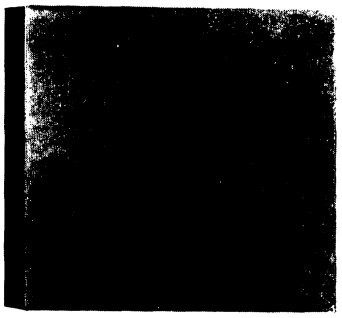
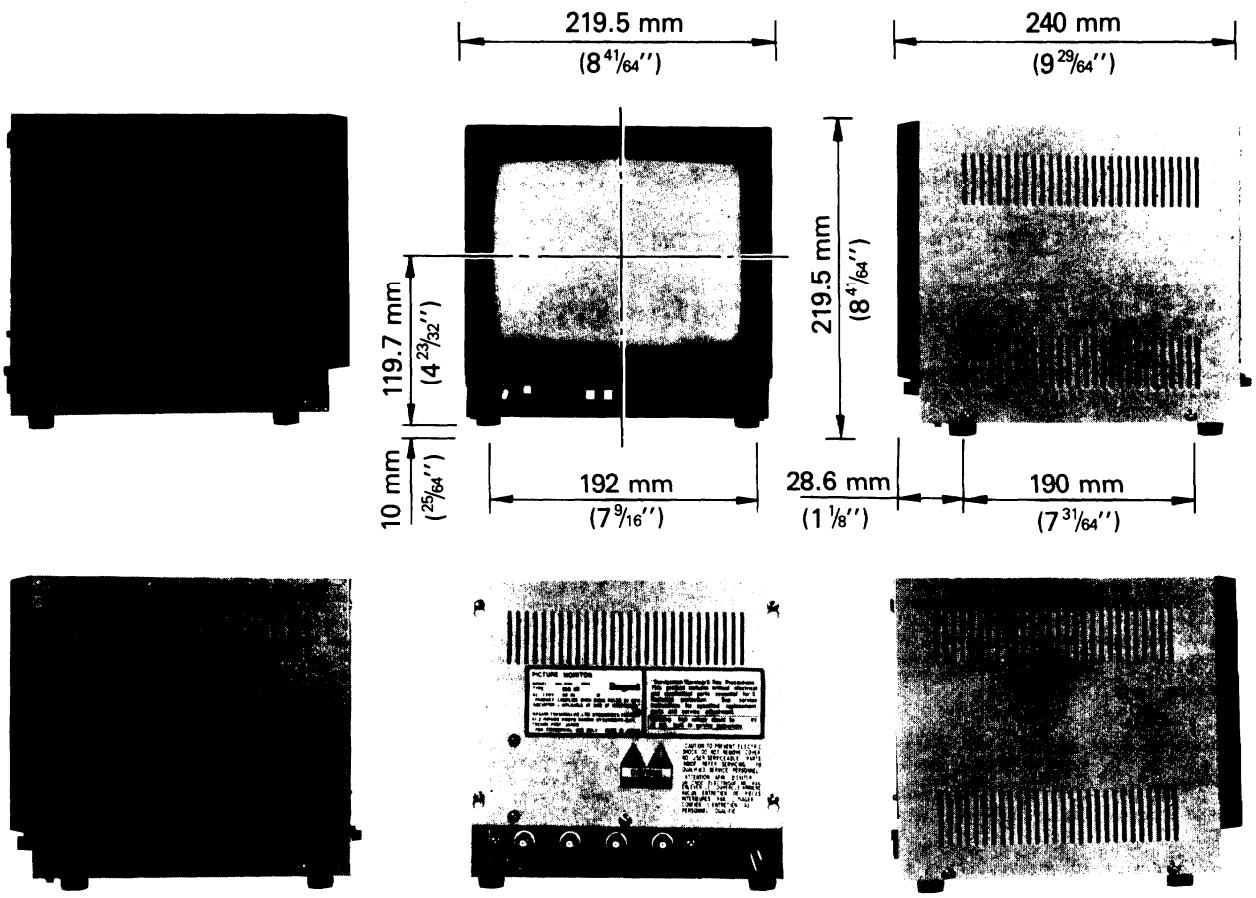
Ikegami

