

# **VIDEO MONITOR**

**VD-401A**

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## **1. GENERAL**

This VD-401A type picture monitor operates upon entry of either one of a video signal or a synchronizing signal which is the composite video signal for the standard television system. This picture monitor is designed for monitoring pictures as a monitor used for the ITV only in combination with a CCTV camera.

All circuits are integrated into a semiconductor through an power asynchronizing system, providing simplified maintenance and uniformed reliability. The main circuit consists of one printed circuit board. The picture monitor can withstand the long-hour operation and long-term continuous running. Its metal external case assures the fire resistance.

## 2. RATING

- **Input Level**  
Video input level VS 1.0Vp-p (V0.7V, S0.3V)  
Synchronizing input level S 4.0 Vp-p (in external synchronization)
- **Input Impedance**  
75Ω terminal (at SW ON) or high impedance (at SW OFF)
- **Output Level**  
Video amplification output 40Vp-p
- **Scanning Frequency**  
Horizontal 15.7KHz/63.5 μS  
Vertical 60Hz/16.7mS
- **Video Monitoring Screen**  
H346mm × V260mm
- **Power source input (Single phase alternating current)**  
AC100V 50Hz/60Hz  
Form factor 5% max. (Commercial power source)
- **Power Consumption**  
Approx. 60 W
- **Operating Ambient Temperature**  
– 5°C ~ 50°C
- **Operation Required**  
Continuous operation
- **Outside Dimension**  
Refer to Sketch Drawing M4-726015.
- **Weight**  
Approx. 16.0 Kg

- **Painting**

**10GY 6.5/0.5 (Munsell symbol) laser tone**



### 3. ELECTRICAL PERFORMANCE

- Video input Level  $\pm 3\text{dB}$  max. from the rated value  
Synchronizing Input Level  $\pm 3\text{dB}$  max. from the rated value
- Input Impedance  
 $\pm 3\%$  max. fro the rated value
- Output Level  
+ 6 dB or more fro the rated value  
- 0
- Scanning Frequency  
Horizontal  $\pm 100\text{ KHz}$  from the rated value  
Vertical  $\pm 1\text{ Hz}$  from the rated value
- Picture Tube  
440 MB4 or equivalent product 114 °C  
Defection  $29\phi \pm$  neck
- Resolution  
Horizontal center 700 lines or more  
Vertical center 320 lines or more  
Horizontal limb 500 lines or more  
Vertical limb 300 lines or more
- Current-voltage Fluctuation  
No abnormalities shall be detected on the screen even if the input voltage fluctuates  $\pm 10\%$  in state where the system operates at the rated level (AC100V).

- Video Amplification Part

- a) Max. gain 44dB  $\pm$  3dB

- b) Frequency characteristic

- It will be as follows on the basis of a 100 KHz sine wave:

- 60 Hz ~ 7 MHz + 1 -3dB max.

- Note that a waveform should be damped in its natural inclination.

- c) Noise

- It will be as follows for the output signal level in state where the system operates at the rated level:

- Synchronized noise : - 35dB or less

- Other noise : - 60 dB or less

- Deflection Part

- a) Synchronization stability

- The system shall operate within the rated level.

- b) Deflection distortion

- It will be as follows according to the spacing change rate rule:

- Horizontal : 10% or less

- Vertical : 10% or less

- c) Deflection amplitude variable range

- Horizontal :  $\pm$  10mm or more

- Vertical :  $\pm$  10mm or more

- d) Picture display screen size

- 8% over scanning size for the horizontal/vertical screen frame

- e) Retrace line duration

- Horizontal : 20% max.

- Vertical : 5% max.

- f) High-voltage output

- 15KV~18KV max. (cut-off)

- g) Flicker on the screen

- It shall not be checked 50cm away from the CRT screen.

- h) Brightness of the screen

- Center of the CRT screen: 260 lux or more (VS, 1 V, monochrome signal, CONTRAST, BRIGHT MAX)

- Others

- a) Spot killer

Spot sicking shall not be generated on the CRT screen when the power is turned ON or OFF.

- b) Reliability required

Electrical reliability: MTBF 20,000 hours or more (K = 1 ambient temperature: 25°C constant)

(MTBF 10,000 hours for CRT only)

- c) Parts in use

As a general rule, they should conform to the JIS standard.

- d) Combustibility

PCB, wiring materials

Incombustibility (Use the products equivalent to those meeting the US UL standard.)

- e) X-ray radiation

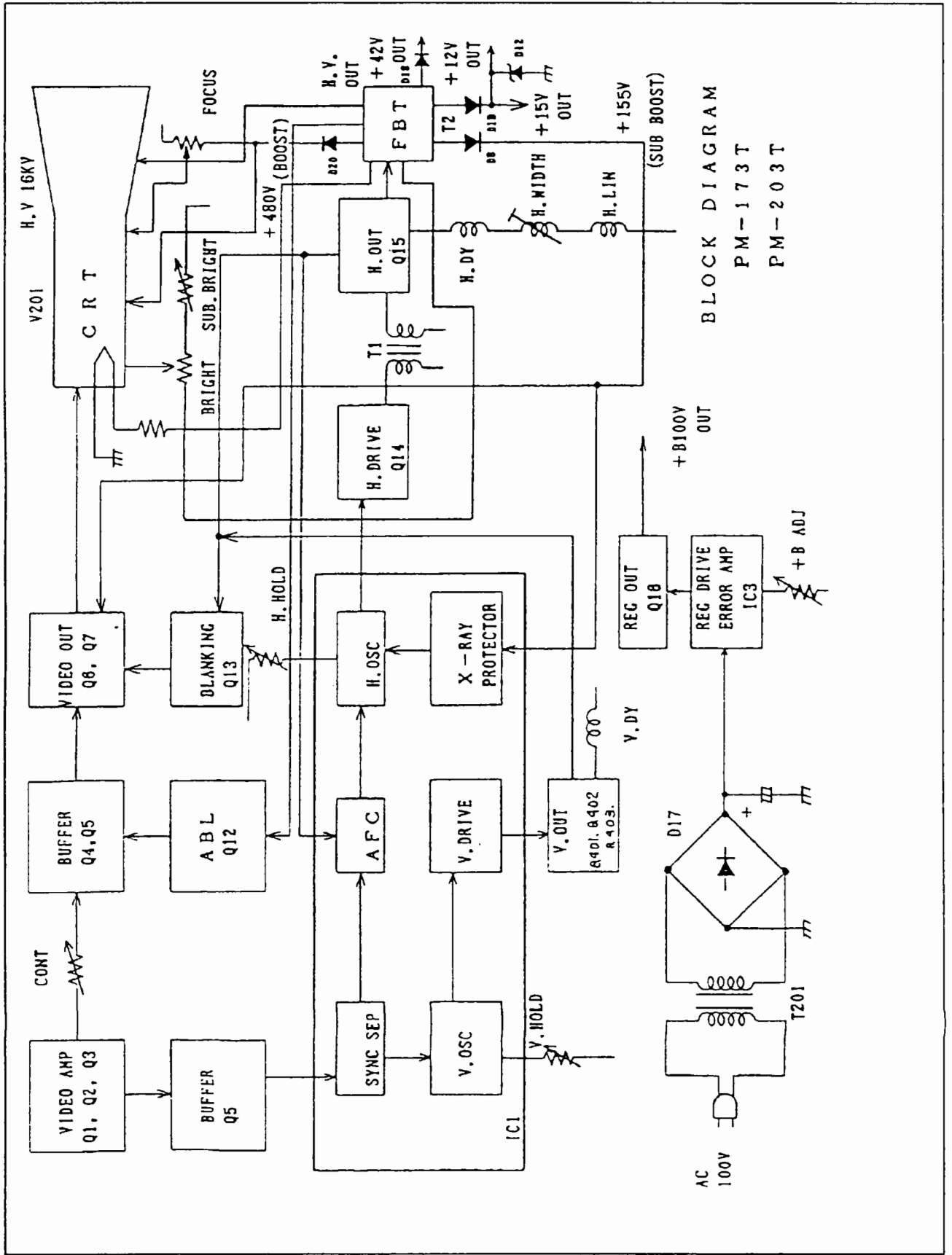
0.5mR/h or less

(Use the circuits equivalent to those meeting the US DHHS standard.)

