

Service Manual

CRT Data Display

MODEL M-900 XXX Series

Chassis No. Y08A

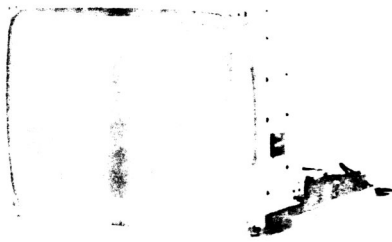
Chassis Family No. 9 Y08

MODEL M-1200 XXX Series

Chassis No. Y08

Chassis Family No. 12 Y08

Wektstoff

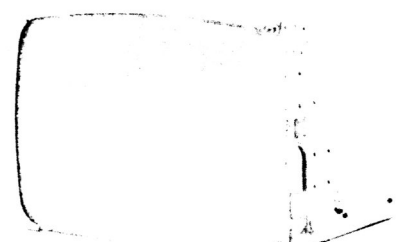


M-9004NA, M-9004NB
Direct Drive Input

M-C9004N
Composite Video Input



Model
M-K12004NB
Direct Drive Input Kit Type



Model
M-12004NA, M-12004NB
Direct Drive Input

M-C12004N
Composite Video Input

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Panasonic.

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CODE NO. FT8010-086

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 0.15 μ F 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 0.15 μ F 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.

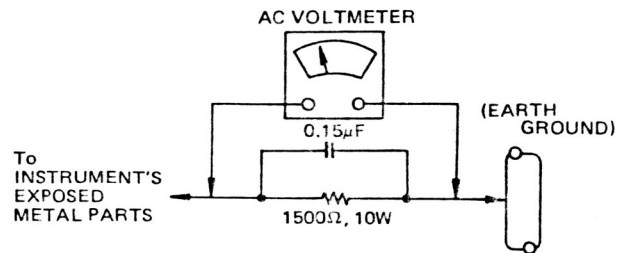


Fig. 1

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 voltage. 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 possibility 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-9004NA, NB M-C9004N	11kV	14.5kV
M-1200NA, NB M-C12004N M-K12004NB	14kV	17.0kV

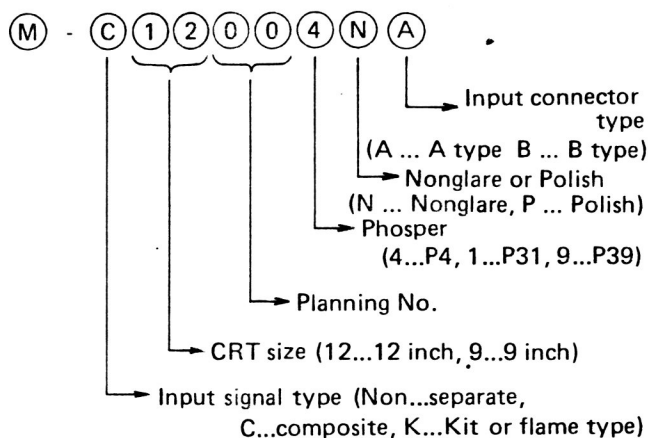
IMPORTANT SAFETY NOTICE

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 manufacturer'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.

It is possible to know an outline of type from model number.



M-900xxx Series is 9-inch CRT data display of metal frame type.

M-9004NA and M-9004NB are of direct drive input type from which video, H. drive and V. drive are separated. M-C9004N is of composite video input type.

M-1200xxx Series of kit type without frame are available in addition to those of metal frame type.

M-12004NA and M-12004NB are of direct drive input type from which video, H. drive and V. drive are separated. M-C12004N is composite video input type.

M-K12004NB is of direct drive input type. In addition, a kit type consisting of CRT and Main P.C.B without frame is available.

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

Input signal is for TTL level, and H. drive pulse is capable of corresponding to 4 to 30μs.

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

External brightness VR (Customer 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). Phosphor P4 is standard, and P31 and P39 are optionally available.

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. (horizontal phase 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 M-900xxA, M-1200xxA Series	B Type M-900xxB, M-1200xxB Series
Model No.	M-9004NA M-C9004N M-12004NA	M-12004NB M-K12004NB M-C12004N M-9004NB
Edge Connector	Key way slot  (Foil side)	Key way slot  (Foil side)
P.C.B. No.	TNP81896	TNP81894

