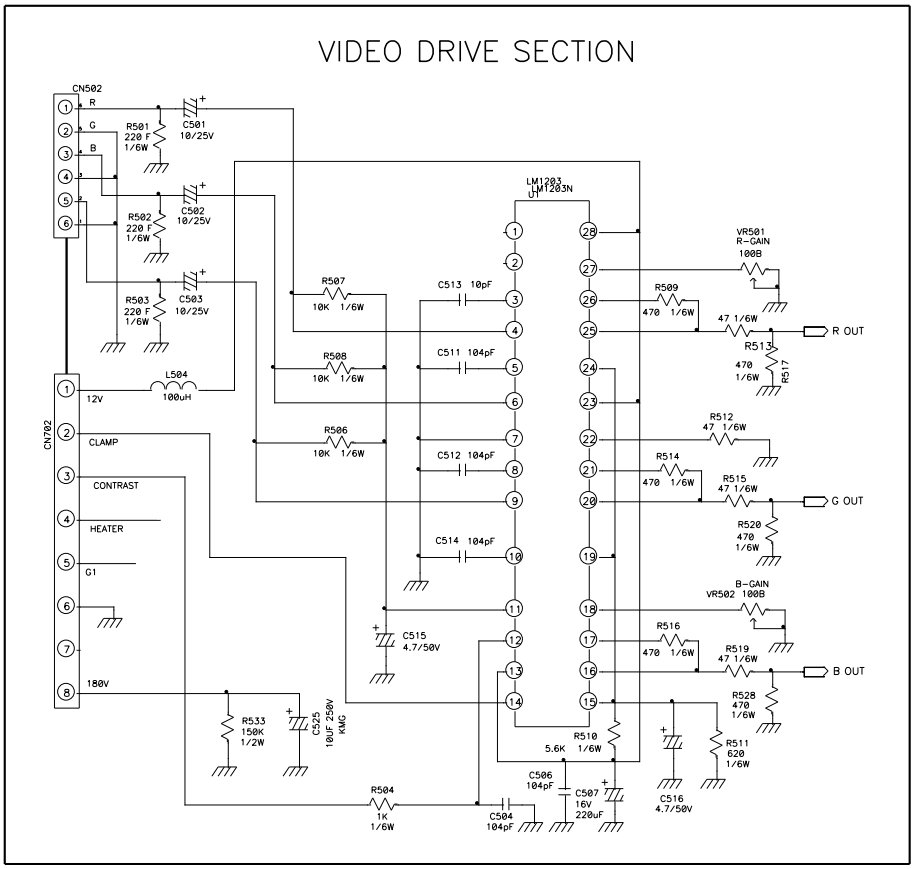


6. GENERAL THEORY OF OPERATION

6-1 BLOCK DIAGRAM

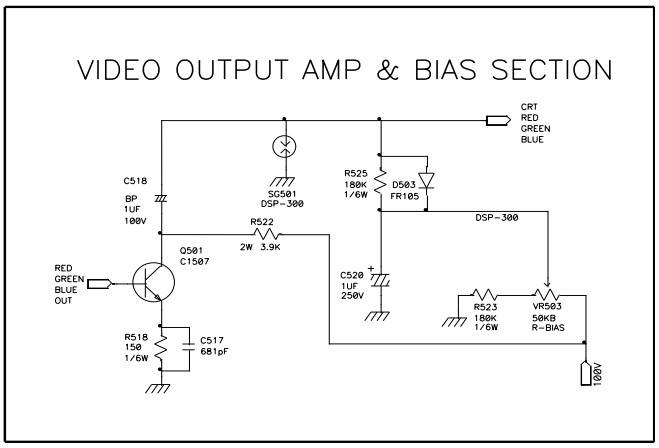
Above is the block diagram of the monitor as a whole. Each major section is presented in a block. The individual circuit that make up the section is covered later and are not shown here. This simple block diagram will allow you a fundamental understanding of the complete monitor. This will help when covering the sections individually. The process from video signal to video display starts with the video signal generated from the source. The signal is composed of information that is fed into various sections of the monitor the following diagrams are based on 15" VGA auto bias monitor and are included for reference only. Actual circuit may be different. Please see update schematic and parts list enclosed.

6-2 VIDEO DRIVE SECTION



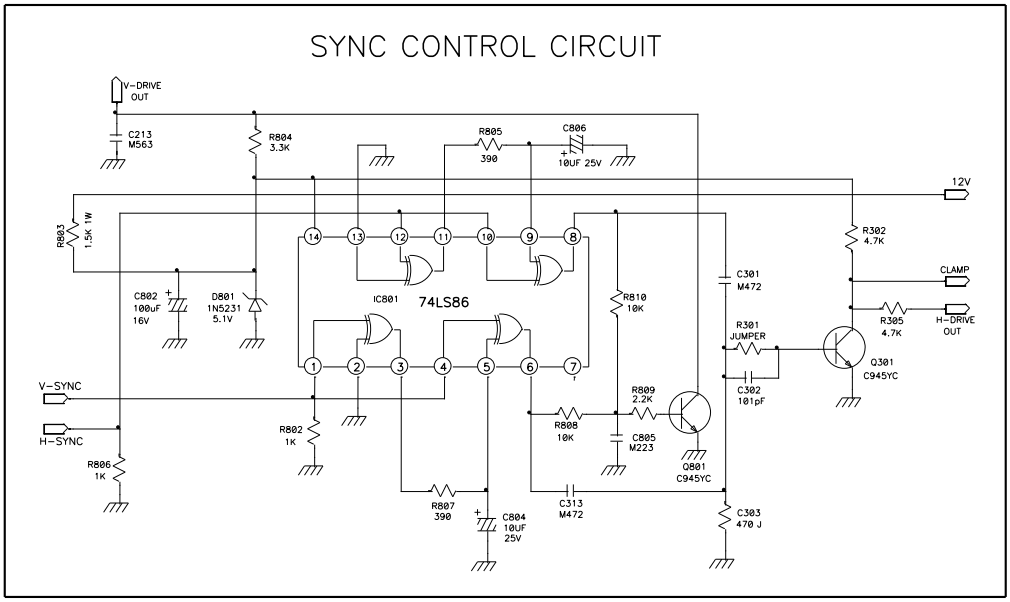
Video signal (0.7V PP) supplied from “CN905 PIN1(RED), 3(GREEN), 5(BLUE)” is supplied to IC501 PIN4, 6, and amplified through 9C501, C502, C503. PIN 5, C511,
PIN 8 C512, PIN 3 C513 and PIN 10 C514 are a capacitor for filter.
IC501 performs VIDEO PRE AMP and its amplitude is determined by DC BIAS of PIN 11 CHIP. PIN12 (CONTRAST) controls its output video level.
Video signal passing through the DCBIAS and the Contrast control is output to PIN 25 (RED) PIN 20 (GREEN) and PIN 16 (BLUE), and supplied to Video output circuit.
PIN17, 21, 26 are resistor for Video Drive Control.
PIN 13, 23 and 28 are the Vcc input drives used to provide the power to LM1203IC.
They supply the power of 1.4 V down-converted through R510 and R511 distribution resistance to PIN 15, 19 and 24 (B, G, R-CLAMP+). PIN 18, 22 and 27 are B, G and R-Drive.
PIN 22 is fixed (G-Drive is fixed as a reference), and PIN 18 and 27 control gains.
Refer to LM1203 Date Book for details.