- f) Ventilation

Since the cooling fan, etc. are not built in this monitor, attention should be given to ventilation in case of incorporating into the frame. Especially, the temperature of the heat sink for power transistor should not rise 80°C or more.




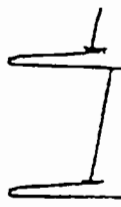










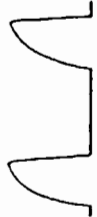


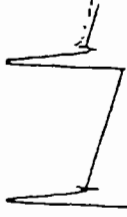





# Voltage Waveform Diagram

HA1358A

IC 2 HA1358A	DC 100V
1	
2	 60 Vp-p
3	0 V
4	 0.8 Vp-p
5	 96 Vp-p

Discrete

CN401	DC 100V
1	
2	 14 Vp-p
3	0 V
4	 1 Vp-p
5	 96 Vp-p

	BASE	COLLECTOR	EMITTER
Q401 25C2688	 60 Vp-p	 60 Vp-p	 60 Vp-p
Q402 25D1138	 96 Vp-p	 60 Vp-p	 96 Vp-p
Q403 25D1138	 1 Vp-p	 96 Vp-p	 0.6 Vp-p

## 4. Operating Instruction

### 4.1 Unpacking and Checking

After unpacking, check the following items and make sure that there is no problem.

- a) There should be no scratch, deficiency, looseness, etc. of the frame.
- b) There should be neither omission of parts nor contamination of foreign matters.
- c) There should be no shortage of number of accessories.

### 4.2 Installation

Any method may be applied to the installation of this monitor. However, prior to use attention should be given to the following items in order to assure the picture of fine quality.

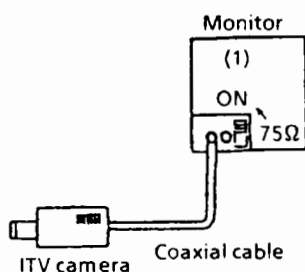
- a) When installing this monitor within the frame due to radiation of heat, be sure that the temperature inside the monitor is less than 60 °C.
- b) The source of linkage flux is not found in the periphery.  
If the monitor is affected by the leakage magnetic field of alternating current from AVR, transformer, etc., flickers are generated on the screen. In the case of the direct current-wise (magnet, etc.) magnetic field, the nester distortion and screen deformation result requiring change of the installation position for use.
- c) As for vibration resistance, when using the monitor in the mounted state, it is desirable to install it onto the appropriate vibration-roof table.
- d) The screen is set to be easy to see against the outside light by increasing the contrast ratio.  
However, care should be taken not to expose the CRT screen directly to a strong light (sunlight) in order to monitor finer pictures.  
Appropriate brightness of the CRT screen provides longer life.
- e) In the case of feeling a weak electric shock when touching the CRT surface  
When touching the CRT surface, you may feel an extremely weak electric shock. This is caused by static electricity (same as one generated by synthetic fiber shirts or friction of a celluloid board); thus, inflicting no injury upon a person.

### 4.3 Connection to the External Units

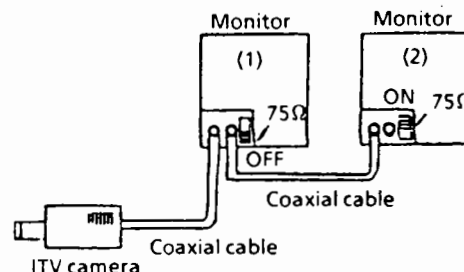
After completion of installing this monitor, connect it to the external units according to the following sequence.

- a) Since this monitor operates according to the single phase AC100V specification, insert the AC plug into the 100V connector.
- b) Connect the video composite signal to the input connector VIDEO IN on the rear of the monitor. Since two connectors are internally in bridge connection, both of them are available for input. If the monitor is not connected to the other equipment, turn ON the 75Ω terminal switch.
- c) Because the signal transmitting cable is required to transmit the high-frequency signal, use the coaxial cable whose length is as shorter as possible.
- d) If the signal transmitting cable is used within a long distance (100m to 500m), the picture screen not to reproduce sharply. Therefore, compensate the cable loss by means of the video distributor, etc. and then use it.
- e) When using the (two to five) monitors in series connection, in the terminal resistance 75Ω inside the monitor turn ON the most end of the 75Ω terminal switch and turn OFF the switch of the equipment on the way.
- f) When using five or more monitors in series connection, prepare the video distributor separately. Lowering of the high-frequency band develops the “fading” and “much reflection” on the screen.

Example of use 1. Monitor 1



Example of use 2. Monitor 2



g) Method of operating the adjusting knobs at the front

- (1) POWER Power switch. Press of this switch turns on the power.
- (2) H.HOLD Adjust this knob when the horizontal synchronization became unstable.
- (3) V.HOLD Adjust this knob when the vertical synchronization became unstable.
- (4) CONTRAST Used to adjust the black-and-white contrast of a picture.
- (5) BRIGHTNESS Used to adjust the brightness of the entire picture.

h) Connection of terminals located at the rear

- (1) VIDEO.IN.OUT. Used as the input terminal for video signal and the output terminal for bridge connection to the other video monitor.
- (2) 75 $\Omega$  Terminal Switch Slided to the ON side when one monitor is connected and to the OFF side when several monitors are in bridge connection.
- (3) SYNC.IN.OUT Used as the input terminal for external synchronizing signal and as the output terminal for bridge connection to the other video monitor.
- (4) EXT/INT Switch Slided to the EXT side when using the external synchronizing signal to input the synchronizing signals (H.V.SYNC) and the video signals to the VIDEO.IN.  
Slided to the INT side when using the composite (video and synchronizing) signals only.
- (5) EXT.75 $\Omega$  Switch Used when the EXT/INT switch in (4) above was slided to the EXT side.

i) Adjusting sections at the rear

- (1) H.FREQ Set the H.HOLD knob to adjust this section so that the horizontal synchronization becomes normal.
- (2) V.LIN Used to adjust the expansion of the upper part of the picture.
- (3) V.HEIGHT Used to adjust the expansion of the vertical size of the raster.
- (4) SUB.BRIGHT This is the auxiliary regulator for the BRIGHTNESS volume. (It has been already adjusted at the factory according to the CRT.)

#### 4.4 Displaying the Screen

- a) After the connector connection is complete, turn ON the power switch.
- b) About 50 second later after this monitor has operated normally, the picture (rester) will appear on the CRT screen. If the picture does not appear on the screen, adjust the "BRIGHT" and "CONTRAST" knobs on the front panel (by turning them clockwise).
- c) If the picture does not become stationary due to the unstable condition of horizontal/vertical synchronization, adjust the "V.HOLD" and "H.HOLD" knobs to make the picture stable at the front of this monitor.