INSTRUCTION MANUAL

9" CCTV PICTURE MONITOR

Model PM-970





OUTDOOR USE WARNING:
WARNING—TO PREVENT FIRE OR ELECTRIC SHOCK,
DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CONTENTS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

IMPORTANT SAFEGUARDS

- Read all of these instructions.
- Save these instructions for later use.
- Unplug this television monitor from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use attachments not recommended as they may cause hazards.
- Do not use this television monitor near water-for example, near a bathtub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, etc.
- Do not place this television monitor on an unstable cart, stand, or table. The television monitor may fall, causing serious injury to a child or adult, and serious damage to the appliance. Use only with a cart or stand recommended, sold with the television monitor.
  Wall or shelf mounting should follow the manufacturer's instructions, and should use a mounting kit approved.
- Slots and openings in the cabinet and the back or bottom are provided for ventilation, and to ensure reliable operation of the television monitor and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the television monitor on a bed, sofa, rug, or other similar surface. This television monitor should never be placed near or over a radiator or heat register. This television monitor should not be placed in a built-in installation such as a bookcase unless proper ventilation is provided.
- This television monitor should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your television dealer or local power company. For a television monitor designed to operate on battery power, refer to this operating instructions.
- This television monitor is equipped with a 3-wire grounding-type plug (a plug having a third grounding pin). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
- Do not allow anything to rest on the power cord. Do not locate this television monitor where the cord will be abused by persons walking on it.
- Follow all warnings and instructions marked on the television monitor.
- For added protection for this television monitor during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the receiver due to lightning and power line surges.
- Do not overload wall outlets and extension cords as this can result in fire or electric shock.
- Never push objects of any kind into this television monitor through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the television monitor.
- Do not attempt to service this television monitor yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
- Unplug this television monitor from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  a. When the power cord or plug is damaged or frayed.
  b. If liquid has been spilled into the television monitor.
  c. If the television monitor has been exposed to rain on water.
  d. If the television monitor does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the television monitor to normal operation.
  e. If the television monitor has been dropped or the cabinet has been damaged.
  f. When the television receiver exhibits a distinct change in performance-this indicates a need for service.
- When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer that have the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazards.
- Upon completion of any service or repairs to this television monitor, ask the service technician to perform routine safety checks to determine that the television is in safe operating condition.

SAFETY PRECAUTIONS

WARNING: The chassis is fully isolated from the mains supply.

The following precautions should be observed:

1. Do not install, remove, or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling.

2. When replacing a chassis in the cabinet, always ensure that all the protective devices are put back in place, such as, barriers, non-metallic knobs, adjustment and compartment cover or shields, isolation resistor capacitor, etc.

3. When service is required, observe the original lead dress. Extra precaution should be taken to ensure correct lead dress in the high voltage circuitry area.

4. Always use the manufacturer's replacement component. Especially critical components as indicated on the circuit diagram should not be replaced by other makes. Furthermore where a short circuit has occurred, replace those components that indicate evidence of over-heating.

5. Before returning a serviced receiver to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently defeated during servicing. Therefore, the following checks are recommended for the continued protection of the customers and service technicians.

INSULATION

Insulation resistance should not be less than 50MΩ at 500V DC between the mains poles and any accessible metal parts. Also, no flashover or breakdown should occur during the dielectric strength test, to apply 1200V AC for one minute between the mains poles and accessible metal parts.

HIGH VOLTAGE

High voltage should always be kept at rated value of the chassis-no higher. Operating at higher voltage may cause a failure of the picture tube or high voltage supply and, also, under certain circumstances could produce X-radiation moderately in excess of design levels. The high voltage must not, under any circumstances, exceed 10 KV on the chassis.

X-RADIATION

TUBES: The primary source of X-radiation in this monitor is the picture tube. The tube utilized for the above mentioned function in this chassis is specially constructed to limit X-radiation.

