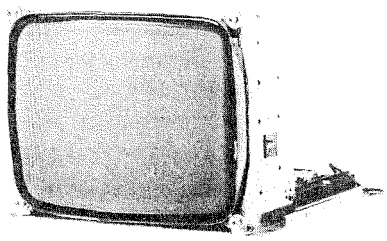
# Service Manual

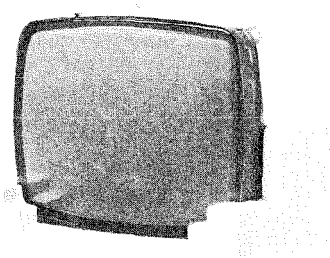
CRT Data Display

## MODEL M-900 ××× Series
## Chassis No. Y08A
## Chassis Family No. 9Y08
## MODEL M-1200 ××× Series
## Chassis No. Y08
## Chassis Family No. 12 Y08

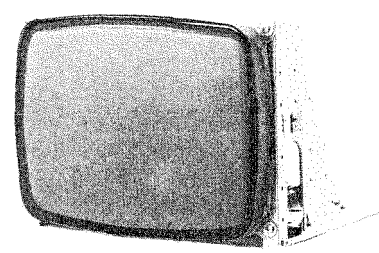


Model
M-9004NA, M9009NA
M-9001NA, M-9009A
Direct Drive Input

Model
M-C9004N, M-C9001N
Compsite Video Input



Model
M-K12004NB, M-K12001NB
Direct Drive Input Kit Type



Model
M-12004NB
Direct Drive Input

Model
M-C12004N, M-C12001N
M-C12009N
Compsite Video Input

Model
M-12021PB, M-12021NB
M-12041NB
H.OSC Internal Type

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Panasonic®

Matsushita Electric

# SAFETY PRECAUTIONS

## 1-1 CAUTION:

No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guide lines.

## 1-2 SAFETY CHECK

Care should be taken while servicing this CRT display because of the high voltage used in the deflection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.

## 1-3 FIRE & SHOCK HAZARD

1-3-1 Insert an isolation transformer between the CRT display and AC power line before servicing chassis.

1-3-2 In servicing pay attention to original lead dress especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated.

1-3-3 All the protective devices must be reinstalled per original design.

1-3-4 Soldering must be inspected possible for cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.

## 1-4 LEAKAGE CURRENT COLD CHECK (AC power supply model only)

1-4-1 Unplug the AC cord and connect a jumper between the two prongs on the plug.

1-4-2 Turn the CRT display power switch on.

1-4-3 Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metallic part on the CRT display such as metal frame, screwhead, control shafts, etc.
When the exposed metallic part has a return path to the chassis, the reading should be 1.8 megohm minimum.

## 1-5 LEAKAGE CURRENT HOT CHECK (AC power supply model only)

1-5-1 Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during this check.

1-5-2 Connect a 1500 ohm, 10 watt resistor, paralleled by a 0.15μF capacitor between each exposed metallic part and good earth ground (as shown in Fig. 1).

1-5-3 Use an AC voltmeter with 1000 ohm/volt or more sensitivity and measure the AC voltage across the combination 1500 ohm resistor and 0.15μF capacitor.

1-5-4 Move the resistor connection to each exposed metallic part and measure the voltage.

1-5-5 Reverse the polarity of the AC plug in the AC outlet and repeat the above measurement.

1-5-6 Voltage measured must not exceed 7.5 volt RMS, from any exposed metallic part to ground. A leakage current tester may be used in the above hot check, in which case any current measured must not exceed 5.0 milliamp. In the case of a measurement exceeding the 5.0 milliamp value, a rework is required to eliminate the chance of a shock hazard.

Note: High voltage is present when this CRT display is operating. Always discharge the anode of the picture tube to the display monitor chassis to prevent shock hazard.

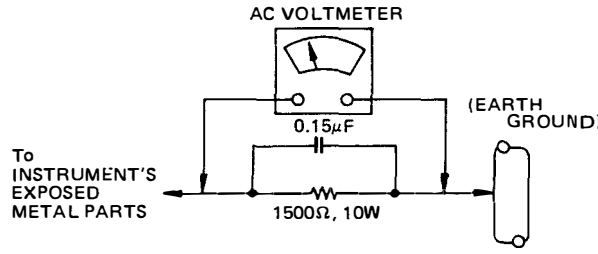



**Fig. 1**

## 1-6 IMPLOSION PROTECTION

All Panasonic picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation. Use only Panasonic replacement picture tubes.

## 1-7 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 X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory-recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

1-7-1 To measure the high voltage, use a high impedance high voltage meter.
Connect (-) to chassis and (+) to the CRT anode button.

1-7-2 Turn the Brightness control fully counterclockwise.

1-7-3 Measure the high voltagg. The high voltage meter should indicate at the following factory-recommended level.

1-7-4 If the upper meter indication exceeds the maximum level, immediate service is required to prevent the possiblity of premature component failure.

1-7-5 To prevent X-Radiation possibility, it is essential to use the specified picture tube.

1-7-6 The following are the nominal and maximum high voltage at zero beam current at rated voltage.

| Model | Nominal | Maximum |
|---|---|---|
| M-900xxx | 11kV | 14.5kV |
| M-1200xxx | 14kV | 17.0kV |

## IMPORTANT SAFETY NOTICE

There are special components used in Panasonic CRT displays which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X-RADIATION, shock, fire or other hazards. Do not modify the original design without written permission of the Panasonic company or this will void the original parts and labor guarantee.

# GENERAL INFORMATIONS

This manual contains information of the standard model designed as a data display monitor for M-900xxx Series and M-1200xxx Series.

When connecting to equipment, directly connect it to printed circuit board input terminal through 10-pin card edge connector.

In addition, +B is supplied from the outside through 10-pin card edge connector, operating the monitor on +12V DC.

External brightness VR (Custmer Supply) is used by connecting it to the connector.

Features:
CRT is exceptionally superb in quality and reliability and is of non-glare type (direct etched CRT) and polish Type phospher.

The deflecting coil is a yoke equipped with 4-P magnet and is of PANASONIC's own design that permits adjustment of geometric distortion on the raster,

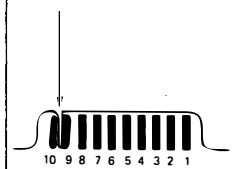
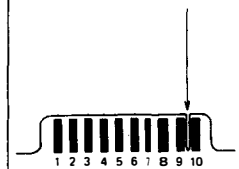
In order to meet users' requirements, frame mechanism is employed for easy adjustment of CRT setting angle.

Angle can be changed by stages such as 0°, 2.5°, 5°, 7.5° and 10°.

Chassis is fully equipped with ICs:
Vertical deflection
H.P.C. (horizontalphase control)
H.AFC/OSC

F.B.T is sealed up for assuring high quality and reliability.

All connections are equipped with connectors to make servicing easier.

| TYPE | A Type | B Type |
|---|---|---|
| Edge Connector | Key way slot<br>  <br><br>(Foil side) | Key way slot<br>  <br><br>(Foil side) |
| P.C.B. No. | TNP81896 | TNP81894 |

| MODEL NO. | Construction and Input Connector Type | Input Signal Type | CRT Phosper |
|---|---|---|---|
| M-9001NA | Flame A | Separate | P31 Green Nonglare |
| M-9004NA | Flame A | Separate | P4 White Nonglare |
| M-9009NA | Flame A | Separate | P39 Yellowish-Green Nonglare |
| M-9009A | Flame A | Separate | P39 Yellowish-Green Polish |
| M-C9001N | Flame A | Compsite | P31 Green Nonglare |
| M-C9004N | Flame A | Compsite | P4 White Nonglare |
| M-12004NB | Flame B | Separate | P4 White Nonglare |
| M-12021NB | Flame B | Separate | P31 Green Nonglare |
| M-12021PB | Flame B | Separate | P31 Green Polish |
| M-12041NB | Flame B | Separate | P31 Green Nonglare |
| M-C12001N | Flame B | Compsite | P31 Green Nonglare |
| M-C12004N | Flame B | Compsite | P4 White Nonglare |
| M-C12009N | Flame B | Compsite | P39 Yellowish-Green Nonglare |
| M-K12001NB | Kit B | Separate | P31 Green Nonglare |
| M-K12004NB | Kit B | Separate | P4 White Nonglare |

# CRT DATA DISPLAY SPECIFICATIONS

## SEPARATE TYPE MODEL

## ELECTRICAL CHARACTERISTICS

| | 9" M-9001NA M-9004NA M-9009NA M-9009A | 12" M-12004NB M-12021PB M-12021NB M-K12001NB M-K12004NB | 12" M-12041NB |
|---|---|---|---|
| **Power Requirements:** | DC12V 1.0A max. | DC12V 1.3A max. | DC12V 1.4A max. |
| **Signal Input:** | | | |
| Video Input Signal | Black level = 0 +0.4V −0.0V<br>White level = 4 ±1.5V | Black level = 0 +0.4V −0.0V<br>White level = 4 ±1.5V | Black level = 0 +0.4V −0.0V<br>White level = 4 ±1.5V |
| Input Impedance | 300 ohms min. 40pF max. | 300 ohms min. 40pF max. | 300 ohms min. 40pF max. |
| **Vertical Input Sync Signal:** | | | |
| Active Polarity | Positive | Positive | Positive |
| Pulse Rate | 60.0Hz | 60.0Hz | 60.0Hz |
| Amplitude | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V |
| Input Impedance | 1K ohm min. 40pF max. | 1K ohm min. 40pF max. | 1K ohms min. 40pF max. |
| **Horizontal Input Sync Signal:** | | | |
| Actice Polarity | Positive | Positive | Positive |
| Pulse Rate | 15.75KHz | 15.75KHz | 18.96KHz ±0.5KHz |
| Amplitude | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V | Low = 0 +0.4V −0.0V<br>High = 4 ±1.5V |
| Input Impedance | 2K Ohms min. 40pF max. | 2K ohms min. 40pF max. | 2K ohms min. 40pF max. |
| **Video Amplifier Bandwidth:** | 25MHz typ | 25MHz typ | 25MHz typ |
| Rise/Fall Time | 15ns/15ns typ | 15ns/15ns typ | 15ns/15ns typ |
| **Resolution:** | 800 TV lines typ (CRT Center) | 1000 TV lines typ | 1000 TV lines typ (CRT Center) |
| **Character Area:** | | | |
| Vertical | 4.33 ±0.2" (110 ±5mm) | 5.91 ±0.2" (150 ±5mm) | 5.91 ±0.2" (150 ±5mm) |
| Horizontal | 6.30 ±0.2" (160 ±5mm) | 8.46 ±0.2" (215 ±5mm) | 8.46 ±0.2" (215 ±5mm) |
| **Blanking Time:** | | | |
| Vertical | 1000μs min. | 1000μs min. | 840μs min. |
| Horizontal | 10μs min. | 10μs min. | 10μs min. |
| **Deflection Linearity:** | | | |
| Vertical/Horizontal | 10% max. | 10% max. | 10% max. |
| **Geometric Distortion:** | | | |
| Vertical/Horizontal | Within 1.5% measured with standard EIA ball chart | Within 1.5% measured with standard EIA ball chart | Within 1.5% measured with standard EIA ball chart |
| **Operating Ambient Temperature:** | 0 ~ 55°C | 0 ~ 55°C | 0 ~ 55°C |
| **Storage Temperature:** | −40 ~ +65°C | −40 ~ +65°C | −40 ~ +65°C |
| **Operating Humidity:** | 5 ~ 90% (Non-Condensing) | 5 ~ 90% (Non-Condensing) | 5 ~ 90% (Non-Condensing) |
| **Operating Altitude:** | 0 ~ 10,000 Feet (3,000m) | 0 ~ 10,000 Feet (3,000m) | 0 ~ 10,000 Feet (3,000m) |
| **Storage Altitude:** | 0 ~ 40,000 Feet (12,000m) | 0 ~ 40,000 Feet (12,000m) | 0 ~ 40,000 Feet (12,000m) |

## PHYSICAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| **Dimension:** | | | |
| Height | 6.84" (174mm) | 8.98" (228mm) | 8.99"(228.3mm) |
| Width | 9.49" (241mm) | 11.46" (291mm) | 11.47" (291.4mm) |
| Depth | 8.90" (226mm) | 11.62" (295mm)<br>* Not application are Kit Types | 10.84" (274.4mm) |
| **Weight:** | 6.0 lbs. (2.7kg) | 12.1lbs.(5.5kg) *Kit Type 9.9lbs. | 12.1 lbs (5.5kg) |
| **Picture Tube:** | 240AHB4(N) Non-Glare (M-9004NA)<br>240AKB31(N) Non-Glare (M-9001NA)<br>240AKB39(N) Non-Glare (M-9009NA)<br>240AMB39MD Polish (M-9009A)<br>Visual 9" 90° def.<br>20mm dia. | 310JLB4(N) Non-Glare (M-12004NB/M-K12004NB)<br>310JLB31J Polish (M-12021PB)<br>310KRB31(N) Non-Glare (M-12021NB)<br>310JLB31(N) Non-Glare (M-12021NB/M-K12001NB)<br>Visual 12" 90° def.<br>20mm dia. | 310JLB31(N) Non-Glare (M-12041NB)<br>Visual 12" 90° def.<br>20mm dia. |
| **Tilt Angle:** | 10° | 10° * Not applicable to Kit Type | 10° |

## COMPOSITE TYPE MODEL

## ELECTRICAL CHARACTERISTICS

| | 9" M-C9004N M-C9001N | 12" M-C12001N M-C12004N M-C12009N |
|---|---|---|
| **Power Requirements:** | DC 12V 1.0A max. | DC 12V 1.3A max. |
| **Signal Input:** | | |
| Signal LeveL Amplitude | 0.5 ~ 2.0Vp-p/Composite<br>1Vp-p Nominal | 0.5 ~ 2.0Vp-p/Composite<br>1Vp-p Nominal |
| Sync Signal Ratio | 25% ~ 35%<br>30% Nominal | 25% ~ 35%<br>30% Nominal |
| Vertical Sync Signal | 60Hz | 60Hz |
| Horizontal Sync Signal | 15.75KHz | 15.75KHz |
| Polarity | Video-Positive, Sync-Negative | Video-Positive, Sync-Negative |
| Input Impedance | 75 ohms | 75 ohms |
| **Video Amplifier Bandwidth:** | 15MHz typ | 15MHz typ |
| Rise/Fall Time | 20ns/20ns typ | 20ns/20ns typ |
| **Resolution:** | 800 TV lines typ (CRT Center) | 1000 TV lines typ |
| **Character Area:** | | |
| Vertical | 4.33 ±0.20" (110 ±5mm) | 5.91 ±0.20" (150 ±5mm) |
| Horizontal | 6.30 ±0.20" (160 ±5mm) | 8.46 ±0.20" (215 ±5mm) |
| **Blanking Time:** | | |
| Vertical | 1000μs min. | 1000μs min. |
| Horizontal | 10μs min. | 10μs min. |
| **Deflection Linearity:** | | |
| Vertical | 10% max. | 10% max. |
| Horizontal | 10% max. | 10% max. |
| **Geometric Distortion:** | | |
| Vertical/Horizontal | Within 1.5% measured with standard EIA ball chart | Within 1.5% measured with standard EIA ball chart |
| **Operating Ambient Temperature:** | 0 ~ 55°C | 0 ~ 55°C |
| **Storage Temperature:** | –40 ~ +65°C | –40 ~ +65°C |
| **Operating Humidity:** | 5 ~ 90% (Non-Condensing) | 5 ~ 90% (Non-Condensing) |
| **Operating Altitude:** | 0 ~ 10,000 Feet (3,000m) | 0 ~ 10,000 Feet (3,000m) |
| **Storage Altitude:** | 0 ~ 40,000 Feet (12,000m) | 0 ~ 40,000 Feet (12,000m) |

## PHYSICAL CHARACTERISTICS

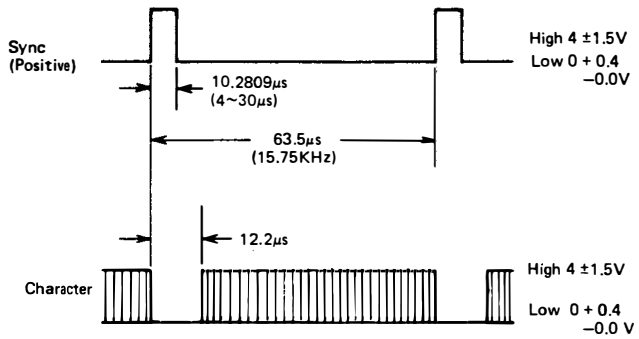
| | | |
|---|---|---|
| **Dimension:** | | |
| Height | 6.77" (172mm) | 8.98" (228mm) |
| Width | 9.49" (241mm) | 11.46" (291mm) |
| Depth | 9.47" (240.6mm) | 11.62" (295mm) |
| **Weight:** | 6.0 lbs. (2.7kg) | 12.1 lbs. (5.5kg) |
| **Picture Tube:** | 240AHB4(N) Non-Glare<br>(M-C9004N)<br>240AKB31(N) Non-Glare<br>(M-C 9001N)<br>Visual 9" 90° def. 20mm dia. | 310JLB4(N) Non-Glare<br>(M-C12004N)<br>310JLB31(N) Non-Glare<br>(M-C12001N)<br>310RKB39(N) Non-Glare<br>(M-C12009N)<br>Visual 12" 90° def. 20mm dia. |
| **Tilt Angle:** | 10° | 10° |

# TIMING CHART

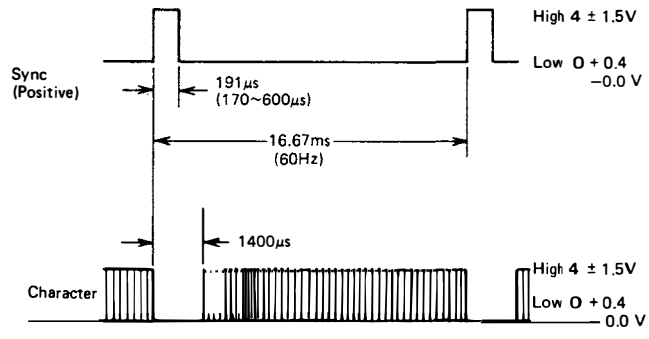
## Direct Drive Input type
## M-9001NA, M-9004NA, M-9009NA, M-9009A
## M-12004NA, M-12004NB, M-K12004NB

## H.OSC Internal type
## M-12021PB, M-12021NB

### Horizontal Sync Timing



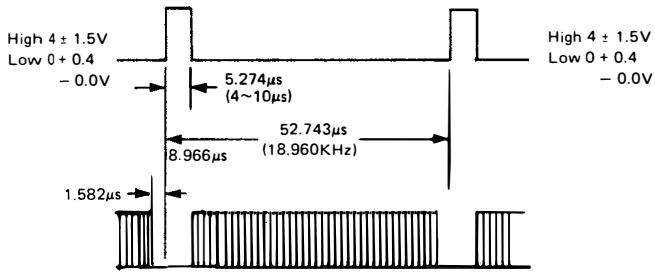

### Vertical Sync Timing



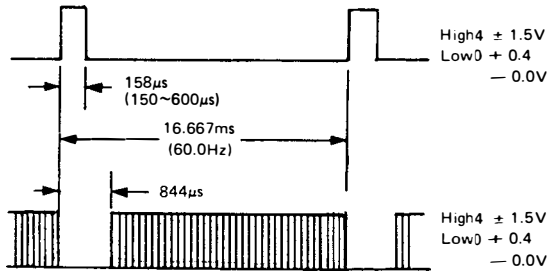

Note: Time Tolerance : ±0.1%
Sample unit is adjusted according to this timing and frequency.

## H.OSC Internal type
## M-12041NB

### Horizontal Sync




### Vertical Sync

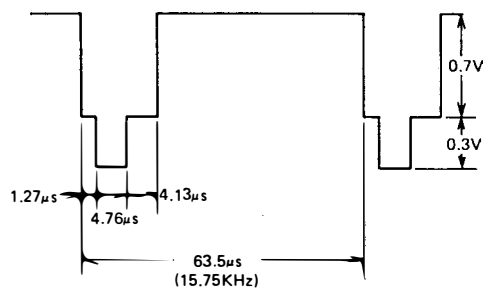



Note: Time Tolerance : ±0.1%
Sample unit is adjusted according to this timing and frequency.

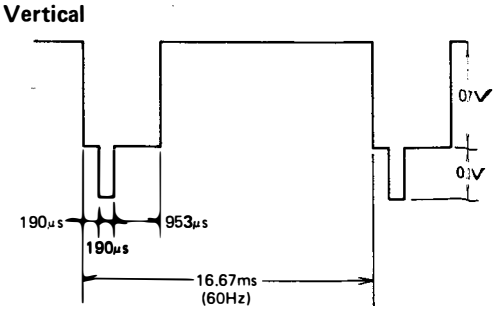
## Composite Input type
## M-C9001N, M-C9004N, M-C
## M-C12001N, M-C12004N, M-C12009N

Timing chart defined in EIA-RS-170

### Horizontal



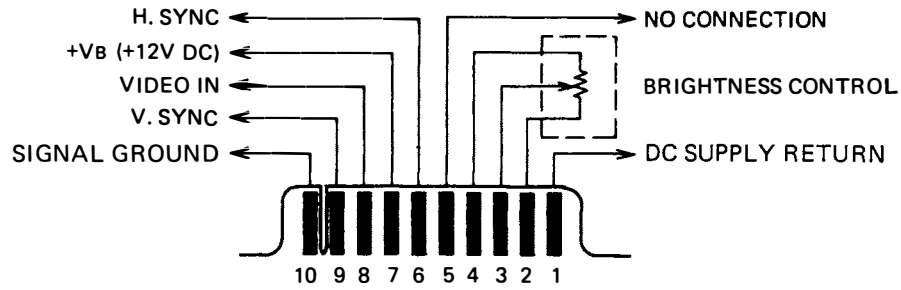

### Vertical




Note: Time Tolerence : ±0.1%
Sample unit is adjusted according to this timing and frequency.

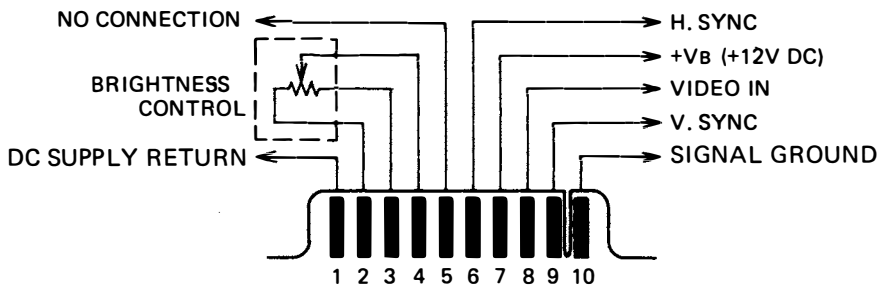
# CONNECTOR WIRING

## CONNECTOR TYPE [A] Model M-9004NA, M-9001NA, M-9009NA, M-9009A

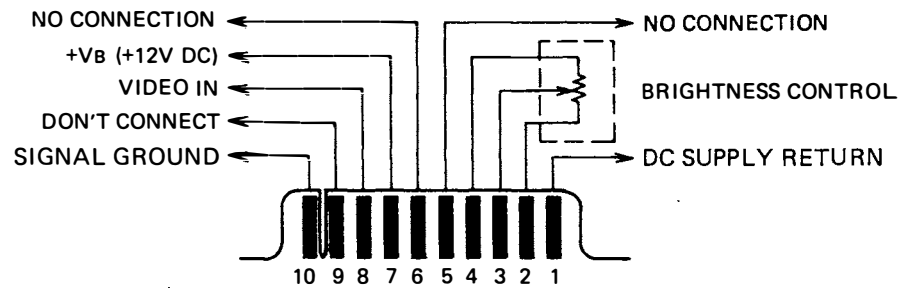



(FOIL SIDE)

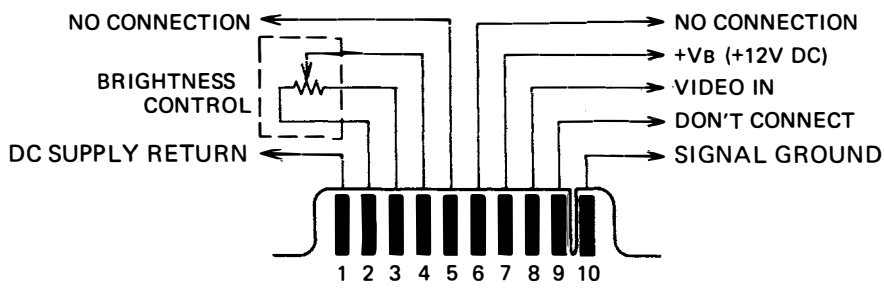
## CONNECTOR TYPE [B] Model M-12004NB, M-K12001NB, M-K12004NB, M-12021NB, M-12021PB, M-12041NB




## CONNECTOR TYPE [A] Model M-C9004N, M-C9001N




## CONNECTOR TYPE [B] Model M-C12001N, M-C12004N, M-C12009N



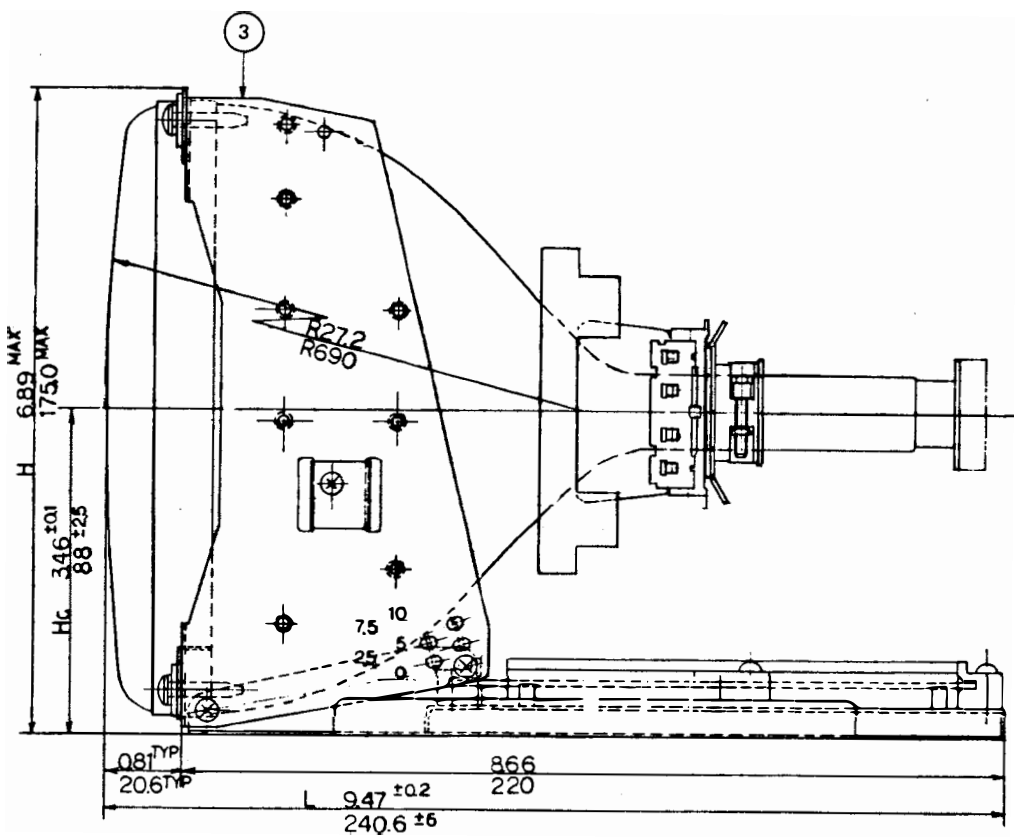
# DIMENSION

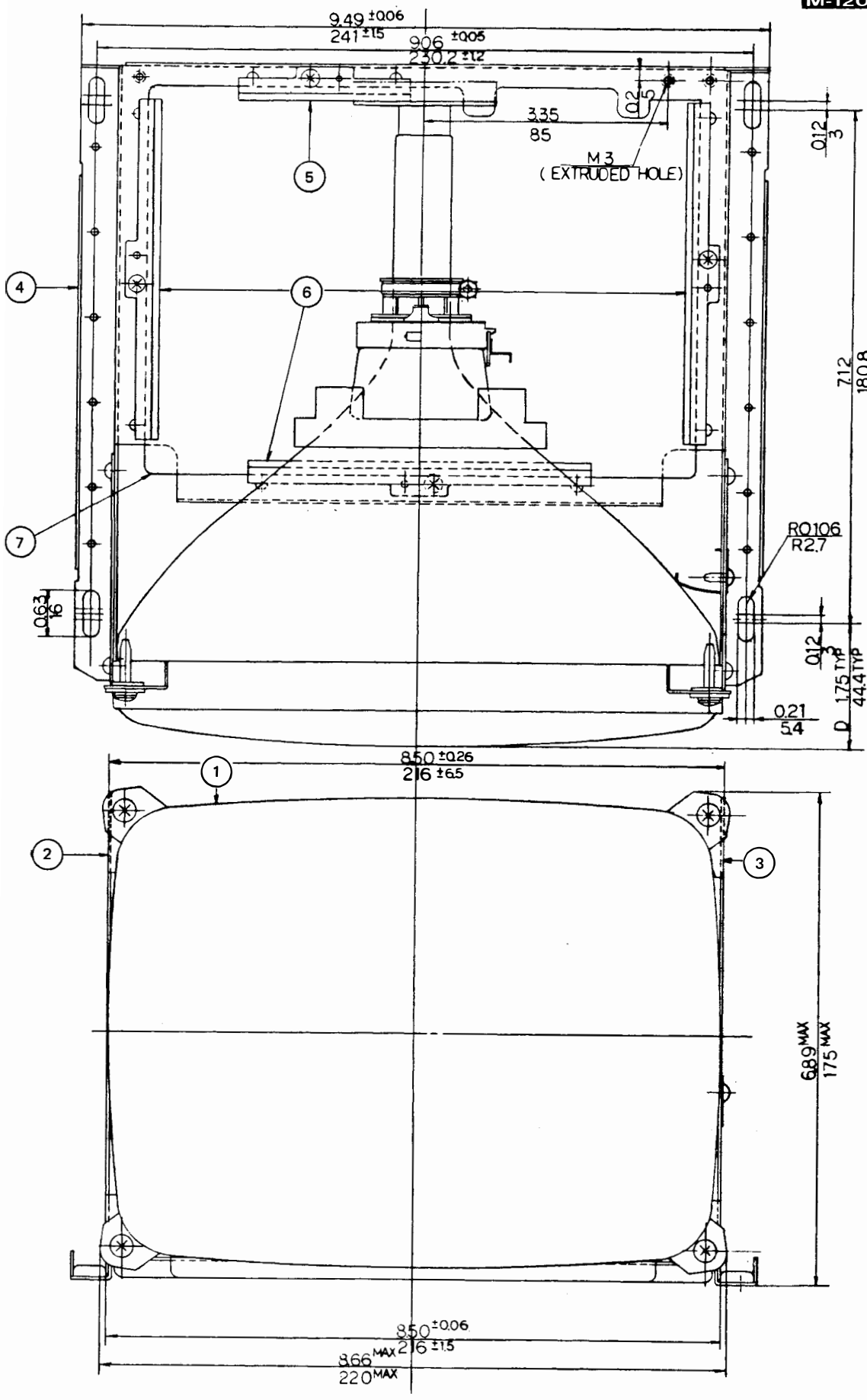
## ■MODEL M-900×××Series

| CRT TILT | H MAX | ±0.1 Hc ±2.5 | D | ±0.2 L ±5 |
|---|---|---|---|---|
| 0° | 6.89 175.0 | 3.46 88.0 | 1.75 44.4 | 9.47 240.6 |
| 2.5° | 6.90 175.2 | 3.51 89.1 | 1.61 40.8 | 9.33 237.0 |
| 5° | 6.89 175.0 | 3.55 90.1 | 1.46 37.2 | 9.19 233.4 |
| 7.5° | 6.87 174.5 | 3.58 90.9 | 1.32 33.5 | 9.04 229.7 |
| 10° | 6.84 173.7 | 3.61 91.6 | 1.17 19.8 | 8.90 226.0 |

| Sym | Part Name | qt. | Note |
|---|---|---|---|
| ① | CRT | 1 | |
| ② | CRT FIXING METAL | 1 | LEFT |
| ③ | CRT FIXING METAL | 1 | RIGHT |
| ④ | CHASSIS FIXING METAL | 1 | |
| ⑤ | PRINTED CIRCUIT BOARD STAY | 1 | SHORT |
| ⑥ | PRINTED CIRCUIT BOARD STAY | 3 | LONG |
| ⑦ | PRINTED CIRCUIT BOARD | 1 | |