## 4.5 Adjustment

Since this monitor has been adjusted and inspected sufficiently at the factory, there seems to required almost no readjustment for it. However, the method of adjustment inside the equipment for failure repair, readjustment, etc. will be described ed as follows.

a) [+B Voltage ADJ]

Adjust the stabilized output voltage to be +100V by using the DC line voltage regulator (VR5 B-4.7K  $\Omega$  + B.ADJ).

b) [HEIGHT]

Adjust the amplitude to the screen amplitude by using the vertical amplitude regulator (VR3 V-1K $\Omega$ ).

This amplitude is changed by the VR4 B-1K $\Omega$  [VLIN].

Therefore, it is necessary to adjust this [VLIN]and the [HEIGHT.VLIN ]alternately.

c) [V.LIN ]

Adjust the linearity in the vertical direction to be its best condition by using the linearity regulator VR4 B-1K $\Omega$  for vertical deflection.

d) [H.FREQ]

Adjust the oscillating frequency to be synchronized by using the oscillating frequency regulator VR2 B-5K $\Omega$  for horizontal deflection, so that the picture appears on the center of the CRT screen.

e) [WIDTH ]

Adjust the screen amplitude to be the specified width by using the vertical amplitude regulator L8 M2108 coil.

f) [FOCUS]

Adjust the sharpness of a picture on the CRT screen to be its best condition and uniformed entirely by using the focus regulator VR6 B-1M $\Omega$ .

g) Centering Magnet

This is used to set the CRT beam to be irradiated to the center of the CRT screen. For actual adjustment, adjust this magnet to display the picture uniformly to the periphery of the CRT screen, considering the influence by the external magnetic field and linearity of deflection. It should be especially noted that unnecessary compensation may worsen the reater distortion.



## 4.6 Description of Circuits

### a) Video amplification circuit

The video amplification circuit consisting of 7 transistors in total (5 NPN transistors and 2 PNP transistors) amplifies the input video signal which is added to the cathode of the CRT. The video signal which is added to the collector of the final transistor Q6, that is, the cathode of the CRT is negative polarity. Its level can be adjusted by the variable resistor VR201 "CONTRAST" connected to the input circuit (transistor VR202 "BRIGHT", which is the brightness regulator, adjusts the grid voltage of the CRT.

### b) Synchronizing distribution circuit

The transistor circuit Q8 is the synchronizing distribution circuit which is used to gain the video synchronizing composite signal only. The video synchronizing composite signal is input to Ic1 Pin 15 for switching.

With this, the synchronizing signal which has almost no video signal can be obtained in Ic1. In the case of internal synchronization, the system operates upon receipt of the video synchronizing composite signal connected to the "VIDEO.IN". When connected to the external synchronizing input terminal, the system operates upon receipt of the synchronizing signal by means of the synchronization selector switch at the rear of the frame. Horizontal and vertical synchronizing distribution are performed in Ic1. The horizontal circuit is composed of a diode discriminating circuit and a reference sawtooth wave AFX circuit.

### c) Vertical deflection circuit

The vertical deflection circuit consists of a SUB/PCB for output and an IC1 for synchronizing distribution.

The vertical pulse is supplied from the Ic1 Pin 2 to the SUB/PCB Pin 4 via the D13/R52. The vertical sawtooth wave is generated by the Ic1 Pin 5 and the C32 2.2 $\mu$ F/25 tantalum capacitor and drive-supplied to the SUB.PCB Pin 4/5. The d.c negative feedback of deflection yoke returns to the Ic1 Pin 3, resulting in extremely less change of temperature of oscillating frequency as well as in compensation of vertical linearity.

### d) Horizontal deflection circuit

This circuit is the oscillating circuit having Ic1 Pin 12 which consists of a diode discriminating circuit and a phase deflection AAFC circuit consisting of Ic1 Pin 13/14 which use the sawtooth wave as the reference waveform. In the transistor horizontal deflection circuit, the output current waveform causes several phase lag due to the accumulation effect of the excitation output stage as compared with the oscillating waveform. For this reason the output waveform is used as the reference for compensating the phase lag. The

pulse generated at the Ic1 Pin 10 is amplified by Q14 and supplied as the base current which fully saturates the output transistor via the exciting transformer T1. The horizontal deflection output circuit in this monitor is a grounded emitter type. About 760V (p-p) positive/negative horizontal output pulses are generated in its collector, applying the sawtooth wave large current to the deflecting coil.

e) High-pressure generating circuit

The output pulse generated at the collector of the horizontal deflection output transistor Q15 is used as the high-pressure generating pulse.

In other words, the high-pressure T2 supplies the d.c voltage to Q15 through the primary winding and at the same time gains the B voltage and boost voltages (480V, 155V, 15V, 12V, 42V, and -31V) by making the output pulse pressure up.

f) Blanking signal generating circuit

By using the retrace line pulse for output waveform generated at the Q15 collector, this circuit synthesized the horizontal pulse and the vertical pulse at Q13 and adds them to the final step of video amplification for blanking.

g) Current stabilizing circuit

This circuit is comprised of a voltage driver, a protection circuit, a comparison circuit, and reference voltage at Ic3 and controls Q16 to keep output voltage constant. The output voltage DC100V is the reference voltage to be adjusted by the VR5 B-4.7K $\Omega$ . Do not change at random as long as DC100V is specified.

h) Protection circuits

If the parts of the power circuit and horizontal circuit forming the protection circuit for X-ray from the T2 flyback transformer via Zener (36V  $\times$  2) diode become failure, the high pressure rise extraordinarily, resulting in danger. This circuit decreases the oscillating frequency to avoid the high pressure rise by connecting it to Ic1.

If the CRT is filled with tube discharge for return, the rise of discharge voltage causes a possible damage of the accessory circuit, making the circuit operation inoperable. Thus the second protection circuit protects the accessory circuit by inserting the discharge component near the CRT socket for instantaneous discharge.

## 4.7 Maintenance

### ◆ General

This monitor is designed for adequately withstanding the long-term and continuous operation. However, it is necessary to periodically check it one time per year or two years in order to achieve the satisfactory performance during operation, paying attention to the following points.

- (1) Check the imperfect contact of causing noise, etc. by turning the front knob.
- (2) Check the looseness and imperfect contact of the rear input connector.
- (3) Check that the rise of the internal temperature is within 60 °C.
- (4) Check that noise is generated when this monitor, etc. are vibrated.
- (5) Clean the inside of the monitor because dust and “soot” are contaminated after one or two-year operation.
- (6) Check the burning of the CRT and degradation of brightness.
- (7) Check the waveform, voltage, etc. by temporarily replacing this monitor with the substitute product, etc.

### ◆ Cautions for general handling

- (1) Do not connect and disconnect each connector with the power on.
- (2) Contact of plugs and hands with the anode gap (high-pressure gap) of the monitor CRT easily causes electrical discharges. It is recommended to apply the insulating silicon oil after cleaning
- (3) When replacing the monitor CRT, be sure to handle it after discharging and short-circuiting because in most cases the high voltage may be charged at the anode gap.

#### ◆ Cautions for handling the Ics and transistors

- (1) The Ics and transistors, although highly resistant to the mechanical shock, are sensitive to the electrical shock. When checking the circuit with this monitor operated, do it with great care so as not to short-circuit the circuit at the end of the tester lead.
- (2) Be sure to turn off the power when mounting and dismounting the circuit parts.
- (3) Do not connect the capacitor to the circuit being operated carelessly. Special attention should be given to the large-capacity circuits. Careless connection of uncharged or charged capacitors may damage the circuits or other Ics and transistors.
- (4) Perform the soldering in order not to apply unnecessary heat.
- (5) Use the soldering iron which does not have "Absolute AC Leak".
- (6) Be sure to use the high-impedance probe synchroscope (oscilloscope) to check the waveform.
- (7) Be sure to use the high-impedance measurement equipment such as the digital tester instead of the tester for the transistor Ic.