6-3 VIDEO OUT PUT AMP & BIAS SECTION



Signal supplied from video PRE AMP is sent to Q501 base. The amplitude of Q501 is determined by EMITTER RESISTOR R518 and COLLECTOR RESISTOR R522. Circuit of C517 is configured for prevention from and compensation of loss of high frequency.
VIDEO OUT PUT AMP is composed of three circuits of R, G and B. The above description is about RED circuit. For the description of Green and Blue circuit, see the entire circuit because Location no. of the parts are differently applied. To provide enough BIAS voltage to the cathode, adjust V/R503 and R523 to supply 115~125 V to FBT PIN 10, and transmit the amplified video to the cathode to display.
Understand the characteristics of the parts before you provide after sales service or change the part value.

6-4 SMPS CIRCUIT SECTION



Power supply is composed of line filter, switching AMP and switching trans circuit. Line filter circuit removes the noise element of power line supplied from outside and prevents noise generated in switching amp from flowing out to external power line. The circuit is made up of C401, L401, C402 and C403.
AC voltage supplied through line filter circuit is supplied to D401 and converted to ripple voltage, and then converted to DC through the operation of C404.

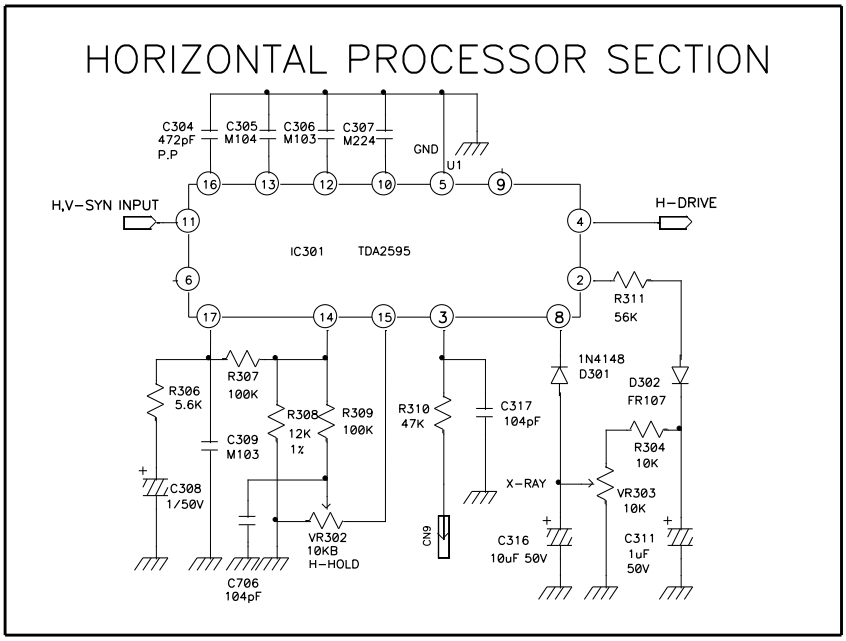
The switching circuit operates as following; As the DC is supplied to FE401 Gate through R402 (overvoltage preventive resister) and R403 (Start Resister), FE401 is turned on, provides pulse to T401 PINs 2 and 4, and supplies the voltage to T401 PINs 5, 6 and 7. The voltage supplied to PINs 5, 6 and 7 is supplied to Q403 Base and on both ends of R402.
The voltage to Q402 Base is variable by V/R401, and you can have the required voltage for the second destination. Therefore, if high voltage is supplied to Q403 Base, voltage to Q402 Base gets lower, and collector voltage goes up. On the other hand, if low voltage is supplied to Q403 Base, Q402 Base voltage gets lower and collector voltage goes down.

If the voltage to Q401 Base goes up, Vcc voltage goes down steeply, and FE401 becomes inactive. That makes Q401 Base voltage goes down, and voltage to FE401 Gate goes up, and hence, FE401 becomes active. Switching operation is performed as these processes are repeated. If high voltage feeds back, Q401 turns on, and voltage to FE401 Gate is reduced to stop and protect the circuit. C405, R404 and D405 are the circuits that protect FE401 from surge as it switches.

These sequential actions make power to be supplied to the secondary side of T401 and to each part. The voltage provided to the secondary side is transformed to DC through D403, leveled in C414 and C412, removed noise in L401 and C413, and provided to FBT PIN3 to be boosted.

The voltage rectified in D404 is provided to IC501, IC301, IC801, IC201 and HDT for normal monitor operation.

6-5 HORIZONTAL PROCESSOR SECTION



IC301 (TDA2595) is the device designed to operate without SYNC supplied from outside by means of the output of horizontal frequency upon free running with the oscillation of the built-in OSC.

IC301 is to be operated by the supplied 12V voltage with PIN No 15.

Horizontal oscillating frequency is determined with PIN 16 and PIN 14 upon free running (Free running frequency is determined by R308 and C304).

PIN 17 is acting a role to compare SYNC phase input from outside and built-in OSC phase, and coincide them, which is mainly done by C308, C309, R306, R307 and is assured by adjustment of DC level with VR302. Generally connecting voltage is controlled within the range of 3.5~3.8V.

PIN 11 is input terminal of horizontal SYNC, separate SYNC by receiving of composite signal and send output by amplification.

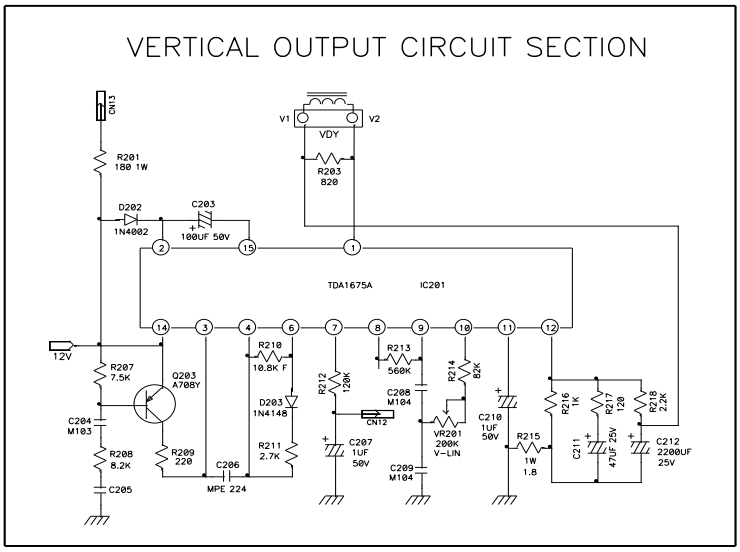
PIN 5 is GND of IC301.

PIN 1, 6, 7, 9, 8 is NC terminal.

PIN 2 controls by receiving of fly-back pulse input, compare and detect pulse from No 6 terminal of FBT by feedback, and operate in the sequence of pulse detection, comparison output and feedback so that high voltage is always maintained constant.

PIN 8 is a protection circuit and operates by detection of feedback current.
Generally it can be used by set-up in the range of 1~8.5V. If abnormal phenomena happens, then high voltage goes up over about 27KV due to abrupt elevation of voltage, X-ray is discharged within Brown tube. It is the circuit to prevent this and designed to stop a circuit by detection of this voltage at IC 301 (TDA 2595) PIN No 8 according to set-up voltage. PIN 3 is connected to a voltage of 12V line, adjusts and controls DC voltage, and amount of H-POS varies according to varying amount of V/R.
PIN 4 is a horizontal output terminal and can operate horizontal drive stage with this output. PIN 15 is a terminal to supply Vcc voltage. PIN 14 H-POS adjusts and controls with DC voltage, and circuit is composed of C308, R309, R308 and VR302.