Dimension:
Upper Side: inch
Bottom Side: mm

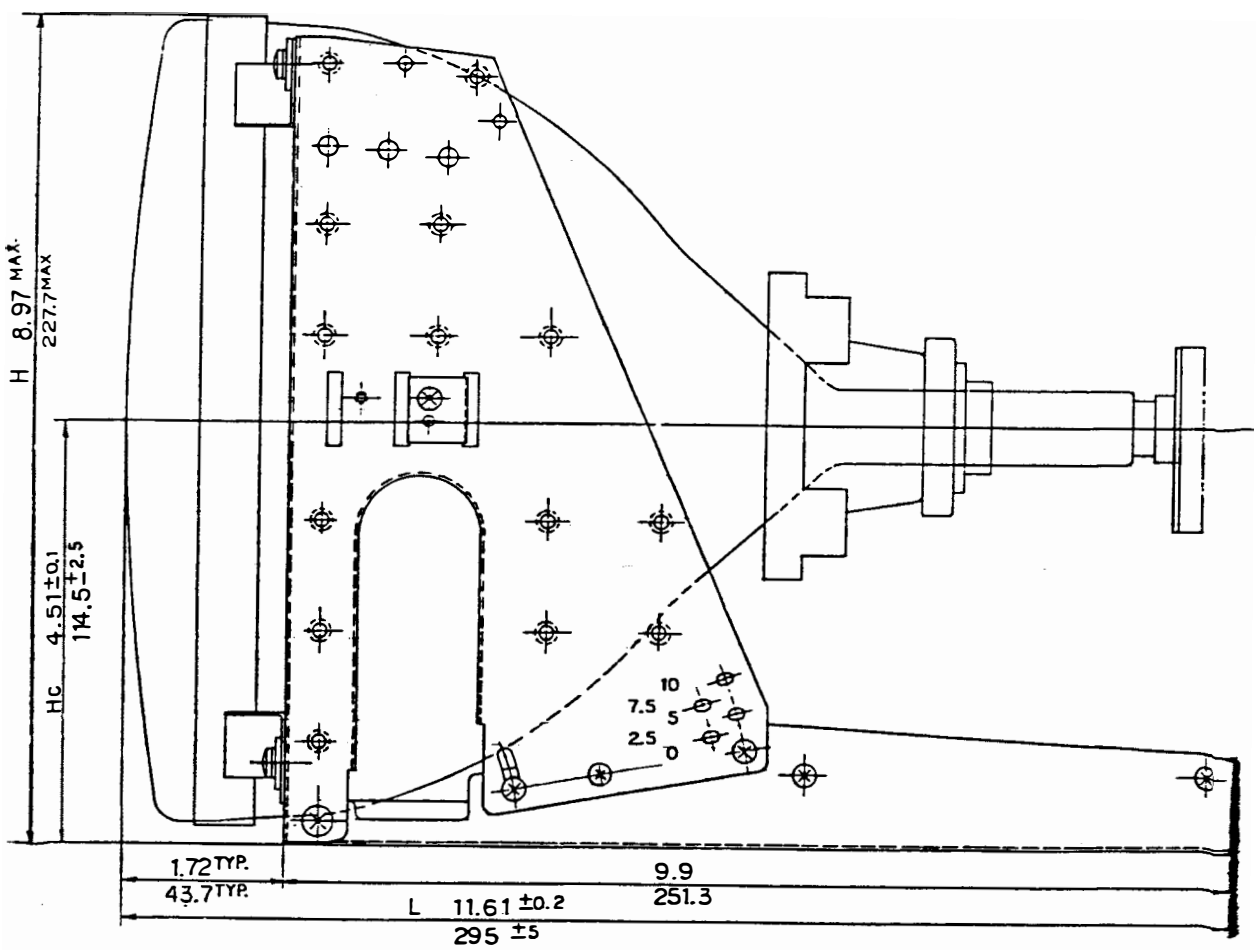


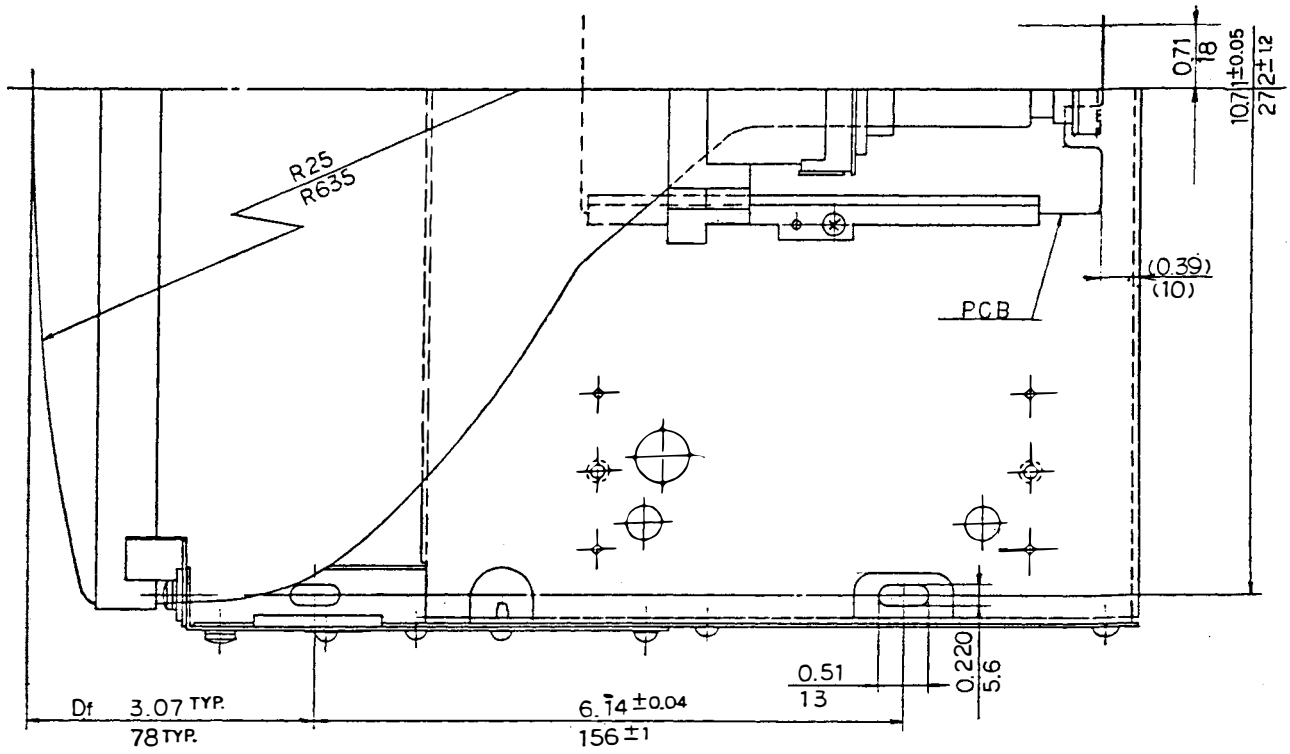

9.49 ±0.06
241 ±1.5
9.06 ±0.05
230.2 ±1.2
3.35
85
0.2
5
0.12
3
M3
(EXTRUDED HOLE)
5
4
6
7
7.12
180.8
R0.106
R2.7
0.63
16
0.12
3
1.75 TYP
44.4 TYP
0.21
5.4
8.50 ±0.26
216 ±6.5
1
2
3
6.89 MAX
175 MAX
8.50 ±0.06
216 ±1.5
8.66 MAX
220 MAX

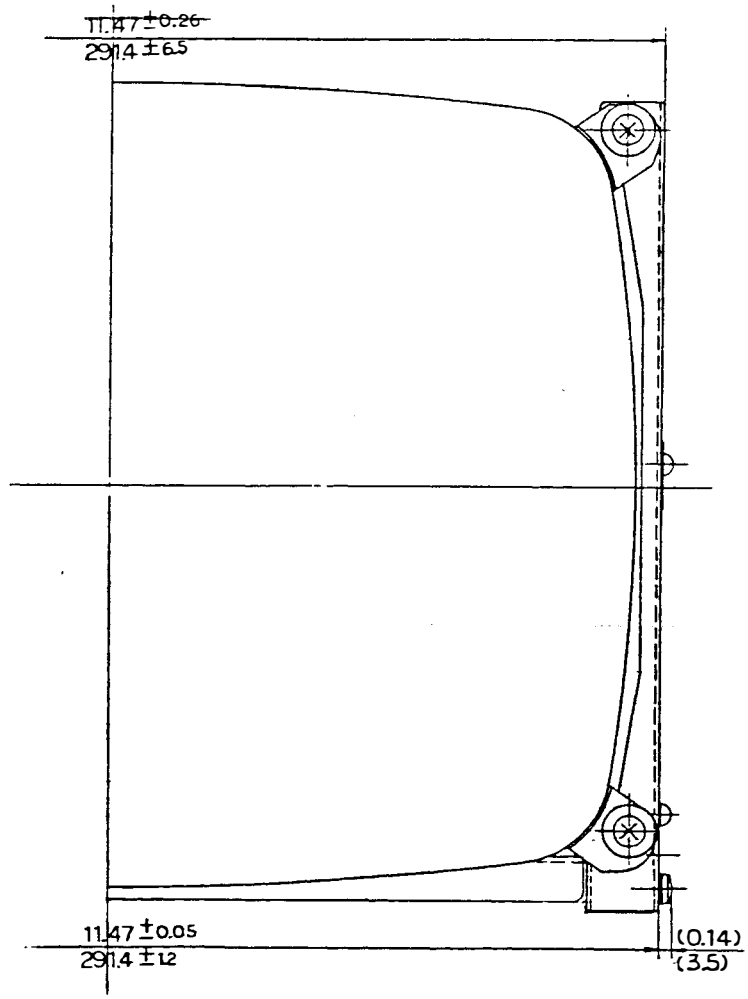
# ■MODEL M-1200×××Series

| CRT TILT | H MAX | ±0.1 HC ±2.5 | Do TYP | Dt TYP. | ±0.2 L ±5 |
|---|---|---|---|---|---|
| 10° | 8.99 228.3 | 4.81 122.1 | 3.95 100.4 | 2.30 58.4 | 10.84 275.4 |
| 7.5° | 9.03 229.3 | 4.74 120.5 | 4.15 10.55 | 2.50 63.5 | 11.04 280.4 |
| 5° | 9.06 230.0 | 4.67 118.7 | 4.34 110.4 | 2.69 68.4 | 11.24 285.4 |
| 2.5° | 9.07 230.2 | 4.59 116.7 | 4.54 115.2 | 2.88 73.2 | 11.43 290.2 |
| 0° | 8.97 227.7 | 4.51 114.5 | 4.72 120.0 | 3.07 78.0 | 11.61 295 |

Dimension:
Upper Side: inch
Bottom Side: mm

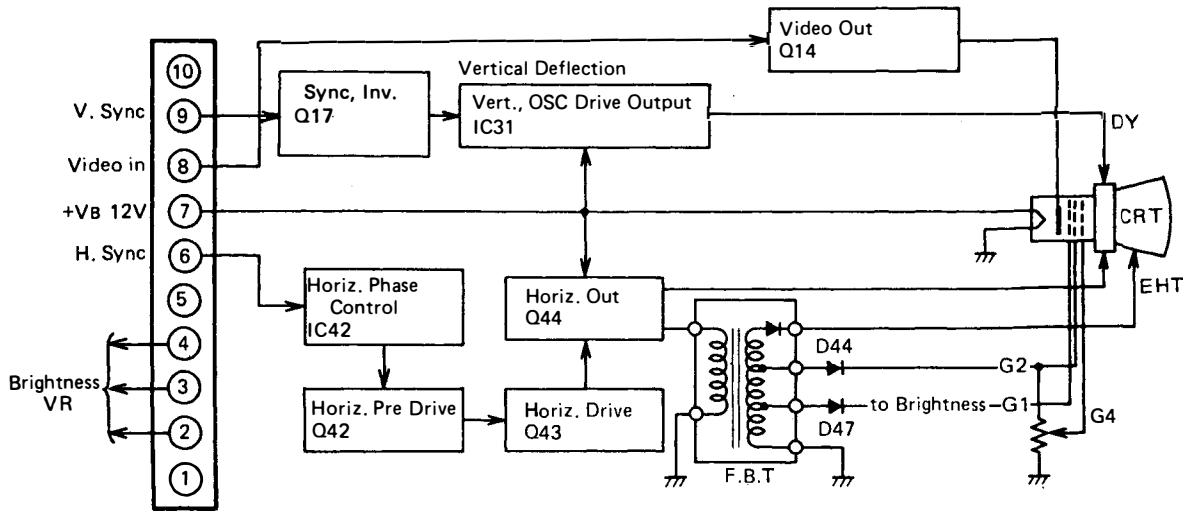



R25
R635
0.71
18
10.71±0.05
272±1.2
(0.39)
(10)
PCB
0.51
13
0.220
5.6
Df 3.07 TYP.
78 TYP.
6.14±0.04
156±1

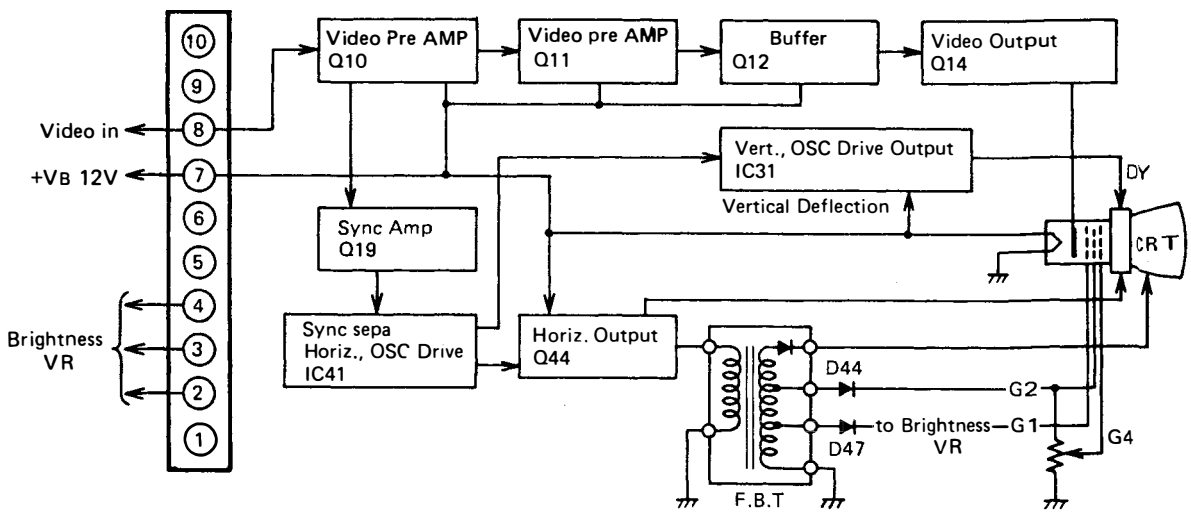

11.47±0.26
291.4±6.5
11.47±0.05
291.4±1.2
(0.14)
(3.5)

# BLOCK DIAGRAM

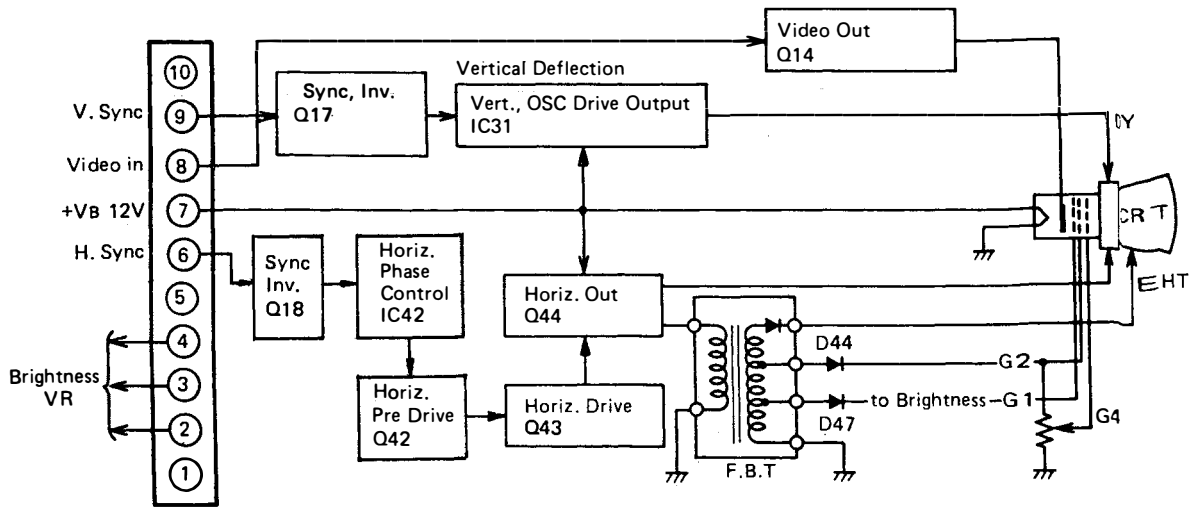
## Models M-9001NA, M-9004NA, M-9009A, M-9009A, M-12004NB, M-K12004NB, M-K12001NB




## Models M-C9001N, M-C9004N, M-C12001N, M-C12004N, M-C12009N

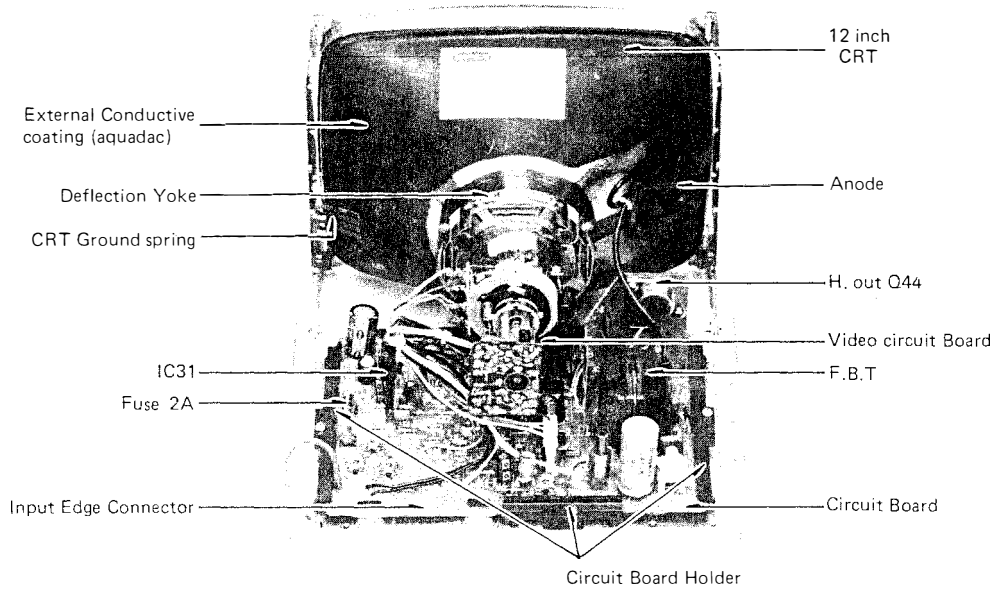



## Models M-12021PB, M-12021NB, M-12041NB

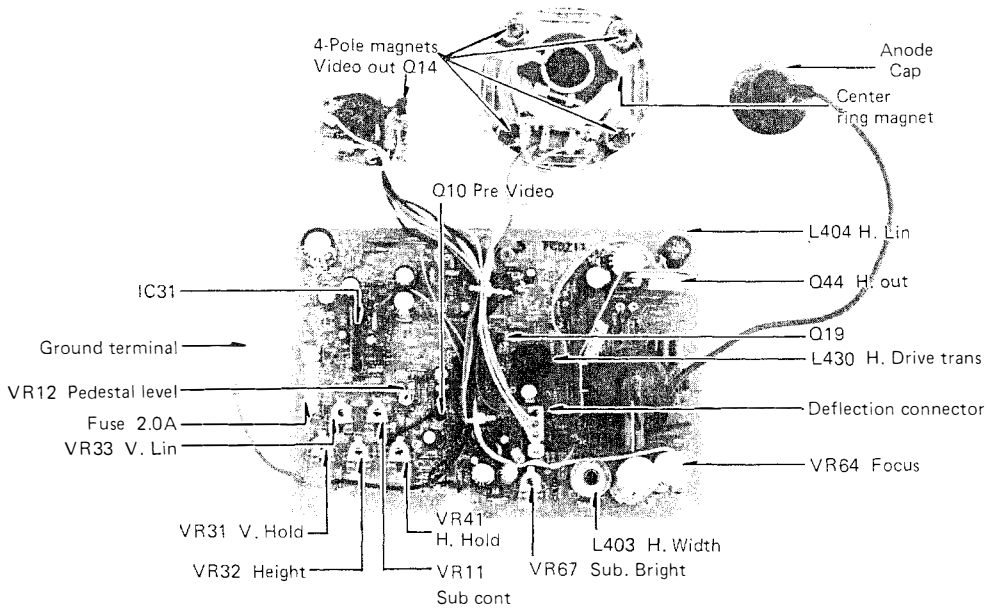


# MONITOR CIRCUIT BOARD DETAL COMPONENT LOCATION

This photograph explains model M-12004NB. However it can be applied to other models as the basic chassis is commonly used.

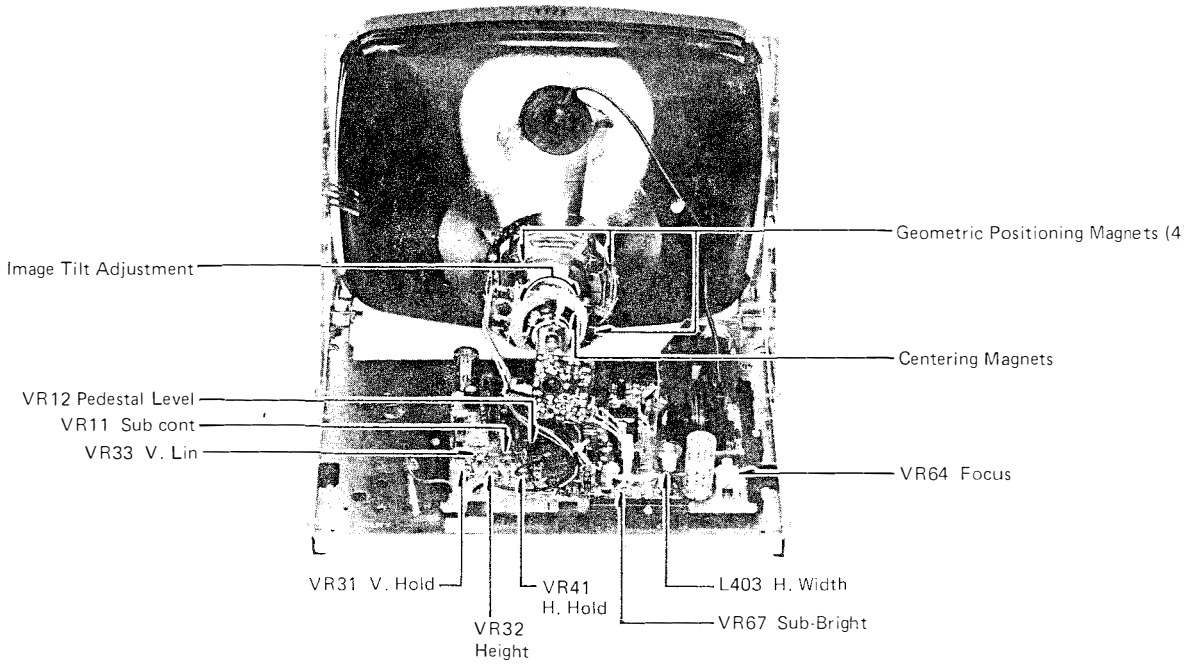



**Rear Chassis View**




**Monitor Circuit Board Detail-Component Location**

# CONTROL DESCRIPTION




**Vertical Hold (VR31):**
Stabilizes the raster vertically.

**Vertical Height (VR32):**
Adjusts the height of the active display area.

**Vertical Linearity (VR33):**
Adjusts the height of the characters within the active display area.

**Horizontal Hold (VR41):** (Compsite only)
VR41 can be considered a fine adjustment for the horizontal stability and position of the display area Adjust VR41 to center the display area.

**Horizontal Width (L403):**
Adjusts the width of the active display area.

**Sub Bright:**
This control adjust the raster brightness. (Internal)

**Brightness:**
Adjust the brightness of the raster.
(Remote of customer)

**Focus (VR64):**
Adjusts the focus in the center of the active display area. Keep the whole picture uniform and then adjust it to the best point.

**Tilt Adjustment (1):**
The tilt adjustment entails the use yoke clamp.
Loosening the yoke clamp and rotating the yoke either clockwise or counter-clockwise corrects the tilt of the raster.

**Centering Magnets (2):**
(Located on the yoke between the yoke electrical termination and the yoke clamp.) These controls are used to center the raster vertically.

**Geometric Positioning Magnets (4):**
(Located around the yoke periphery) adjusts the geometric shape of the active display area.

**Sub cont (Composite type only) VR11:**
Controls the brightness of characters by changing input signal level.

**Pedestal level (Composite type only)**
Sets the standard of pedestal level by means of VR12.

# ALIGNMENT PROCEDURE

## PREPARATION

1. Connect the 10-Pin connecter from the proper logic to the defined input signal.
2. Apply power to the CRT data display and allow the monitor to stabilize.
3. Adjust coils by means of a hexagonal tuning tool (non-metalic).
   Variable resistoer by — screw driver and deflection yoke (deflection distortion) by square tuning tool (non-metalic).
4. All controls are set at optimum position prior to shipment.

## ADJUSTMENT PROCEDURE

**• Image Tilt Adjustment**

Loosen the deflection yoke clamp and turn in the arrow directions to adjust tilt. (See Fig. 2).