#### ◆ Notes for circuit constant

- (1) Parts marked with  $\Delta$  shown in the circuit connection diagram are those related to the X-ray radiation from the CRT. For this reason, be sure to replace them by the qualified person who has a technical knowledge. If you have anything incomprehensible, please contact our makers.
- (2) Adjusting parts marked with \* may vary depending on the lots.
- (3) We shall not be responsible for any troubles in manufacturing occurred in cases where this monitor is remodeled without our permission.

## 4.8 Part List

VD-401A (for 100V)

<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
Q1	Transistor NPN	2SC458PCRR	1
Q2	Transistor PNP	2SA844PCRR	1
Q3	Transistor PNP	2SA844PCRF	1
Q4	Transistor NPN	2SC458PCRF	1
Q5	Transistor NPN	2SC458PCRR	1
Q6	Transistor NPN	2SC2688	1
Q7	Transistor NPN	2SC1921	1
Q8	Transistor NPN	2SC458PCRR	1
Q9		NOT. USED	1
Q10		NOT. USED	1
Q11		NOT. USED	1
Q12	Transistor NPN	2SC458PCRF	1
Q13	Transistor NPN	2SC458PCRR	1
Q14	Transistor NPN	2SD2688	1
Q15	Transistor NPN	2SD1397	1
Q16	Transistor NPN	2SD1018	1
IC1	IC	2SD1018	1
IC3	IC	LA5112A	1
D1	Diode	1S2473.T-77	1
D2	Diode	MV-104V	1
D3	Diode	SM-1A-02TPA	1
D4	Diode	SM-1A-02TPA	1
D5	Diode	1S247.3T-77	1
D6	Diode	HZ-36-3 TD	1
D7	Diode	HZ-36-3 TD	1
D8	Diode	F1-06TPA	1
D9	Diode	SM-05A-16FR	1
D10	Diode	MV-12	1
D11	Diode	SM-1A-02TPA	1
D12	Diode	HZ12A-1TD	1
D13	Diode	1S2473 T-77	1
D14	Diode	SM-1A-02TPA	1
D15	Diode	SM-1A-02TPA	1
D16	Diode	HZ-36-3TE	1
D17	Rectifier	LBA-04ZILF	1
D18	Diode	SM-1A-08FRTPA	1
D19	Diode	F1-06TPA	1
D20	Diode	SM-1A-08FRTPA	1
D21	Diode	NOT. USED	1
D22	Diode	SM-1A-02	1

<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
CN1	Connector	PI-051-3F	1
	Connecting pin	706412-2M	3
	Connector	PI-051-3M	1
CN2	Connector	PI-051-4F	1
	Connecting pin	706412-2M	1
	Connecting pin	706312-2M	3
	Connector	PI-051-4M	1
	Connector	PI-051-7F	1
CN3	Connector	PI-051-7F	1
	Connecting pin	706412-2M	1
	Connecting pin	706312-2M	3
	Connector	PI-051-7M	1
	Connector	PI-051-2F	1
CN4	Connecting pin	706412-2M	2
	Connector	PI-051-2M	1
	Connector	TN-50H-06-A1	1
	Connecting pin	004T-4100	4
CN5	Post	TN-50H-06-Z1	1
	Connector	TN-50H-02-A1	1
	Connecting pin	004T-4100	2
CN6	Post	TN-50P-02-B2	1
	Connector	PI-011-3F	1
	Connecting pin	702062-2M	3
CN7	Post	PI-011-3M	1
	Impedance	EL060SK1-680K	1
	Impedance	NOT. USED	
L1	Impedance	NOT. USED	
L2	Impedance	NOT. USED	
L3	Impedance	EL0910G-101K	1
L4	Impedance	EL0909-472K	1
L5	Impedance	SL7C-220K	1
L6	Impedance	SL7C-220K	1
L7	Linear coil	L1004	1
L8	Wise coil	M2108	1
T1	Drive transformer	T1004	1
T2	FBT	TF-17B	1
C1	Electrolytic capacitor	EC16V47TB	1
C2	Electrolytic capacitor	EC25V470	1
C3	Electrolytic capacitor	EC16V100TB	1
C4	Electrolytic capacitor	EC35V47TB	1
C5	Electrolytic capacitor	EC25V122T	1
C6	Ceramic capacitor	CE2H122T	1
C7	Electrolytic capacitor	EC250V47	1
C8	Electrolytic capacitor	EC16V22TB	1
C9	Ceramic capacitor	CE2H102T	1
C10	Tantalum capacitor	TA25V1TB	1
C11	Tantalum capacitor	NOT. USED	
C12	Tantalum capacitor	NOT. USED	
C13	Electrolytic capacitor	EC16V22TB	1
C14	Ceramic capacitor	CE2H821T	1
C15	Ceramic capacitor	CE2H221T	1
C16	Ceramic capacitor	CE2H180T	1
C17	Electrolytic capacitor	EC160V1TB	1
C18	PP capacitor	FPD4223K	1
C19	PP capacitor	FPD4334K	1
C20	PP capacitor	FPD6103K	1

<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
C21	PP capacitor	HAD3D202J	1
C22	PP capacitor	HAD3D152J	1
C23	Electrolytic capacitor	EC160V10	1
C24	Mylar capacitor	MY2A223T	1
C25	Special condenser	CE4D1H010NBPET	1
C26	Electrolytic capacitor	EC16V220	1
C27	PP capacitor	EPD2473K	1
C28	Electrolytic capacitor	EC16V470	1
C29	Mylar capacitor	MY1H102 (AWS)	1
C30		NOT. USED	
C31		NOT. USED	
C32	Tantalum capacitor	TA25V22TB	1
C33	Ceramic capacitor	CE 1H151 T	1
C34	Ceramic capacitor	CE2H681 T	1
C35	Ceramic capacitor	CE1H561 T	1
C36	Mylar capacitor	MY1H152 T	1
C37	Ceramic capacitor	CE2H821 T	1
C38	Tantalum capacitor	TA25V1 TB	1
C39	Electrolytic capacitor	EC16V22TB	1
C40	Tantalum capacitor	TA25V1 TB	1
C41	Electrolytic capacitor	EC16V22TB	1
C42	Electrolytic capacitor	EC16V470	1
C43		NOT. USED	
C44	Mylar capacitor	MY1H153T	1
C45	Mylar capacitor	MY1H682T	1
C46	Mylar capacitor	MY1H473T	1
C47	Mylar capacitor	MY2A223T	1
C48	Mylar capacitor	MY1H473T	1
C49	Electrolytic capacitor	EC50V1 TB	1
C50	Ceramic capacitor	CE1H101T	1
C51	Mylar capacitor	MY1H683T	1
C52	Tantalum capacitor	TA25V2.2TB	1
C53	Tantalum capacitor	TA25V6.8TB	1
C54	Mylar capacitor	MY2A473	1
C55	Ceramic capacitor	ECK-T2H151KBP (CE2H151T)	1
C56	Electrolytic capacitor	EC50V1000	1
C57	Electrolytic capacitor	EC160V1TB	1
C58	Electrolytic capacitor	EC200V2.2	1
C59	Electrolytic capacitor	EC50V1000	1
C60	Ceramic capacitor	CE2H472	1
C61	Electrolytic capacitor	EC160V100	1
C62	Mylar capacitor	MY2A223J	1
C63	Electrolytic capacitor	EC160V1TB	1
C64	Electrolytic capacitor	CEHPW2D471N	1
C65	Electrolytic capacitor	EC 10V470	1
C66	Electrolytic capacitor	EC 25V330	1
C67	PP capacitor	FPD6473K	1
C68		NOT. USED	
C69		NOT. USED	
C70	Ceramic capacitor	CE1H330	1
C71	Ceramic capacitor	CE2H331T	1
C72	Electrolytic capacitor	E25V100TB	1