6-6 VERTICAL OUTPUT CIRCUIT SECTION



As IC 201 is built-in with oscillating part within chip, it has a function of its own oscillation, amplification and output, and it is designed to operate independently. Besides it is an independent circuit having special functions of ESD protection, thermal shutdown protection and etc.
TDA 1675 is a device used to supply to deflection yoke by oscillation and amplification of the oscillating part built-in within chip, and send output by amplification with pin No 1.
When IC 201 PIN 1 is not supplied with SYNC from outside, it receives input of serrated wave generated by determination of pulse width according to integer of TDA 1675 PIN 3, 4, 6. Then it is amplified through amplifier built-in within chip and is supplied to deflection yoke by its output. It is thus composed so that it performs free running motion in this sequence.

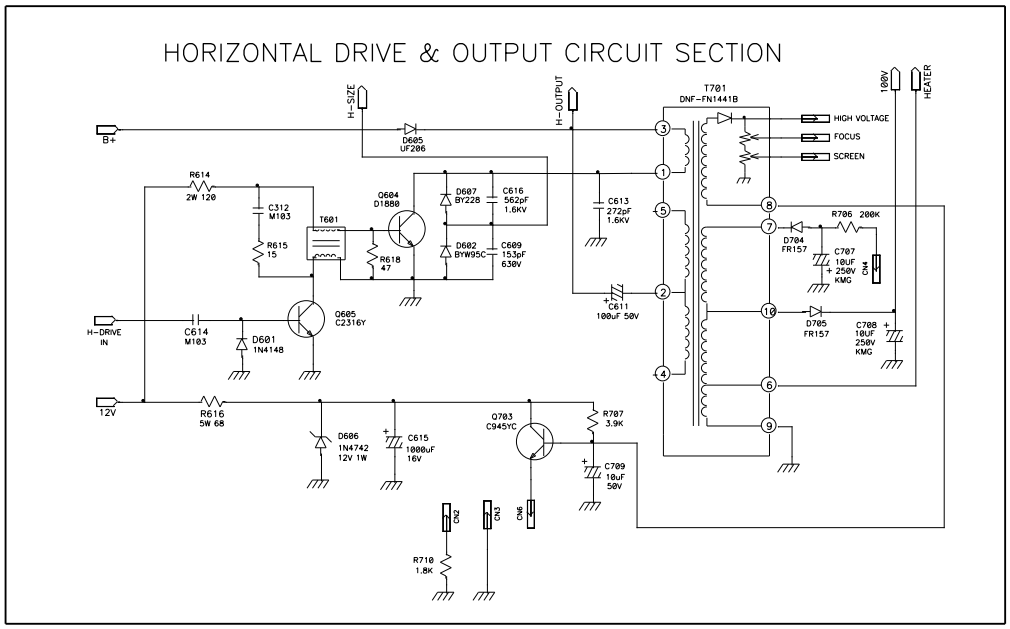
PIN 2 receives a voltage of 12V line and is connected to a voltage of about 22V while going through D202. This voltage is a terminal to amplify a voltage required in vertical deflection and send output. It receives from fly-back generator in the section of retrace time. PIN 3, PIN 4 and PIN 6 are pulse generators, and charge and discharge occurs according to capacitor value set up between PIN No 3 and No 4, and resistor value set up between PIN No 4 and No 6. OSC built-in within chip oscillates using this time, and this pulse becomes output to PIN 1 and deflected. PIN 5 and PIN 13 is NC terminal.

PIN 7 is a terminal to control V-size and is controlled with DC level. Its surrounding circuits are composed of R212, C207 and VR204, and are controlled according to the value of V/R204. PIN 8 is GND terminal. PIN 9 and 10 are terminals to control V-linearity and its circuit is as follows. It is composed of R214, V/R204, C209, C208 and R213, and R203 is a resistor set up for limiter use whose value is set up for correction of linearity for C208 and C209. V-linearity is to be varied according to value of V/R204.

PIN 11 and 12 are composed of reversed amplifier and filter, and its circuit is composed of C210, R215, R216, C211, R217, R218 and C212. R215 and R216 are set up for limiter use of vertical output. R218 and C212 are circuits used for damping in order to prevent distortion occurred upon switching of current flowing in DY coil.

PIN 14 is Vcc line and is supplied with a voltage of 12V from SMPS, and is an input terminal to make IC 201 operate smoothly.

6-7 HORIZONTAL DRIVE & OUTPUT CIRCUIT SECTION



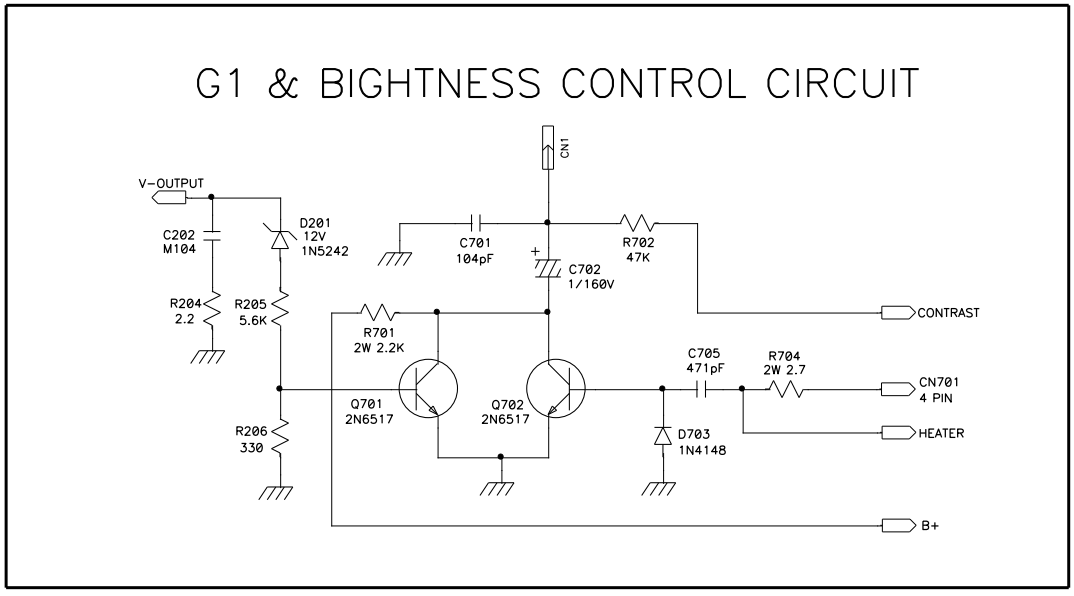
When horizontal drive receives output pulse from TDA2595 PIN 4 and supplies it to Q605 base, Q605 repeats on/off motion by pulse and at this time pulse generated at T601 operates T601.

It is composed that if T601 operates, pulse abandoned from the secondary side of T601 can fully drive horizontal output TR. Then it is supplied to Q604 base and repeats on/off motion by pulse. Thus FBT can be operated. Then pulse to be supplied to horizontal deflection is generated at C616, C609 and C613 (When Q604 is on, C616, C609 and C613 are charged. When it is off, they are discharged.) for supply and Vcp voltage of 900~1000V is connected to T701 PIN1. This voltage varies according to the supplied voltage and here supplied voltage is boosted into higher voltage at T701. Then it becomes output as high voltage, screen voltage, focus voltage and etc.