CRT DATA DISPLAY SPECIFICATIONS

SEPARATE TYPE MODEL

ELECTRICAL CHARACTERISTICS

	9" M-9004NA/NB	12" M-12004NA/NB	12" M-K12004NB
Power Requirements:	DC12V 1.0A max.	DC12V 1.3A max.	DC12V 1.3A max.
Signal Input:			
Video Input Signal	Black level = 0 +0.4V -0.0V White level = 4 ±1.5V	Black level = 0 +0.4V -0.0V White level = 4 ±1.5V	Black level = 0 +0.4V -0.0V 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 High = 4 ±1.5V	Low = 0 +0.4V -0.0V High = 4 ±1.5V	Low = 0 +0.4V -0.0V High = 4 ±1.5V
Input Impedance	1K ohm min. 40pF max.	1K ohm min. 40pF max.	1K ohm min. 40pF max.
Horizontal Input Sync Signal:			
Active Polarity	Positive	Positive	Positive
Pulse Rate	15.75KHz	15.75KHz	15.75KHz
Amplitude	Low = 0 +0.4V -0.0V High = 4 ±1.5V	Low = 0 +0.4V -0.0V High = 4 ±1.5V	Low = 0 +0.4V -0.0V High = 4 ±1.5V
Input Impedance	2K ohms min. 40pF max.	2K ohms min. 40pF max.	2K ohms min. 40pF max.
Video Amplifier Bandwidth:			
Rise/Fall Time	25MHz typ 15ns/15ns typ	25MHz typ 15ns/15ns typ	25MHz typ 15ns/15ns typ 12" Model
Resolution:	800 TV lines typ (CRT Center)	1000 TV lines typ	1000 TV lines typ
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.	1000µs 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	0 ~ 10,000 Feet	0 ~ 10,000 Feet
Storage Altitude:	0 ~ 40,000 Feet	0 ~ 40,000 Feet	0 ~ 40,000 Feet

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)	4.5kg
Picture Tube:	240AHB4(N) Non-Glare Visual 9" 90° def. 20mm dia.	310JLB4(N) Non-Glare Visual 12" 90° def. 20mm dia.	310JLB4(N) Non-Glare Visual 12" 90° def. 20mm dia.
Tilt Angle:	0°	0°	-

COMPOSITE TYPE MODEL

ELECTRICAL CHARACTERISTICS

	9" M-C9004N	12" M-C12004N
Power Requirements:	DC 12V 1.0A max.	DC 12V 1.3A max.
Signal Input:		
Signal Level Amplitude	0.5 ~ 2.0Vp-p/Composite 1Vp-p Nominal	0.5 ~ 2.0Vp-p/Composite 1Vp-p Nominal
Sync Signal Ratio	25% ~ 35% 30% Nominal	25% ~ 35% 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	0 ~ 10,000 Feet
Storage Altitude:	0 ~ 40,000 Feet	0 ~ 40,000 Feet

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 Visual 9" 90° def. 20mm dia.	310JLB4(N) Non-Glare Visual 9" 90° def. 20mm dia.
Tilt Angle:	0°	0°