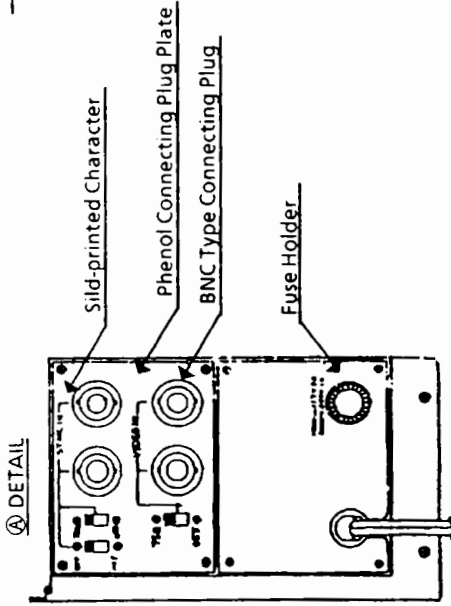
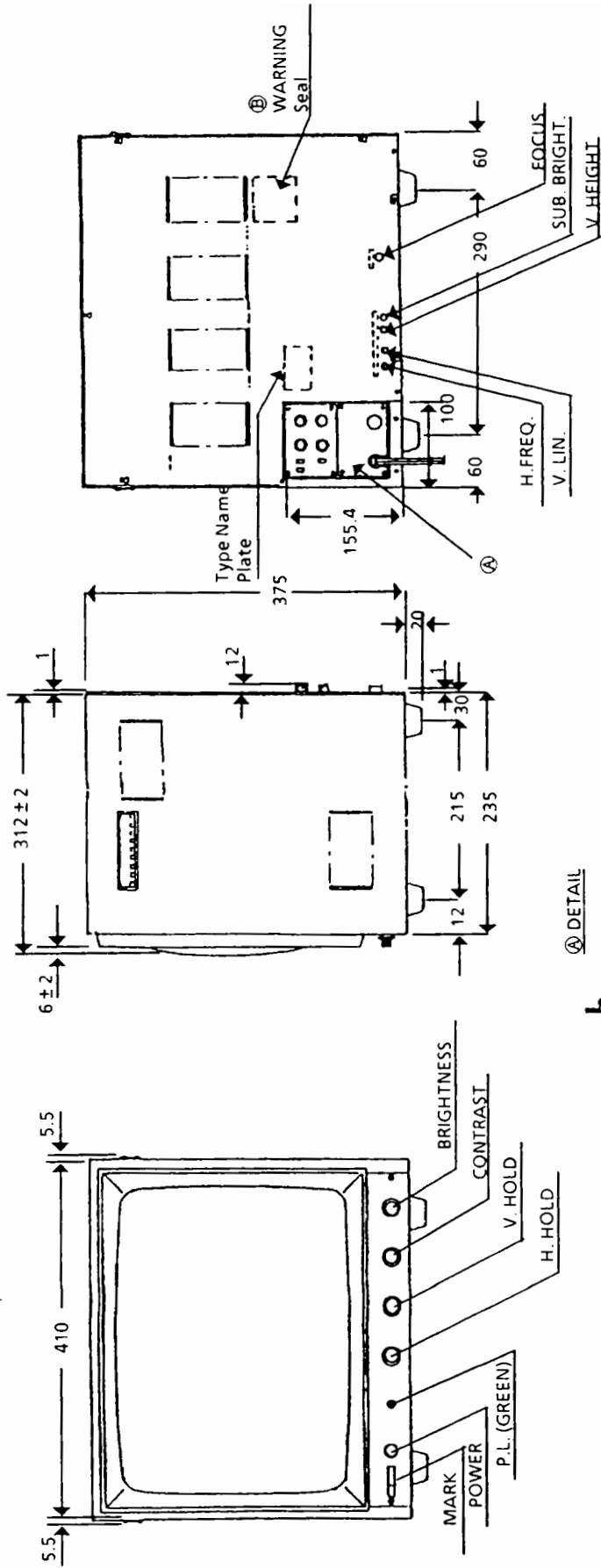
<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
C73		NOT. USED	
C74	Mylar capacitor	MY1H562 (AWS) T	1
C75	Ceramic capacitor	CK45Z5W2BA472ZY.	1
C76	PP capacitor	HAD3D202J	1
C77	Electrolytic capacitor	EC 10V1000	1
C78	MF capacitor	MY250V0.1	1
C79		NOT. USED	1
C80	Ceramic capacitor	CE1H101T	1
VR1	Volume	EVTH1C100B14	1
VR2	Volume	EVTK0YS105B53	1
VR3	Volume	EVK0YS10B13	1
VR4	Volume	EVK0YS10B13	1
VR5	Volume	H1051A-4.7KB	1
VR6	Volume	EVMJ6U10KB16	1
VR7	Volume	EVTK0YS10B15	1
R1	Resistor	¼WS 330T	1
R2	Resistor	¼WS 56KT	1
R3	Resistor	¼WS 10KT	1
R4	Resistor	¼WS 820T	1
R5	Resistor	¼WS 220T	1
R6	Resistor	¼WS 1KT	1
R7	Resistor	¼WS 150T	1
R8	Resistor	¼WS 1KT	1
R9	Resistor	¼WS 100T	1
R10	Resistor	¼WS 27KT	1
R11	Resistor	¼WS 22KT	1
R12	Resistor	¼W 1KT	1
R13	Resistor	¼WS 1K	1
R14	Resistor	¼WS 100T	1
R15	Resistor	¼WS 120T	1
R16	Resistor	¼WS 120T	1
R17	Resistor	¼WS 5.6K	1
R18	Resistor	¼WS 18	1
R19	Resistor 3W self-isolating	3WH 6.8K	1
R20	Resistor	¼WS 100T	1
R21	Resistor	¼WS 12KT	1
R22	Resistor	¼WS 1KT	1
R23	Resistor	¼WS 10KT	1
R24	Resistor	¼WS 100	1
R25	Resistor	¼WS 20K	1
R26	Resistor	¼WS 100T	1
R27		NOT. USED	
R28		NOT. USED	
R29	Resistor	¼WS 180K	1
R30		NOT. USED	
R31		NOT. USED	
R32		NOT. USED	
R33	Resistor	¼WS 10K	1
R34	Resistor	¼WS 390T	1
R35	Resistor	¼WS 1KT	1
R36	Resistor	¼WS 1.2KT	1
R37	Resistor	¼WS 6.8KT	1
R38	Resistor	¼WS 12KT	1