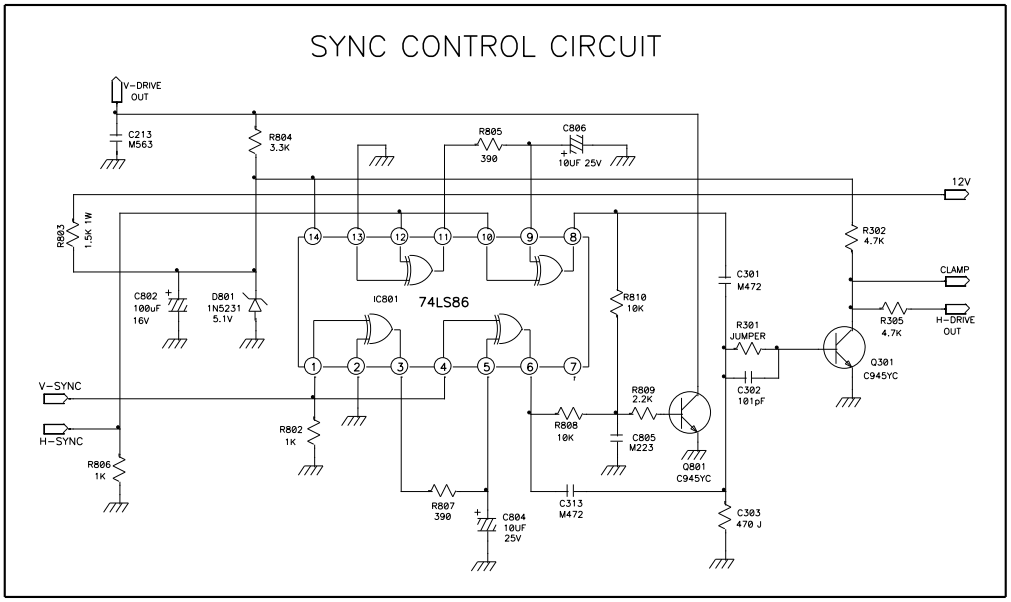
6-8 G1 & BRIGHTENESS CONTROL CIRCUIT

G1 control connects CDT G1 deeply to blanking section and makes line not to appear on screen by using the horizontal and vertical blanking pulse. And also this voltage receives input voltage of FBT PIN 7 and it is composed to control brightness so that voltage is controlled in the range of –0~-70V.

Q702 is a circuit composed so that line does not appear on screen by turning on of blanking section only and making complete cut-off through connecting deeper minus voltage to G1 than back raster level. It is composed of D201, R205, R206, R701, Q701, Q702, D702, D703, C705 and etc..



6-9.SYNC CONTROL CIRCUIT



This SYNC Control Circuit acts a role to transform so that output of constant level is always made regardless of input or no input of SYNC.

In order to do so the circuit is composed using the chip built-in with 4 sets of EXCLUSIVE-OR Gate circuit.

PIN 14 is Vcc supplying terminal for driving of chip.

PIN 1, 2, 4, 5, 9, 10, 12 and 13 are SYNC input terminal.

PIN 3, 6, 8, 11 are output terminal. (Please refer to the following Function Table for detail contents.)

※ FUNCTION TABLE

◆ EACH GATE

IN-PUT		OUT-PUT
A(PIN 1)	B(PIN 2)	Y(PIN 3)
L	L	L
L	H	H
H	L	H
H	H	L

6-10 KTN-2001 (1401) Adjustment Method

*Notes

- (1401) : Only different parts of 14"specification are expressly indicated.

1. B+ voltage adjustment method
   1) Measuring terminal: D403 cathode side
   2) Adjusting V/R: VR401
   3) Adjusting voltage: 107±0.3V (110±0.5V) - Option
   4) Measuring condition: AC 120V, 60 Hz, cross hatch pattern
   5) Other voltage: 6.2±0.1V 149±0.5V (134±0.5V)

2. Screen voltage adjustment method
   1) Measuring terminal:
   2) Adjusting V/R: F.B.T. screen VR
   3) Adjusting voltage: to adjust so that Back Raster is 0.1 F/L
   4) Measuring condition: cross hatch pattern

3. High voltage adjustment method
   1) Measuring terminal: CRT anode
   2) Adjusting V/R: 24KV±300V
   3) Measuring condition: cross hatch pattern
      Screen size: at full scan (horizontal frequency: 15.75 KHz)

4. Contrast adjustment method
   1) Measuring terminal: center of screen
   2) Adjusting V/R: VR702
   3) Measuring condition:
      - Screen voltage: 500±5V
      - Video input voltage: 0.7V
      - Screen brightness: To adjust into max 70F/L
   4) Adjusting method:
      - To supply WINDOW pattern by operation of signal source
      - To adjust brightness into 70F/L by changing of V/R702 from Max to Min

5. Horizontal Raster position adjustment
   1) Adjusting V/R: no adjustment
   2) Adjusting position: center of screen

6. Check of coordinates value
   1) Adjusting position: center of screen (measured as CA-100 in CRT face)
   2) Measuring condition: After adjusting Back Raster into 0.1F/L by varying of screen at Cross Hatch, measurement is made at max 70F/L in Window pattern
      X: 281±20
      y: 311±20
      Y: 60F/L
      At this time, please confirm 30 F/L (40F/L) at Full White