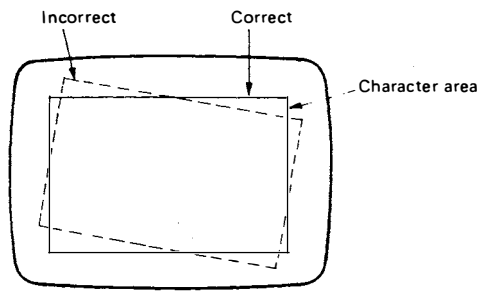



**Fig. 2**

**• Vertical Hold Adjustment**

Adjust (VR31) until the image becomes stable vertically as shown in Fig. 3.

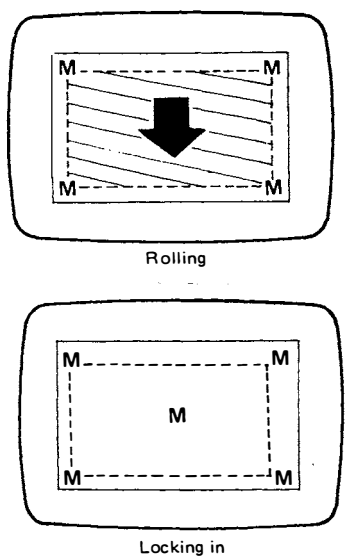



**Fig. 3**

**• Vertical Hold Adjustment**

Checking of height, width and bright should be performed more than 30 minutes after power is applied.
Measure the luminous intensity near the center of CRT and set at 50 lux ±20% (40 to 60 lux). These adjustment are performed on the basis of the input signal of Timing chart (page 6). Adjustment of picture and its associated parts should be made in the order of Sub-contrast, Sub-bright and Pedestal level.

**• Horizontal Hold Adjustment**

Turn (VR41) to set the raster area in the horizontal center of the CRT. (See Fig. 4.)

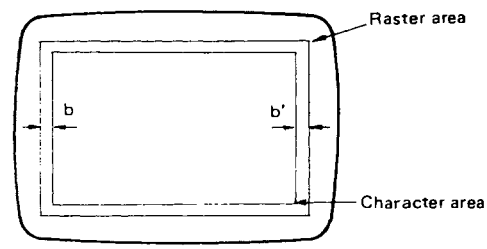



**Fig. 4**

**• Vertical Height Adjustment**

Adjust the vertical height (VR32) to set the vertical height of the active character area as shown in Fig. 5.

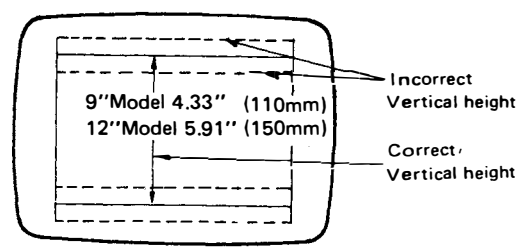



**Fig. 5**

**• Horizontal width Adjustment**

Adjust the horizontal width coil (L403) to set the proper width of the active character area as shown in Fig. 6.

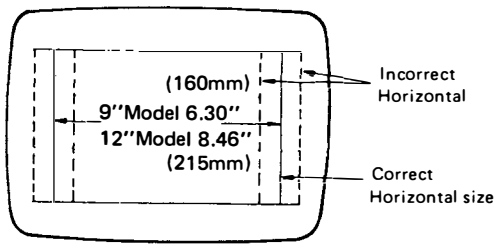



**Fig. 6**

**• Vertical Linearity Adjustment**

Adjust (VR33) for uniform character height within the active character area as shown in Fig. 7.

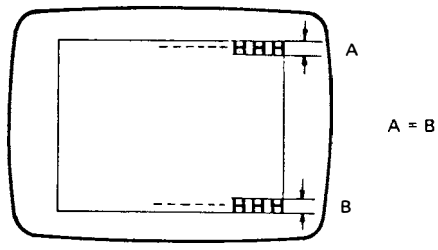



**Fig. 7**

**• Centering Magnet Adjustments**

Rotate the centering magnet tabs away from each other until the character area is centered on the screen as shown in Fig. 8.

Before this adjustment, be sure to ascertain H. hold.

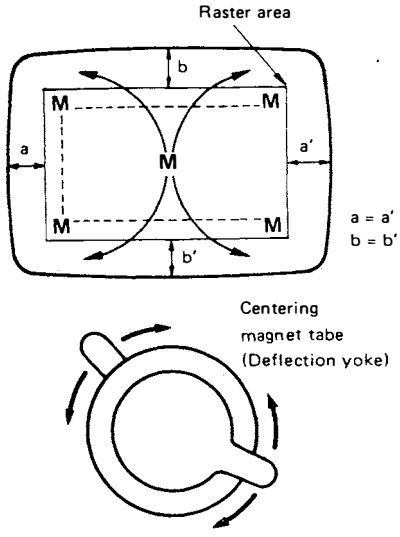



**Fig. 8**

**• Focus Control Adjustment**

Adjust (VR64) until optimum focus is seen on the characters displayed within the active character area.

**• Sub Brightness Adjustment**

Look at a place 30cm distant from the CRT surface and set at a point where the raster slightly comes out, with the brightness VR (Customer) set at MAX. In this case, fully rotate Pedestal Level clockwise. (Contrast of characters minimizes.)

**• Brightness Adjustment (Customer Supply)**

Controls the brightness of the raster by means of the external control VR (Customer Supply). Picture brightness is set at 40 lux before leaving the factory.

**• Sub Contrast Adjustment (composite type only)**

Connect an oscilloscope (with low capacity probe) to the R174 as shown in Fig. 9.

Then adjust VR11 to obtain 3.0Vp-p.

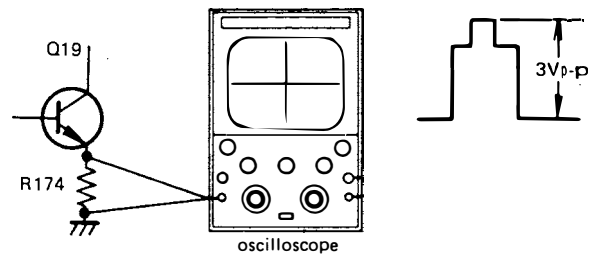



**Fig. 9**

**• Pedestal Level Adjustment (composite type only)**

After the adjustment of sub-brightness and sub-contrast, connect an oscilloscope (with low capacity probe) to the R144 as shown in Fig. 10.

Then adjust VR12 to obtain 10V DC.

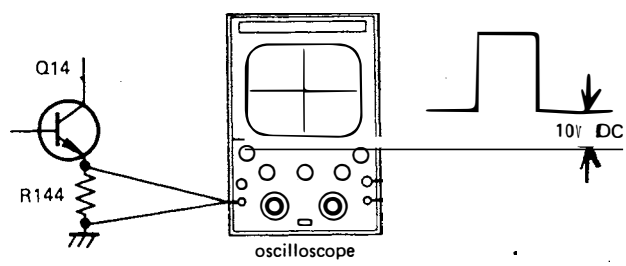



**Fig. 10**

**• Correcting Magnet of Geometric Distortion (4)**

Adjust each "Distortion Correcting Magnet" until the active character area is adjusted to the proper shape as shown in Fig. 11.

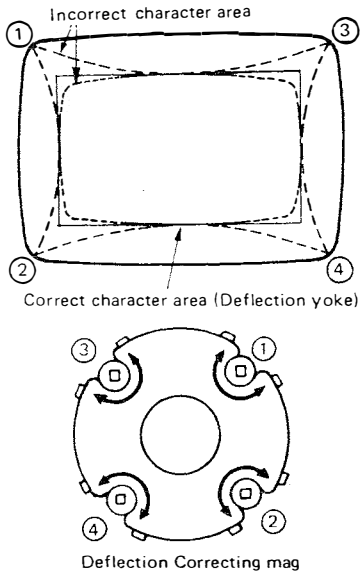



Fig. 11

**• Adjustment of CRT angle**

CRT angle has been adjusted at 0° prior to shipment, but it can be changed at need as shown in the figure below.

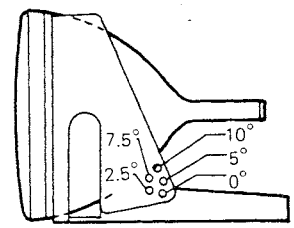



Fig. 12

# PREASSEMBLY INSPECTION AND HANDLING INSTRUCTIONS

**Caution:**

Be sure all handling of the CRT Display is done by the CRT mounting brackets. At no time should the wires be used as a means of moving or carrying a given CRT Display. The CRT neck is the most fragile part of the CRT Display Module and extreme care should be taken not to bump, tap, or otherwise excess force on this neck.

Before applying power to the CRT Display an inspection should be preformed to insure that any foreign material has not been dropped in any part of the CRT Display.

1. Insure that the proper signal and power connections are made in accordance.
2. Apply power to monitor under test and allow monitor to stabilize for a minimum of 5 minutes.
   Note: All adjustments have made at the factory. This procedure is to insure that these adjustments have been made correctly.
3. Turn External Brightness Control to maximum and raster should be slightly visible.
4. Check monitor for proper centering.
5. Check monitor for the specified active character area per Page 3, 4 of this Manual.
6. Check for Geometric Distortion.
7. Check focus.
8. Check Power Supply Voltages in accordance per Page 2 of this Manual.

# CAUTION FOR SERVICING

Be sure to provide power supply sequence of more than 100m S.

Power ON-OFF

Do not turn OFF power supply when the CRT heater is not sufficiently heated. Otherwise, CRT may be burned in spot.

In case of servicing or replacing CRT, high voltage sometimes remains in the anode of CRT. So, completely discharge high voltage before servicing or replacing CRT so as to prevent a shock to the serviceman.

In this case, discharge to the external conductive coating (aquadag) of CRT.

Discharging to other places will cause troubles. The heat sink of horizontal output transistor is applied with +B. So, do not earth it in case of servicing.

Use care to handle IC42.

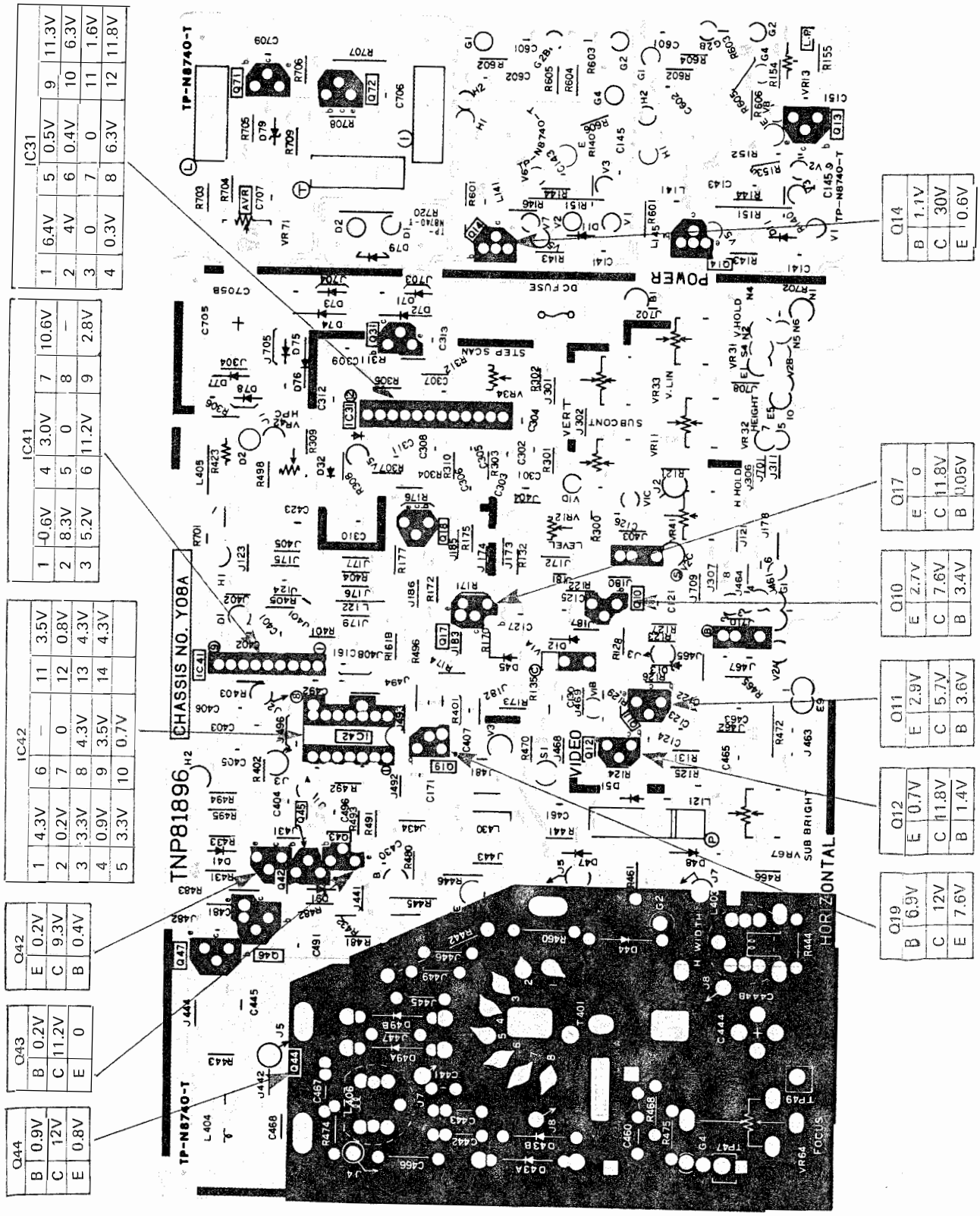
Special care should be taken not to apply overvoltage or static electricity to IC42, as it is of C-MOS.

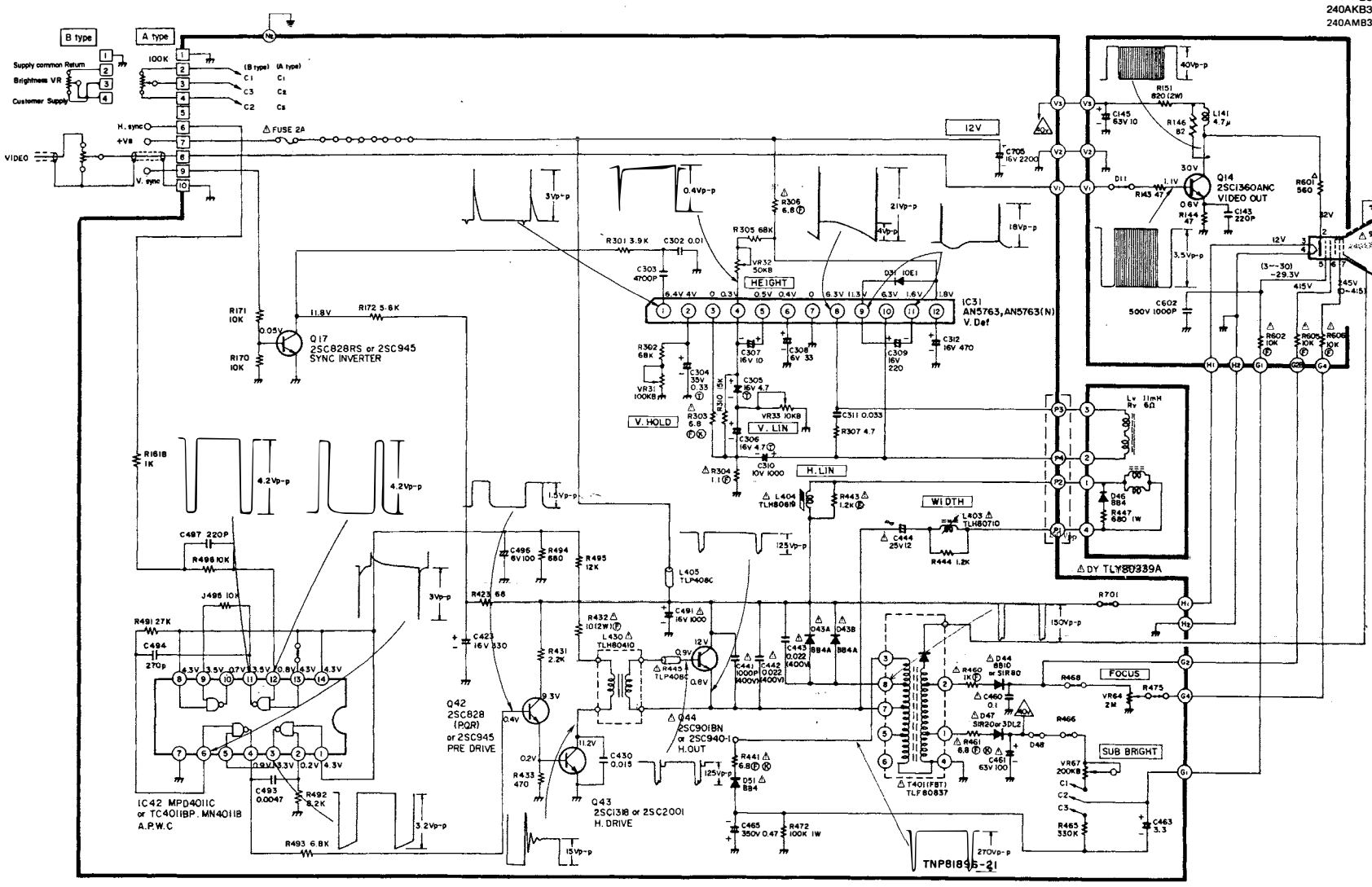
In case of storaging or transporting it, be sure to take some countermeasures for static electricity. When using a soldering iron, be sure to connect it to the earth.

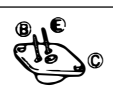
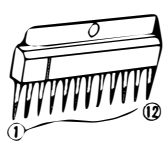
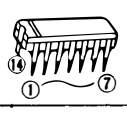
The unused terminal should be soldered without fail

# MONITOR CIRCUIT BOARD-SOLDER VIEW

TNP81896 (Models M-9004NA, M-C9004N, M-9009A, M-9009NA)
(Models M-9001NA, M-C9001N)






| TRANSISTOR BASE iNFORMATION | |
|---|---|
| LOCATION | PARTS NAME |
|  | 2SC828<br>2SC829C<br>2SC945<br>2SC1318 |
|  | 2SC1360ANC |
|  | 2SC940<br>2SC901BN |
|  | AN5753<br>AN5752 |
|  | AN5762<br>AN5763<br>AN5763(N) |
|  | MPD4011C<br>TC4011BP<br>MN4011B |

## IMPORTANT SAFETY NOTICE

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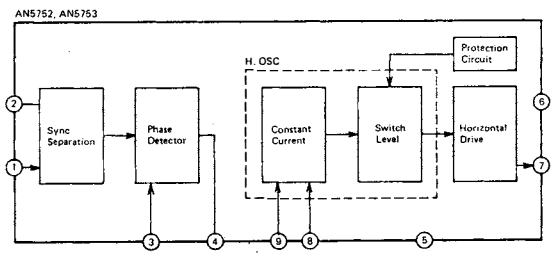
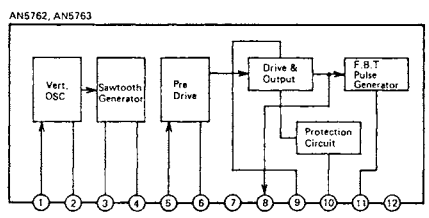


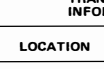
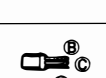
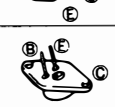
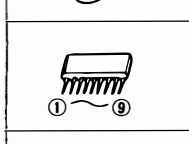
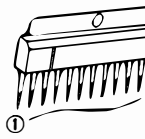

**NOTE**

1. RESISTOR
   All resistors are carbon 1/4W resistor, unless otherwise noted the following marks.
   Unit of resistance is OHM (Ω), (K=1,000, M=1,000,000)
   ⚠ : Solid resistor
   Ⓕ : Non Flame

2. CAPACITOR
   All capacitors are ceramic 50V capacitor, unless otherwise noted the following marks.
   Unit of capacitance is μF, unless otherwise noted.
   Ⓜ : Polyester
   Ⓢ : Polystylene capacitor
   ⁺∥⁻ : Electrolytic capacitor
   Ⓣ : Tantalum

3. COIL
   Unit of inductance is μH.

4. VOLTAGE MEASUREMENT
   a. Voltage is measured by a digital meter with DC 10MΩ OHM/V receiving normal signal.
   b. Use each measurement voltage for reference.

| TRANSISTOR BASE INFORMATION | |
|---|---|
| LOCATION | PARTS NAME |
|  | 2SC828<br>2SC829C<br>2SC945<br>2SC1318 |
|  | 2SC1360ANC |
|  | 2SC940<br>2SC901BN |
|  | AN5753<br>AN5752 |
|  | AN5762<br>AN5763<br>AN5763(N) |
|  | MPD4011C<br>TC4011BP<br>MN4011B |

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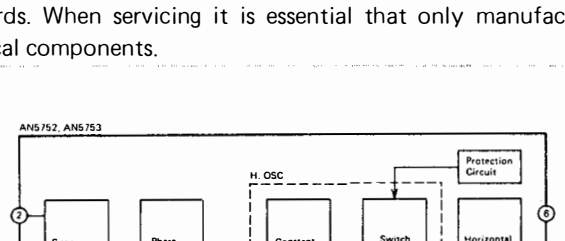


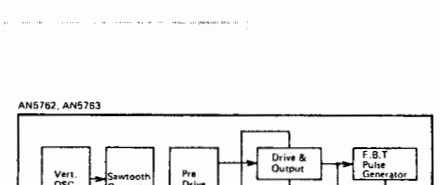


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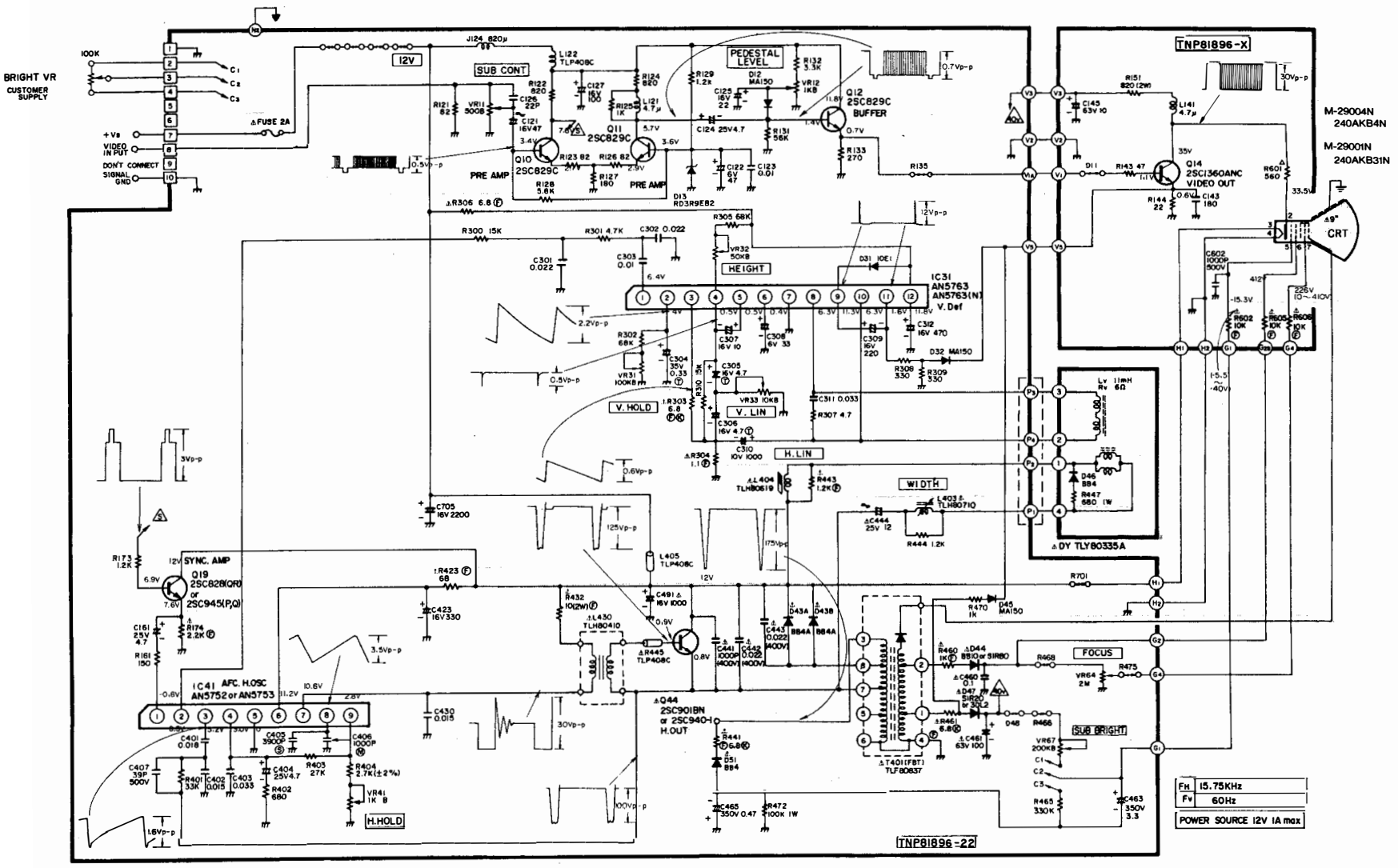
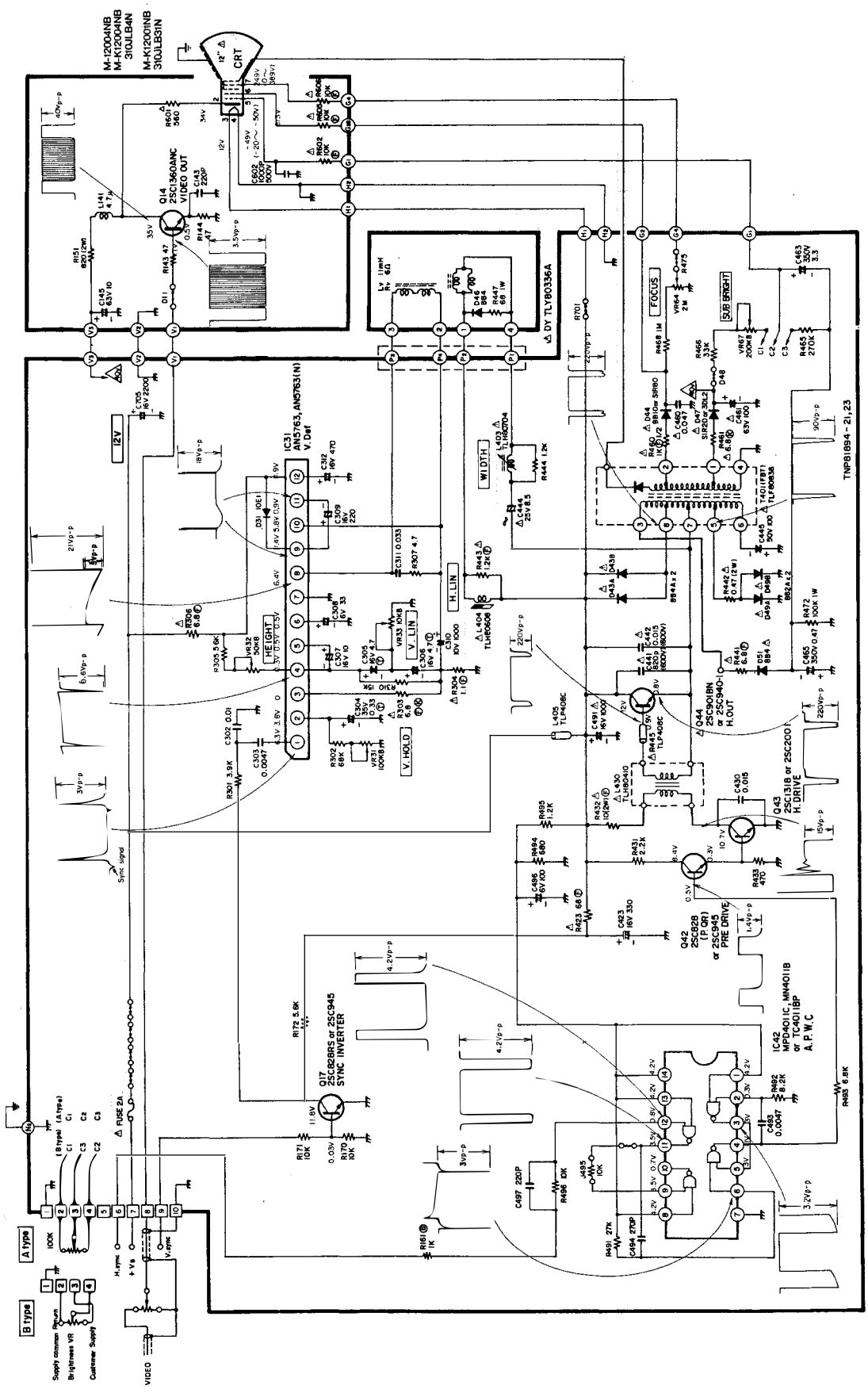
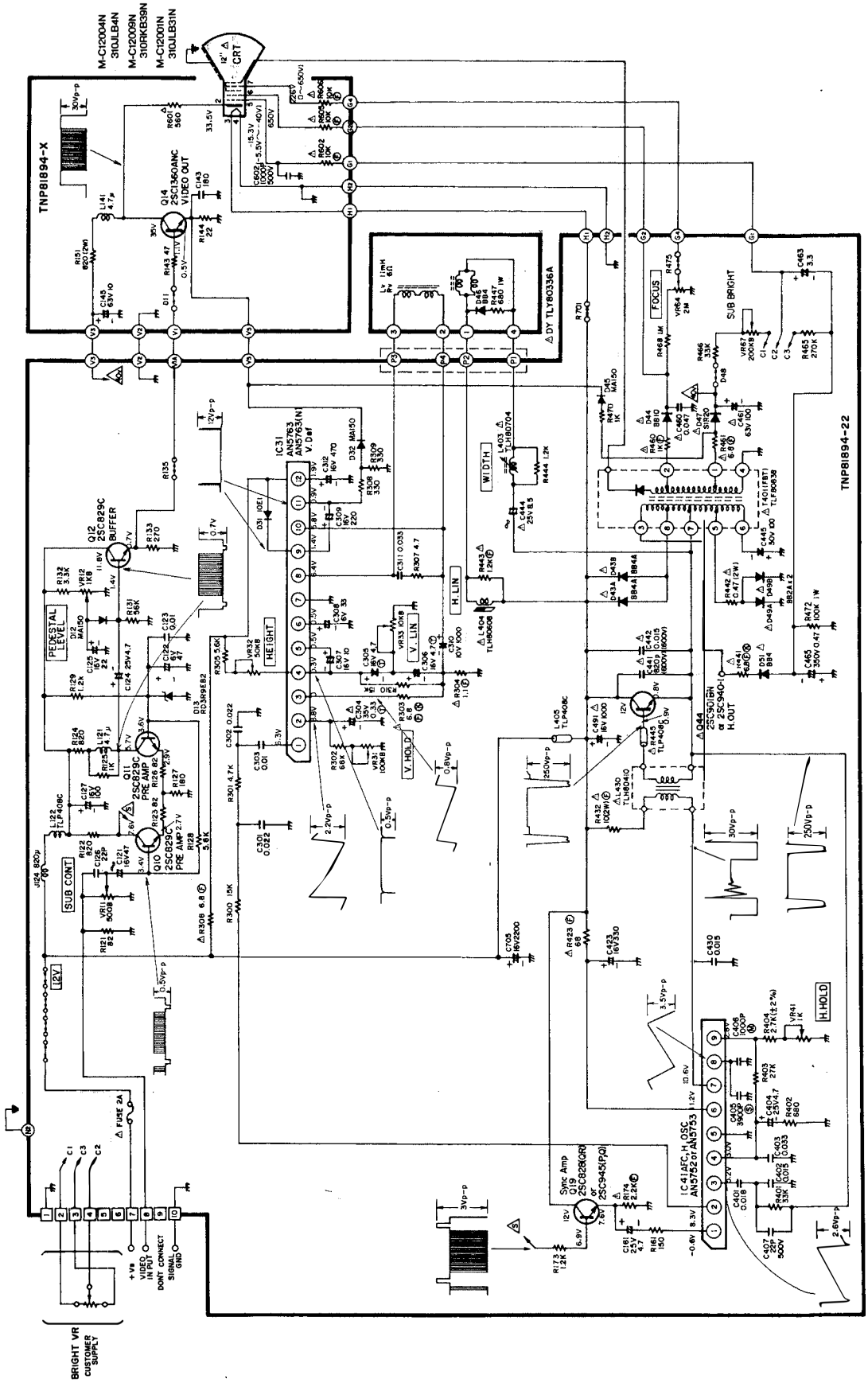