<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
R39	Resistor	$\frac{1}{2}$ W 12K	1
R40	Resistor	$\frac{1}{2}$ W 3.3K	1
R41	Resistor 3W self-isolating	3WH 5.6K	1
R42	Resistor 3W self-isolating	3WH 4.7	1
R43	Resistor 1W self-isolating	1WH 560	1
R44	Resistor 3W self-isolating	3WH 6.8K	1
R45	Resistor	$\frac{1}{4}$ WS 4.7KT	1
R46	Resistor	$\frac{1}{4}$ WS 100KT	1
R47	Resistor	NOT USED	1
R48	Resistor	$\frac{1}{4}$ WS 8.2KT	1
R49	Resistor	$\frac{1}{4}$ WS 3.3KT	1
R50	Resistor	$\frac{1}{4}$ WS 10KT	1
R51	Resistor	$\frac{1}{4}$ WS 12KT	1
R52	Resistor	$\frac{1}{4}$ WS 680T	1
R53	Resistor	$\frac{1}{4}$ WS 470T	1
R54	Resistor	$\frac{1}{4}$ WS 560KT	1
R55	Resistor	$\frac{1}{4}$ WS 4.7KT	1
R56	Resistor	$\frac{1}{4}$ WS 68KT	1
R57	Resistor	$\frac{1}{4}$ WS 5.6K	1
R58	Resistor	$\frac{1}{4}$ WS 27KT	1
R59	Resistor	$\frac{1}{4}$ WS 12KT	1
R60	Resistor	$\frac{1}{4}$ WS 18KT	1
R61	Resistor	$\frac{1}{4}$ WS 8.2KT	1
R62	Resistor	$\frac{1}{2}$ W 8.2K	1
R63	Resistor	$\frac{1}{4}$ WS 470T	1
R64	Resistor	$\frac{1}{4}$ WS 680T	1
R65	Resistor	$\frac{1}{4}$ WS 33KT	1
R66	Resistor	$\frac{1}{4}$ WS 560T	1
R67	Resistor	$\frac{1}{4}$ WS 100T	1
R68	Resistor 1/2WSST	$\frac{1}{2}$ WSST 1KT	1
R69	Resistor 3W self-isolating	3WH 5.6K	1
R70	Resistor	$\frac{1}{4}$ WS 100T	1
R71	Resistor	$\frac{1}{4}$ WS 2.7T	1
R72	Resistor 2W self-isolating	2WH 3.9	1
R73	Resistor	$\frac{1}{4}$ WS 1.2KT	1
R74	Resistor	$\frac{1}{4}$ WS 1KT	1
R75	Resistor	$\frac{1}{4}$ WS 2.4K	1
R76	Resistor	$\frac{1}{4}$ WS 12KT	1
R77	Resistor 1W self-isolating	1WH 820	1
R78	Resistor 1W self-isolating	$\frac{1}{4}$ WS 4.7KT	1
R79	Resistor 1W self-isolating	100K	1
R80	Resistor 1/2WSST	$\frac{1}{2}$ WSS 39KT	1
R81	Resistor	$\frac{1}{4}$ WS 10KT	1
R82	Resistor	$\frac{1}{4}$ WS 10KT	1
R83	Resistor	$\frac{1}{4}$ WS 82KT	1
R84	Resistor	$\frac{1}{4}$ WS 180KT	1
R85	Resistor 2W self-isolating	2WH 1.2K	1
R86	Cement resistor	MVS10W330	1
R87	Resistor	$\frac{1}{4}$ WS 120T	1
R88	Resistor	$\frac{1}{2}$ WS 22K	1
R89	Resistor	$\frac{1}{4}$ WS 560KT	1
R90	Resistor	$\frac{1}{2}$ W 68K	1
R91	Fuse resistor	$\frac{1}{2}$ WHF 2.2	1

<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
R92	Resistor	¼WS 180K	1
R93	Resistor	¼WS 2.7KT	1
R94	Resistor	¼WS 270	1
R95	Resistor	NOT USED	1
R96	Resistor	¼W 1KT	1
R97	Resistor	¼W 10K	1
R98	Resistor	NOT USED	1
R99		NOT USED	1
R100	Fuse resistor H	½WHF 2.2	1
	PWB	M7350/PM-173	1
	IC PWB	U-1	1
	Fuse holder	23165102-C	2
V201	CRT	440MB4	1
	CRT	500NB4	1
J201	Tangent	MRBSA3	1
J202	Tangent	MRBSA3	1
J203	Tangent	MRBSA3	1
J204	Tangent	MRBSA3	1
CN201	Connector	1-480305-0	1
	Connection pin	61116-1	2
	Connector	1-480303-0	1
	Connecting pin	170147-2	1
	Connecting pin	170147-4	1
CN202		NOT. USED	
S10			4
	Connector	171156-1	1
	Connecting pin	170073-5	1
L201	D york	DY-17	1
T201	Power transformer	PW-14C1H	1
C201	PP capacitor	FPD6103K	1
C202	Ceramic capacitor	CK45Z5W2BA47XZY.	1
VR201	Volume	24L25KHB500	1
VR202	Volume	24L25KHB500K	1
VR203	Volume	24L25KHB5K	1
VR204	Volume	24L25KHB1K	1
SW201	Switch	SLF-22-07	1
SW202	Switch	SLF-22-07	1
SW203	Switch	SLF-22-07	1
SW204	Switch	PSB-2PL	1
	Knob	UE 200011	1
R201	Resistor	¼WS 75	1
R202	Resistor	¼WS 1.5K	1
R203		NOT. USED	
R204	Solid resistor	½W 4.7 solid	1
R205	Resistor	¼WS 75	1
F201	Fuse	MF60NR (B) 2A	1
	Fuse holder	SN-2050-03	1
	AC cork	SVT2	1
	LED	BG5535S	1
	LED holder	Mounting clip(5)	1
D301	Diode	1SS83	1
C301	MF capacitor	MF250V0.1	1
SG301	Discharge tube	DSP-301N	1