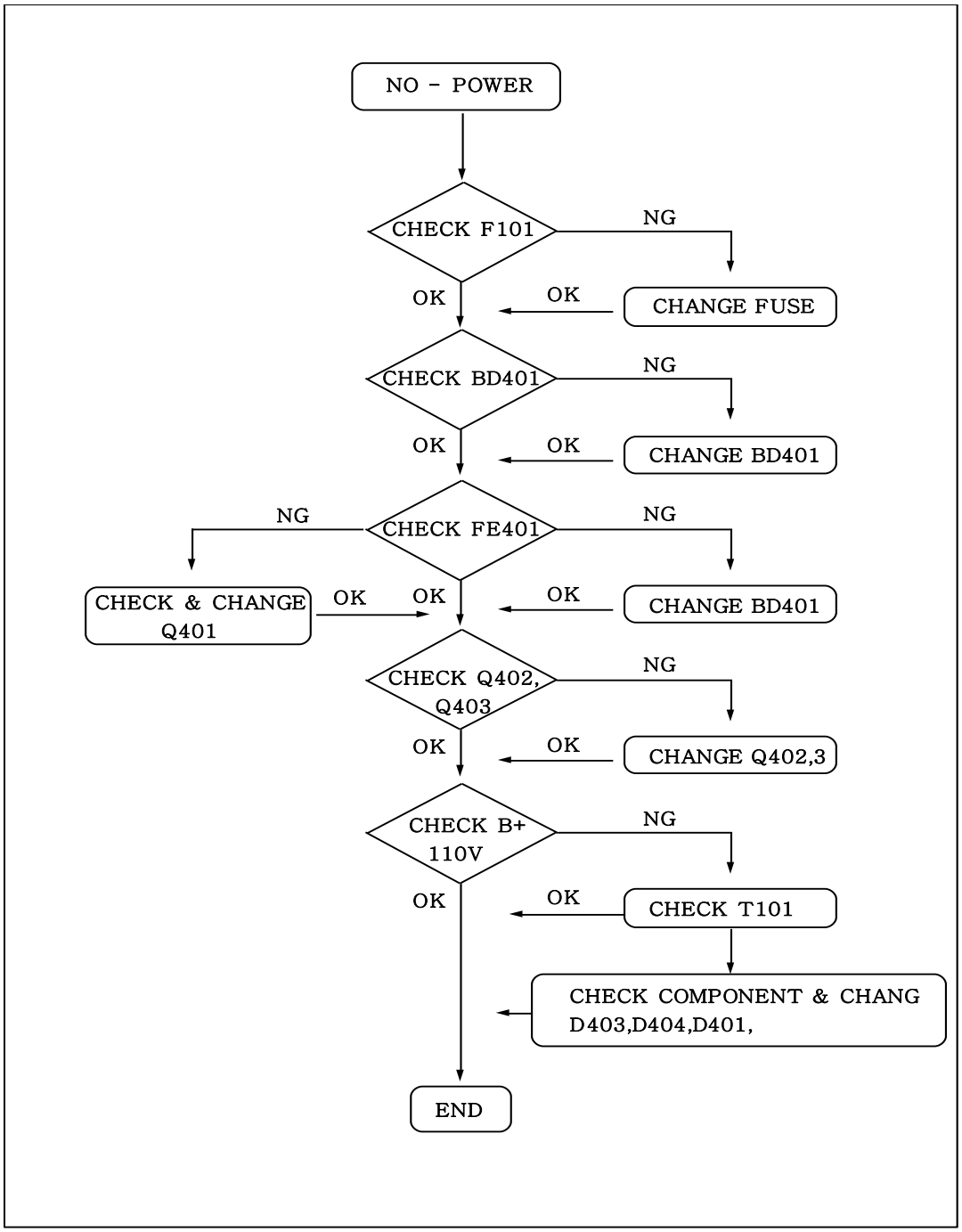
7. Other V/R Adjustment
   1) Measuring condition: BS-120 cross hatch pattern (31.5 KHz 640*480 mode)
   2) Measuring method:

H-size	Min	below 360mm (250mm)
	Max	over scan
V-size	Min	below 190mm (118mm)
	Max	over scan
H-posi.	over 20mm from center	
V-posi.	over 10mm from center	

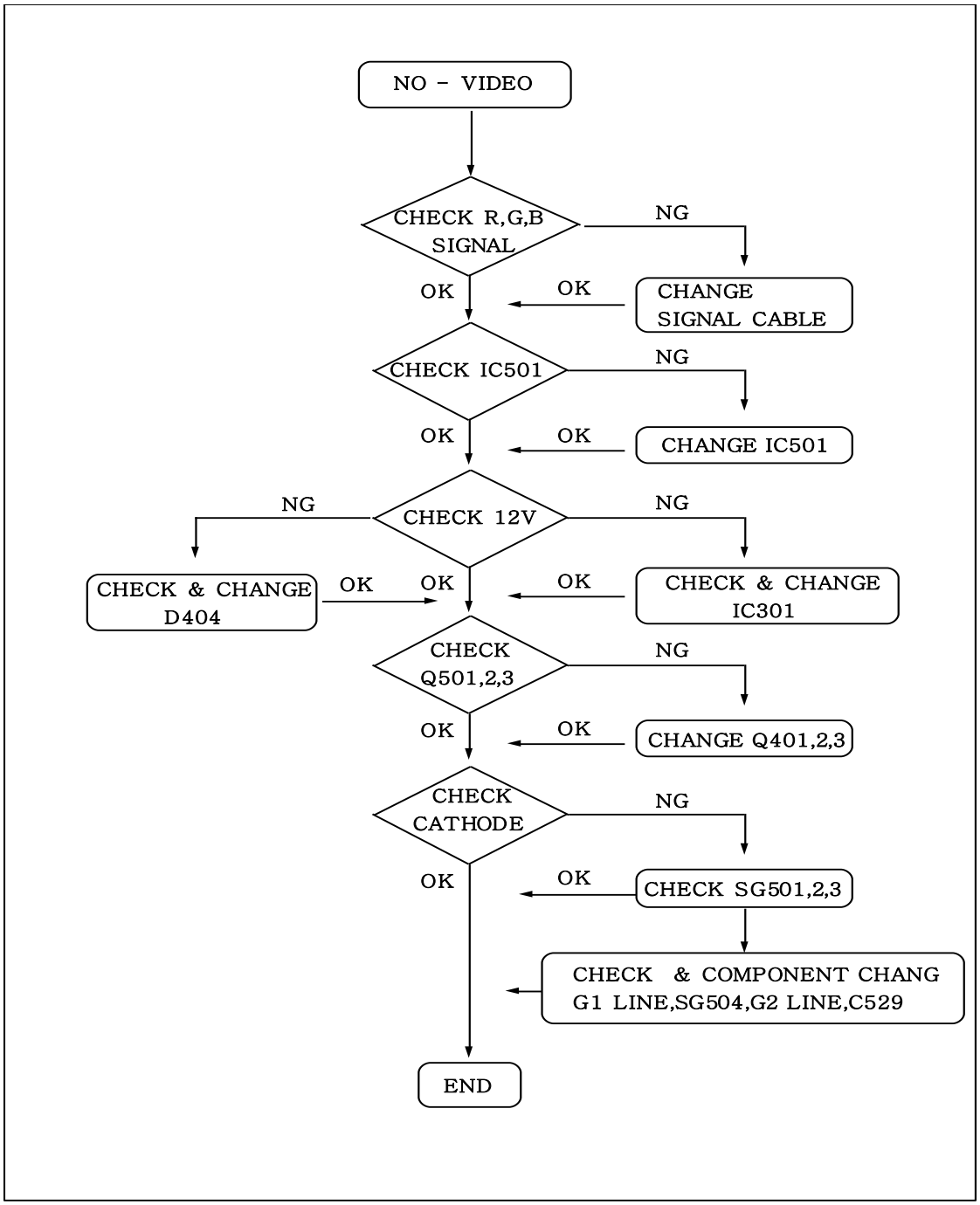
8. High voltage regulation check
   1) Measuring terminal: CRT anode
   2) Measuring voltage: 24KV±300V
   3) Measuring condition: To adjust size varying status of screen at time of maximum and minimum in Contrast V/R under Full White Pattern
   4) Screen change: within 2.0mm