For continued X-radiation protection, the replacement tube must be the same type as the original, IKEGAMI approved type.

PRELIMINARIES

PM-970 incorporates a 9" diagonal CRT. This solid state design, utilizing top quality integrated circuits and silicon semiconductors, assures an excellent picture with long term reliability. This simple circuit design and compact construction present this unit as an economical device.

This manual contains initial set up procedures, operating instructions and service information for PM-970.

Please note that the PM-970 picture monitor is a finely adjusted precision piece of equipment. To be assured of trouble-free operation, full performance capability and a long service life, we strongly recommend that you check these instructions completely before attempting to assemble, install or operate this monitor.

Although this picture monitor is a solid-state, modular unit using mainly low-voltage circuitry at nonhazardous energy levels, power supply voltages are present on certain parts of the interior. Such parts are not accessible in normal use, but while carrying out maintenance or repair, EXTREME CARE should be taken. Mains voltage can be LETHAL!

It is strongly recommended not to tamper with them unless really necessary, and in such cases, always follow the procedure given in these instructions. Use appropriate tools. And note that the inside adjustments or repair should only be made by a fully qualified technicians.

CARE IN HANDLING

Careful handling of the monitor and accessories should be practiced at all times, avoiding unnecessary physical shocks and similar rough handling.

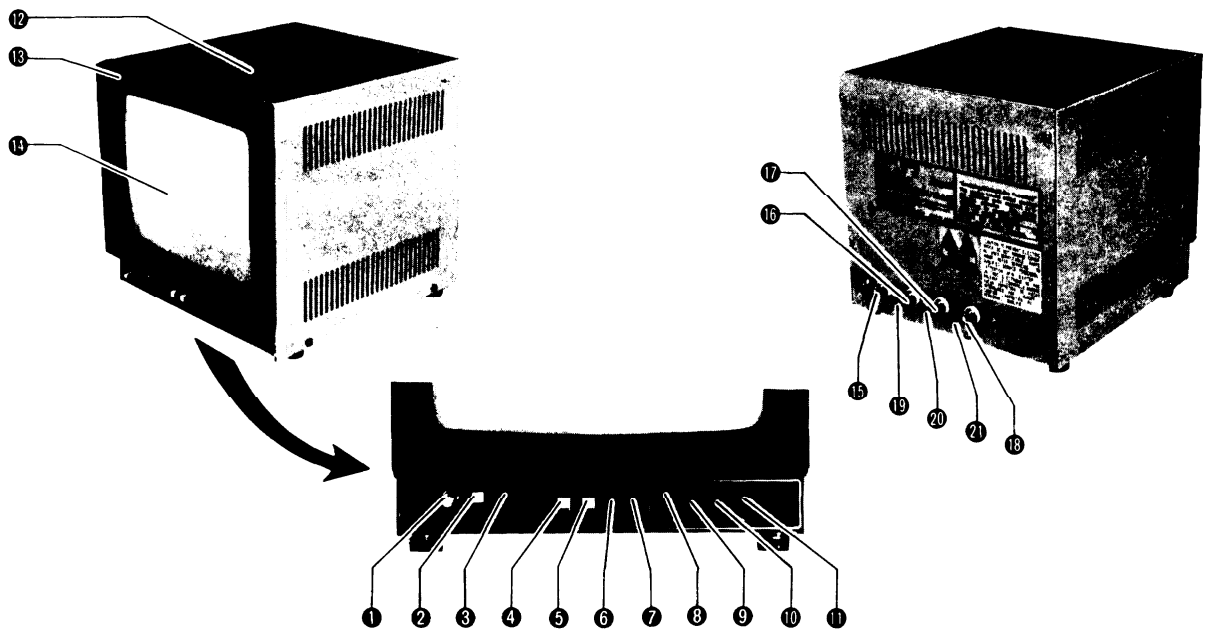
The monitor should always be set up in a well-ventilated area, and shielded from any heat sources, high-powered lights, especially strong magnetic fields (such as power transformers), which may cause picture swing or distortion.