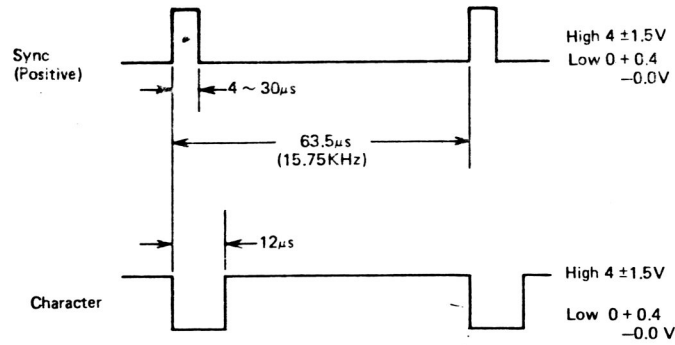
TIMING CHART

Direct Drive Input type

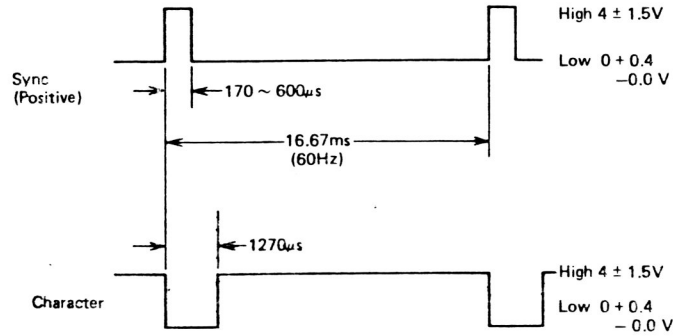
M-9004NA, M-9004NB

M-12004NA, M-12004NB, M-K12004NB

Horizontal Sync



Vertical Sync

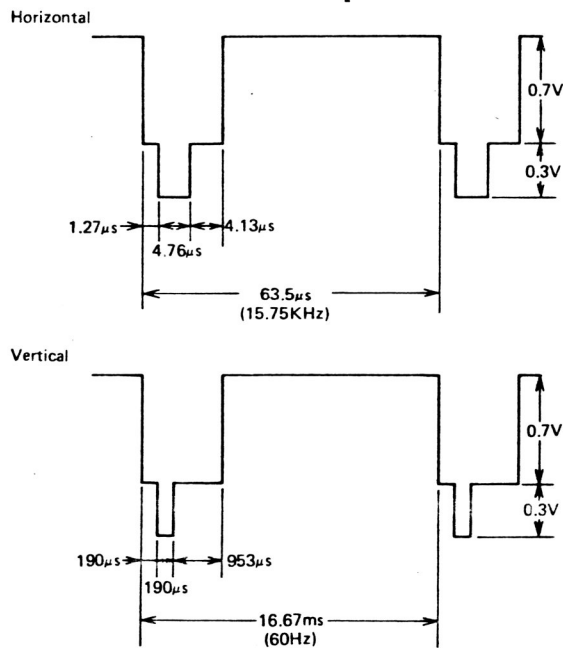


Note: Time Tolerance : $\pm 0.1\%$

Composite Input type

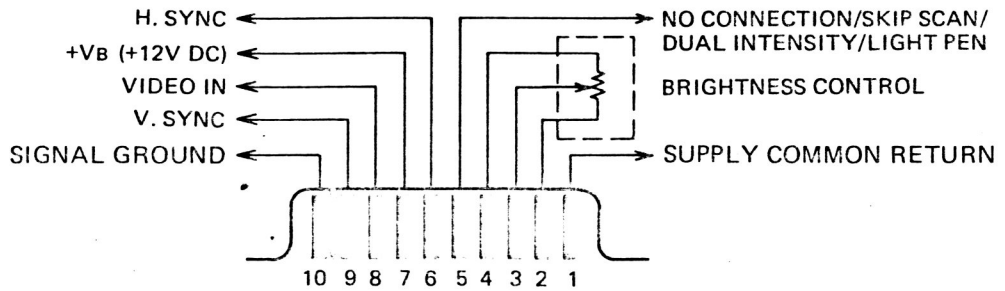
M-C9004N, M-C12004N

Timing chart defined in EIA-RS-170

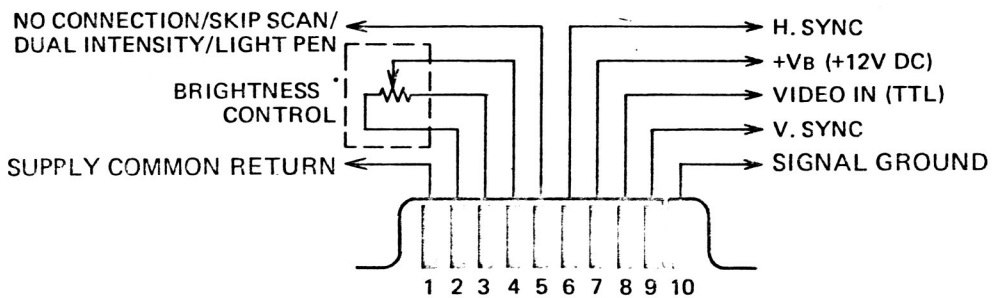


CONNECTOR WIRING

CONNECTOR TYPE [A] Model M-9004NA, M-12004NA

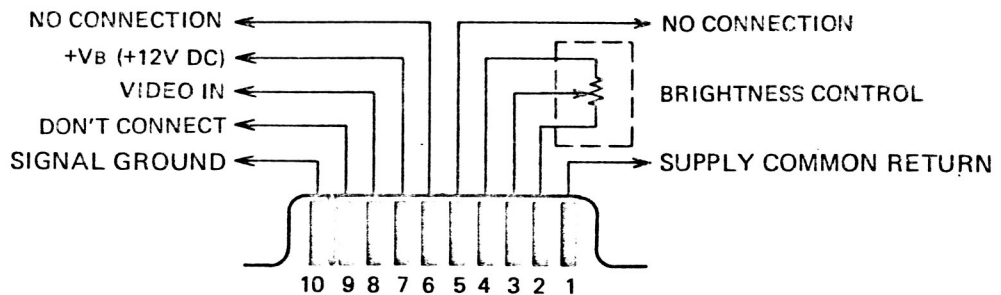


CONNECTOR TYPE [B] Model M-9004NB, M-12004NB, M-K12004NB

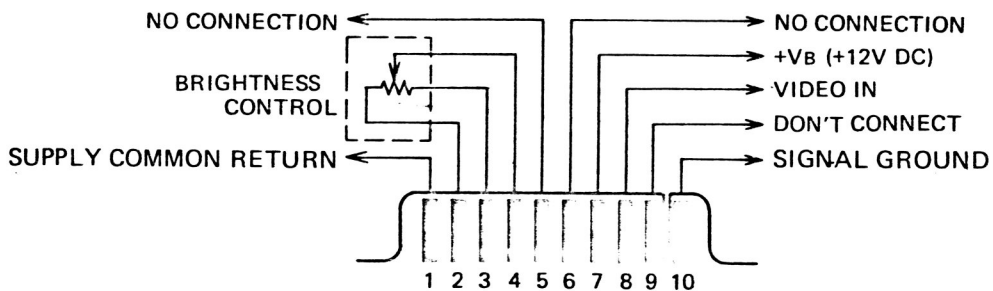


(FOIL SIDE)