7. TROUBLESHOOTING GUIDE

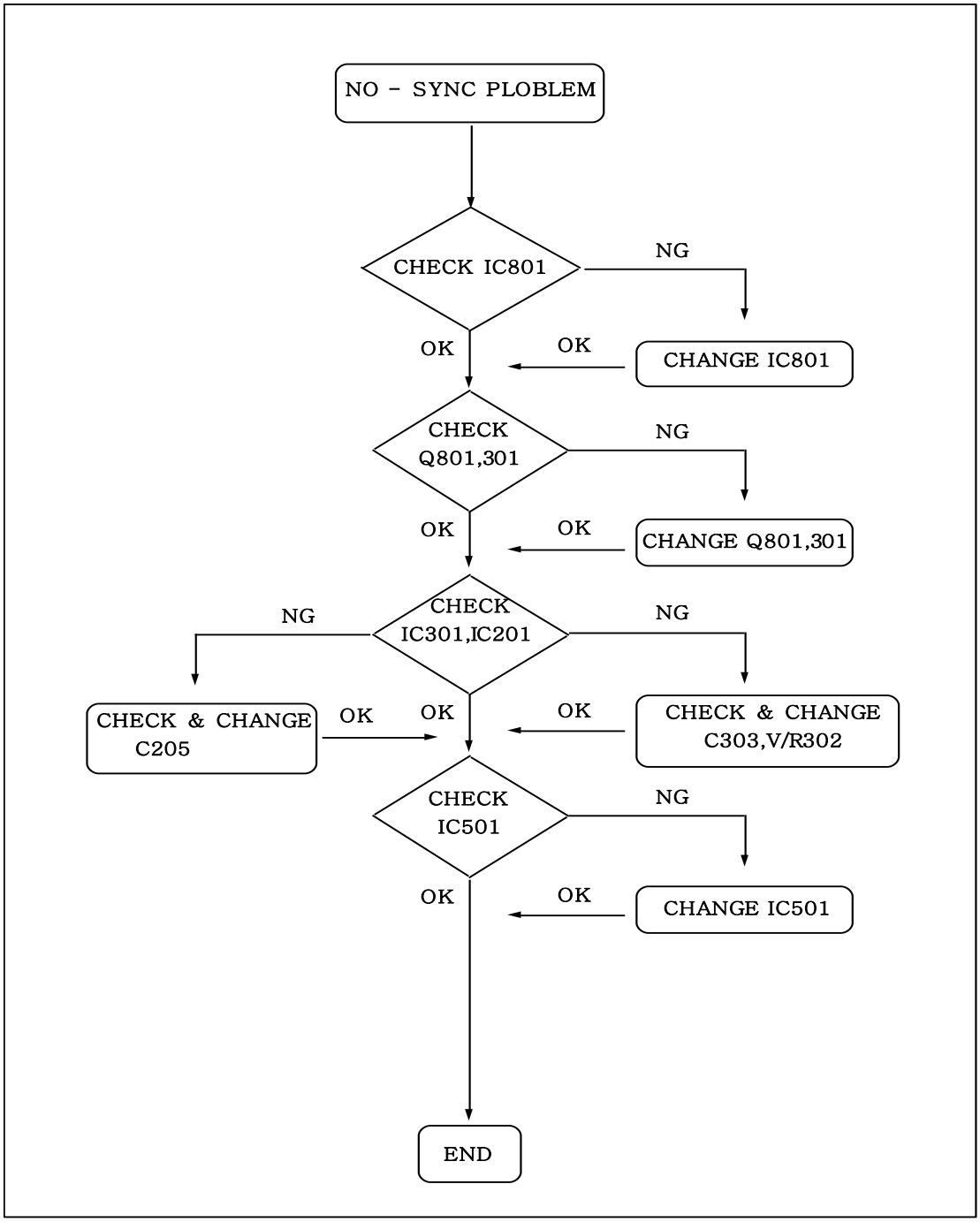
7-1 NO-POWER



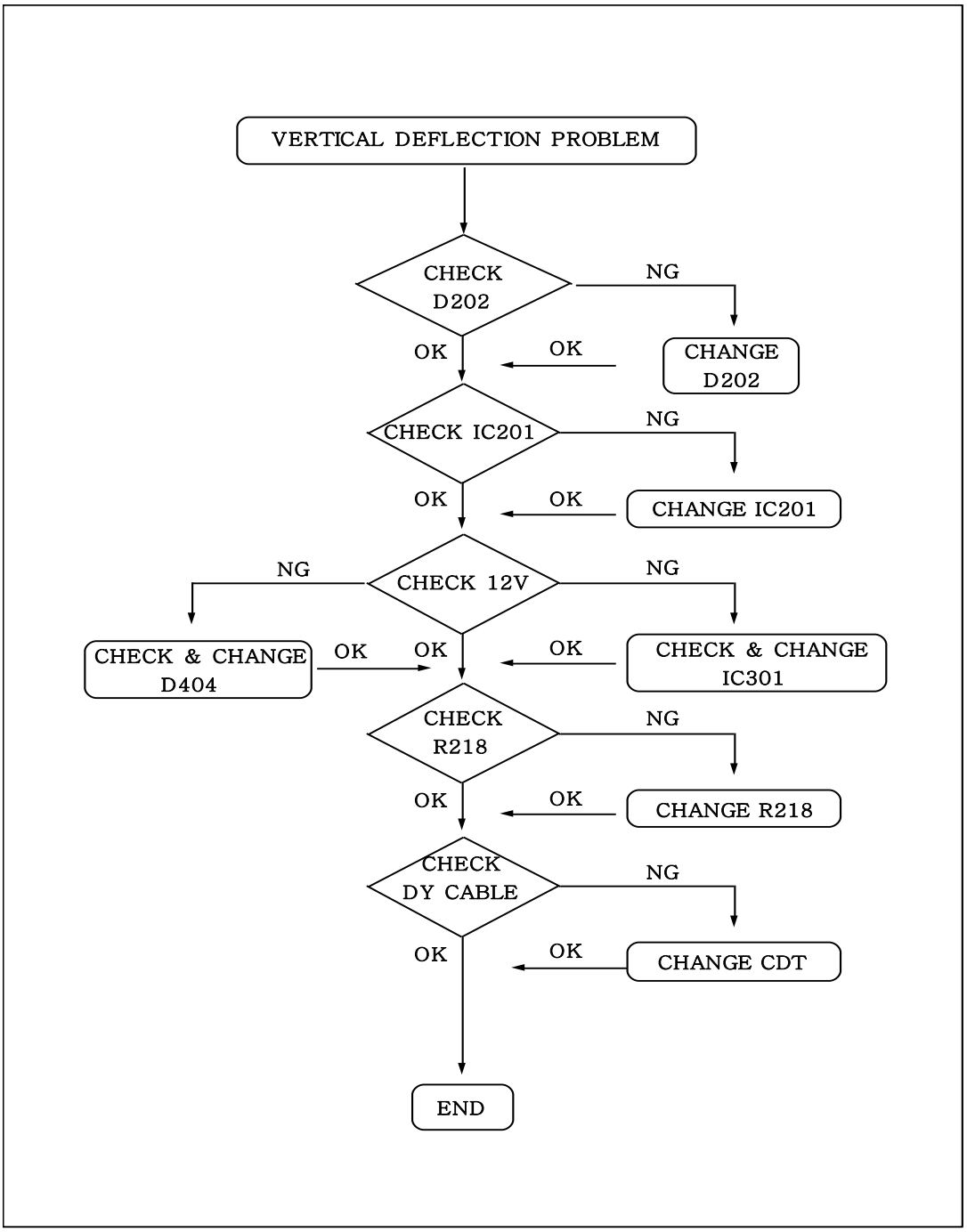
7-2 NO-VIDEO



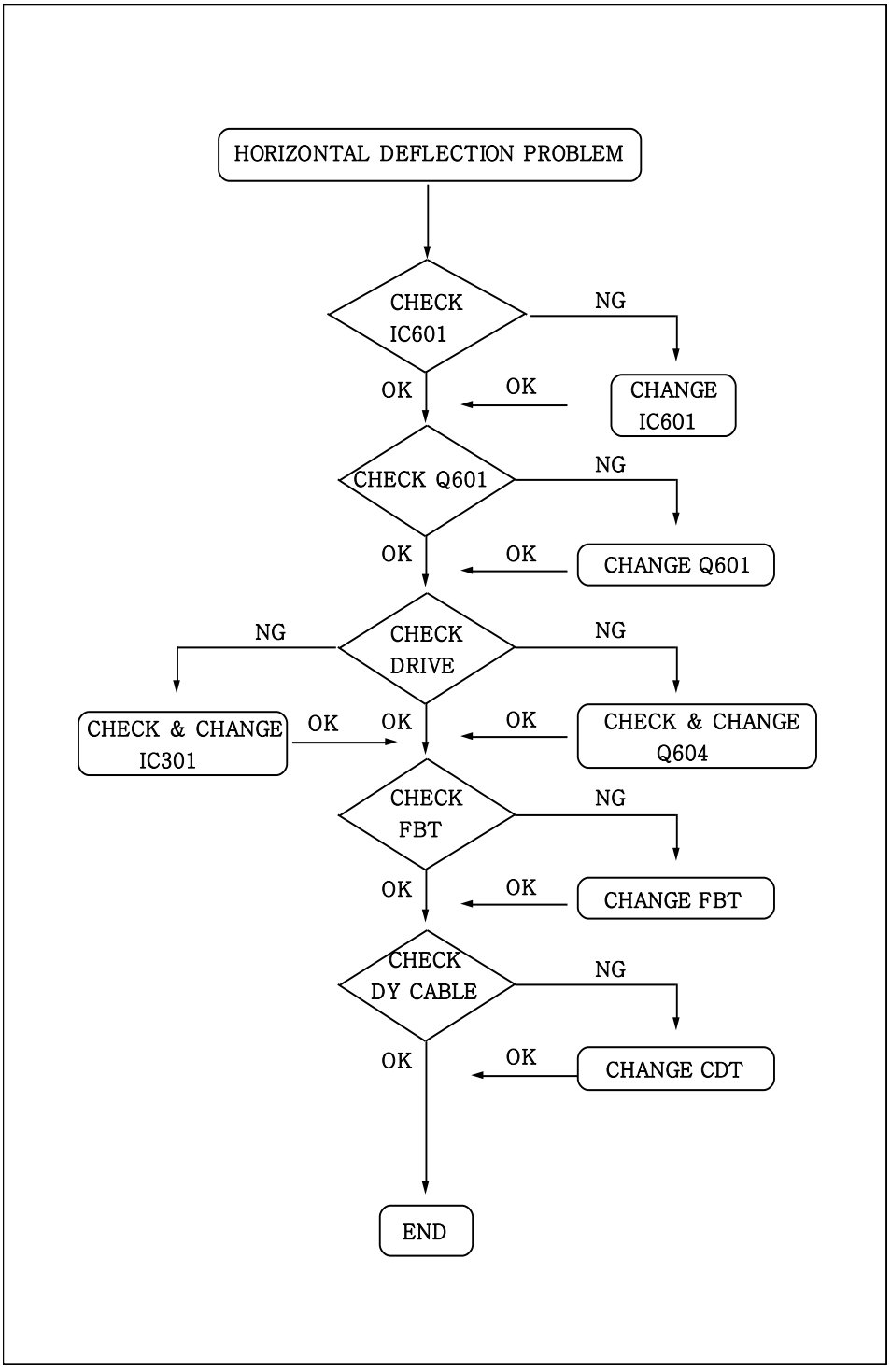
7-3 NO-SYSC PLOBLEM



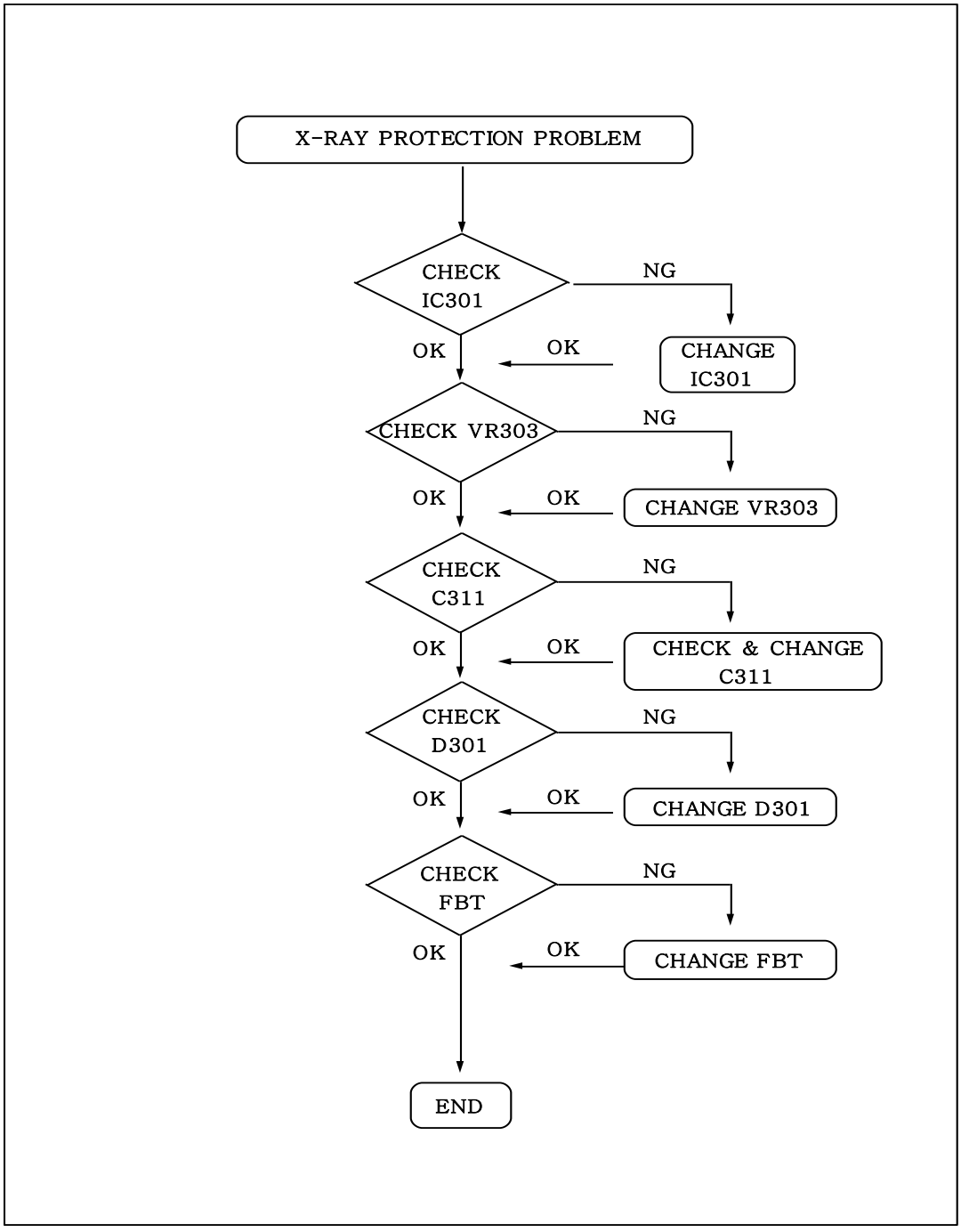
7-4 VERTICAL DEFLECTIOM PROBLEM



7-5 HORIZONTAL DEFLECTION PLOBLEM

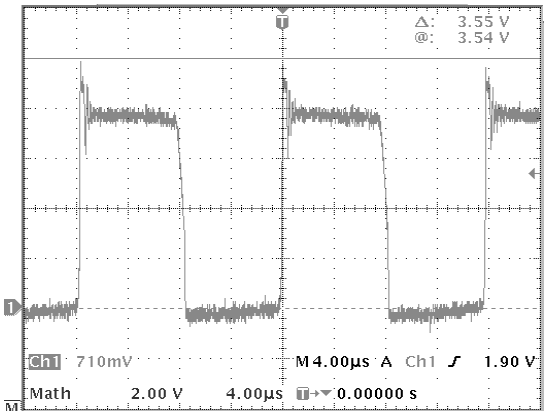