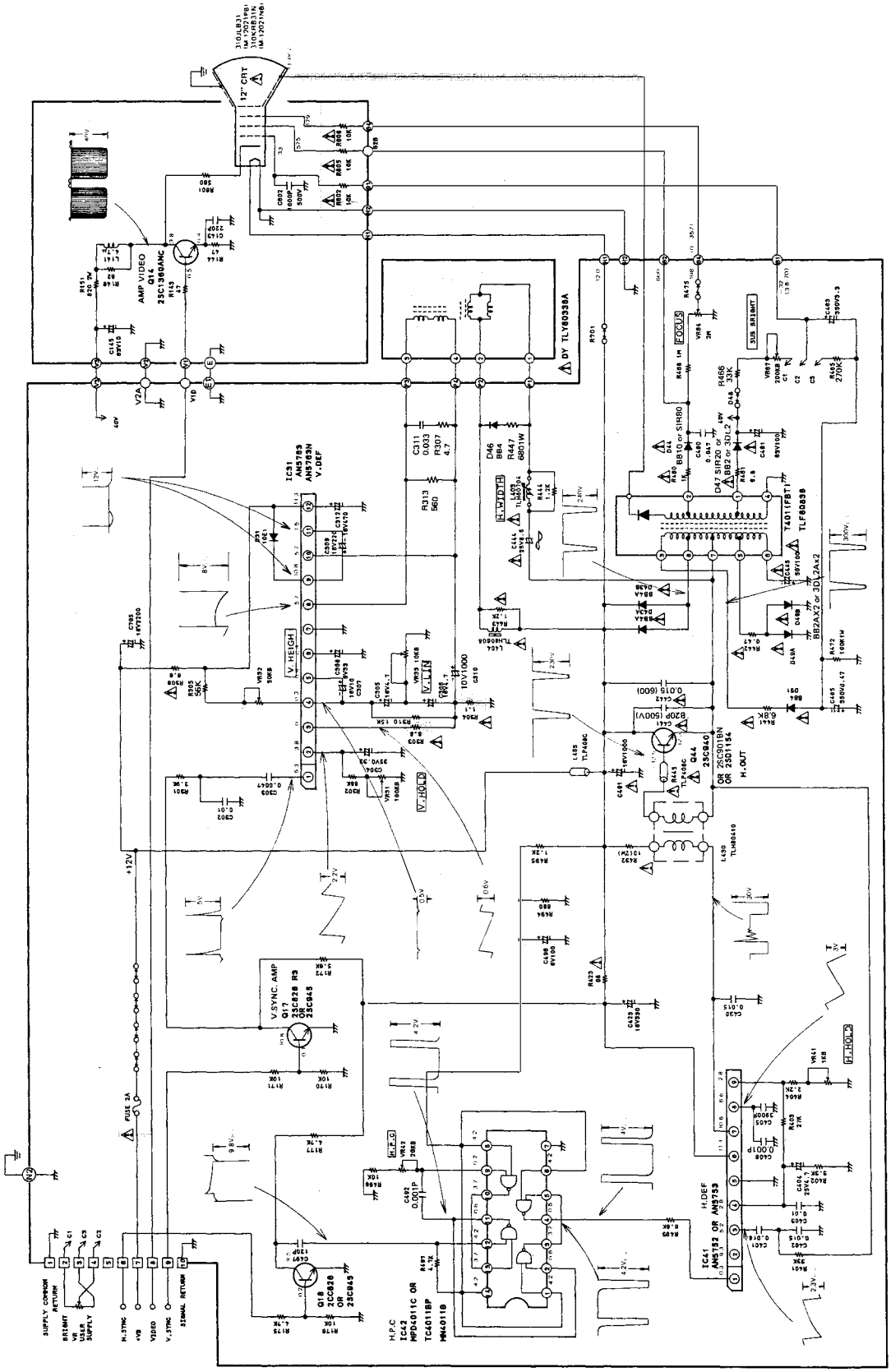
## MODEL M-12004NB/M-K12004NB/M-K12001NB



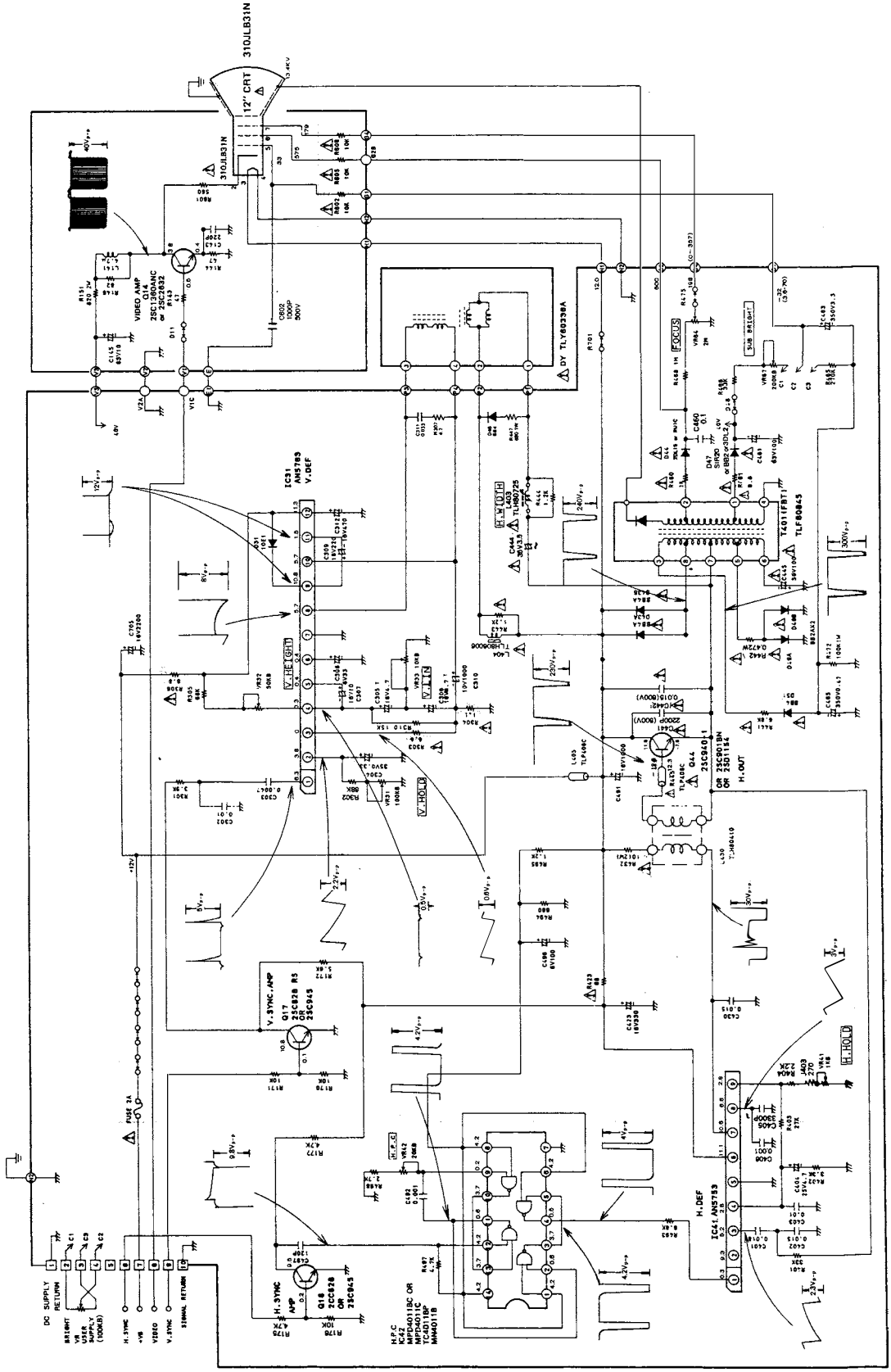
## MODEL M-C12004N/M-C12009N/M-C12001N



## MODEL M-12021PB/M-12021NB

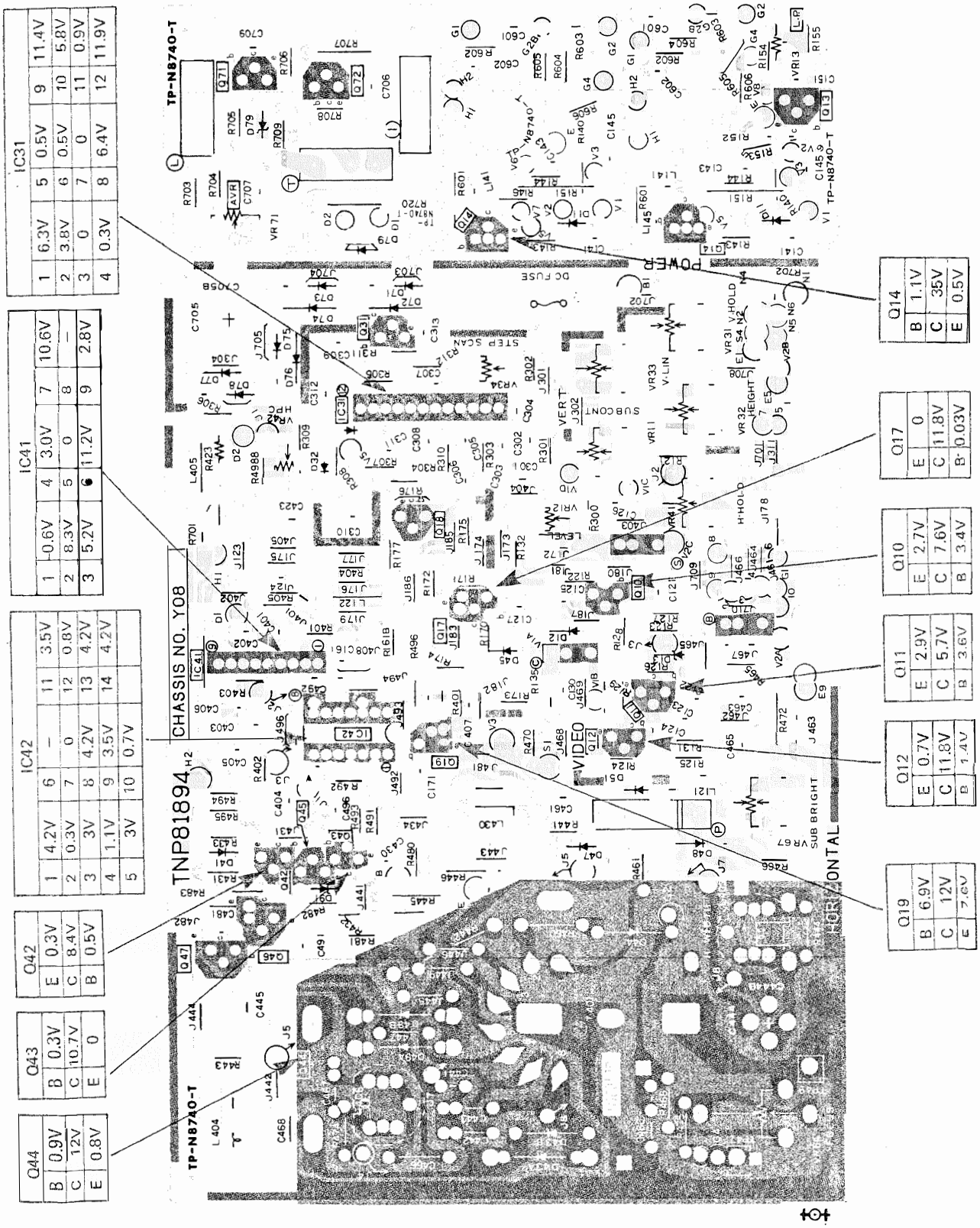


## MODEL M-12041NB



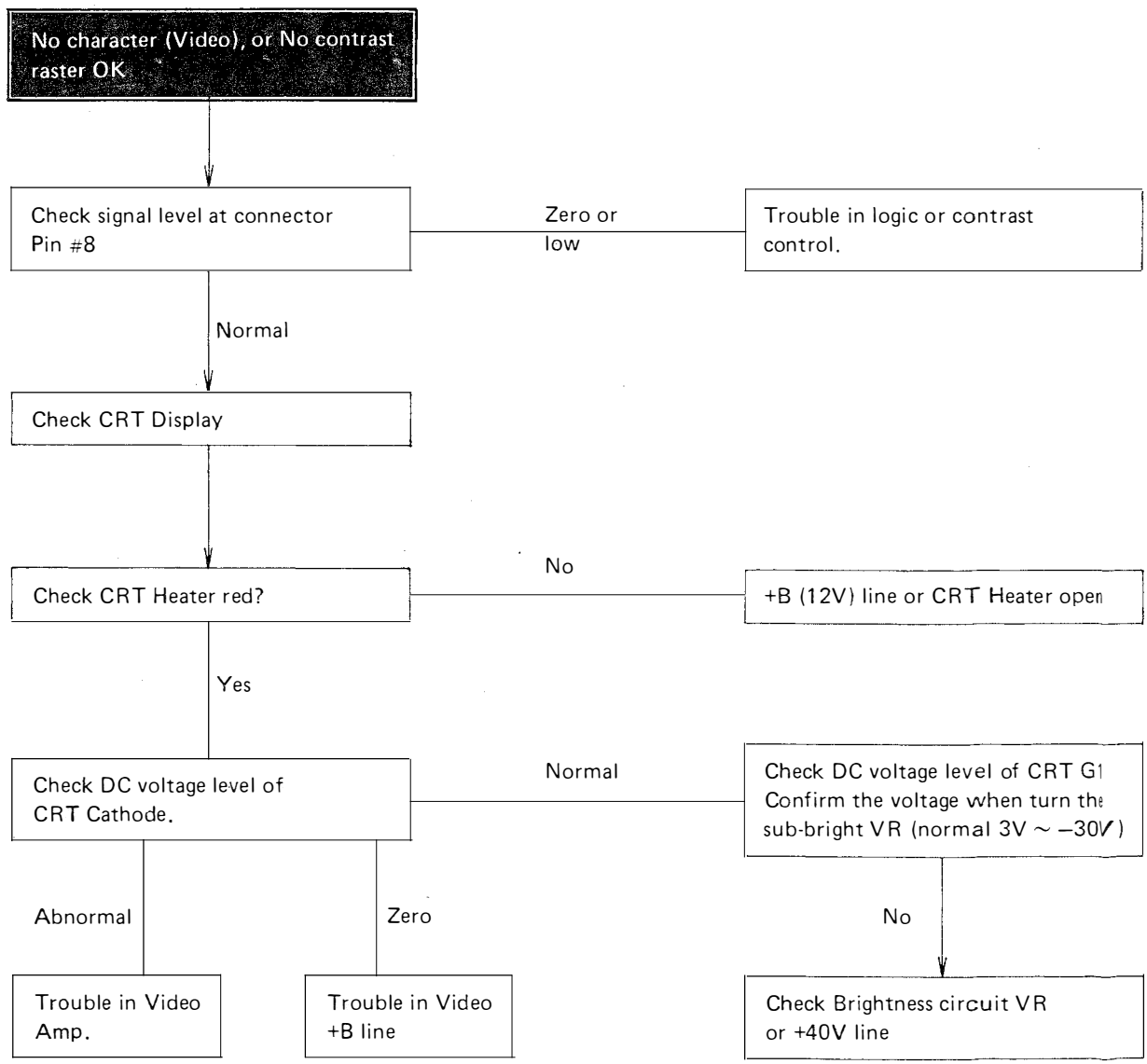
# MONITOR CIRCUIT BOARD-SOLDER VIEW

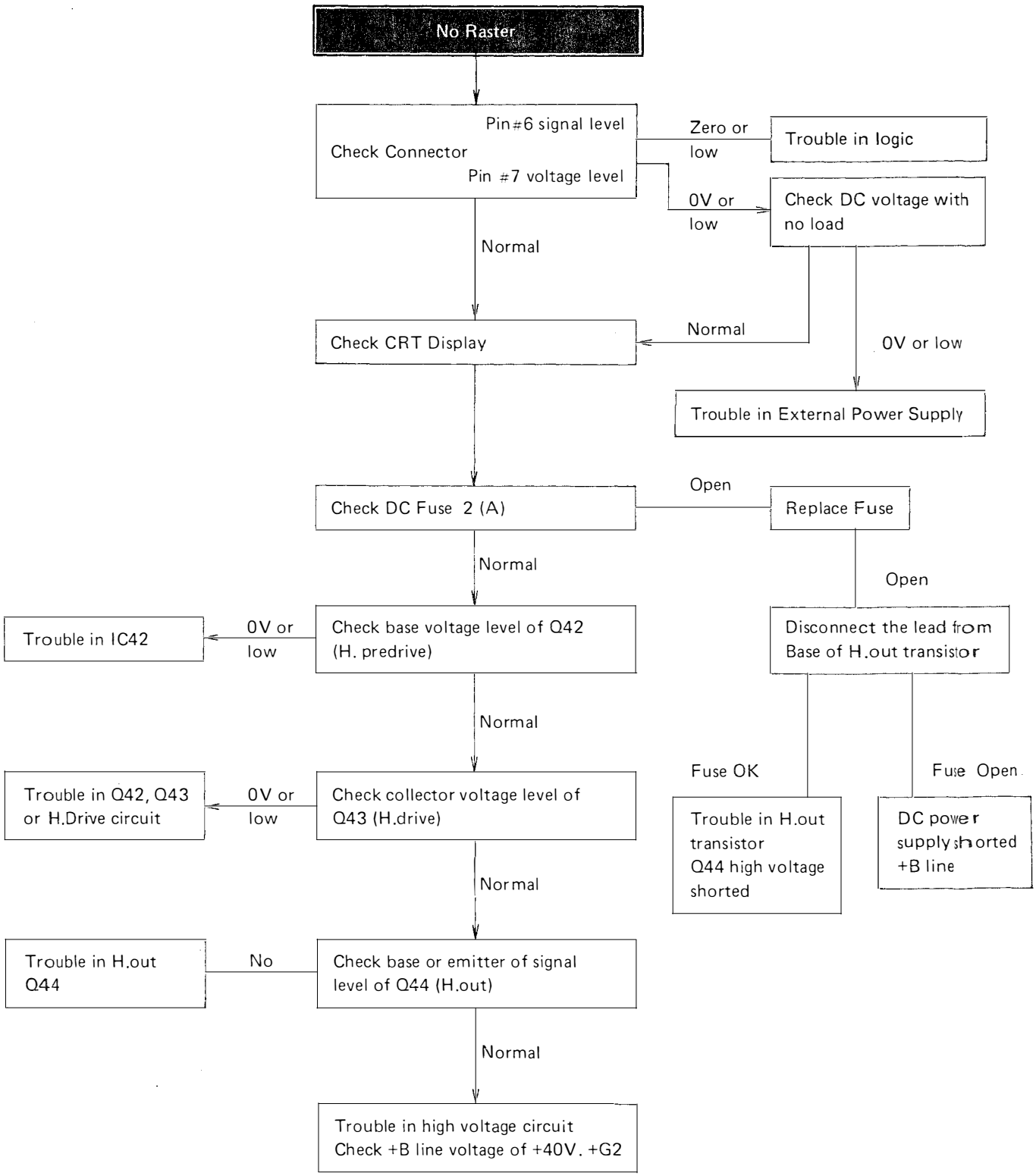
TNP81894 (Models M-12004NB, M-C12004N, M-K12004NB, M-12021PB)
(Models M-12021NB, M-12041NB, M-K12001NB, M-C12001N, M-C12009N)