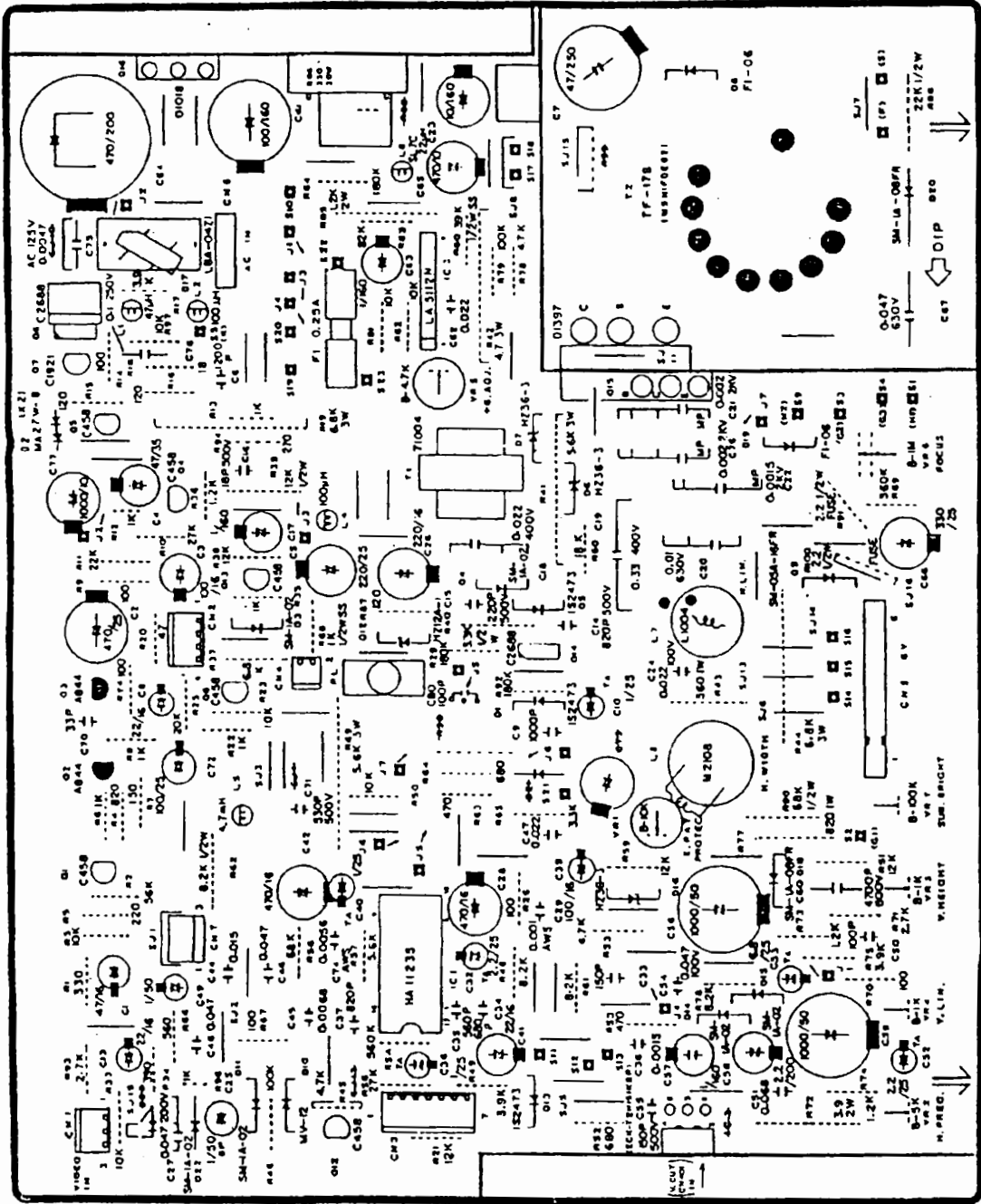
<u>Symbol</u>	<u>Name</u>	<u>Rating</u>	<u>Q'ty</u>
SG302	Discharge tube	DSP-301N	1
SG303	Discharge component	SP-10N	1
SG304	Discharge component	SP-10N	1
R302	Resistor 2W self-isolating	2WH 3.3	1
R302	Solid resistor	¼WS 470	1
R303	Resistor 1/2W	½W 100K	1
R304	Resistor 1/2W	½W 100K	1
R305	Resistor 1/2W	½W 680K	1
R306	Solid resistor	¼WS 470	1
	CRT PWB	M-7360/CRT8	1
	CRT socket	CRT8PWB	1
	Radiator	S120 PVM171	1
	Radiator	S121 PVM171	1
	Radiator	A811 CDH14NR	1
	Cord stopper	SR5P-4	1
	Knob	18N	4
	Earth wire	L-1150-1	1
	Earth spring	S392-1201-1	2
	Rubber leg	K3220W	4
	Excursion	17M	1
	V. OUT. SUB. PCS	M7401	1
R401	Metal oxide register R (H)	ERG 2ANJ821H	1
R402	Metal oxide register R (H)	ERG 1ANJ103H	1
R403	Metal oxide register R (H)	ERG 2ANJ102H	1
R404	Metal oxide register R (H)	ERG 2ANJ102H	1
R405	1/4W-R (H)	ERD 25PJ 3R9	1
R406	1/4W-R (H)	ERD 25PJ 1R0	1
D401	Diode	V06C	1
D402	Diode	V06C	1
D403	Diode	1S2076	1
D404	Diode	1S2076	1
Q401	Transistor G	2SC2688	1
Q402	Transistor D	2SD1138C	1
Q403	Transistor D	2SD1138C	1
C401	Electrolytic capacitor	CE4U2E2R2	1
C402	Electrolytic capacitor	SM50VB-33M	1
C403	Ceramic capacitor	CC45SL2H151KYA	1
CN401	Housing CAP	PI-051-5F	1
	Post	PI-051-5M	1
	Connection pin	706312-2M	5
	Radiator	S656-TMC-17H	1
	Washer	YC40B	2
	Insulating plate	S-7	2



**WARNING:**  
HIGH VOLTAGE  
DANGEROUS TO HAND  
HANDLE WITH CARE  
DANGER TO LIFE  
DANGER TO PROPERTY

SYNC IN	M-BR
VIDEO IN	M-BR
AC IN	two-core 1.7mm
Connecting Plug Plate	Phenol and UL-Y4V-0 Connecting Plug Plate HOT 2.0T
Painting Color	10GY 60S/0.5 laser tone
Right Name Plate	Black Hair Line
Front Name Plate	White Hair Line
Knob	19-N
Type Name	VD-401A
Product	Sketch Drawing
Name Drawing No.	M-726015