Excessive moisture-, gas- or salt-laden atmospheres should be avoided as much as possible, since circuitry components and connector contacts may be adversely affected.

Dust accumulation should be avoided, since many parts of the unit will be adversely affected in time, and the service-life will be shortened.

Regularly check the connection cables, which are prone to damage, especially in outdoor use. The cable should always be handled with care, kept free from sharp bends and kinks, and relieved from strain near the connectors. Checking of the connectors for full insertion and tightness is also recommended, especially where the same set up is used for a long time.

FUNCTION LOCATIONS



❶ Power switch
❷ Power lamp (LED)
❸ Tarry lamp (LED) (Option)
❹ VTR/NORMAL selector switch
❺ Scan selector switch
❻ Pulse cross switch (Option)
❼ Video A/B selector switch (Option)
❽ Brightness
❾ H. hold (Driver control)
❿ V. hold (Driver control)
⓫ Contrast
⓬ Upper case
⓭ Front escutcheon
⓮ Picture tube (CRT)
⓯ Video A input connector
⓰ Video A output connector (bridged)
⓱ EXT. Sync or Video B input connector
⓲ EXT. Sync or Video B output connector (bridged)
⓳ Video A termination switch (75-ohms ON/OFF)
⓴ Sync. mode switch (internal or external)
㉑ EXT. Sync or Video B termination switch (75-ohms ON/OFF)

SET UP AND OPERATION

Position the monitor in the desired location and connect the mains (power) cord to an AC outlet. And make sure that the monitor is installed securely, in a stable condition.

Make the coaxial-cable connection for video signal between the picture monitor and the signal source (video camera or VTR etc.). And make certain that all connectors are properly and fully mated, and the locking rings are securely tightened.

Set the video termination switch to 75-ohm, (If more than one monitor is to be used, see following connection instructions.)

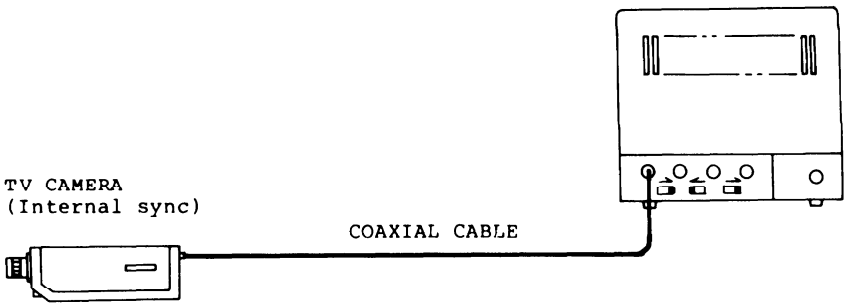
And set the sync. mode switch, internal/external switch to internal, (If external sync. mode is to be applied, see following instructions.)

It is recommended to check mains voltage and the monitor's power requirement to avoid any accidental mis-operation, before switching on the power.

After switching on the monitor, and setting up the raster, adjust the brightness and contrast controls for the most pleasing picture.

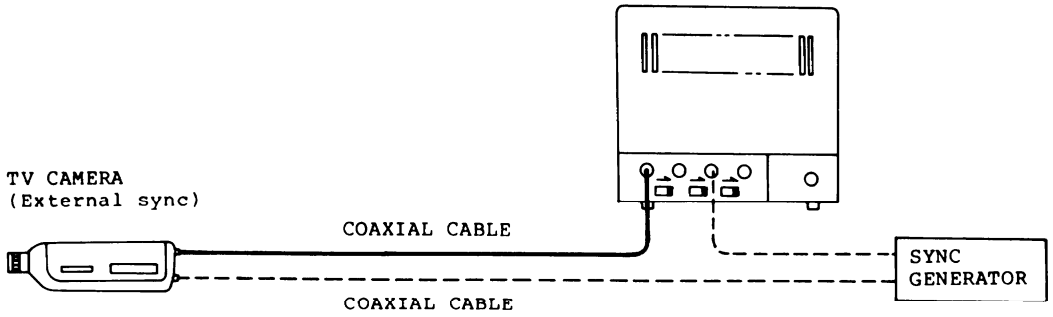
[Basic connection]