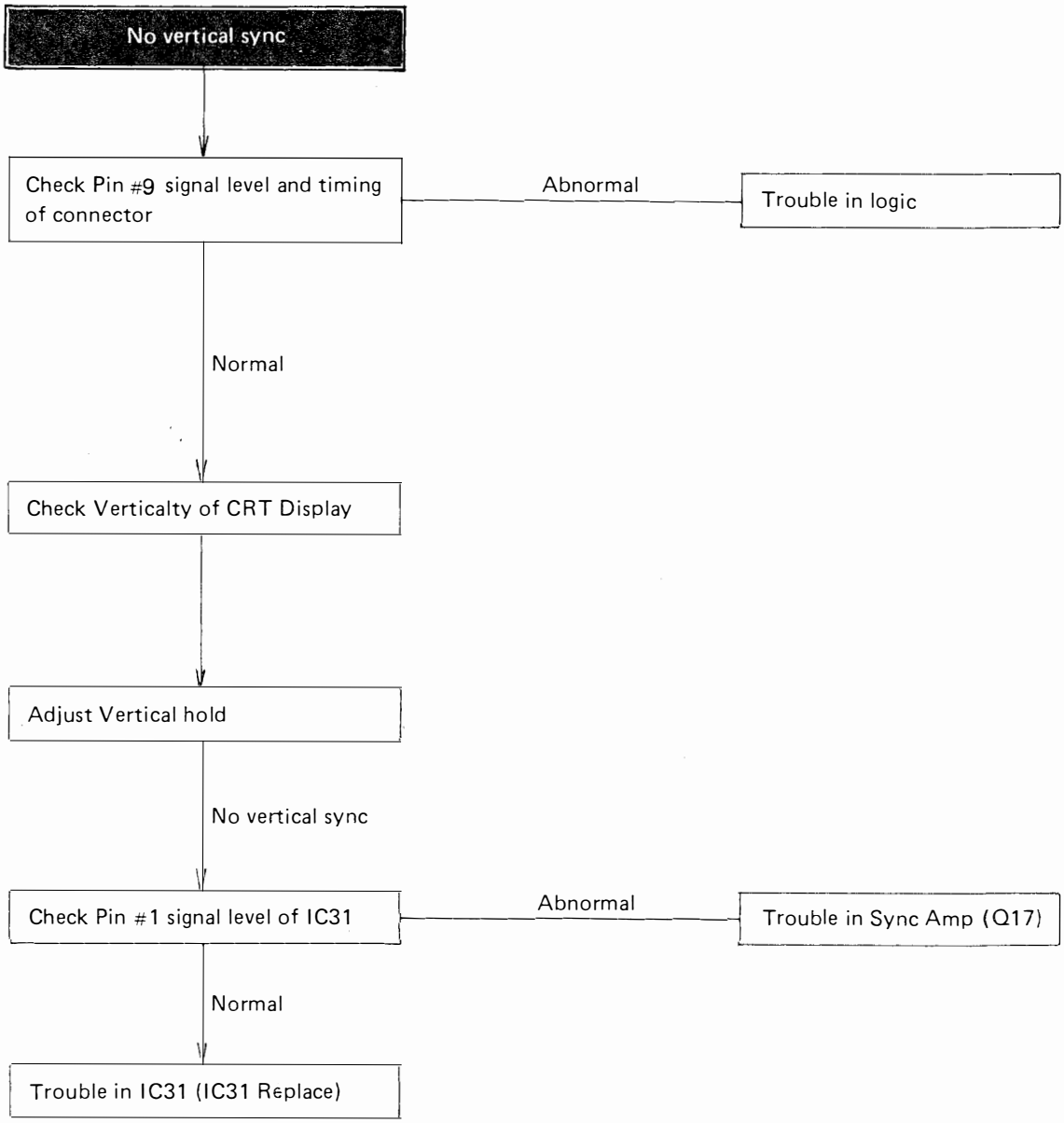


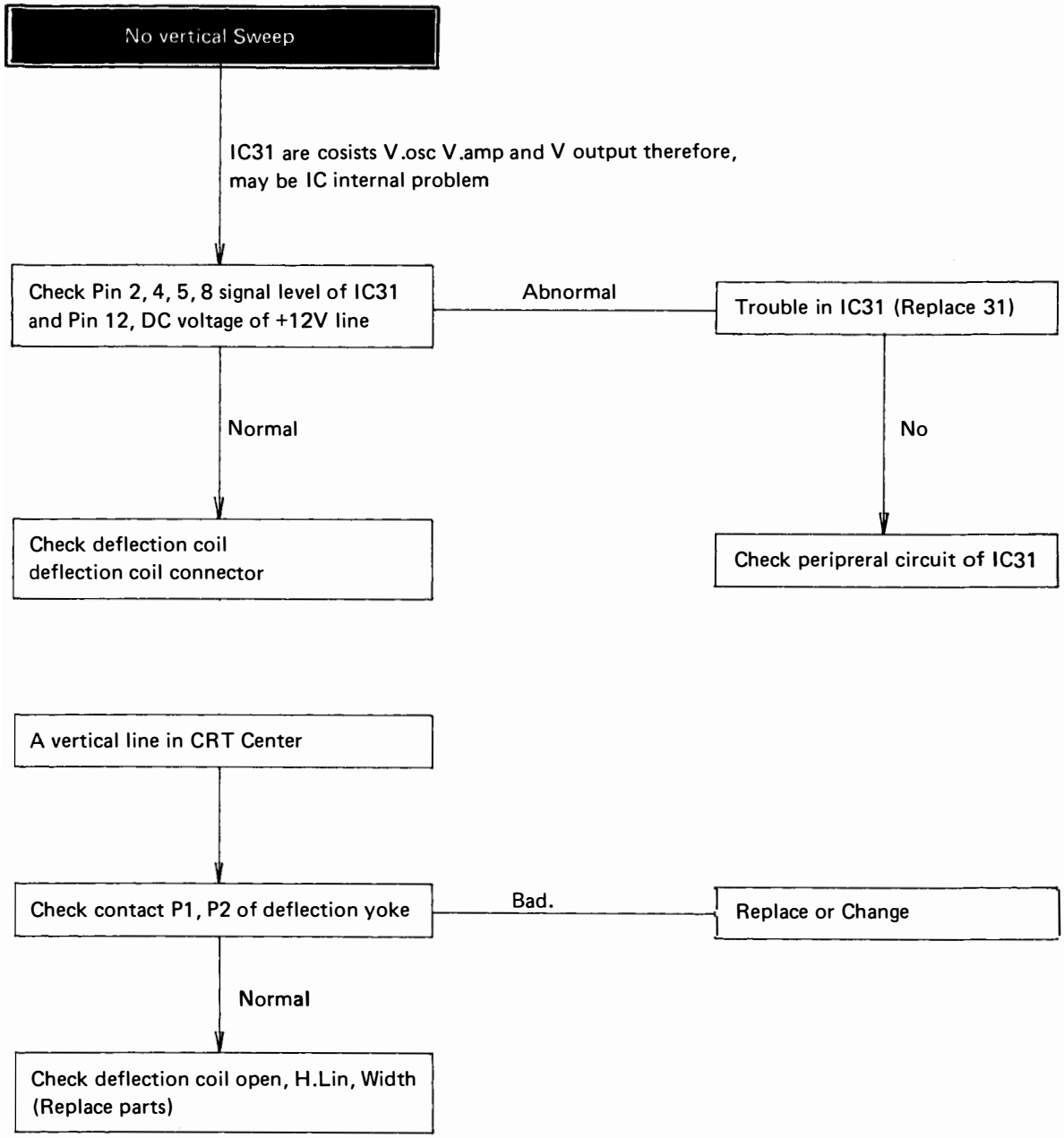
# TROUBLE SHOOTING HINTS

**Separate type model** (M-9004NA, M-9001NA, M-9009NA, M-9009A, M-K12001NB, M-12004NB, M-K12004NB)

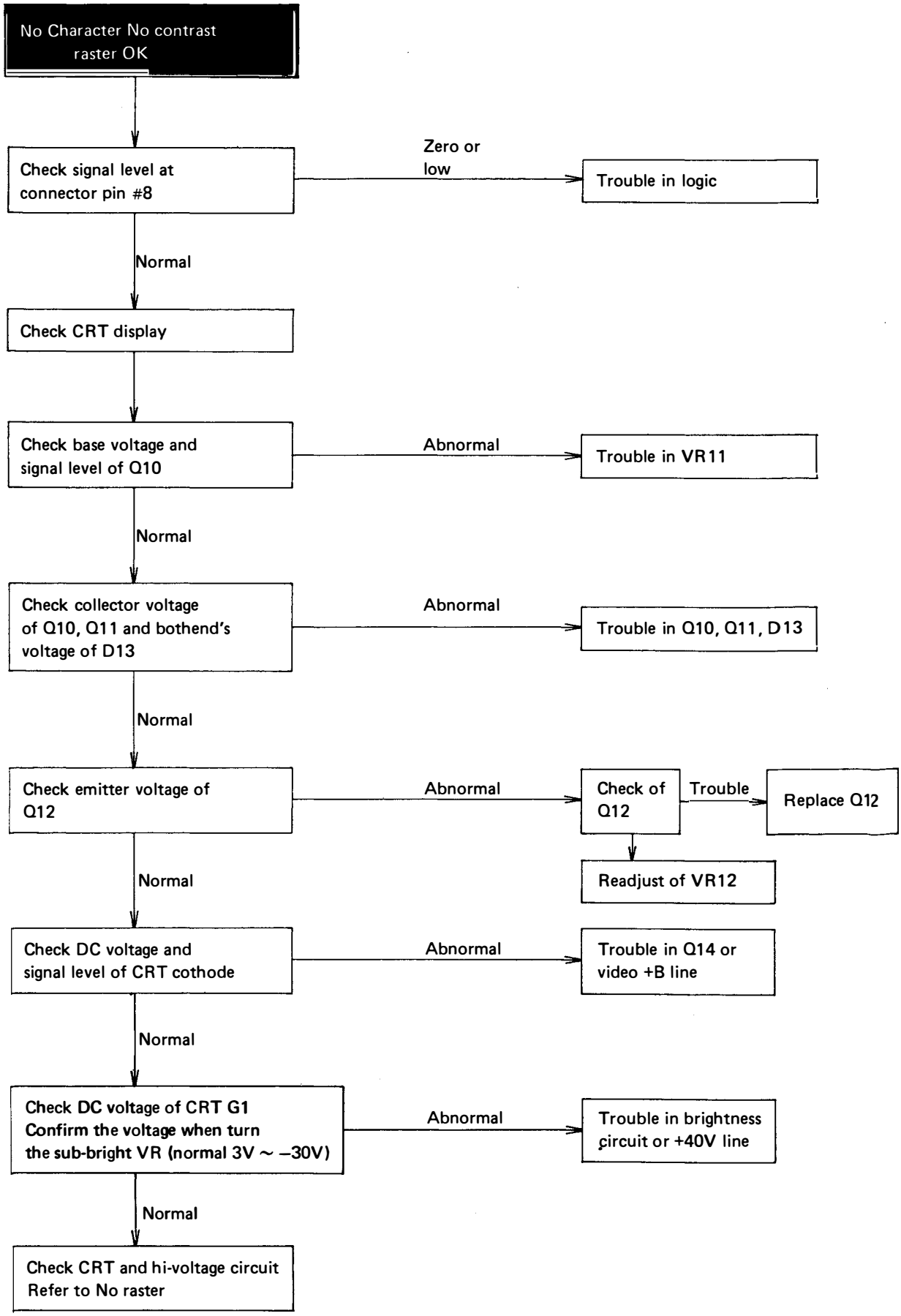


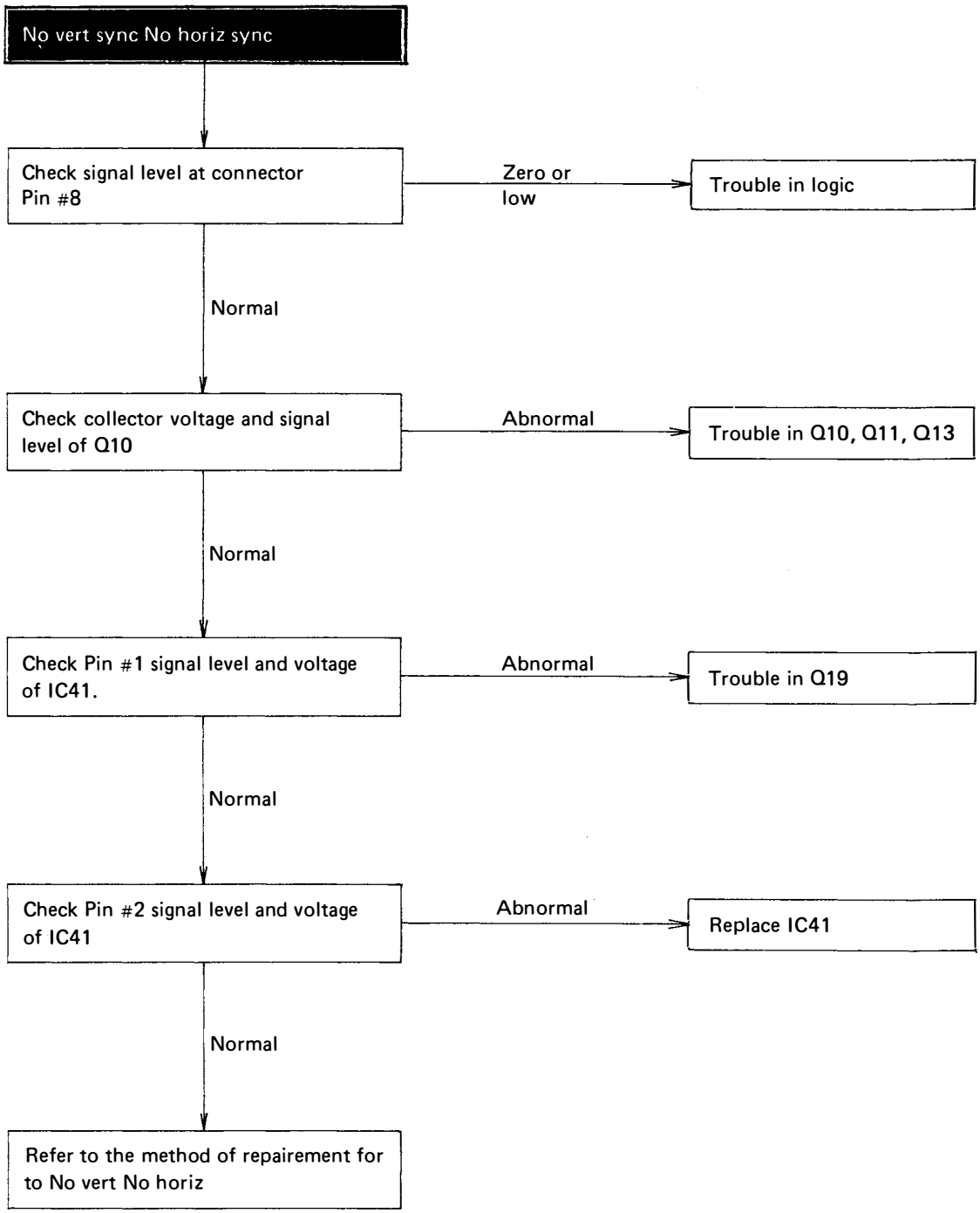

No Raster
Pin#6 signal level
Check Connector
Pin #7 voltage level
Zero or low
Trouble in logic
0V or low
Check DC voltage with no load
Normal
Check CRT Display
Normal
0V or low
Trouble in External Power Supply
Check DC Fuse 2 (A)
Open
Replace Fuse
Normal
Open
Trouble in IC42
0V or low
Check base voltage level of Q42 (H. predrive)
Disconnect the lead from Base of H.out transistor
Normal
Fuse OK
Fuse Open
Trouble in Q42, Q43 or H.Drive circuit
0V or low
Check collector voltage level of Q43 (H.drive)
Trouble in H.out transistor Q44 high voltage shorted
DC power supply shorted +B line
Normal
Trouble in H.out Q44
No
Check base or emitter of signal level of Q44 (H.out)
Normal
Trouble in high voltage circuit
Check +B line voltage of +40V. +G2

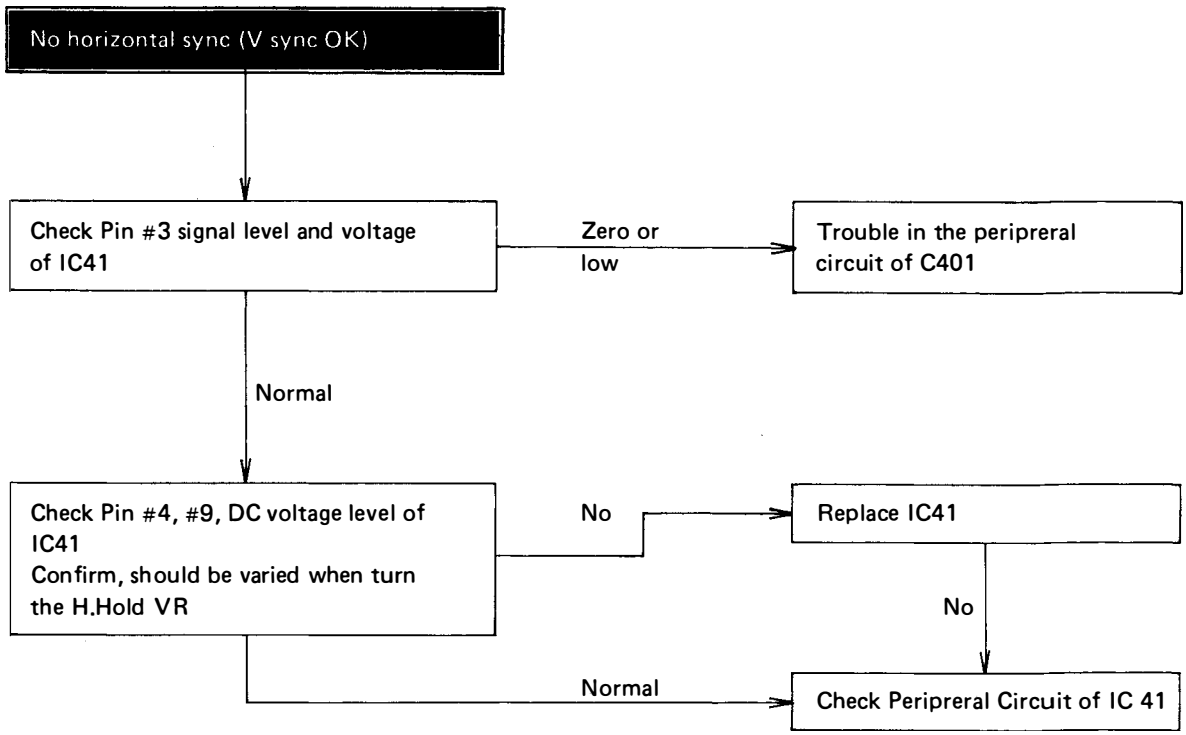

No vertical sync
Check Pin #9 signal level and timing of connector
Abnormal
Trouble in logic
Normal
Check Verticalty of CRT Display
Adjust Vertical hold
No vertical sync
Check Pin #1 signal level of IC31
Abnormal
Trouble in Sync Amp (Q17)
Normal
Trouble in IC31 (IC31 Replace)


No vertical Sweep
IC31 are cosists V.osc V.amp and V output therefore, may be IC internal problem
Check Pin 2, 4, 5, 8 signal level of IC31 and Pin 12, DC voltage of +12V line
Abnormal
Trouble in IC31 (Replace 31)
Normal
No
Check deflection coil deflection coil connector
Check peripreral circuit of IC31
A vertical line in CRT Center
Check contact P1, P2 of deflection yoke
Bad.
Replace or Change
Normal
Check deflection coil open, H.Lin, Width (Replace parts)

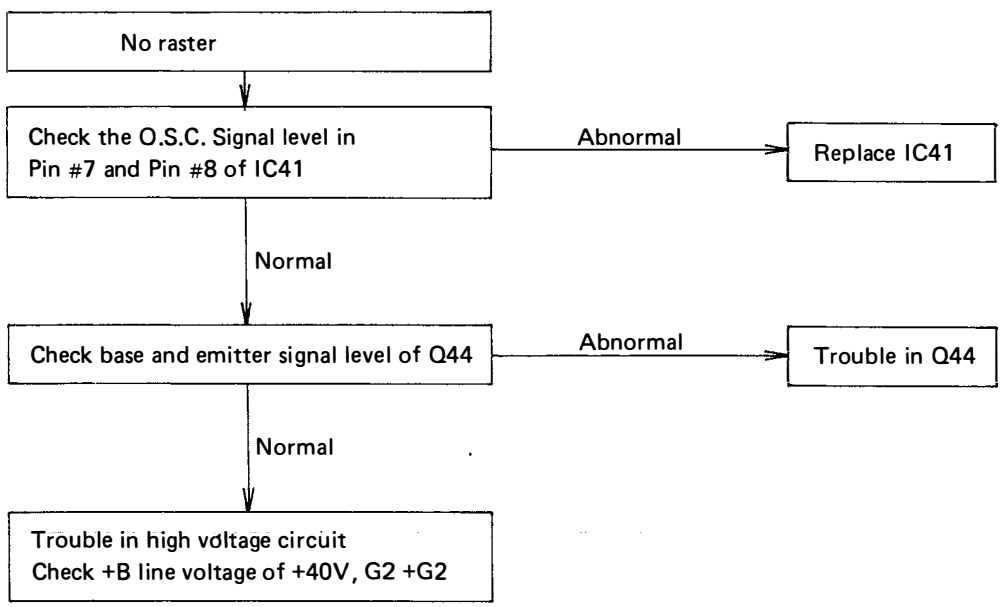
## Composite type model (M-C9004N M-C12004N, M-C9001N, M-C12001N, M-C12009N)



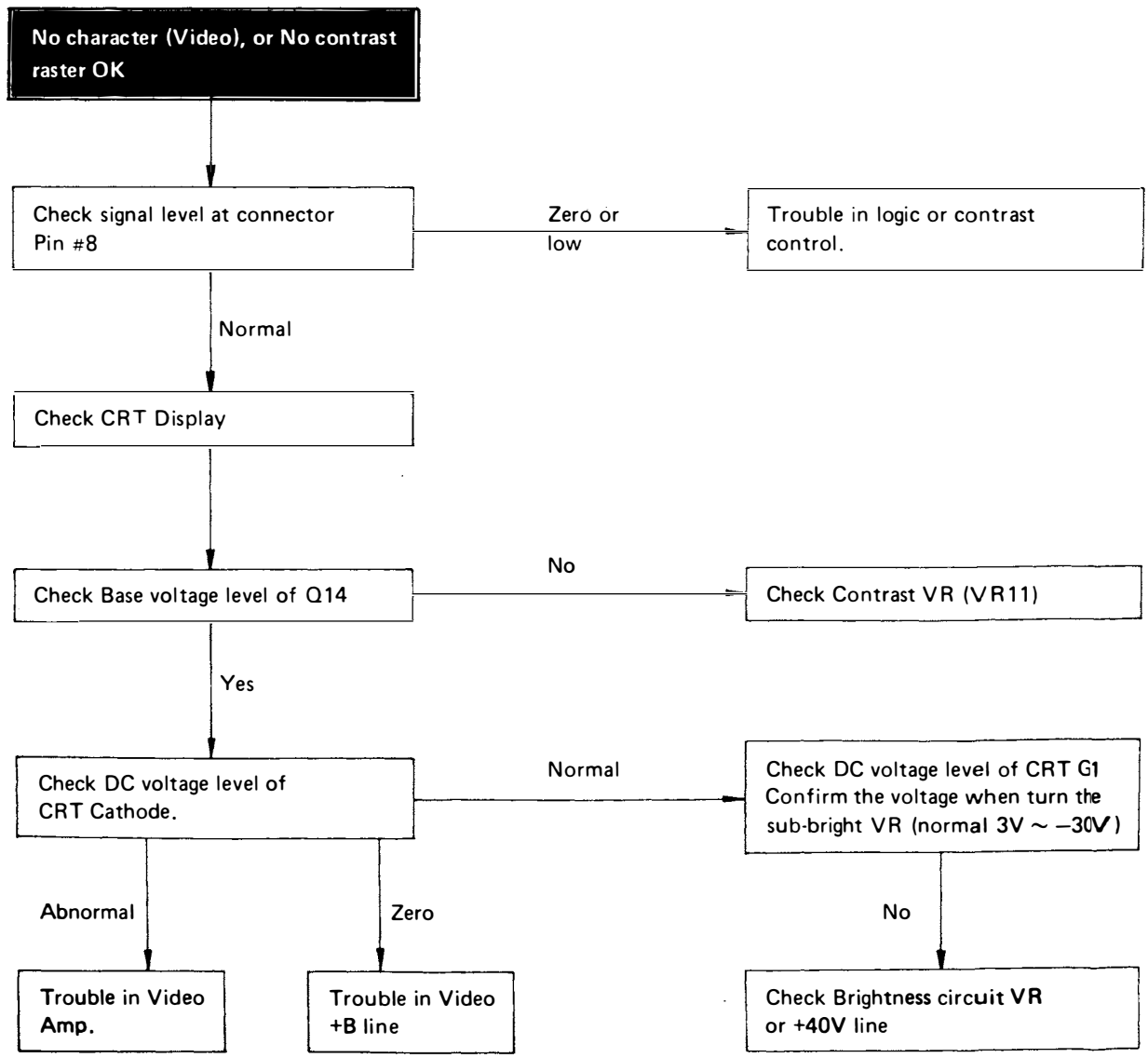

No vert sync No horiz sync
Check signal level at connector Pin #8
Zero or low
Trouble in logic
Normal
Check collector voltage and signal level of Q10
Abnormal
Trouble in Q10, Q11, Q13
Normal
Check Pin #1 signal level and voltage of IC41.
Abnormal
Trouble in Q19
Normal
Check Pin #2 signal level and voltage of IC41
Abnormal
Replace IC41
Normal
Refer to the method of repairement for to No vert No horiz

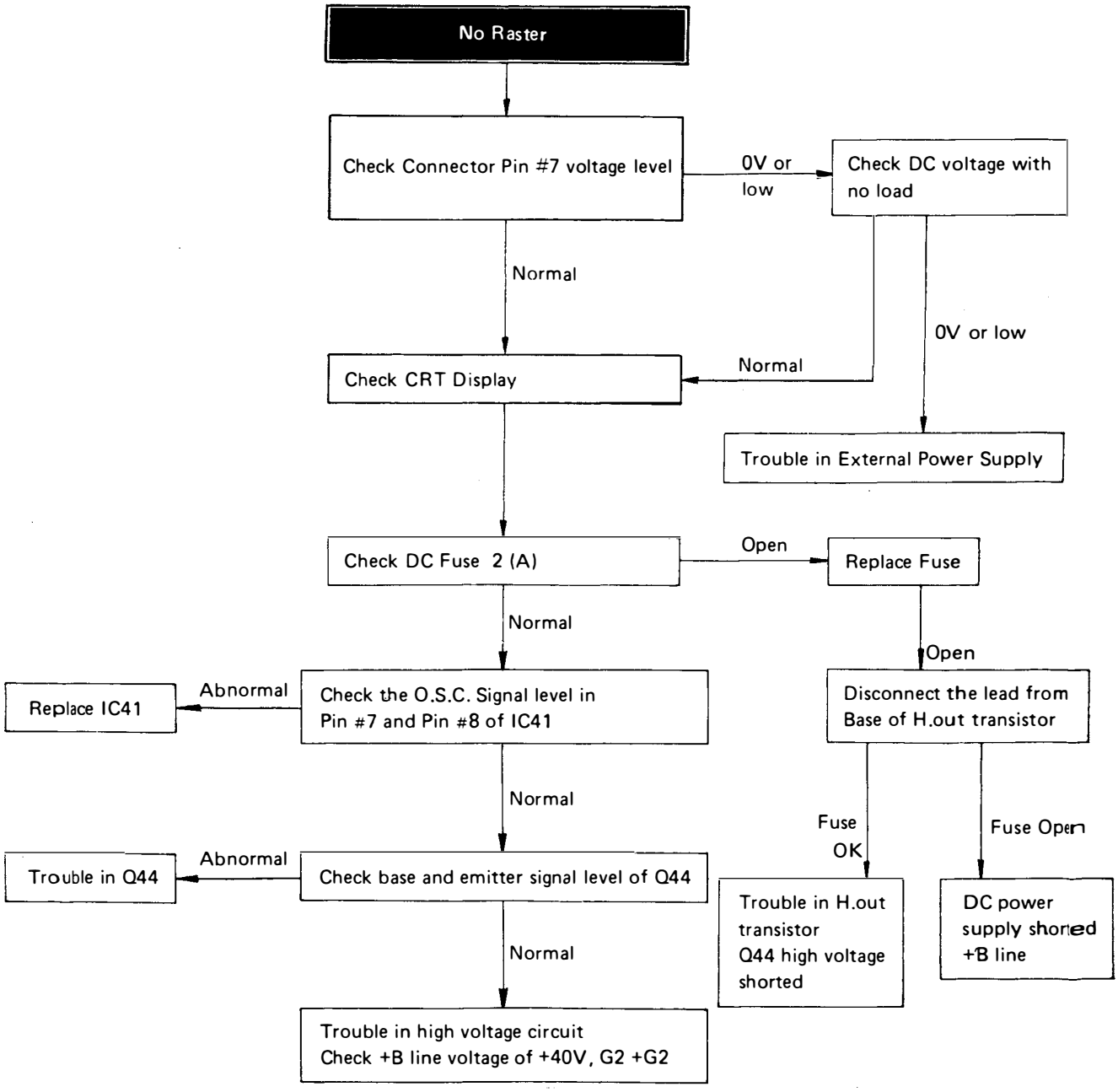


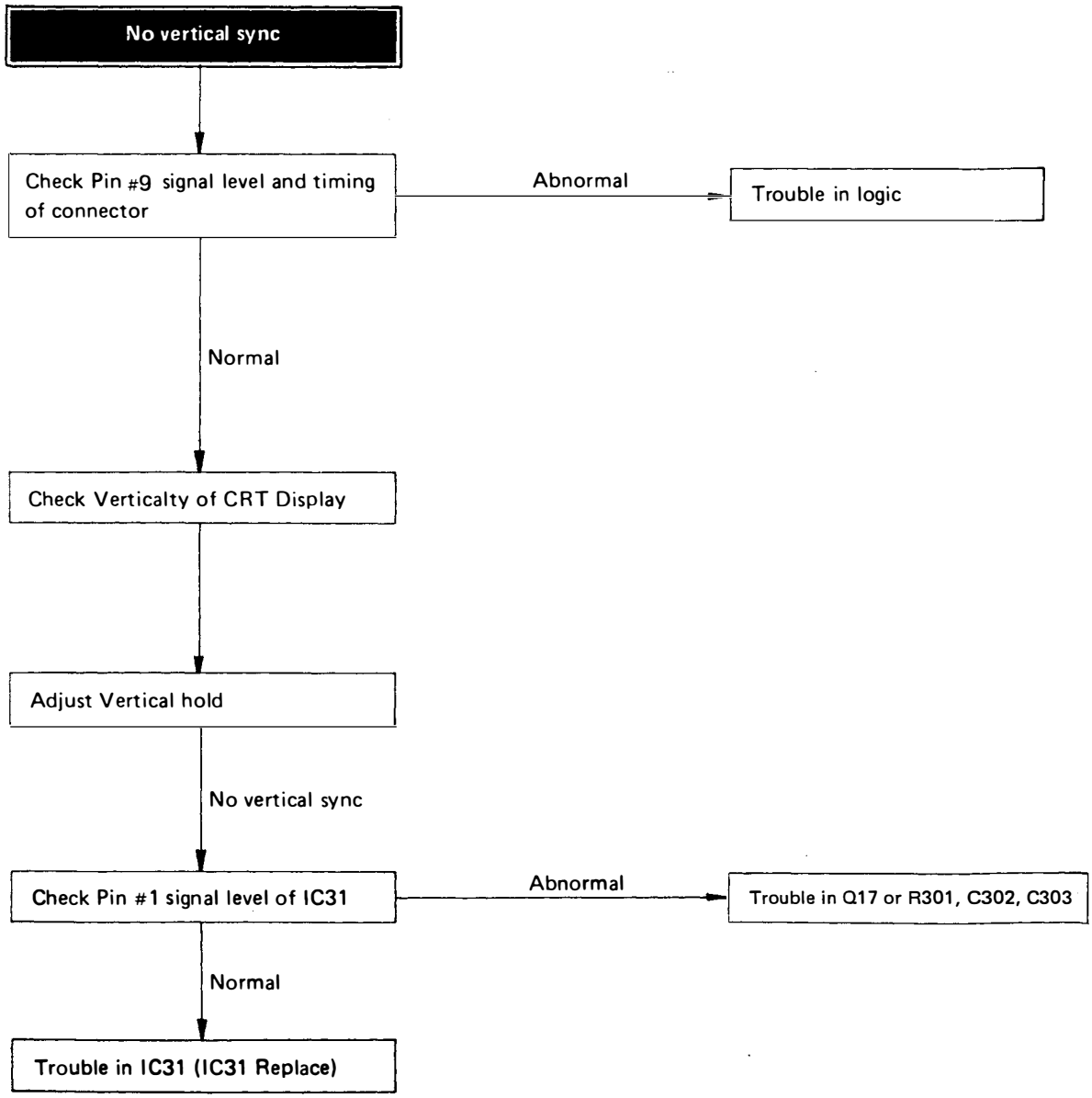

Refer to when No vert. sync, No horiz. sync

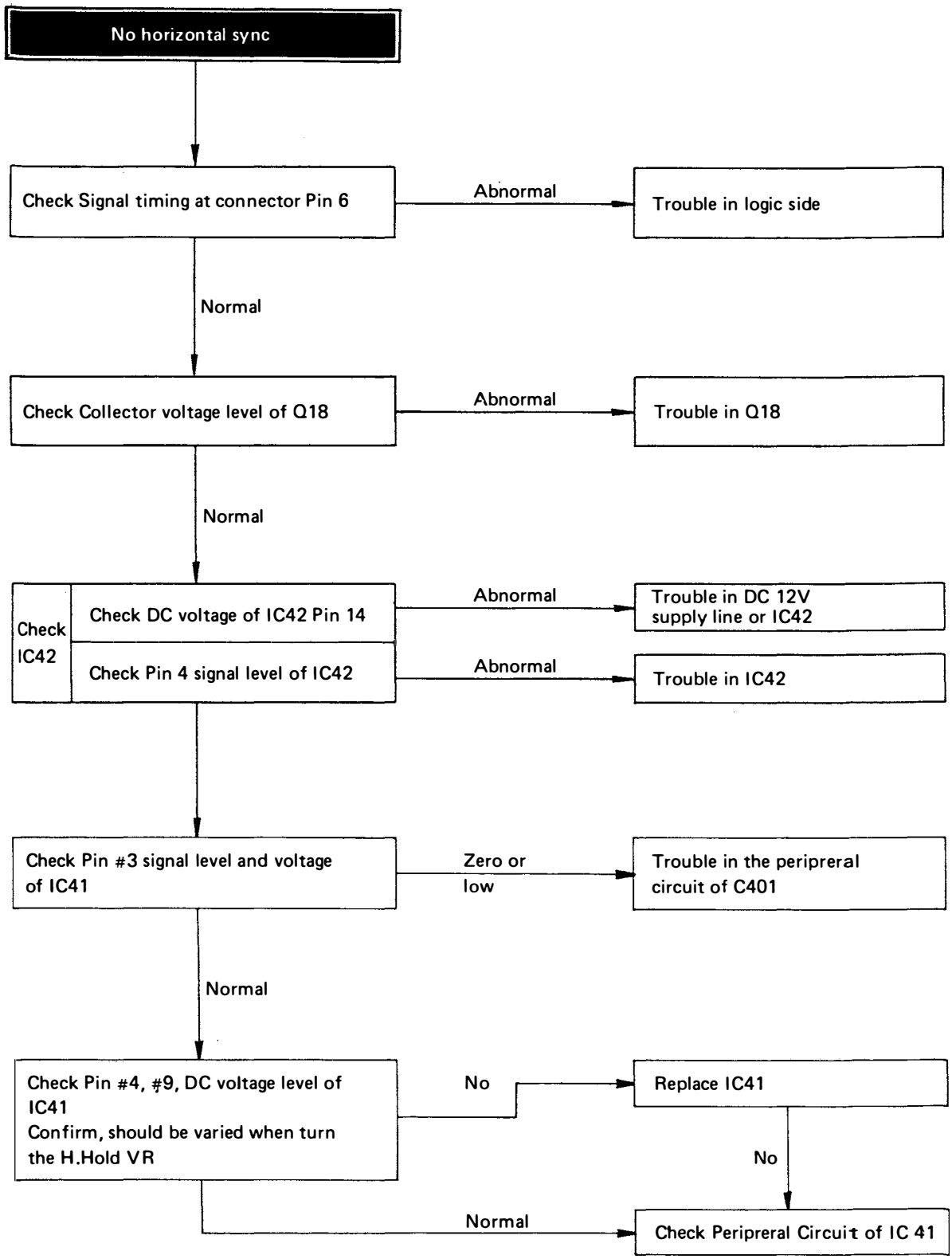


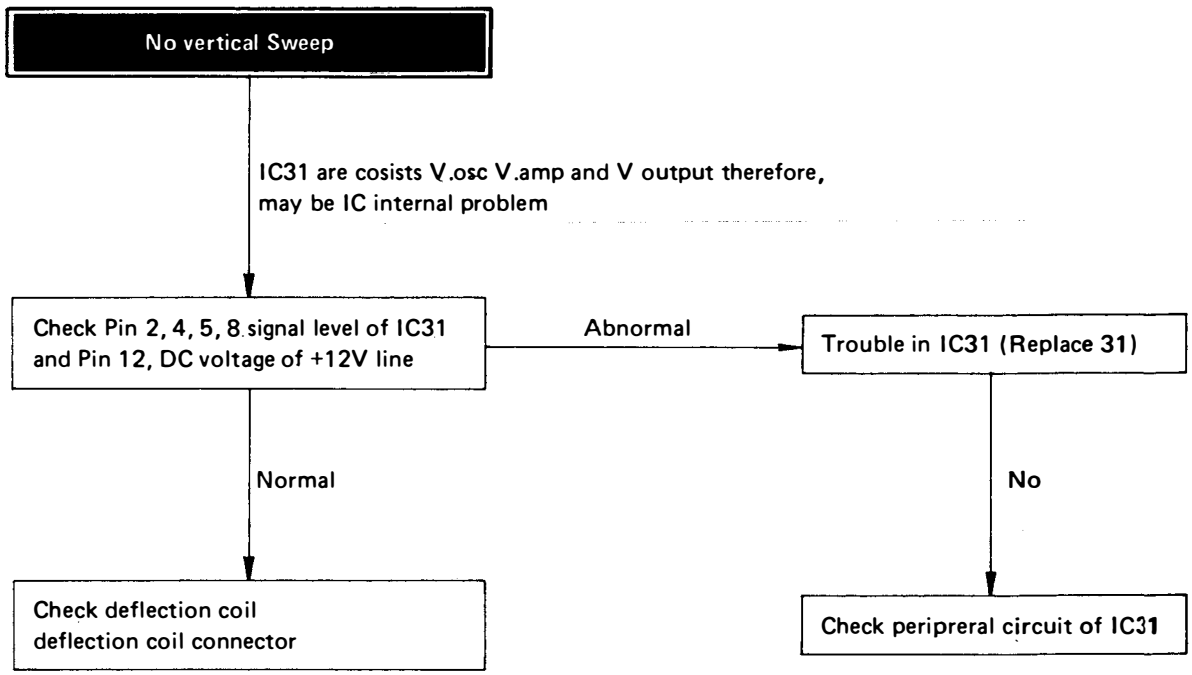
## H.OSC Internal type model (M-12021PB, M-12021NB, M-12041NB)