CONNECTOR TYPE [A] Model M-C9004N

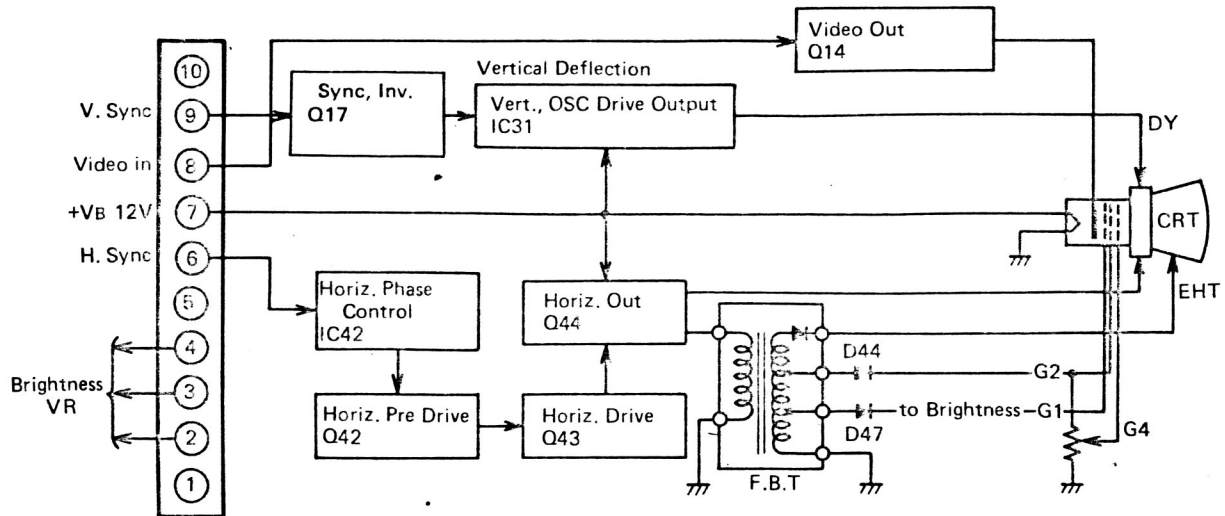


CONNECTOR TYPE [B] Model M-C12004N

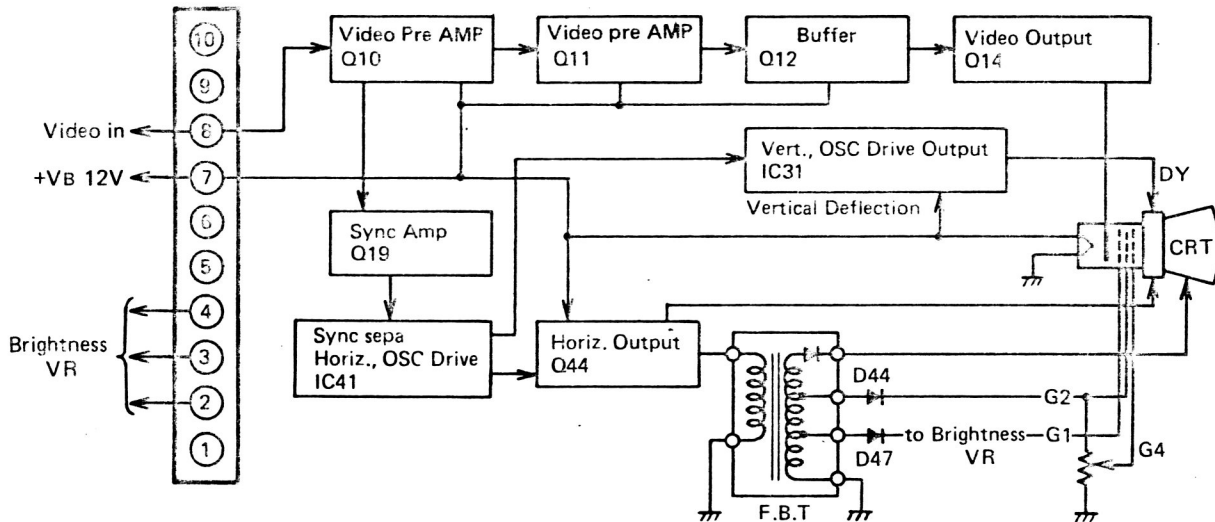


BLOCK DIAGRAM

Models M-9004NA, M-9004NB, M-12004NA, M-12004NB, M-K12004NB

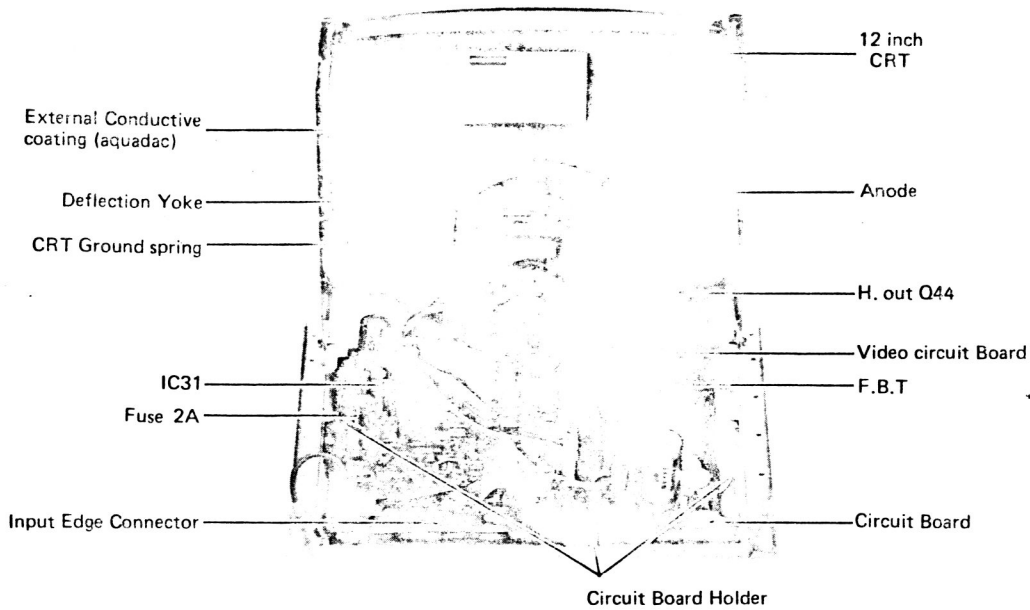


Models M-C9004N, M-C12004N

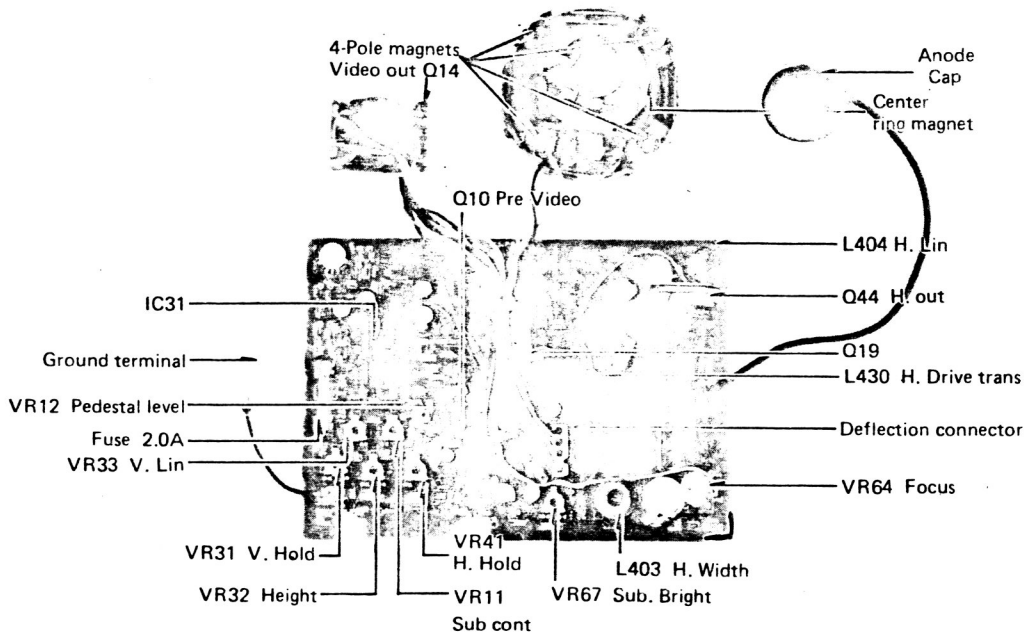


MONITOR CIRCUIT BOARD DETAIL COMPONENT LOCATION

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