7-6 X-RAY PROTECTION PLOBLEM

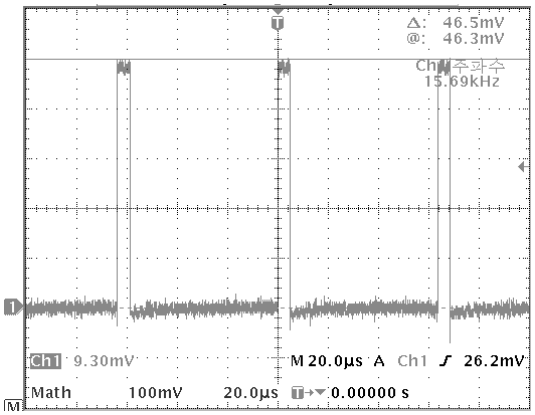


8. Waveform for major parts

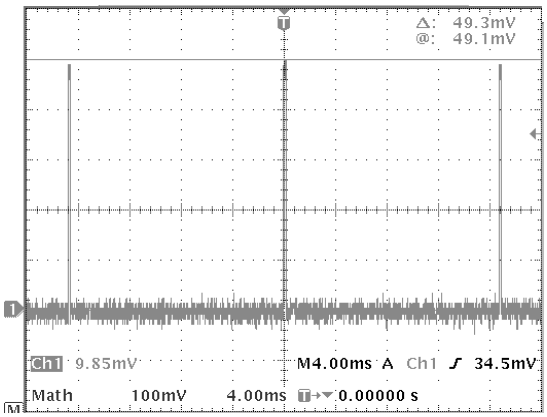
1)FE401 DRAIN OUTPUT WAVEFORM



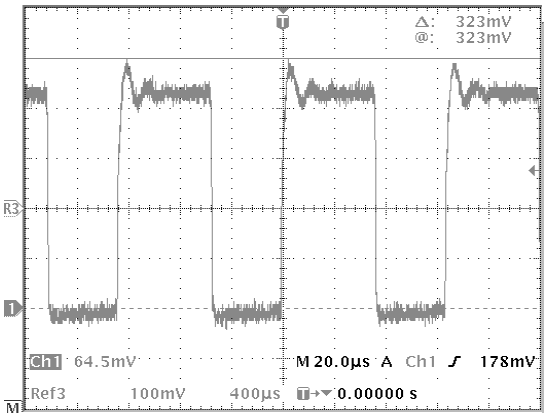
2)HORIZONTAL INPUT WAVEFORM



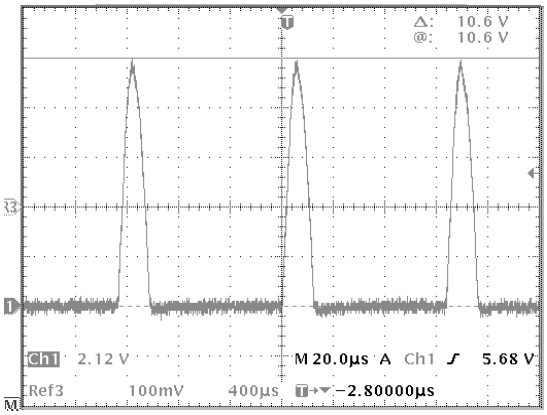
3) VERTICAL INPUT WAVEFORM



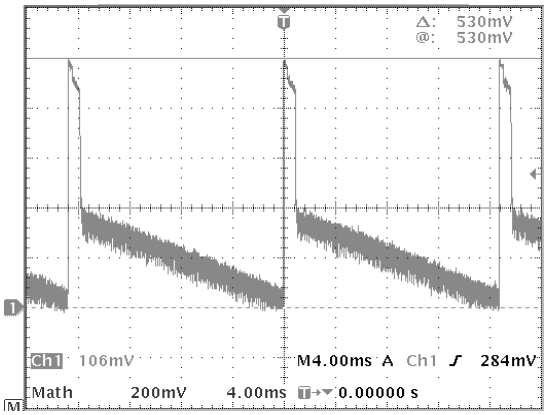