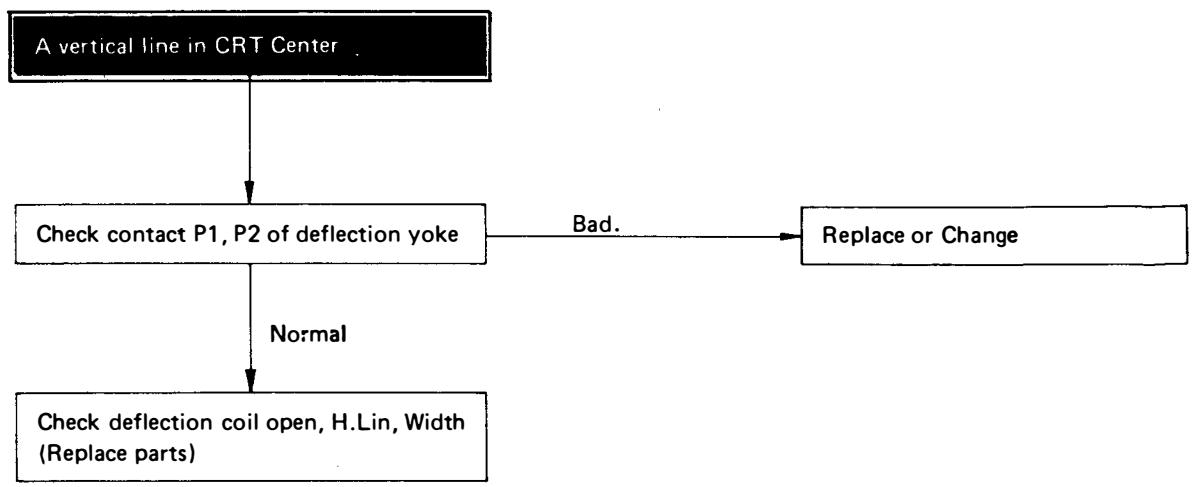



No Raster
Check Connector Pin #7 voltage level
0V or low
Check DC voltage with no load
Normal
0V or low
Normal
Check CRT Display
Trouble in External Power Supply
Check DC Fuse 2 (A)
Open
Replace Fuse
Normal
Open
Replace IC41
Abnormal
Check the O.S.C. Signal level in Pin #7 and Pin #8 of IC41
Disconnect the lead from Base of H.out transistor
Normal
Fuse OK
Fuse Open
Trouble in Q44
Abnormal
Check base and emitter signal level of Q44
Trouble in H.out transistor Q44 high voltage shorted
DC power supply shorted +B line
Normal
Trouble in high voltage circuit
Check +B line voltage of +40V, G2 +G2


No vertical sync
Check Pin #9 signal level and timing of connector
Abnormal
Trouble in logic
Normal
Check Verticalty of CRT Display
Adjust Vertical hold
No vertical sync
Check Pin #1 signal level of IC31
Abnormal
Trouble in Q17 or R301, C302, C303
Normal
Trouble in IC31 (IC31 Replace)


No horizontal sync
Check Signal timing at connector Pin 6
Abnormal
Trouble in logic side
Normal
Check Collector voltage level of Q18
Abnormal
Trouble in Q18
Normal
Check IC42
Check DC voltage of IC42 Pin 14
Abnormal
Trouble in DC 12V supply line or IC42
Check Pin 4 signal level of IC42
Abnormal
Trouble in IC42
Check Pin #3 signal level and voltage of IC41
Zero or low
Trouble in the peripreral circuit of C401
Normal
Check Pin #4, #9, DC voltage level of IC41
Confirm, should be varied when turn the H.Hold VR
No
Replace IC41
No
Normal
Check Peripreral Circuit of IC 41


No vertical Sweep
IC31 are cosists V.osc V.amp and V output therefore, may be IC internal problem
Check Pin 2, 4, 5, 8 signal level of IC31 and Pin 12, DC voltage of +12V line
Abnormal
Trouble in IC31 (Replace 31)
Normal
No
Check deflection coil deflection coil connector
Check peripreral circuit of IC31


A vertical line in CRT Center
Check contact P1, P2 of deflection yoke
Bad.
Replace or Change
Normal
Check deflection coil open, H.Lin, Width (Replace parts)

# REPLACEMENT PARTS LIST

**Important Safety Notice**

Components identified by the international symbol ⚠ have special characteristics important for safety.
When replacing any of these components use only manufacturer's specified parts.

**Note:** 1. Tolerance J: ±5% K: ±10% Z: $^{+80}_{-20}$% C: ±0.25pF

| Ref. No. | Part No. | Description |
|---|---|---|
| | | **CABINET AND MAIN CHASSIS PARTS** |
| | TUW81967 | Right Side Plate W/Label |
| | TUW81968 | Left Side Plate |
| | TUX80847-1 | Bottom Plate |
| | TBM80175 | Model Plate (M-9004NA only) |
| | TBM81842 | Model Plate (M-9009A only) |
| | TES8143-2 | CRT Grounded Spring |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 240AMB39 | CRT (M-9009A only) |
| ⚠ | 240AKB4N | CRT (M-9004NA only) |
| ⚠ | TLY80335A | Deflection Yoke |
| D46 | TVSBB4 | Diode |
| R447 | ERGIANJ681 | Metal Oxide 680Ω ±5% 1W |
| | TNP81896-21 | Main PC Board |
| | TXAJIV4P179A | 4P Connector Ass'y (DY) |
| | TPC816781 | Outer Carton (M-9009A only) |
| | TQF80525 | Fuse Label (Side plate L) |
| | TQF80759 | Warning Label |
| | TQF80761 | Service Warning Label |
| | TPC806231 | Outer Carton (M-9004NA only) |
| | TXAPD1M900X | Filler Complete |
| | TPE84046 | Set Cover |
| | | **SCREWS & WASHERS** |
| | XTV3+15BFN | Screw (PC Board Holder) |
| | XTV3+8BFN | Screw (Side Plate) |
| | XWA38 | Washer (Side Plate) |
| | XTB4+20BFN | Screw (CRT) |
| | XWA4B | Washer (CRT) |
| | XWG5H14 | Washer (CRT) |
| | | **Model No. M-C9004N/M-C9001N** |
| | TUW81967 | Right Side Plate W/Label |
| | TUW81968 | Left Side Plate |
| | TUX80847-1 | Bottom Plate |
| | TBM80176 | Model Plate (M-C9004N only) |
| | TBM80759 | Model Plate (M-C9001N only) |
| | TES8143-2 | CRT Grounded Spring |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 240AKB4N | CRT (M-C9004N only) |
| ⚠ | 240AKB31N | CRT (M-C9001N only) |
| ⚠ | TLY80335A | Deflection Yoke |
| D46 | TVSBB4 | Diode |
| R447 | ERGIANJ681 | Metal Oxide 680Ω ±5% 1W |
| | TNP81896-22 | Main PC Board |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TPC806241 | Outer Carton (M-C9004N only) |
| | TPC806811 | Outer Carton (M-C9001N only) |
| | TQF80525 | Fuse Label |
| | TQF80759 | Warning Label |
| | TQF80802 | Service Warning Label |
| | TXAPD1M900X | Filler Complete |
| | TPE84046 | Set Cover |
| | | **SCREWS & WASHERS** |
| | XTV3+15BFN | Screw (PC Board Holder) |
| | XTV3+8BFN | Screw (Side Plate) |
| | XWA3B | Washer (Side Plate) |
| | XTB4+20BFN | Screw (CRT) |
| | XWA4B | Washer (CRT) |
| | XWG5H14 | Washer (CRT) |
| | | **Model No. M-12004NB** |
| | TUW81962-1H | Right Side Plate |
| | TUX81963-4H | Left Side Plate W/Label |
| | TUX80848-1H | Bottom Plate W/Label |
| | TUX80849 | Bottom Plate Bracket (Right) |
| | TUX80850-1 | Bottom Plate Bracket (Left) |
| | TBM80178 | Model Plate (M-12004NB only) |
| | TES8143-2 | CRT Grounded Spring |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 310JLB4N | CRT |
| ⚠ | TLY80336A | Deflection Yoke |
| D46 | TVSBB4 | Diode |
| R447 | ERGIANJ681 | Metal Oxide 680Ω ±5% 1W |
| | TNP81894-21 | Main PC Board (M-12004NB only) |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TPC806301 | Outer Carton (M-12004NB only) |
| | TXAPD1M1200X | Filler Complete |
| | TPE84048 | Set Cover |
| | | **SCREWS & WASHERS** |
| | XTV3+15BFN | Screw (PC Board Holder) |
| | XTB4+25BFN | Screw (Side Plate-Front) |
| | XTV3+8BFN | Screw (Side Plate) |
| | XTB4+8BFN | Screw (Side Plate Bracket) |
| | XTB4+20BFN | Screw (CRT) |
| | XWA3B | Washer (Side Plate-Back) |
| | XWA4B | Washer (CRT Side Plate-Front) |
| | XWG5H14 | Washer |
| | | **Model No. M-C12004N/M-C12009N/M-C12001N** |
| | TUW81962-1 | Right Side Plate |
| | TUW81963-1 | Left Side Plate W/Label |
| | TUX80848 | Bottom Plate W/Label |
| | TUX80849-1 | Bottom Plate Bracket (Right) |

| Ref. No. | Part No. | Description |
|---|---|---|
| | TUX80850-2 | Bottom Plate Bracket (Left) |
| | TBM80760 | Model Plate (M-C12001N only) |
| | TBM80788 | Model Plate (M-C12009N only) |
| | TBM80177 | Model Plate (M-C12004N only) |
| | TES8143-2 | CRT Grounded Spring |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 310JLNB4N | CRT (M-C12004N only) |
| ⚠ | 310KRB39N | CRT (M-C12009N only) |
| ⚠ | 310JLB31NJ | CRT (M-C12001N only) |
| ⚠ | TLY80336A | Deflection Yoke |
| D46 | TVSBB4 | Diode |
| R447 | ERJIANJ681 | Metal Oxide 680Ω ±5% 1W |
| | TQF80759 | Warning Label |
| | TQF80802 | SVC Warning Label |
| | TQF80525 | Fuse Label |
| | TNP81894-22 | Main PC Board |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TPC806821 | Outer Carton (M-C12001N only) |
| | TPC816001 | Outer Carton (M-C12009N only) |
| | TPC806251 | Outer Carton (M-C12004N only) |
| | TXAPD1M1200X | Filler Complete |
| | TPE84048 | Set Cover |

**SCREWS & WASHERS**

| | | |
|---|---|---|
| | XTV3+15BFN | Screw (PC Board Holder) |
| | XTB4+25BFN | Screw (Side Plate-Front) |
| | XTV3+8BFN | Screw (Side Plate) |
| | XTB4+8BFN | Screw (Side Plate Bracket) |
| | XTB4+20BFN | Screw (CRT) |
| | XWA3B | Washer (Side Plate-Back) |
| | XWA4B | Washer (CRT Side Plate-Front) |
| | XWG5H14 | Washer (CRT) |

## Model No. M-K12004NB/M-K12001NB

| | | |
|---|---|---|
| | TES8177 | CRT Grounded Spring |
| | TKS80203-1 | Chassis Bracket |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 310JLB4N | CRT (M-K1200NB only) |
| ⚠ | 310JLB31NJ | CRT (M-K12001NB only) |
| ⚠ | TLY80336A | Deflection Yoke |
| | TNP81894-23 | Main PC Board |
| D46 | YVSBB4 | Diode |
| R447 | ERJIANJ681 | Metal Oxide 680Ω ±5% 1W |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TPC806162 | Outer Carton (M-K12004NB) |
| | TPC806163 | Outer Carbon (M-K12001NB) |
| | TXAPD1K1200 | Filler Complete |

**SCREWS**

| | | |
|---|---|---|
| | XTV3+12BFN | Screw (PC Board Holder) |

| Ref. No. | Part No. | Description |
|---|---|---|

## Model No. M-9001NA/M-9009NA

| | | |
|---|---|---|
| | TUW81967 | Right Side Plate W/Label |
| | TUW81968 | Left Side Plate |
| | TUX80847-1 | Bottom Plate |
| | TBM80289 | Model Plate (M-9009NA only) |
| | TBM80288 | Model Plate (M-9001NA only) |
| | TES8143-2 | CRT Grounded Spring |
| | TKX822001 | PC Board Holder (Big) |
| | TKX822101 | PC Board Holder (Small) |
| ⚠ | 240AKB39N | CRT (M-9009NA only) |
| ⚠ | 240AKB31N | CRT (M-9001NA only) |
| ⚠ | TLY80335A | Deflection Yoke |
| | TNP81896-21 | Main P.C. Board |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TPE84046 | Set Cover |
| | TPC806561 | Outer Carton (M-9009NA only) |
| | TPC806551 | Outer Carbon (M-9001NA only) |
| | TXAPD1M900X | Filler Complete |
| | TQF80525 | Fuse Label (Side Plate L) |
| | TQF80759 | Warning Label |
| | TQF80761 | Service Warning Label |

**SCREW & WASHERS**

| | | |
|---|---|---|
| | XTV3+15BFN | Screw (P.C. Board Holder) |
| | XTV3+8BFN | Screw (Side Plate) |
| | XWA3B | Washer (Side Plate) |
| | XTB4+20BFN | Screw (CRT) |
| | XWA4B | Washer (CRT) |
| | XWG5H14 | Washer (CRT) |

## Model No. M-12021PB/M-12021NB

| | | |
|---|---|---|
| | TUW81962-1 | Side Plate (Right) |
| | TUW81963-1 | Side Plate (Left) |
| | TUX80849-1 | Side Plate Bracket (Right) |
| | TUX80850-2 | Side Plate Bracket (Left) |
| | TUX80848 | Bottom Plate |
| | | Circuit Board Holder |
| | TKX822001 | Circuit Board Holder |
| | 310JLB31NJ | CRT (M-12021NB only) |
| ⚠ | 310JLB31J | CRT (M-12021PB only) |
| ⚠ | TLY80336A | Deflection Yoke |
| ⚠ | | |
| | TNP81894-34 | Main P.C. Board |
| | TBM80739 | Model Plate M-12021NB |
| | TBM80768 | Model Plate M-12021PB |
| | TES8143-2 | CRT Grounded Spring |
| | TXAJTV4P179A | 4P Connector Ass'y |
| | TPC806731 | Outer Carton (M-12021NB only) |
| | TPC806901 | Outer Carton (M-12021PB only) |
| | TXAPD1M1200X | Filler Complete |
| | TPE84048 | Set Cover |
| | TQF80525 | Fuse Label |
| | TQF80759 | Warning Label |
| | TQF80802 | S.V.C Warning Label |

| Ref. No. | Part No. | Description |
|---|---|---|
| | **SCREWS & WASHERS** | |
| | XTV3+15BFN | Screw (P.C. Board) |
| | XTV3+8BFN | Screw (Bracket) |
| | XTB4+20BFN | Screw (CRT) |
| | XTB4+25BFN | Screw (Side Plate) |
| | XWA4B | Washer (CRT) |
| | XWG5H14 | Washer (CRT) |
| | **Model No. M-12041NB** | |
| | TUW81962-2 | Side Plate (Right) |
| | TUW81963-2 | Side Plate (Left) |
| | TUX80849-1 | Side Bracket (Right) |
| | TUX80850-2 | Side Bracket (Left) |
| | TUX80848 | Bottom Plate |
| | TKX822101 | P.C. Board Holder (Small) |
| | TKX822001 | P.C. Board Holder (Big) |
| | TBM81816 | Model Plate (M-12041NB) |
| ⚠ | 310JLB31NJ | Picture Tube |
| | TNP81894-39 | Main P.C. Board Ass'y |
| ⚠ | TLY80336A | Deflection Yoke |
| | TES8143-2 | CRT Grounded Spring |
| | TXAJTV4P179A | 4P Connector Ass'y (DY) |
| | TQF83825 | Sirial No. Label |
| | TPC816661 | Outer Carton (M-12041NB) |
| | TXAPD1M1200Z | Filler Comp. |
| | TPE84048 | Set Cover |
| | TQF80759 | Warning |
| | TQF80802 | S.V.C Warning |
| | TQF80525 | Fuse Label |
| | **SCREWS & WASHERS** | |
| | XTB4+20BFN | Screw (CRT) |
| | XTB4+25BFN | Screw (Side Plate) |
| | XTV3+15BFN | Screw (P.C. Board) |
| | XTV3+8BN | Screw (Side Plate Eash Spring) |
| | XWG5H14 | Washer (CRT) |
| | XWA3B | Washer (Side Plate) |
| | XWA4B | Washer (CRT Side Plate) |

## MAIN P.C.BOARD PARTS LIST

**Model No. M-9001NA/M-9009NA/M-9004NA/ M-9009A TNP81896-21**

| Ref. No. | Part No. | Description |
|---|---|---|
| | **I.C** | |
| IC31 | AN5763 | V-Osc, Amp. Output |
| IC42 | TVSMPD4011C | Phase Control |
| | **TRANSISTROS** | |
| Q14 | 2SC1360ANC | Video Amp. |
| Q17 | 2SC828AR | Vert. Inv. (Q, R) |
| Q42 | 2SC828AR | Horiz. Inv. (P, Q, R) |
| Q43 | 2SC1318R | Horiz. Drive (R, S) |
| Q44 | 2SC940-1 | Horiz. Output |
| | **DIODES** | |
| D31 | TVS10E1 | Rectifier |
| D43A ⚠ | TVSBB4A | Dumper |
| D43B ⚠ | TVSBB4A | Dumper |
| D44 ⚠ | TVSBB10 | Focus |
| D46 | TVSBB4A | Diode |
| D47 ⚠ | TVSS1R20 | Video Rectifier |
| D51 ⚠ | TVSBB4A | OB Rectifier |
| | **COILS & TRANSFORMERS** | |
| L141 | TLT047-999 | Peaking Coil 4.7μH |
| L403 | TLH80710 | Horiz. Width Coil |
| L404 | TLH80619 | Horiz. Lin. Coil |
| L405 | TLP408 | Choke Coil |
| L430 ⚠ | TLH80410 | Horiz. Drive Trans. |
| R445 | TLP408 | Choke Coil |
| T401 ⚠ | TLF80837 | Flyback Trans. |

**CAPACITORS**

| | | | | | |
|---|---|---|---|---|---|
| C143 | ECCD1H221J | Ceramic | 220pF | ±5% | 50V |
| C145 | ECEA1JS100 | Electrolytic | 10μF | | 63V |
| C302 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C303 | ECQM1H472JZ | Polyester | 4,700pF | ±5% | 50V |
| C304 | ECSZ35EFR33V | Tantalum | 0.33μF | | 35V |
| C305 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C306 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1,000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester | 0.033μF | ±5% | 50V |
| C312 | ECEA1CS471 | Electrolytic | 470μF | | 16V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C441 ⚠ | ECKD2H102KB2 | Ceramic | 1,000pF | ±10% | 500V |
| C442 ⚠ | ECQM4223KZ | Polyester | 0.022μF | ±10% | 400V |
| C443 ⚠ | ECQM4223KZ | Polyester | 0.022μF | ±10% | 400V |
| C444 ⚠ | ECEA25W12ZE | Electrolytic | 12μF | | 25V |
| C460 ⚠ | ECQE6104KZ | Polyester | 0.1μF | ±10% | 600V |
| C461 ⚠ | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA350V3R3 | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA350VR47 | Electrolytic | 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic | 1,000μF | | 16V |
| C493 | ECQM1H472JZ | Polyester | 4,700pF | ±5% | 50V |
| C494 | ECCD1H271J | Ceramic | 270pF | ±5% | 50V |
| C496 | ECEA0JS101 | Electrolytic | 100μF | | 6.3V |
| C497 | ECCD1H221J | Ceramic | 220pF | ±5% | 50V |
| C602 | ECKD2H102KB2 | Ceramic | 1,000pF | ±10% | 500V |
| C705 | ECEA1CS222 | Electrolytic | 2,200μF | | 16V |

**RESISTORS**

| | | | | | |
|---|---|---|---|---|---|
| R143 | ERD25TJ470 | Carbon | 47Ω | ±5% | ¼W |
| R144 | ERD25TJ470 | Carbon | 47Ω | ±5% | ¼W |
| R146 | ERD25TJ820 | Carbon | 82Ω | ±5% | ¼W |
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | ±5% | 2W |
| R161B | ERD25TJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R170 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R171 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| R172 | ERD25TJ562 | Carbon | 5.6KΩ | ±5% | ¼W |
| R301 | ERD25TJ392 | Carbon | 3.9KΩ | ±5% | ¼W |
| R302 | ERD25TJ683 | Carbon | 68KΩ | ±5% | ¼W |
| R303 | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R304 | ERD25FJ1R1 | Carbon | 1.1Ω | ±5% | ¼W |
| R305 | ERD25TJ683 | Carbon | 68KΩ | ±5% | ¼W |
| R306 | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R307 | ERD25TJ4R7 | Carbon | 4.7Ω | ±5% | ¼W |
| R310 | ERD25TJ153 | Carbon | 15KΩ | ±5% | ¼W |
| R423 ⚠ | ERD25FJ680 | Carbon | 68Ω | ±5% | ¼W |
| R431 | ERD25TJ221 | Carbon | 220Ω | ±5% | ¼W |
| R432 ⚠ | TRF2SJ100 | Non Flame | 10Ω | ±5% | 2W |
| R433 | ERD25TJ471 | Carbon | 470Ω | ±5% | ¼W |
| R441 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R443 | ERD25FJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R444 ⚠ | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R447 | ERG1ANJ681 | Metal Oxide | 680Ω | ±5% | 1W |
| R460 ⚠ | ERD14FJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R461 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R465 | ERD25TJ334 | Carbon | 330KΩ | ±5% | ¼W |
| R472 | ERG1ANJ104 | Metal Oxide | 100KΩ | ±5% | 1W |
| R491 | ERD25TJ273 | Carbon | 27KΩ | ±5% | ¼W |
| R492 | ERD25TJ822 | Carbon | 8.2KΩ | ±5% | ¼W |
| R493 | ERD25TJ682 | Carbon | 6.8KΩ | ±5% | ¼W |
| R494 | ERD25TJ681 | Carbon | 680Ω | ±5% | ¼W |
| R495 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R496 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R601 | ERC12GJ561 | Solid | 560Ω | ±5% | ½W |
| R602 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R605 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R606 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| J495 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |

### CONTROLS

| | | | |
|---|---|---|---|
| VR31 | EVTS3AA00B15 | Vert. Hodl | 100KΩB |
| VR32 | EVTS3AA00B54 | Vert. Height | 50KΩB |
| VR33 | EVTS3AA00B14 | Vert. Lin. | 10KΩB |
| VR64 | EVM81U10KB26 | Focus | 2MΩB |
| VR67 | EVTS3AA00B25 | Sub. Bright | 200KΩB |

### OTHER PARTS

| | | | |
|---|---|---|---|
| SF1,3 | TJC305-1 | Fuse Holder | |
| | TJS25640V | CRT Socket | |
| | TMK81516 | CRT Cover | |
| | TMM81434 | Revet | |
| ⚠ | XBA1F20NU14 | Fuse | 2.0A |

## Model No. M-12004NB
## TNP81894-21

### I.C

| | | |
|---|---|---|
| IC31 | AN5763 | V-Osc, Amp. Output |
| IC42 | TVSMPD4011C | Phase Control |

### TRANSISTORS

| | | | |
|---|---|---|---|
| Q14 | 2SC1360ANC | Video Amp. | |
| Q17 | 2Sc828AR | Vert. Inv. | (Q, R) |
| Q42 | 2SC828AR | Horiz. Inv. | (P, Q, R) |
| Q43 | 2SC1318R | Horiz. Drive | (R, S) |
| Q44 | 2SC940-1 | Horiz. Output | |

### DIODES

| | | |
|---|---|---|
| D31 | TVS10E1 | Rectifier |
| D43A ⚠ | TVSBB4A | Dumper |
| D43B ⚠ | TVSBB4A | Dumper |
| D44 ⚠ | TVSBB10 | Focus |
| D47 ⚠ | TVSS1R20 | Video Rectifier |
| D49A ⚠ | TVSBB2A | Boost |
| D49B ⚠ | TVSBB2A | Boost |
| D51 ⚠ | TVSBB4A | Recifier |

### COILS & TRANSFORMERS

| | | | |
|---|---|---|---|
| L141 | TLT047-999 | Peaking Coil | 4.7μH |
| L403 ⚠ | TLH80704 | Horiz. Width Coil | |
| L404 ⚠ | TLH80608 | Horiz. Lin. Coil | |
| L405 | TLP408 | Choke Coil | |
| L430 ⚠ | TLH80410 | Horiz. Drive Trans. | |
| R445 | TLP408 | Choke Coil | |
| T401 ⚠ | TLF80838 | Flyback Trans. | |

### CAPACITORS

| | | | | | |
|---|---|---|---|---|---|
| C143 | ECCD1H221J | Ceramic | 220pF | ±5% | 50V |
| C145 | CEEA1JS100 | Electrolytic | 10μF | | 63V |
| C302 | ECQM05103JZ | Polyester | 0.01μF | ±5% | 50V |
| C303 | ECQM05472JZ | Polyester | 4,700pF | ±5% | 50V |
| C304 | ECSZ35EFR33V | Tantalum | 0.33μF | | 35V |
| C305 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C306 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1,000μF | | 10V |
| C311 | ECQM05333JZ | Polyester | 0.033μF | ±5% | 50V |
| C312 | ECEA1CS471 | | 470μF | | 16V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM05153JZ | Polyester | 0.015μF | ±5% | 50V |
| C441 ⚠ | ECKD2H821KB9 | Ceramic | 820pF | ±10% | 500V |
| C442 ⚠ | ECQM6153KZ | Polyester | 0.015μF | ±10% | 600V |
| C444 ⚠ | ECEA25W8R5Z | Electrolytic | 8.5μF | | 25V |
| C460 ⚠ | ECQE10473KZ | Polyester | 0.047μF | ±10% | 1KV |
| C461 ⚠ | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA350V3R3 | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA350VR47 | Electrolytic | 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic | 1,000μF | | 16V |
| C493 | ECQM05472JZ | Polyester | 4,700pF | ±5% | 50V |
| C494 | ECCD1H271J | Ceramic | 270pF | ±5% | 50V |
| C496 | ECEA0JS101 | Electrolytic | 100μF | | 6.3V |
| C497 | ECCD1H221J | Ceramic | 220pF | ±5% | 50V |
| C602 | ECKD2H102KB2 | Ceramic | 1,000pF | ±10% | 500V |
| C705 | ECEA1CS222 | Electrolytic | 2,200μF | | 16V |