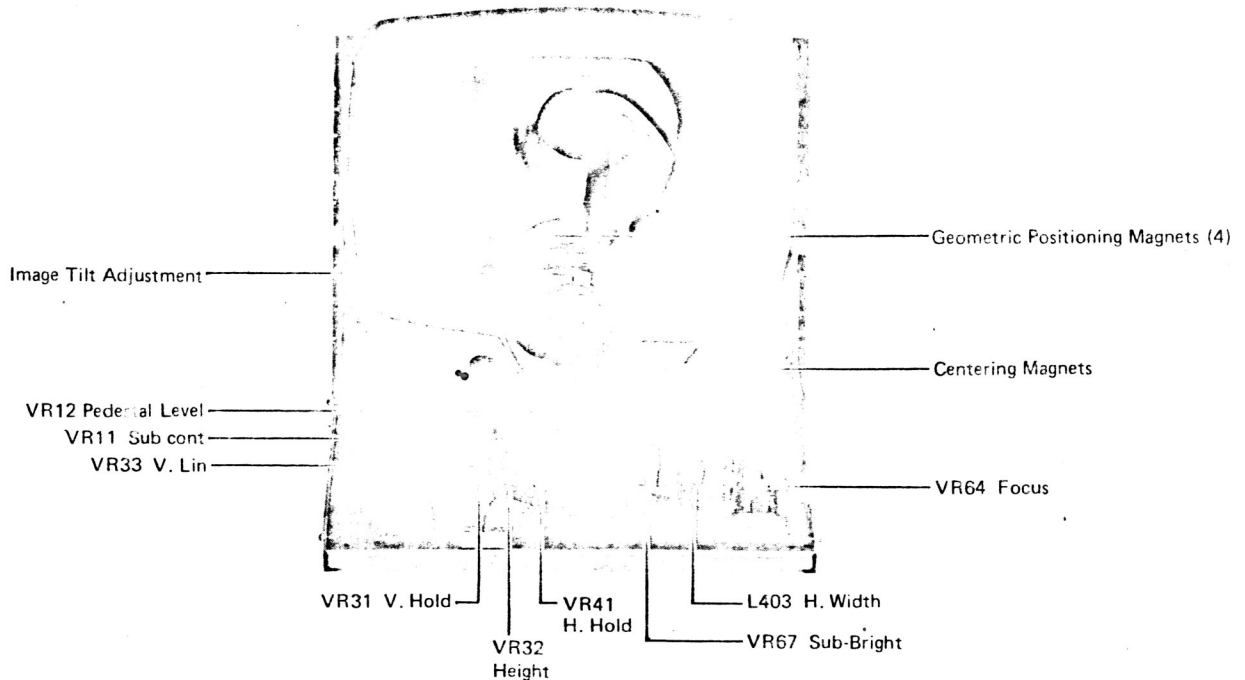


Rear Chassis View



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): (Compjet 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 connector 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-metallic).
Variable resistor by – screw driver and deflection yoke (deflection distortion) by square tuning tool (non-metallic).
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).