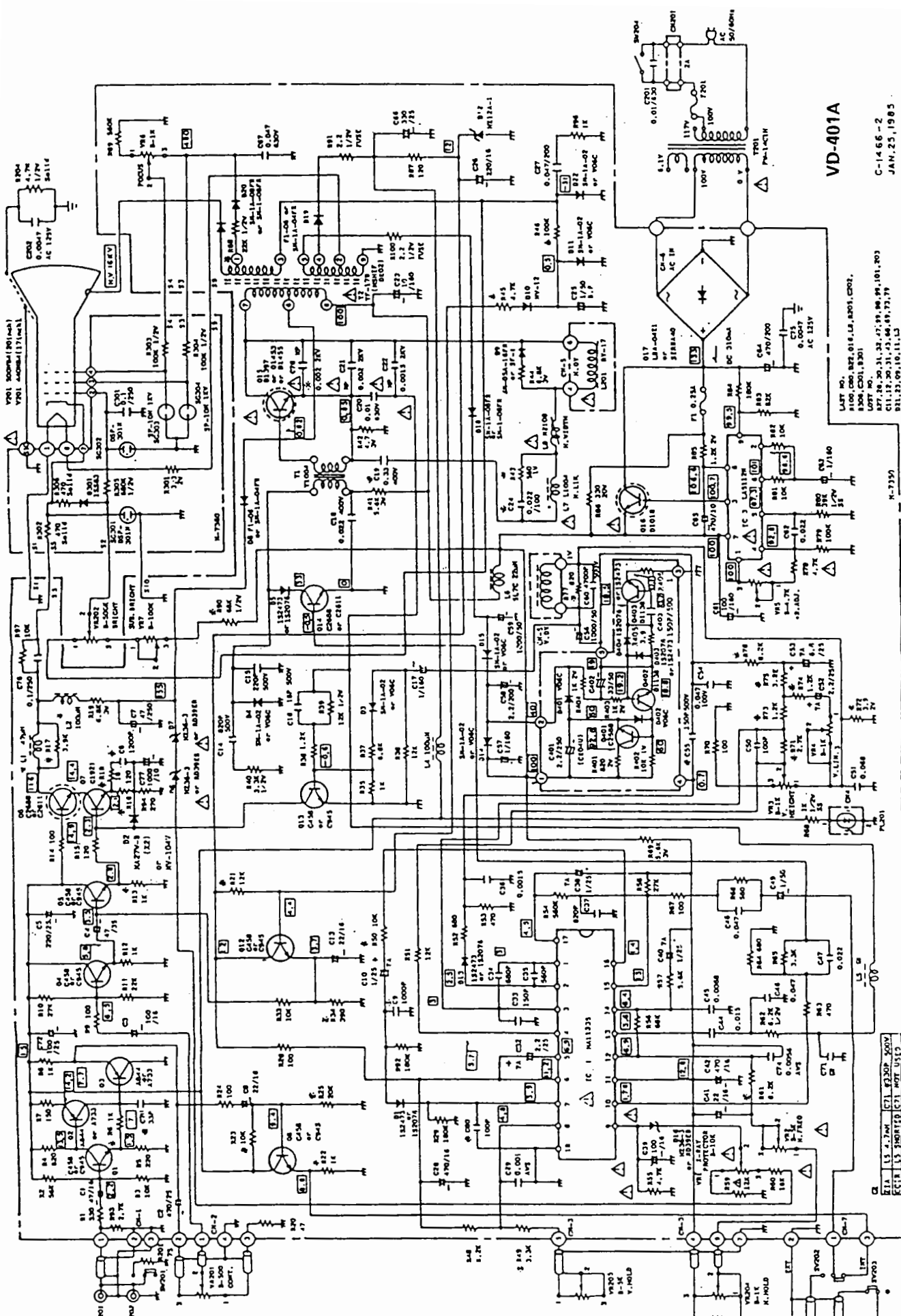
Outline General Tolerance ± 10



E1A	L5 4.7mH	C71	47250P 500V
CC18	L3 SHORTED	C71	NOT USED

VD-401A

D-019  
 AUG. 8, 1966  
 REV.D  
 NOV. 3, 1966



**VD-401A**

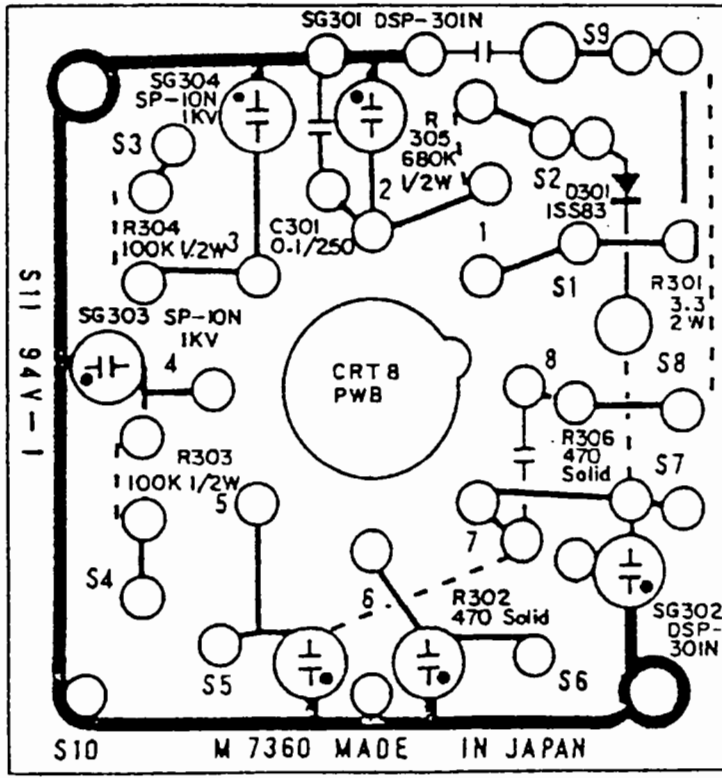
C-1466-2  
JAN. 25, 1985  
REV. D

LIST NO. 822,016,11,2001,2002,  
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877,20,20,31,32,37,39,94,94,101,203  
811,12,20,31,32,36,48,73,79  
911,23,09,10,11,13

K-7350

1. All marked parts are critical components affecting substitution.
2. Resistor values are in ohms.
3. Resistor values are in 1/2 watt.
4. Resistor values are in 1 watt.
5. Resistor values are in 5 watt.
6. 1/2Watt, small resistors (100,50).

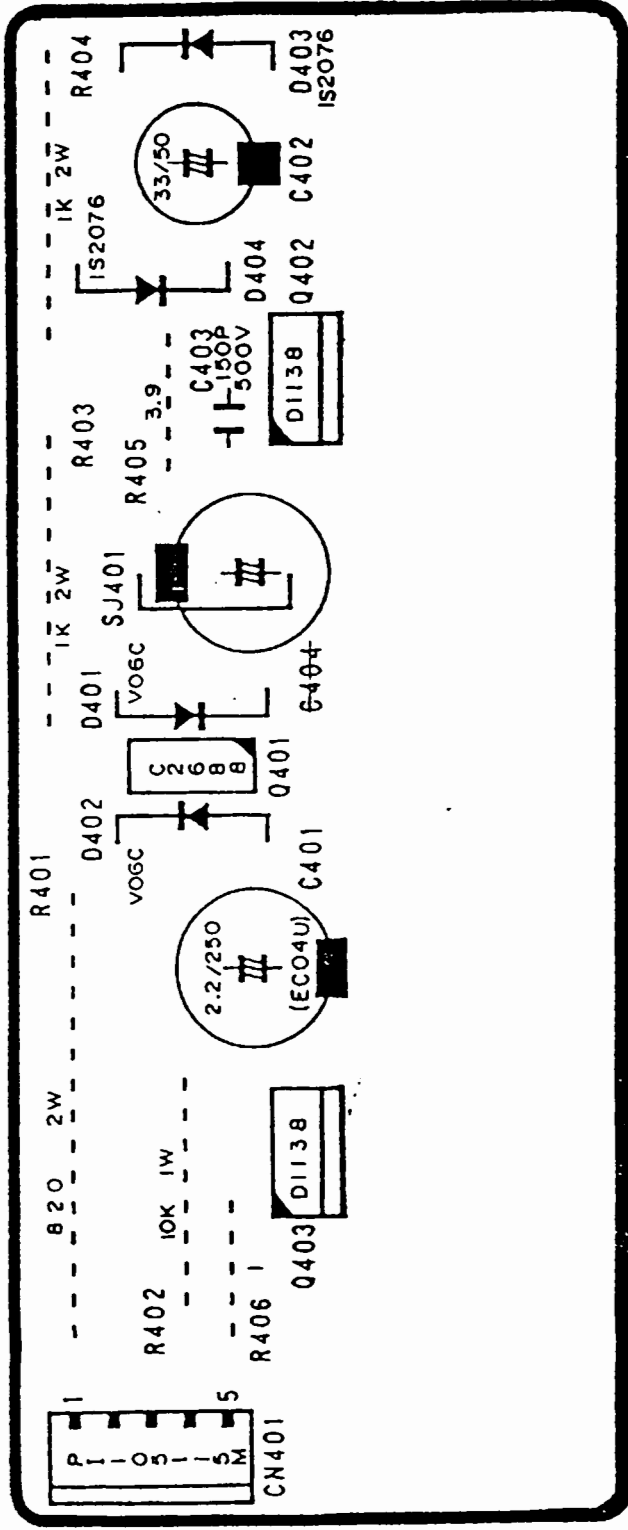
100K  
Resistor values are in ohms.  
Resistor values are in 1/2 watt.  
Resistor values are in 1 watt.  
Resistor values are in 5 watt.  
Resistor values are in 10 watt.  
Resistor values are in 50 watt.



CRT PCB

VD-401A

C-1465-1  
 JAN.26,1985



V. OUT, SUB. PCB  
 TMC - 17H SERIES  
 TMC - 20H  
 E-0078  
 9, JULY 1966



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The model and serial number of your instrument are identified on the rear or bottom of the unit. Write the model and serial number in the spaces provided below. Whenever you call your distributor concerning this instrument, these two pieces of information should be mentioned for quick and accurate service.

Model \_\_\_\_\_

Serial number \_\_\_\_\_

YOUR DISTRIBUTOR