### RESISTORS

| | | | | | |
|---|---|---|---|---|---|
| R143 | ERD25TJ470 | Carbon | 47Ω | ±5% | ¼W |
| R144 | ERD25TJ470 | Carbon | 47Ω | ±5% | ¼W |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | ±5% | 2W |
| R161B | ERD25TJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R170 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R171 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R172 | ERD25TJ562 | Carbon | 5.6KΩ | ±5% | ¼W |
| R301 | ERD25TJ392 | Carbon | 3.9KΩ | ±5% | ¼W |
| R302 | ERD25TJ683 | Carbon | 68KΩ | ±5% | ¼W |
| R303 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R304 ⚠ | ERD25FJ1R1 | Carbon | 1.1Ω | ±5% | ¼W |
| R305 | ERD25TJ563 | Carbon | 56KΩ | ±5% | ¼W |
| R306 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R307 | ERD25TJ4R7 | Carbon | 4.7Ω | ±5% | ¼W |
| R310 | ERD25TJ153 | Carbon | 15KΩ | ±5% | ¼W |
| R423 ⚠ | ERD25FJ680 | Carbon | 68Ω | ±5% | ¼W |
| R431 | ERD25TJ222 | Carbon | 2.2KΩ | ±5% | ¼W |
| R432 ⚠ | TRF2SJ100 | Non Flame | 10Ω | ±5% | 2W |
| R433 | ERD25TJ471 | Carbon | 470Ω | ±5% | ¼W |
| R441 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R442 ⚠ | TRF2SKR47 | Non Flame | 0.47Ω | ±10% | 2W |
| R443 ⚠ | ERD25FJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R444 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R460 ⚠ | ERD14FJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R461 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R465 | ERD25TJ274 | Carbon | 270KΩ | ±5% | ¼W |
| R466 | ERD25TJ333 | Carbon | 33KΩ | ±5% | ¼W |
| R468 | ERD25TJ105 | Carbon | 1MΩ | ±5% | ¼W |
| R472 | ERG1ANJ104 | Metal Oxide | 100KΩ | ±5% | 2W |
| R491 | ERD25TJ273 | Carbon | 27KΩ | ±5% | ¼W |
| R492 | ERD25TJ822 | Carbon | 8.2KΩ | ±5% | ¼W |
| R493 | ERD25TJ682 | Carbon | 6.8KΩ | ±5% | ¼W |
| R494 | ERD25TJ681 | Carbon | 680Ω | ±5% | ¼W |
| R495 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R496 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R601 | ERC12GJ561 | Solid | 560Ω | ±5% | ½W |
| R602 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R605 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R606 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| J495 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼W |

### CONTROLS

| | | | |
|---|---|---|---|
| VR31 | EVTS3AA00B15 | Vert. Hold | 100KΩB |
| VR32 | EVTS3AA00B54 | Vert. Height | 50KΩB |
| VR33 | EVTS3AA00B14 | Vert. Lin. | 10KΩB |
| VR64 | EVM81U10KB26 | Focus | 2MΩB |
| VR67 | EVTS3AA00B25 | Sub. Bright | 200KΩB |

### OTHER PARTS

| | | | |
|---|---|---|---|
| SF1,3 | TJC305-1 | Fuse Holder | |
| | TJS25640V | CRT Socket | |
| | TMK81516 | CRT Cover | |
| | TMM81434 | Revet | |
| ⚠ | XBA1F20NU14 | Fuse | 2.0A |

| Ref. No. | Part No. | Description |
|---|---|---|

## Model No. M-C12001N/M-C12004N/M-C12009N TNP81894-22 MAIN P.C. BOARD

### I.C

| | | |
|---|---|---|
| IC31 | AN5763 | I.C |
| IC41 | AN5753 | I.C |

### TRANSISTORS

| | | |
|---|---|---|
| Q10 | 2SC829C | Transistor |
| Q11 | 2SC829C | Transistor |
| Q12 | 2SC829C | Transistor |
| Q14 | 2SC1360ANC | Transistor |
| Q19 | 2SC828AQ | Transistor |
| Q44 | 2SC901BN | Transistor |

### DIODES

| | | |
|---|---|---|
| D12 | MA150 | Diode |
| D13 | TVSRD3R9EB2 | Diode |
| D31 | TVS10E1 | Diode |
| D32 | MA150 | Diode |
| D43A ⚠ | TVSBB4A | Diode |
| D43B ⚠ | TVSBB4A | Diode |
| D44 ⚠ | TVS2DL15 | Diode |
| D45 | MA150 | Diode |
| D46 | TVSBB4 | Diode |
| D47 ⚠ | TVSS1R20 | |
| D49A ⚠ | TVSBB2A | Diode |
| D49B ⚠ | TVSBB2A | Diode |
| D51 ⚠ | TVSBB4 | Diode |

### COILS & TRANSFORMERS

| | | | |
|---|---|---|---|
| L121 | TLT047-999 | Peaking Coil | 0.47μH |
| L122 | TLP408 | Choke Coil | |
| L141 | TLT047-999 | Peaking Coil | 0.47μH |
| L403 ⚠ | TLH80704 | Width Coil | |
| L404 ⚠ | TLH80608 | H. Lin. Coil | |
| L405 | TLP408 | Choke Coil | |
| L430 ⚠ | TLH80410 | H. Drive Trans. | |
| J124 | TLT821-999 | Peaking Coil | 820μH |
| T401 ⚠ | TLF80838 | Flyback Trans. | |

### RESISTORS

| | | | | | |
|---|---|---|---|---|---|
| R121 | ERD25TJ820 | Carbon | 82Ω | J | ¼W |
| R122 | ERD25TJ821 | Carbon | 820Ω | J | ¼W |
| R123 | ERD25TJ820 | Carbon | 82Ω | J | ¼W |
| R124 | ERD25TJ821 | Carbon | 820Ω | J | ¼W |
| R125 | ERD25TJ102 | Carbon | 1KΩ | J | ¼W |
| R126 | ERD25TJ820 | Carbon | 82Ω | J | ¼W |
| R127 | ERD25TJ181 | Carbon | 180Ω | J | ¼W |
| R128 | ERD25TJ562 | Carbon | 5.6KΩ | J | ¼W |
| R129 | ERD25TJ122 | Carbon | 1.2KΩ | J | ¼W |
| R131 | ERD25TJ563 | Carbon | 56KΩ | J | ¼W |
| R132 | ERD25TJ332 | Carbon | 3.3KΩ | J | ¼W |
| R133 | ERD25TJ271 | Carbon | 270Ω | J | ¼W |
| R143 | ERD25TJ470 | Carbon | 47Ω | J | ¼W |
| R144 | ERD25TJ220 | Carbon | 22Ω | J | ¼W |
| R146 | ERD25TJ820 | Carbon | 82Ω | J | ¼W |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | J | 2W |
| R161A | ERD25TJ151 | Carbon | 150Ω | J | ¼W |
| R173 | ERD25TJ122 | Carbon | 1.2KΩ | J | ¼W |
| R300 | ERD25TJ153 | Carbon | 15KΩ | J | ¼W |
| R301 | ERD25TJ472 | Carbon | 4.7KΩ | J | ¼W |
| R302 | ERD25TJ683 | Carbon | 68KΩ | J | ¼W |
| R303 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | J | ¼W |
| R304 ⚠ | ERD25FJ1R1 | Carbon | 1.1Ω | J | ¼W |
| R305 | ERD25TJ563 | Carbon | 56KΩ | J | ¼W |
| R306 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | J | ¼W |
| R307 | ERD25TJ4R7 | Carbon | 4.7Ω | J | ¼W |
| R308 | ERD25TJ331 | Carbon | 330Ω | J | ¼W |
| R309 | ERD25TJ331 | Carbon | 330Ω | J | ¼W |
| R310 | ERD25TJ153 | Carbon | 15KΩ | J | ¼W |
| R401 | ERD25TJ333 | Carbon | 33KΩ | J | ¼W |
| R402 | ERD25TJ332 | Carbon | 3.3KΩ | J | ¼W |
| R403 | ERD25TJ273 | Carbon | 27KΩ | J | ¼W |
| R404 | ERO25CKG2701 | Metal Oxide | 2.7KΩ | G | ¼W |
| R423 ⚠ | ERD25FJ680 | Carbon | 68Ω | J | ¼W |
| R432 ⚠ | TRF2SJ100 | Non Flame | 10Ω | J | 2W |
| R441 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | J | ¼W |
| R442 ⚠ | TRF2SKR47 | Non Flame | 0.47Ω | K | 2W |
| R443 ⚠ | ERD25FJ122 | Carbon | 1.2KΩ | J | ¼W |
| R444 | ERD25TJ122 | Carbon | 1.2KΩ | J | ¼W |
| R445 | TLP408 | Hoke Coil | | | |
| R447 | ERG1ANJ681 | Metal Oxide | 680Ω | J | 1W |
| R460 ⚠ | ERD14FJ102 | Carbon | 1KΩ | J | ¼W |
| R461 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | J | ¼W |
| R465 | ERD25TJ274 | Carbon | 270KΩ | J | ¼W |
| R466 | ERD25TJ333 | Carbon | 33KΩ | J | ¼W |
| R468 | ERD25TJ105 | Carbon | 1MΩ | J | ¼W |
| R470 | ERD25TJ102 | Carbon | 1KΩ | J | ¼W |
| R472 | ERG1ANJ104 | Metal Oxide | 100KΩ | J | 1W |
| R601 | ERC12GJ561 | Solid | 560Ω | J | ½W |
| R602 ⚠ | ERD25FJ103 | Carbon | 10KΩ | J | ¼W |
| R605 ⚠ | ERD25FJ103 | Carbon | 10KΩ | J | ¼W |
| R606 ⚠ | ERD25FJ103 | Carbon | 10KΩ | J | ¼W |

## CAPACITORS

| | | | | | |
|---|---|---|---|---|---|
| C121 | ECEA1CN470SE | Electrolytic | 47μF | | 16V |
| C122 | ECEA0JS470 | Electrolytic | 47μF | | 6.3V |
| C123 | ECKD1H103PF2 | Ceramic | 0.01μF | P | 50V |
| C124 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C125 | ECEA1CS220 | Electrolytic | 22μF | | 16V |
| C126 | ECCD1H220JC2 | Ceramic | 22pF | J | 50V |
| C127 | ECEA1CS101 | Electrolytic | 100μF | | 16V |
| C143 | ECCD1H181JC | Ceramic | 180pF | J | 50V |
| C145 | ECEA1JS100 | Electrolytic | 10μF | | 63V |
| C161 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C301 | ECQM1H223JZ | Polyester | 0.022μF | J | 50V |
| C302 | ECQM1H223JZ | Polyester | 0.022μF | J | 50V |
| C303 | ECQM1H103JZ | Polyester | 0.01μF | J | 50V |
| C304 | ECSZ35EFR33V | Tantalum | 0.33μF | | 35V |
| C305 | ECSF16E4R7Z | Tantalum | 4.7μF | | 16V |
| C306 | ECSF16E4R7Z | Tantalum | 4.7μF | | 16V |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1,000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester | 0.033μF | J | 50V |
| C312 | ECEA1CS471 | Electrolytic | 470μF | | 16V |
| C401 | ECQM1H183JZ | Polyester | 0.018μF | J | 50V |
| C402 | ECQM1H153JZ | Polyester | 0.015μF | J | 50V |
| C403 | ECQM1H103JZ | Polyester | 0.01μF | J | 50V |
| C404 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C405 | ECQS1392JWT | Styrol | 3900pF | J | 100V |
| C406 | ECQM1H102JZ | Polyester | 1000pF | J | 50V |
| C407 | ECCD2H220K | Ceramic | 22pF | K | 500V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester | 0.015μF | J | 50V |
| C441 ⚠ | ECKD2H821KB9 | Ceramic | 820pF | K | 500V |
| C442 ⚠ | ECQM6153KZ | Polyester | 0.015μF | K | 600V |
| C444 ⚠ | ECEA25W8R5Z | Electrolytic | 8.5μF | | 25V |
| C445 | ECEA50V100Y | Electrolytic | 10μF | | 50V |
| C460 ⚠ | ECQE10473KZ | Polyester | 0.047μF | K | |
| C461 ⚠ | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA2VS3R3Y | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA2VSR47Y | Electrolytic | 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic | 1000μF | | 16V |
| C602 | ECKD2H102KB2 | Ceramic | 1000pF | K | 500V |
| C705 | ECEA1CS222 | Electrolytic | 2200μF | | 16V |

## OTHER PARTS

| | | | |
|---|---|---|---|
| | TJS25640V | CRT Socket | |
| | TMK81516 | CRT P.C. Board Cover | |
| | TMM81434 | Rivet | |
| ⚠ | XBA1F20NU14 | Fuse | 2A |
| SF1,3 | TJC305-1 | Fuse Holder | |

## CONTROLS

| | | | |
|---|---|---|---|
| VR11 | EVTS3MA00B52 | Sub. Contrast Control | 500Ω B |
| VR12 | EVNK4AA00B13 | Pedestal Level Control | 1KΩB |
| VR31 | EVTS3AA00B15 | V. Hold Control | 100KΩB |
| VR32 | EVTS3MA00B54 | Height Control | 50KΩB |
| VR33 | EVTS3MA00B14 | V Lin. Control | 10KΩB |
| VR41 | EVTS3MA00B13 | H. Hold Control | 1KΩB |
| VR64 | EVT81US10B26 | Focus | 2MΩB |
| VR67 | EVLS3JA00B25 | Control | 200KΩB |

## Model No. M-K12001NB/M-K12004NB
## TNP81894-23

### I.C

| | | | |
|---|---|---|---|
| IC31 | AN5763 | I.C | |
| IC42 | TVSMPD4011C | I.C | |

### TRANSISTORS

| | | | |
|---|---|---|---|
| Q14 | 2SC1360ANC | Transistor | |
| Q17 | 2SC828AR | Transistor | (Q, R) |
| Q42 | 2SC828AR | Transistor | (P, Q) |
| Q43 | 2SC1318-R | Transistor | (R, S) |
| Q44 | 2SC940-1 | Transistor | |

| Ref. No. | Part No. | Description |
|---|---|---|
| **DIODES** | | |
| D31 | TVS10E1 | Rectifier |
| D43A ⚠ | TVSBB4A | Dumper |
| D43B ⚠ | TVSBB4A | Dumper |
| D44 ⚠ | TVS2DL15 | Focus |
| D47 ⚠ | TVSS1R20 | Video Rectifier |
| D49A ⚠ | TVSBB2A | Boost |
| D49B ⚠ | TVSBB2A | Boost |
| D51 ⚠ | TVSBB4A | Rectifier |
| **COILS & TRANSFORMERS** | | |
| L141 | TLT047-999 | Peaking Coil 0.47μH |
| L403 ⚠ | TLH80704 | Horiz. Width Coil |
| L404 ⚠ | TLH80608 | Horiz. Lin. Coil |
| L405 | TLP408 | Choke Coil |
| L430 ⚠ | TLH80410 | Horiz. Drive Trans. |
| T401 ⚠ | TLF80838 | Flyback Trans. |
| R445 | TLP408 | Choke Coil |

| Ref. No. | Part No. | Description | | |
|---|---|---|---|---|
| **CAPACITORS** | | | | |
| C143 | ECCD1H221J | Ceramic 220pF | | 50V |
| C145 | ECEA1JS100 | Electrolytic 10μF | | 63V |
| C302 | ECQM1H103JZ | Polyester 0.01μF | | 50V |
| C303 | ECQM1H472JZ | Polyester 4700pF | | 50V |
| C304 | TCSZ35EFR33V | Tantalum 0.033μF | | 35V |
| C305 | ECSF16E4R7ZE | Tantalum 47μF | | 16V |
| C306 | ECSZ16EF4R7N | Tantalum 47μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic 1000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester 0.033μF | | 50V |
| C312 | ECEA1CS471 | Electrolytic 470μF | | 16V |
| C423 | ECEA1CS331 | Electrolytic 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester 0.015μF | J | 50V |
| C441 ⚠ | ECKD2H821KB9 | Ceramic 820pF | K | 500V |
| C442 ⚠ | ECQM6153KZ | Polyester 0.015μF | K | 600V |
| C444 ⚠ | ECEA25W8R5Z | Electrolytic 8.5μF | | 25V |
| C445 | ECEA1HS101 | Electrolytic 10μF | | 50V |
| C460 ⚠ | ECQE10473KZ | Polyester 0.047μF | K | 1KV |
| C461 ⚠ | ECEA1JS101 | Electrolytic 100μF | | 63V |
| C463 | ECEA2VS3R3Y | Electrolytic 3.3μF | | 350V |
| C465 | ECEA350VR47 | Electrolytic 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic 1000μF | | 16V |
| C493 | ECQM1H472JZ | Polyester 4700pF | J | 50V |
| C494 | ECCD1H271J | Ceramic 270pF | J | 50V |
| C496 | ECEA0JS101 | Electrolytic 100μF | | 6.3V |
| C497 | ECCD1H221J2 | Ceramic 220pF | J | 50V |
| C602 | ECKD2H102KB2 | Ceramic 1000pF | K | 500V |
| C705 | ECEA1CS222 | Electrolytic 2200μF | | 16V |
| **RESISTORS** | | | | |
| R143 | ERD25TJ470 | Carbon 47Ω | J | ¼W |
| R144 | ERD25TJ470 | Carbon 47Ω | J | ¼W |
| R146 | ERD25TJ820 | Carbon 82Ω | J | ¼W |
| R151 | ERG2ANJ821 | Metal Oxide 820Ω | J | 2W |
| R161B | ERD25TJ102 | Carbon 1KΩ | J | ¼W |

| Ref. No. | Part No. | Description | | |
|---|---|---|---|---|
| R170 | ERD25TJ103 | Carbon 10KΩ | J | ¼W |
| R171 | ERD25TJ103 | Carbon 10KΩ | J | ¼W |
| R172 | ERD25TJ562 | Carbon 5.6KΩ | J | ¼W |
| R301 | ERD25TJ392 | Carbon 3.9KΩ | J | ¼W |
| R302 | ERD25TJ683 | Carbon 68KΩ | J | ¼W |
| R303 ⚠ | ERD25FJ6R8 | Carbon 6.8Ω | J | ¼W |
| R304 ⚠ | ERD25TJ1R1 | Carbon 1.1Ω | J | ¼W |
| R305 | ERD25TJ823 | Carbon 8.2KΩ | J | ¼W |
| R306 ⚠ | ERD25FJ6R8 | Carbon 6.8Ω | J | ¼W |
| R307 | ERD25TJ4R7 | Carbon 4.7Ω | J | ¼W |
| R310 | ERD25TJ153 | Carbon 15KΩ | J | ¼W |
| R423 ⚠ | ERD25FJ680 | Carbon 68Ω | J | ¼W |
| R431 | ERD25TJ222 | Carbon 2.2KΩ | J | ¼W |
| R432 ⚠ | TRF2SJ100 | Non Flame 10Ω | J | 2W |
| R433 | ERD25TJ471 | Carbon 470Ω | J | ¼W |
| R441 ⚠ | ERD25FJ6R8 | Carbon 6.8Ω | J | ¼W |
| R442 ⚠ | TRF2SKR47 | Non Flame 0.47Ω | K | 2W |
| R443 ⚠ | ERD25FJ122 | Carbon 1.2KΩ | J | ¼W |
| R444 | ERD25FJ122 | Carbon 1.2KΩ | J | ¼W |
| R447 | ERG1ANJ681 | Metal Oxide 680Ω | J | 1W |
| R460 ⚠ | ERD14FJ102 | Carbon 1KΩ | J | ¼W |
| R461 ⚠ | ERD25FJ6R8 | Carbon 6.8Ω | J | ¼W |
| R465 | ERD25TJ274 | Carbon 270KΩ | J | ¼W |
| R466 | ERD25TJ333 | Carbon 33KΩ | J | ¼W |
| R468 | ERD25TJ105 | Carbon 1MΩ | J | ¼W |
| R472 | ERG1ANJ104 | Metal Oxide 0.1μF | J | 1W |
| R491 | ERD25TJ273 | Carbon 27KΩ | J | ¼W |
| R492 | ERD25TJ822 | Carbon 8.2KΩ | J | ¼W |
| R493 | ERD25TJ682 | Carbon 6.8KΩ | J | ¼W |
| R494 | ERD25TJ681 | Carbon 680Ω | J | ¼W |
| R495 | ERD25TJ122 | Carbon 1.2KΩ | J | ¼W |
| R496 | ERD25TJ103 | Carbon 10KΩ | J | ¼W |
| R601 | ERD12FJ561 | Carbon 560Ω | J | ½W |
| R602 ⚠ | ERD25FJ103 | Carbon 10KΩ | J | ¼W |
| R605 ⚠ | ERD25FJ103 | Carbon 10KΩ | J | ¼W |
| R606 ⚠ | ERD25FJ103 | Carbon 10KΩ | J | ¼W |
| R495 | ERD25TJ103 | Carbon 10KΩ | J | ¼W |

| | | |
|---|---|---|
| **OTHER PARTS** | | |
| | TJS25640V | CRT Socket |
| SF1,3 | TJC305-1 | Fuse Holder |
| | TMK81516 | CRT PWB. Cover |
| | TMM81434 | Push Revet |
| | XBA1F20NU14 | Fuse 2A |

| | | | |
|---|---|---|---|
| **CONTROLS** | | | |
| VR31 | EVTS3AA00B15 | Vert. Hold | 100KΩB |
| VR32 | EVTS3AA00B54 | Vert. Height | 50KΩB |
| VR33 | EVTS3AA00B14 | Vert. Lin. | 10KΩB |
| VR64 | EVT81US10B26 | Focus Control | |
| VR67 | EVLS3JA00B25 | Sub. Bright | |

## Model No. M-29001N/M-29004N
## TNP81896-22

### I.C

| Ref. No. | Part No. | Description |
|---|---|---|
| IC31 | AN5763 | V-Osc. Amp, Output |
| IC41 | AN5753 | Sync.-Sep. Amp. H-Osc. Afc. Drive |

### TRANSISTORS

| Ref. No. | Part No. | Description |
|---|---|---|
| Q10 | 2SC829C | Video Pre-Amp. |
| Q11 | 2SC829C | Video Pre-Amp. |
| Q12 | 2SC829C | Video Pre-Amp. |
| Q14 | 2SC1360ANC | Video Amp. |
| Q19 | 2SC828AR | Video Pre-Amp. Buf. (Q, R) |
| Q44 | 2SC940-1 | Horiz. Output |

### DIODES

| Ref. No. | Part No. | Description |
|---|---|---|
| D12 | MA150 | Pedestal Level |
| D13 | TVSRD3R9EB2 | Zener |
| D31 | TVS10E1 | Rectifier |
| D32 | MA150 | Vert. Blanking |
| D43A ⚠ | TVSBB4A | Dumper |
| D43B ⚠ | TVSBB4A | Dumper |
| D44 ⚠ | TVS2DL15 | Focus |
| D45 | MA150 | Horiz. Blanking |
| D46 | TVSBB4 | Diode |
| D47 ⚠ | TVSS1R20 | Diode |
| D51 ⚠ | TVSBB4 | OB Rectifier |

### COILS & TRANSFORMERS

| Ref. No. | Part No. | Description |
|---|---|---|
| L121 | TLT047-999 | Peaking Coil 4.7μH |
| L122 | TLP408 | Choke Coil |
| L141 | TLT047-999 | Peaking Coil 4.7μH |
| L403 ⚠ | TLH80710 | Horiz. Width Coil |
| L404 ⚠ | TLH80619 | Horiz. Lin. Coil |
| L405 | TLP408 | Choke Coil |
| L430 ⚠ | TLH80410 | Horiz. Drive Trans. |
| R445 | TLP408 | Choke Coil |
| T401 ⚠ | TLF80837 | Flyback Trans. |

### CAPACITORS

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| C121 | ECEA1CN470SE | Electrolytic | 47μF | | 16V |
| C122 | ECEA0JS470 | Electrolytic | 47μF | | 6.3V |
| C123 | ECKD1H103PF2 | Ceramic | 0.01μF | $^{+100}_{-0}$% | 50V |
| C124 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C125 | ECEA1CS220 | Electrolytic | 22μF | | 16V |
| C126 | ECCD1H220JC2 | Ceramic | 22pF | ±5% | 50V |
| C127 | ECEA1CS101 | Electrolytic | 100μF | | 16V |
| C143 | ECCD1H181JC | Ceramic | 180pF | ±5% | 50V |
| C145 | ECEA1JS100 | Electrolytic | 10μF | | 63V |
| C161 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C301 | ECQM1H223JZ | Polyester | 0.022μF | ±5% | 50V |
| C302 | ECQM1H223JZ | Polyester | 0.022μF | ±5% | 50V |
| C303 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C304 | ECSZ35EFR33V | Tantalum | 0.33μF | | 35V |
| C305 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C306 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester | 0.033μF | ±5% | 50V |
| C312 | ECEA1CS471 | Electrolytic | 470μF | | 16V |
| C401 | ECQM1H183JZ | Polyester | 0.018μF | ±5% | 50V |
| C402 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C403 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C404 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C405 | ECQS1392JWT | Styrol | 3900pF | ±5% | 100V |
| C406 | ECQM1H102JZ | Polyester | 1000pF | ±5% | 50V |
| C407 | ECCD2H220K | Ceramic | 22pF | ±10% | 500V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C441 ⚠ | ECKD2H102KB2 | Ceramic | 1000pF | ±10% | 500V |
| C442 ⚠ | ECQM4223KZ | Polyester | 0.022μF | ±10% | 400V |
| C443 ⚠ | ECQM4223KZ | Polyester | 0.022μF | ±10% | 400V |
| C444 ⚠ | ECEA25W12Z | Electrolytic | 12μF | | 25V |
| C460 ⚠ | ECQE6104KZ | Polyester | 0.1μF | ±10% | 600V |
| C461 ⚠ | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA2VS3R3Y | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA2VSR47Y | Electrolytic | 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic | 1000μF | | 16V |
| C602 | ECKD2H102KB2 | Ceramic | 1000pF | ±10% | 500V |
| C705 | ECEA1CS222 | Polyester | 2200μF | | 16V |

### RESISTORS

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| R121 | ERD25TJ820 | Carbon | 82Ω | ±5% | ¼W |
| R122 | ERD25TJ821 | Carbon | 820Ω | ±5% | ¼W |
| R123 | ERD25TJ820 | Carbon | 82Ω | ±5% | ¼W |
| R124 | ERD25TJ821 | Carbon | 820Ω | ±5% | ¼W |
| R125 | ERD25TJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R126 | ERD25TJ820 | Carbon | 82Ω | ±5% | ¼W |
| R127 | ERD25TJ181 | Carbon | 180Ω | ±5% | ¼W |
| R128 | ERD25TJ562 | Carbon | 5.6KΩ | ±5% | ¼W |
| R129 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R131 | ERD25TJ563 | Carbon | 56KΩ | ±5% | ¼W |
| R132 | ERD25TJ332 | Carbon | 3.3KΩ | ±5% | ¼W |
| R133 | ERD25TJ271 | Carbon | 270Ω | ±5% | ¼W |
| R143 | ERD25TJ470 | Carbon | 47Ω | ±5% | ¼W |
| R144 | ERD25TJ220 | Carbon | 22Ω | ±5% | ¼W |
| R146 | ERD25TJ820 | Carbon | 82Ω | ±5% | ¼W |
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | ±5% | 2W |
| R161A | ERD25TJ151 | Carbon | 150Ω | ±5% | ¼W |
| R173 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R174 ⚠ | ERD25TJ222 | Carbon | 2.2KΩ | ±5% | ¼W |
| R300 | ERD25TJ153 | Carbon | 15KΩ | ±5% | ¼W |
| R301 | ERD25TJ392 | Carbon | 3.9KΩ | ±5% | ¼W |
| R302 | ERD25TJ683 | Carbon | 68KΩ | ±5% | ¼W |
| R303 ⚠ | ERD25TJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R304 ⚠ | ERD25FJ1R1 | Carbon | 1.1Ω | ±5% | ¼W |
| R305 | ERD25TJ683 | Carbon | 68KΩ | ±5% | ¼W |
| R306 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R307 | ERD25TJ4R7 | Carbon | 4.7Ω | ±5% | ¼W |
| R308 | ERD25TJ331 | Carbon | 330Ω | ±5% | ¼W |
| R309 | ERD25TJ331 | Carbon | 330Ω | ±5% | ¼W |
| R310 | ERD25TJ153 | Carbon | 15KΩ | ±5% | ¼W |
| R401 | ERD25TJ333 | Carbon | 33KΩ | ±5% | ¼W |
| R402 | ERD25TJ332 | Carbon | 3.3KΩ | ±5% | ¼W |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| R403 | ERD25TJ273 | Carbon | 27KΩ | ±5% | ¼W |
| R404 | ERD25TG2701 | Carbon | 2.7KΩ | ±2% | ¼W |
| R423 ⚠ | ERD25FJ680 | Carbon | 68Ω | ±5% | ¼W |
| R432 ⚠ | TRF2SJ100 | Carbon | 10Ω | ±5% | 2W |
| R441 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R443 ⚠ | ERD25FJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R444 | ERD25TJ122 | Carbon | 1.2KΩ | ±5% | ¼W |
| R447 | ERG1ANJ681 | Metal Oxide | 680Ω | ±5% | 1W |
| R460 ⚠ | ERD25FJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R461 ⚠ | ERD25FJ6R8 | Carbon | 6.8Ω | ±5% | ¼W |
| R465 | ERD25TJ334 | Carbon | 330KΩ | ±5% | ¼W |
| R470 | ERD25TJ102 | Carbon | 1KΩ | ±5% | ¼W |
| R472 | ERG1ANJ104 | Metal Oxide | 100KΩ | ±5% | ½W |
| R601 | ERC12GJ561 | Solid | 560Ω | ±5% | ½W |
| R602 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R605 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |
| R606 ⚠ | ERD25FJ103 | Carbon | 10KΩ | ±5% | ¼W |