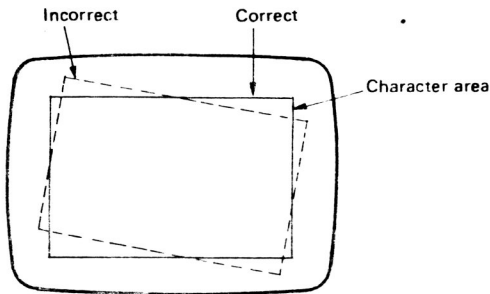


Fig. 2

• Vertical Hold Adjustment

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 $\pm 20\%$ (40 to 60 lux). These adjustments 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.)

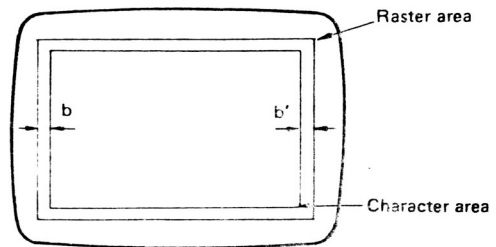
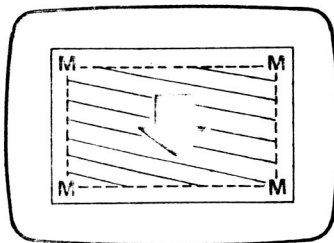


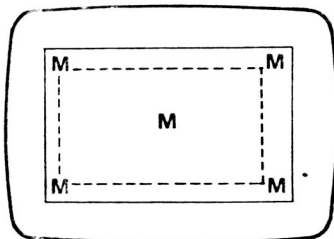
Fig. 4

• Vertical Hold Adjustment

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



Rolling



Locking in

Fig. 3

• Vertical Height Adjustment

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

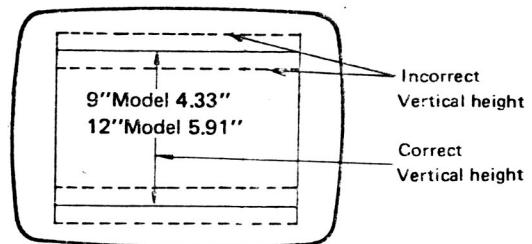


Fig. 5

• **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.

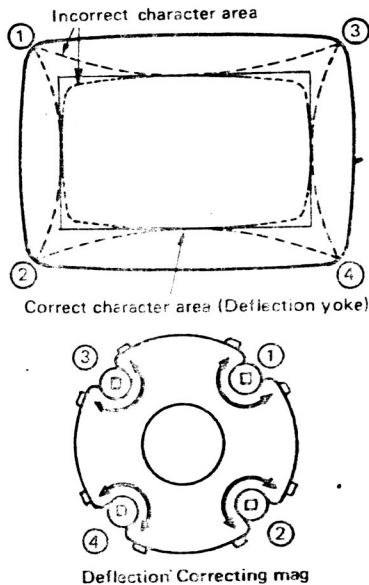


Fig. 11

• **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.

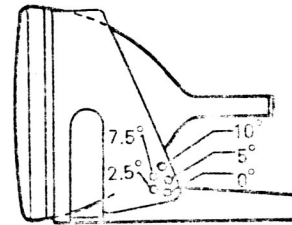


Fig. 12

PRE-ASSEMBLY 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 exert force on this neck.

Before applying power to the CRT Display an inspection should be performed 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 100μs.

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 (aquadac) 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 storing 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.

• **Horizontal width Adjustment**

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

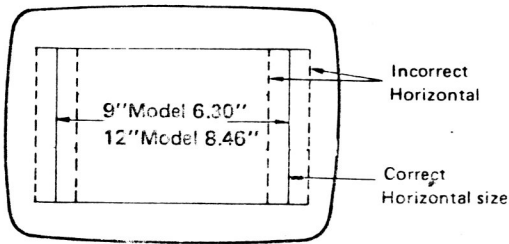


Fig. 6

• **Vertical Linearity Adjustment**

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

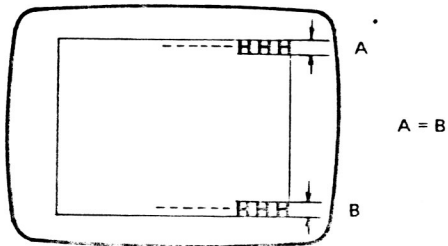


Fig. 7

• **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.

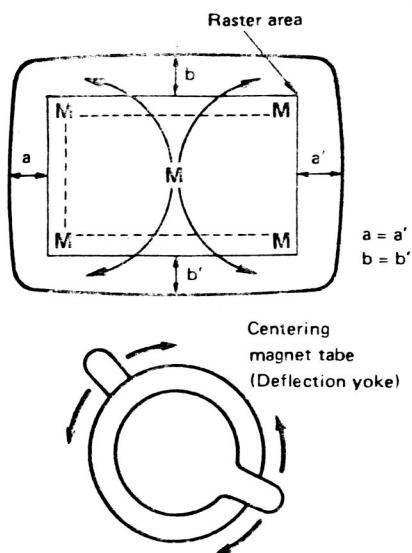


Fig. 8

• **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.