4) Q605 HORIZONTAL DRIVE WAVEFORM



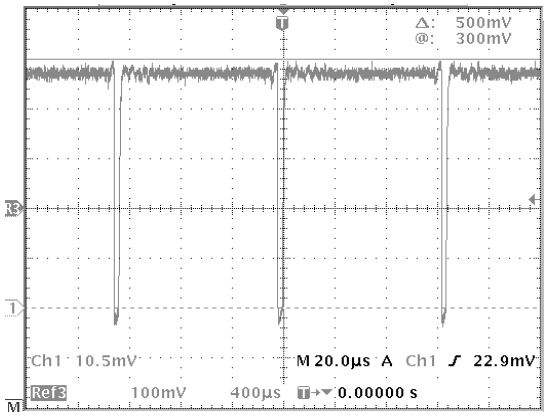
5)Q604 HORIZON OUTPUT WAVEFORM



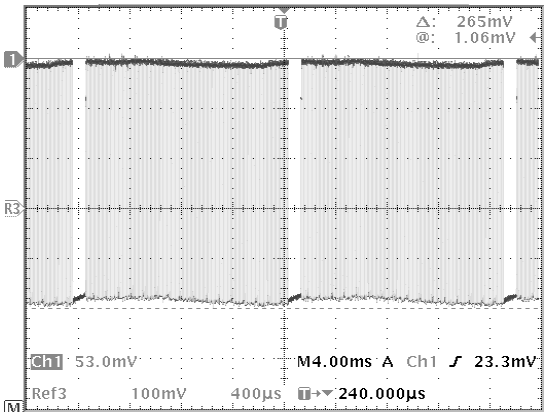
6)IC201PIN 1 VERTICAL OUTPUT WAVEFORM



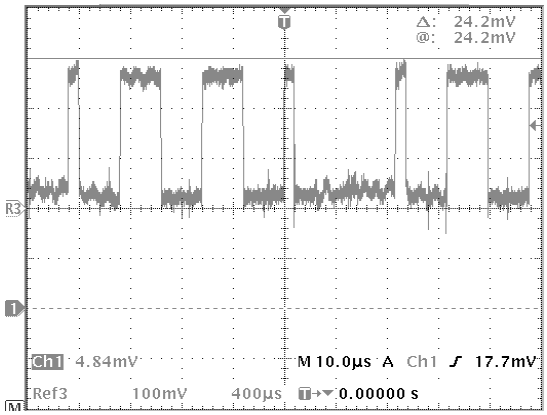
7)CLAMP(IC501 PIN 14) WAVEFORM



8) Q702 COLLECTOR PULSE WAVEFORM



9)IC501(1203) PIN 25 IN PUT WAVEFORM



10) Q501 COLLECTOR WAVEFORM