## CONTROLS

| | | | |
|---|---|---|---|
| VR11 | EVTS3MA00B52 | Sub. Contrast | 500ΩB |
| VR12 | EVNK4AA00B13 | Pedestal Level | 1KΩB |
| VR31 | EVTS3AA00B15 | Vert.-Hold | 100KΩB |
| VR32 | EVTS3AA00B54 | Vert.-Height | 50KΩB |
| VR33 | EVTS3AA00B14 | Vert.-Lin. | 10KΩB |
| VR41 | EVTS3MA00B52 | Horiz.-Hold | 500ΩB |
| VR64 | EVM81U10KB26 | Focus | 2MΩB |
| VR67 | EVLS3JA00B25 | Sub. Bright | 200KΩB |

## OTHER PARTS

| | | |
|---|---|---|
| SF1,3 | TJS305-1 | Fuse Holder |
| | TJS25640V | CRT Socket |
| | TMK81516 | CRT Cover |
| | TMM81434 | Revet |
| ⚠ | XBA1F20NU14 | Fuse |

## Model No. M-12021NB/M-12021PB TNP81894-34

### I.C

| | | |
|---|---|---|
| IC31 | AN5763 | V-Osc. Amp. Output |
| IC41 | AN5752 | I.C |
| IC42 | TVSMPD4011C | Phase Control |

### TRANSISTORS

| | | |
|---|---|---|
| Q14 | 2SC1360ANC | Video Amp. |
| Q18 | 2SC828AR | Transistor (Q, R) |
| Q17 | 2SC828AR | Transistor (Q, R) |
| Q44 | 2SC901BN | Horiz. Output |

### DIODES

| | | |
|---|---|---|
| D31 | TVS10E1 | Rectifier |
| D43A ⚠ | TVSBB4A | Dumper |
| D43B ⚠ | TVSBB4A | Dumper |
| D44 ⚠ | TVS2DL15 | Focus |
| D47 ⚠ | TVSS1R20 | Video Rectifier |
| D49A ⚠ | TVSBB2A | Boost |
| D49B ⚠ | TVSBB2A | Boost |

| Ref. No. | Part No. | Description |
|---|---|---|
| D51 ⚠ | TVSBB4A | Rectifier |

### COILS & TRANSFORMERS

| | | |
|---|---|---|
| L141 | TLT047-999 | Peaking Coil 0.47μH |
| L403 ⚠ | TLH80704 | Horiz. Width Coil |
| L404 ⚠ | TLH80608 | Horiz. Lin. Coil |
| L405 | TLP408 | Choke Coil |
| L430 ⚠ | TLH80410 | Horiz. Drive Trans. |
| T401 ⚠ | TLF80838 | Flyback Trans. |
| R445 | TLP408 | Choke Coil |

## CAPACITORS

| | | | | | |
|---|---|---|---|---|---|
| C143 | ECCD1H221J | Ceramic | 220pF | ±5% | 50V |
| C145 | ECEA1JS100 | Electrolytic | 10μF | | 63V |
| C302 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C303 | ECQM1H472JZ | Polyester | 4700pF | ±5% | 50V |
| C304 | TCSZ35EFR33V | Tantalum | 0.033μF | | 35V |
| C305 | ECSF16E4R7ZE | Tantalum | 4.7μF | | 16V |
| C306 | ECSZ16EF4R7N | Tantalum | 4.7μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester | 0.033μF | ±5% | 50V |
| C312 | ECEA1CS471 | Electrolytic | 470μF | | 16V |
| C401 | ECQM1H183JZ | Polyester | 0.018μF | ±5% | 50V |
| C402 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C403 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C404 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C405 | ECQS1392JWT | Styrol | 2.2μF | ±5% | 100V |
| C406 | ECQM1H102JZ | Polyester | 1000pF | ±5% | 50V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C441 ⚠ | ECKD2H821KB9 | Ceramic | 820pF | ±10% | 500V |
| C442 ⚠ | ECQM6153KZ | Polyester | 0.015μF | ±10% | 600V |
| C444 ⚠ | ECEA25W8R5Z | Electrolytic | 8.5μF | | 25V |
| C445 | ECEA1HS101 | Electrolytic | 10μF | | 50V |
| C460 ⚠ | ECQE10473KZ | Polyester | 0.047μF | ±10% | 1KV |
| C461 ⚠ | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA2VS3R3Y | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA350VR47 | Electrolytic | 0.47μF | | 350V |
| C491 ⚠ | ECEA1CS102 | Electrolytic | 1000μF | | 16V |
| C492 | ECQM1H102JZ | Electrolytic | 1000pF | ±5% | 50V |
| C496 | ECEA0JS101 | Electrolytic | 100μF | | 6.3V |
| C497 | ECCD1H121J | Ceramic | 120pF | ±5% | 50V |
| C602 | ECKD2H102KB2 | Ceramic | 1000pF | ±10% | 500V |
| C705 | ECEA1CS222 | Electrolytic | 2200μF | | 16V |

## RESISTORS

| | | | | | |
|---|---|---|---|---|---|
| R143 | ERD25FJ470K | Carbon | 47Ω | ±5% | ¼W |
| R144 | ERD25FJ470K | Carbon | 47Ω | ±5% | ¼W |
| R146 | ERD25FJ820K | Carbon | 82Ω | ±5% | ¼W |
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | ±5% | 2W |
| R170 | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |
| R171 | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |
| R172 | ERD25FJ562K | Carbon | 5.6KΩ | ±5% | ¼W |

| Ref. No. | | Part No. | Description | | | |
|---|---|---|---|---|---|---|
| R175 | | ERD25FJ472K | Carbon | 4.7KΩ | ±5% | ¼W |
| R176 | | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |
| R177 | | ERD25FJ472K | Carbon | 4.7KΩ | ±5% | ¼W |
| R301 | | ERD25FJ392K | Carbon | 3.9KΩ | ±5% | ¼W |
| R302 | | ERD25FJ683K | Carbon | 68KΩ | ±5% | ¼W |
| R303 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | ±5% | ¼W |
| R304 | ⚠ | ERD25FJ1R1K | Carbon | 1.1Ω | ±5% | ¼W |
| R305 | | ERD25FJ823K | Carbon | 8.2KΩ | ±5% | ¼W |
| R306 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | ±5% | ¼W |
| R307 | | ERD25FJ4R7K | Carbon | 4.7Ω | ±5% | ¼W |
| R310 | | ERD25FJ153K | Carbon | 15KΩ | ±5% | ¼W |
| R313 | | ERD25FJ561K | Carbon | 560Ω | ±5% | ¼W |
| R401 | | ERD25FJ333K | Carbon | 33KΩ | ±5% | ¼W |
| R402 | | ERD25FJ332K | Carbon | 3.3KΩ | ±5% | ¼W |
| R403 | | ERD25FJ273K | Carbon | 27KΩ | ±5% | ¼W |
| R404 | | ERO25CKG2701 | Metal | 2.7KΩ | ±2% | ¼W |
| R423 | ⚠ | ERD25FJ680K | Carbon | 68Ω | ±5% | ¼W |
| R432 | ⚠ | TRF2SJ100 | Non Flame | 10Ω | ±5% | 2W |
| R441 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | ±5% | ¼W |
| R442 | ⚠ | TRF2SKR47 | Non Flame | 0.47Ω | ±5% | 2W |
| R443 | ⚠ | ERD25FJ122K | Carbon | 1.2KΩ | ±5% | ¼W |
| R444 | | ERD25FJ122K | Carbon | 1.2KΩ | ±5% | ¼W |
| R447 | | ERG1ANJ681 | Metal Oxide | 680Ω | ±5% | 1W |
| R460 | ⚠ | ERD25FJ102K | Carbon | 1KΩ | ±5% | ¼W |
| R461 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | ±5% | ¼W |
| R465 | | ERD25FJ274K | Carbon | 270KΩ | ±5% | ¼W |
| R466 | | ERD25FJ333K | Carbon | 33KΩ | ±5% | ¼W |
| R468 | | ERD25FJ105K | Carbon | 1MΩ | ±5% | ¼W |
| R472 | | ERG1ANJ104 | Metal Oxide | 0.1μF | ±5% | 1W |
| R493 | | ERD25FJ682K | Carbon | 6.8KΩ | ±5% | ¼W |
| R494 | | ERD25FJ681K | Carbon | 680Ω | ±5% | ¼W |
| R495 | | ERD25FJ122K | Carbon | 1.2KΩ | ±5% | ¼W |
| R497 | | ERD25FJ472K | Carbon | 4.7KΩ | ±5% | ¼W |
| R498 | | ERD25FJ272K | Carbon | 2.7KΩ | ±5% | ¼W |
| R601 | | ERD25FJ561K | Carbon | 560Ω | ±5% | ¼W |
| R602 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |
| R605 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |
| R606 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | ±5% | ¼W |

### OTHER PARTS

| | | | |
|---|---|---|---|
| | TJS25640V | CRT Socket | |
| SF1,3 | TJC305-1 | Fuse Holder | |
| | TMK81516 | CRT PWB. Cover | |
| | TMM81434 | Push Revet | |
| ⚠ | XBA1F20NU14 | Fuse | 2A |

### CONTROLS

| | | | |
|---|---|---|---|
| VR31 | EVTS3AA00B15 | Vert. Hold | 100KΩB |
| VR32 | EVTS3AA00B54 | Vert. Height | 50KΩB |
| VR33 | EVTS3AA00B14 | Vert. Lin. | 10KΩB |
| VR41 | EVTS3MA00B13 | Horiz. Hold | 1KΩB |
| VR42 | EVNK4BA00B24 | H.P.C | 20KΩB |
| VR64 | EVT81US10B26 | Focus Control | |
| VR67 | EVTS3MA00B25 | Sub. Bright | |

| Ref. No. | | Part No. | Description |
|---|---|---|---|

## Model No. M-12041NB
## TNP81894-39 MAIN P.C. BOARD

### I.C

| | | |
|---|---|---|
| IC31 | AN5763 | I.C |
| IC41 | AN5753 | I.C |
| IC42 | TVSUPD4011BC | I.C |

### TRANSISTORS

| | | |
|---|---|---|
| Q14 | 2SC1360ANC | Transistor |
| Q17 | 2SC828AR | Transistor |
| Q18 | 2SC828AR | Transistor |
| Q44 | 2SC901BN | Transistor |

### DIODES

| | | | |
|---|---|---|---|
| D31 | | TVS10E1 | Diode |
| D43A | ⚠ | TVSBB4A | Diode |
| D43B | ⚠ | TVSBB4A | Diode |
| D44 | ⚠ | TVS2DL15 | Diode |
| D46 | | TVSBB4 | Diode |
| D47 | ⚠ | TVSS1R20 | Diode |
| D49A | ⚠ | TVSBB2A | Diode |
| D49B | ⚠ | TVSBB2A | Diode |
| D51 | ⚠ | TVSBB4 | Diode |

### COILS & TRANSFORMERS

| | | | |
|---|---|---|---|
| L141 | | TLT047-999 | Peaking Coil 0.47μH |
| L403 | ⚠ | TLH80725 | Width Coil |
| L404 | ⚠ | TLH80624 | H. Lin. Coil |
| L405 | | TLP408 | Choke Coil |
| L430 | ⚠ | TLH80410 | H. Drive Trans. |
| T401 | ⚠ | TLF80845 | Flyback Trans. |

### RESISTORS

| | | | | | |
|---|---|---|---|---|---|
| R143 | ERD25FJ470K | Carbon | 47Ω | J | ¼W |
| R144 | ERD25FJ220K | Carbon | 22Ω | J | ¼W |
| R146 | ERD25FJ820K | Carbon | 82Ω | J | ¼W |
| R151 | ERG2ANJ821 | Metal Oxide | 820Ω | J | 2W |
| R170 | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| R171 | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| R172 | ERD25FJ562K | Carbon | 5.6KΩ | J | ¼W |
| R175 | ERD25FJ472K | Carbon | 4.7KΩ | J | ¼W |
| R176 | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| R177 | ERD25FJ472K | Carbon | 4.7KΩ | J | ¼W |
| R301 | ERD25FJ392K | Carbon | 3.9KΩ | J | ¼W |
| R302 | ERD25FJ683K | Carbon | 68KΩ | J | ¼W |
| R303 ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | J | ¼W |
| R304 ⚠ | ERD25FJ1R1K | Carbon | 1.1Ω | J | ¼W |
| R305 | ERD25FJ683K | Carbon | 68KΩ | J | ¼W |
| R306 ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | J | ¼W |
| R307 | ERD25FJ4R7K | Carbon | 4.7Ω | J | ¼W |
| R310 | ERD25FJ153K | Carbon | 15KΩ | J | ¼W |
| R313 | ERD25FJ561K | Carbon | 56Ω | J | ¼W |
| R401 | ERD25FJ333K | Carbon | 33KΩ | J | ¼W |
| R402 | ERD25FJ332K | Carbon | 3.3KΩ | J | ¼W |
| R403 | ERD25FJ273K | Carbon | 27KΩ | J | ¼W |
| R404 | ERD25FJ222K | Carbon | 2.2KΩ | J | ¼W |

| Ref. No. | | Part No. | Description | | | |
|---|---|---|---|---|---|---|
| R423 | ⚠ | ERD25FJ680K | Carbon | 68Ω | J | ¼W |
| R432 | ⚠ | ERF2AJ100 | Non Flame | 10Ω | J | 2W |
| R441 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | J | ¼W |
| R442 | ⚠ | ERF2AJR47 | Non Flame | 0.47Ω | J | 2W |
| R443 | ⚠ | ERD25FJ122K | Carbon | 1.2KΩ | J | ¼W |
| R444 | | ERD25FJ122K | Carbon | 1.2KΩ | J | ¼W |
| R445 | | TLP408 | Hoke Coil | | | |
| R447 | | ERG1ANJ681 | Metal Oxide | 680Ω | J | 1W |
| R460 | ⚠ | ERD25FJ102K | Carbon | 1KΩ | J | ¼W |
| R461 | ⚠ | ERD25FJ6R8K | Carbon | 6.8Ω | J | ¼W |
| R465 | | ERD25FJ274K | Carbon | 270KΩ | J | ¼W |
| R466 | | ERD25FJ333K | Carbon | 33KΩ | J | ¼W |
| R468 | | ERD25FJ105K | Carbon | 1MΩ | J | ¼W |
| R472 | | ERG1ANJ104 | Metal | 100KΩ | J | 1W |
| R493 | | ERD25FJ682K | Carbon | 6.8KΩ | J | ¼W |
| R494 | | ERD25FJ681K | Carbon | 680Ω | J | ¼W |
| R495 | | ERD25FJ122K | Carbon | 1.2KΩ | J | ¼W |
| R497 | | ERD25FJ472K | Carbon | 4.7KΩ | J | ¼W |
| R498 | | ERD25FJ272K | Carbon | 2.7KΩ | J | ¼W |
| R601 | | ERC12GJ561 | Solid | 560Ω | J | ½W |
| R602 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| R605 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| R606 | ⚠ | ERD25FJ103K | Carbon | 10KΩ | J | ¼W |
| J403 | | ERD25FJ271K | Carbon | 270Ω | J | ¼W |

## CAPACITORS

| | | | | | |
|---|---|---|---|---|---|
| C143 | ECCD1H221 | Ceramic | 180pF | J | 50V |
| C145 | ECEA1JS100 | Electrolytic | 10μF | | 63V |
| C302 | ECQM1H103JZ | Polyester | 0.01μF | J | 50V |
| C303 | ECQM1H472JZ | Polyester | 4700pF | J | 50V |
| C304 | ECSF35ER33V | Tantalum | 0.33μF | | 35V |
| C305 | ECSF16E4R7Y | Tantalum | 4.7μF | | 16V |
| C306 | ECSF16E4R7Y | Tantalum | 4.7μF | | 16V |
| C307 | ECEA1CS100 | Electrolytic | 10μF | | 16V |
| C308 | ECEA0JS330 | Electrolytic | 33μF | | 6.3V |
| C309 | ECEA1CS221 | Electrolytic | 220μF | | 16V |
| C310 | ECEA1AS102 | Electrolytic | 1000μF | | 10V |
| C311 | ECQM1H333JZ | Polyester | 0.033μF | J | 50V |
| C312 | ECEA1CS471 | Electrolytic | 470μF | | 16V |
| C401 | ECQM1H183JZ | Polyester | 0.018μF | J | 50V |
| C402 | ECQM1H153JZ | Polyester | 0.015μF | J | 50V |
| C403 | ECQM1H103JZ | Polyester | 0.01μF | J | 50V |
| C404 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C405 | ECQS1322JWT | Styrol | 3200pF | J | 100V |
| C406 | ECQM1H102JZ | Polyester | 1000pF | J | 50V |
| C423 | ECEA1CS331 | Electrolytic | 330μF | | 16V |
| C430 | ECQM1H153JZ | Polyester | 0.015μF | J | 50V |
| C441 | ECKD2H821KB9 | Ceramic | 820pF | K | 500V |
| C442 | ECQM6153KZ | Polyester | 0.015μF | K | 600V |
| C444 | ECEA35W4R7Z | Electrolytic | 4.7μF | | 35V |
| C445 | ECEA50V100Y | Electrolytic | 10μF | | 50V |
| C460 | ECQE10104KZ | Polyester | 0.1μF | K | 1KV |
| C461 | ECEA1JS101 | Electrolytic | 100μF | | 63V |
| C463 | ECEA2VS3R3Y | Electrolytic | 3.3μF | | 350V |
| C465 | ECEA2VSR47Y | Electrolytic | 0.47μF | | 350V |
| C491 | ECEA1CS102 | Electrolytic | 1000μF | | 16V |

| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| C492 | ECQM1H102JZ | Polyester | 1000pF | J | 50V |
| C496 | ECEA0JS101 | Electrolytic | 100μF | | 6.3V |
| C497 | ECCD1H121J | Ceramic | 120pF | J | 50V |
| C602 | ECKD2H102KB2 | Ceramic | 1000pF | K | 500V |
| C705 | ECEA1CS222 | Electrolytic | 2200μF | | 16V |

## OTHER PARTS

| | | | |
|---|---|---|---|
| | TJS25640V | CRT Socket | |
| | TMK81516 | CRT P.C Board Cover | |
| | TMM81434 | Rivet | |
| ⚠ | XBA1F20NU14 | Fuse | 2A |
| SF1,3 | TJC305-1 | Fuse Holder | |

## CONTROLS

| | | | |
|---|---|---|---|
| VR31 | EVTS3AA00B15 | V. Hold Control | 100KΩB |
| VR32 | EVTS3MA00B54 | Height Control | 50KΩB |
| VR33 | EVTS3MA00B14 | V. Lin. Control | 10KΩB |
| VR41 | EVTS3MA00B13 | H. Hold Control | 1KΩB |
| VR42 | EVNK4AA00B24 | HPC Control | 20KΩB |
| VR64 | EVT81US10B26 | Focus Control | 2MΩB |
| VR67 | EVTS3MA00B25 | Sub. Bright Control | 200KΩB |

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840305O0-1 Ⓝ

CODE FTD82020196-1

# Service Manual

Supplement

## CRT Data Display

## MODEL M-12021PB
## MODEL M-12021NB

This Supplimental Copy is listed Only the Different Portion From

M-12004NA/NB

The Difference are:

| | M-12021PB | M-12021NB | M-12004NA/NB |
|---|---|---|---|
| CRT. Phosphor | P31 (Green) | P31 (Green) | P4 (White) |
| CRT. Sur-face | Polish | Nonglare | Nonglare |
| Horizontal OSC Circuit | Available | | N / A |

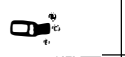
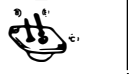
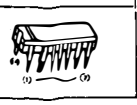
All other specifications are same as that of the basic models M-12004NA/NB.

Panasonic®

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

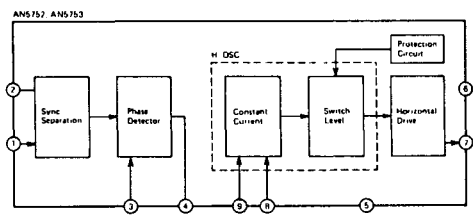
## Supplemental Parts List.

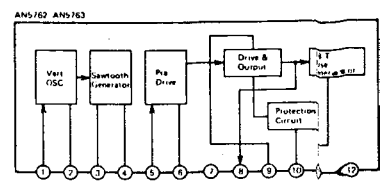
| Ref. No. | Part No. | Description | | | |
|---|---|---|---|---|---|
| ⚠ | 310JLB31J | CRT. (Model. M-12021PB) | | | |
| ⚠ | 310KRB31N | CRT. (Model. M-12021NB) | | | |
| **HORIZONTAL OSC CIRCUIT PART** | | | | | |
| **I. C.** | | | | | |
| IC41 | AN5752 or AN5753 | H. OSC. Drive | | | |
| **TRANSISTORS** | | | | | |
| Q18 | 2SC828AR or 2SC945PQ | H. Sync. AMP | | | |
| **RESISTORS** | | | | | |
| R401 | ERD25TJ333 | Carbon | 33KΩ | ±5% | ¼ % |
| R402 | ERD25TJ332 | Carbon | 3.3KΩ | ±5% | ¼ % |
| R403 | ERD25TJ273 | Carbon | 27KΩ | ±5% | ¼ % |
| R404 | ERD25TJ2701 | Carbon | 2.7KΩ | ±2% | ¼ % |
| R497 | ERD25TJ472 | Carbon | 4.7KΩ | ±5% | ¼ % |
| R498 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼ % |
| R175 | ERD25TJ472 | Carbon | 4.7KΩ | ±5% | ¼ % |
| R176 | ERD25TJ103 | Carbon | 10KΩ | ±5% | ¼ % |
| R177 | ERD25TJ472 | Carbon | 4.7KΩ | ±5% | ¼ % |
| **CAPACITORS** | | | | | |
| C401 | ECQM1H183JZ | Polyester | 0.018μF | ±5% | 50V |
| C402 | ECQM1H153JZ | Polyester | 0.015μF | ±5% | 50V |
| C403 | ECQM1H103JZ | Polyester | 0.01μF | ±5% | 50V |
| C404 | ECEA1ES4R7 | Electrolytic | 4.7μF | | 25V |
| C405 | ECQS1392JWT | Styrol | 3900PF | ±5% | 100V |
| C406 | ECQM1H102JZ | Polyester | 1000PF | ±5% | 50V |
| C492 | ECCD1H331T | Polyester | 330PF | ±5% | 50V |
| C497 | ECCD1H121J | Ceramic | 120PF | ±5% | 50V |
| **CONTROLS** | | | | | |
| VR41 | EVTSMA0013 | Horiz. HOLD | 1KΩB | | |
| VR42 | EVNK4BA00B24 | H.P.C | 20KΩB | | |

| TRANSISTOR BASE INFORMATION | |
|---|---|
| LOCATION | PARTS NAME |
|  | 2SC828<br>2SC829C<br>2SC945<br>2SC1318 |
|  | 2SC1360ANC |
|  | 2SC940<br>2SC901BN |
|  | AN5753<br>AN5752 |
|  | AN5762<br>AN5763<br>AN5763(N) |
|  | MPD4011C<br>TC4011BP<br>MN4011B |

### IMPORTANT SAFETY NOTICE

The component identified by shading and the international symbol ⚠, on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for those critical components.

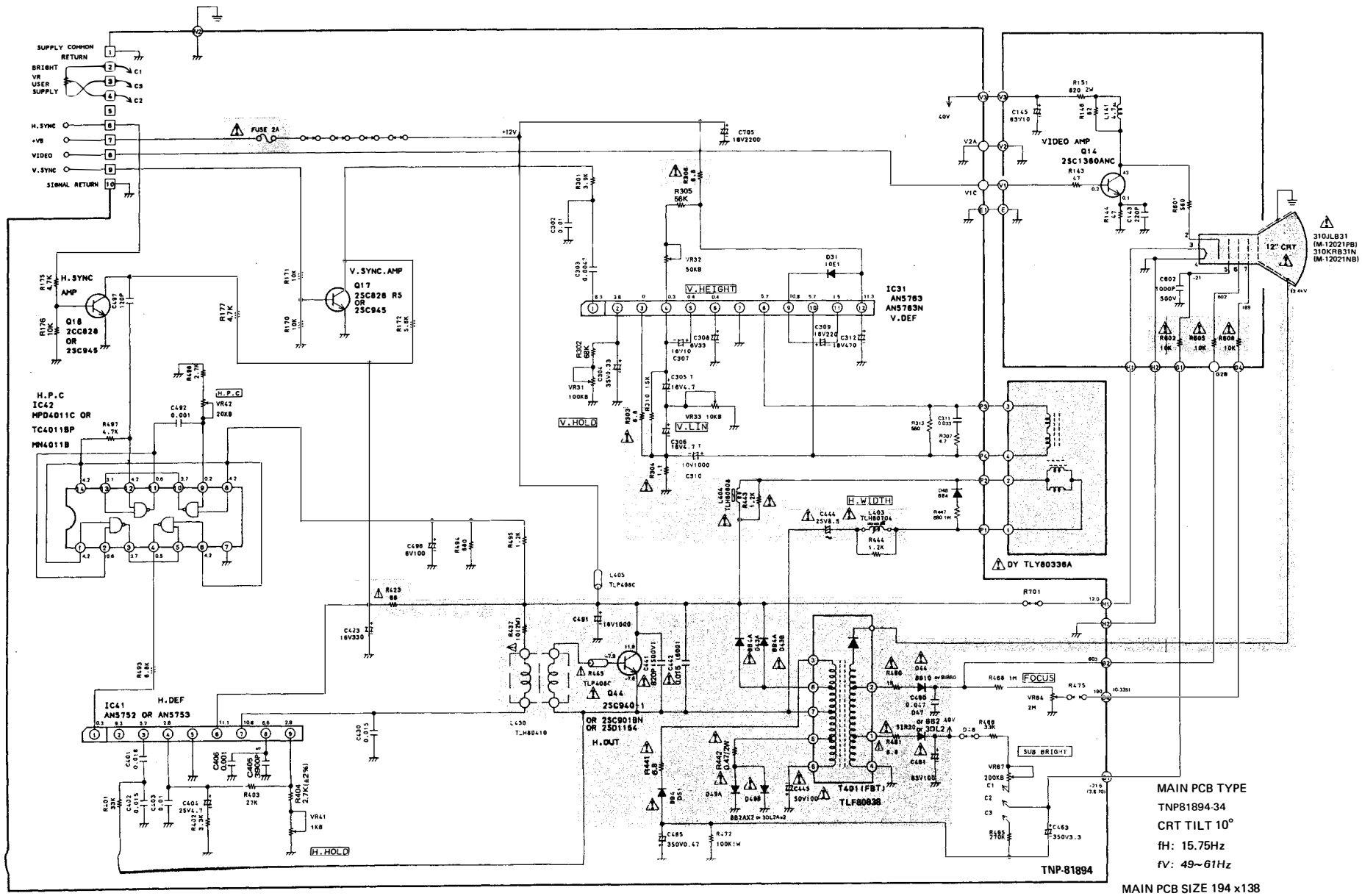



**NOTE**

1. RESISTOR
   All resistors are carbon 1/4W resistor, unless otherwise noted the following marks.
   Unit of resistance is OHM (Ω). (K=1,000, M=1,000,000)
   △ : Solid resistor
   (F) : Non Flame
2. CAPACITOR
   All capacitors are ceramic 50V capacitor, unless otherwise noted the following marks.
   Unit of capacitance is μF, unless otherwise noted.
   (M) : Polyester (S) : Polystylene capacitor
   : Electrolytic capacitor (T) : Tantalum
3. COIL
   Unit of inductance is μH.
4. VOLTAGE MEASUREMENT
   a. Voltage is measured by a digital meter with DC 10MΩ OHM receiving normal signal.
   b. Use each measurement voltage for reference.

# SCHEMATIC DIAGRAM FOR MODELS M-12021PB/M-12021NB




MAIN PCB TYPE
TNP81894-34
CRT TILT 10°
fH: 15.75Hz
fV: 49~61Hz

MAIN PCB SIZE 194 x138
POWER SOURCE 12V 1.3A

M12021PB/M-12021NB