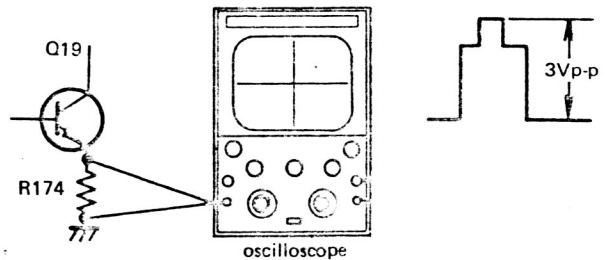


Fig. 9

• **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.

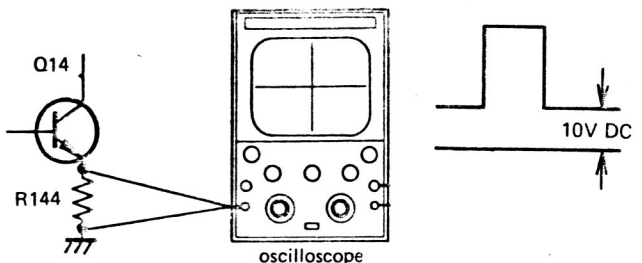
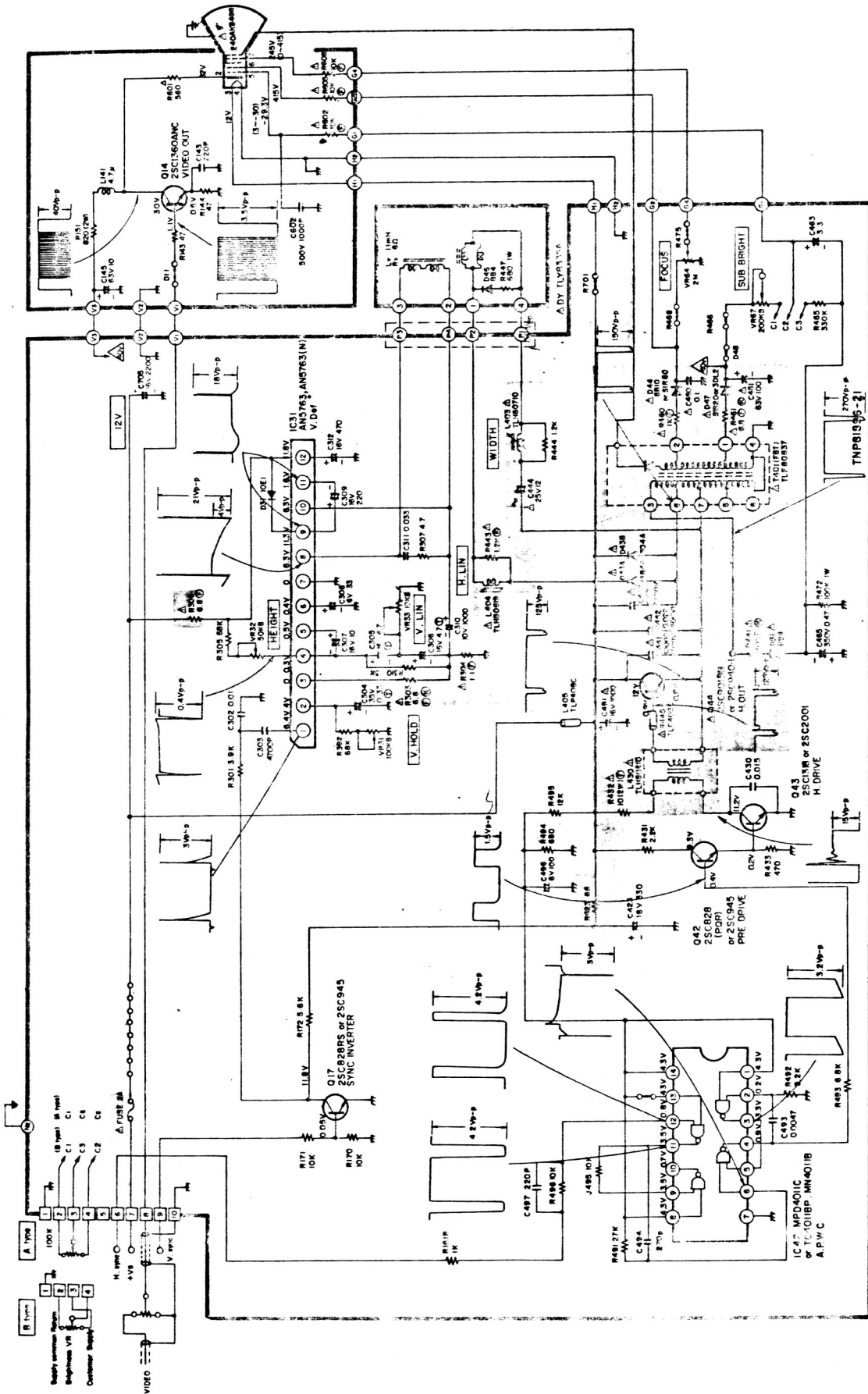


Fig. 10

SCHEMATIC DIAGRAMS

MODELS M-9004NA/M-9004NB



MONITOR CIRCUIT BOARD-SOLDER VIEW

TNP81806 (Models M-9004NA, M-C9004N)

IC31											
1	6.4V	5	0.5V	9	11.3V						
2	4V	6	0.4V	10	6.3V						
3	0	7	0	11	1.6V						
4	0.3V	8	6.3V	12	11.8V						

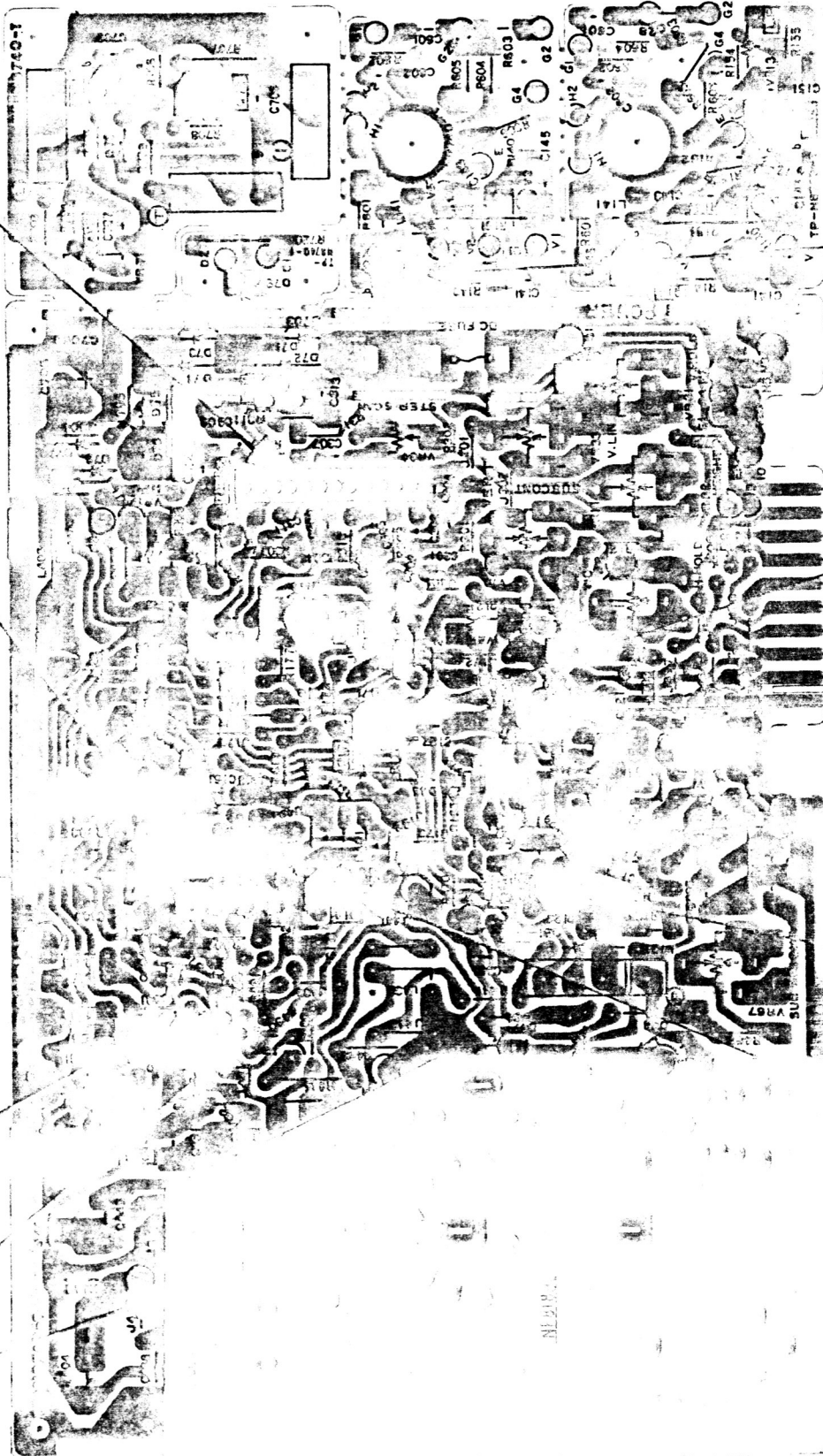
IC41					
1	0.9V	4	3.0V	7	10.6V
2	9.3V	5	0	8	-
3	5.2V	6	11.2V	9	2.8V

IC42					
1	4.3V	6	-	11	3.5V
2	0.2V	7	0	12	0.6V
3	3.3V	8	4.3V	13	0.6V
4	0.9V	9	3.5V	14	4.3V
5	3.3V	10	0.7V		

Q42		
E	0.2V	
C	9.3V	
B	0.4V	

Q43		
B	0.2V	
C	11.2V	
E	0	

Q4		
B	1.9V	
C	12V	
E	0.8V	



Q14	
B	1.1V
C	30V
E	0.6V

Q17	
E	0
C	11.8V
B	0.05V

Q10	
E	2.7V
C	7.6V
B	3.4V

Q11	
E	2.9V
C	5.7V
B	3.6V

Q12	
E	0.7V
C	11.8V
B	1.4V

Q19	
B	6.9V
C	12V
E	7.6V