1. INTERNAL SYNC MODE



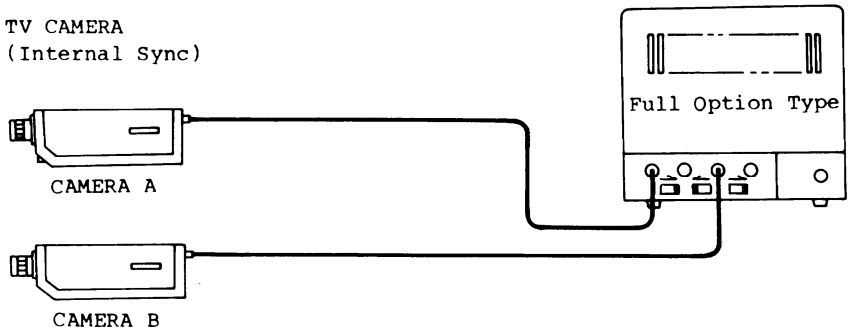
* Switch on the monitor 75-ohm termination switch.
* Set the internal/external sync. switch to internal.

2. EXTERNAL SYNC MODE



* In the case of external sync. mode, set the switch to external and connect sync. signal cable to the sync. input connector at rear.

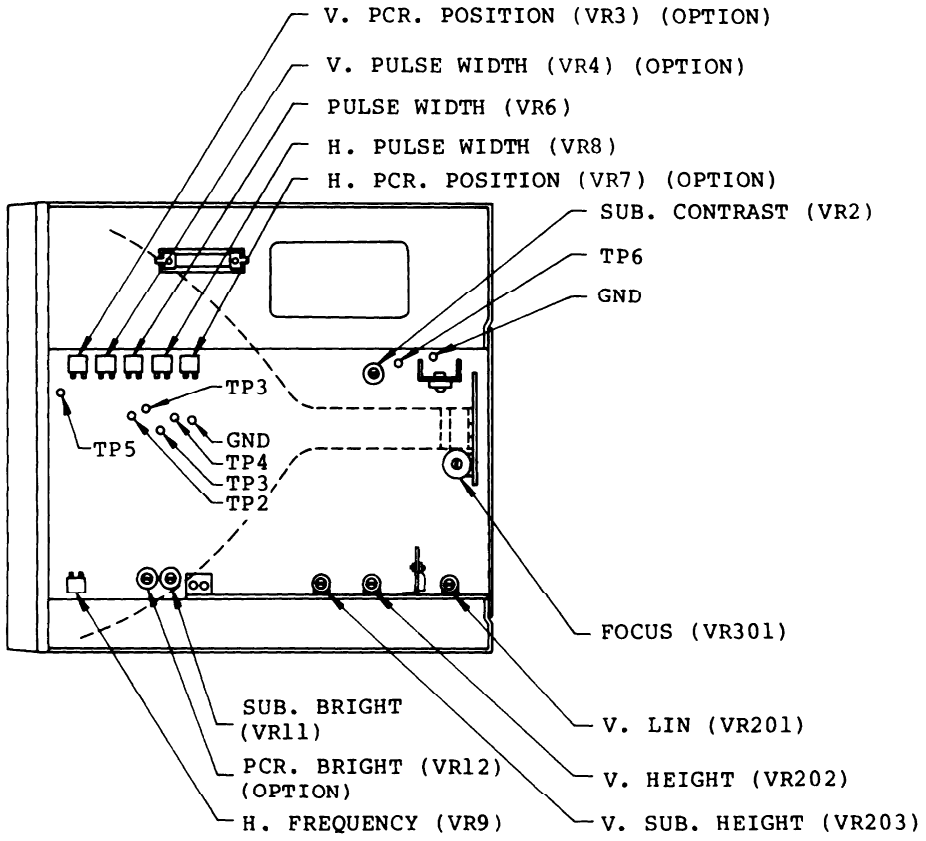
[Two cameras and one monitor connection] (Option)

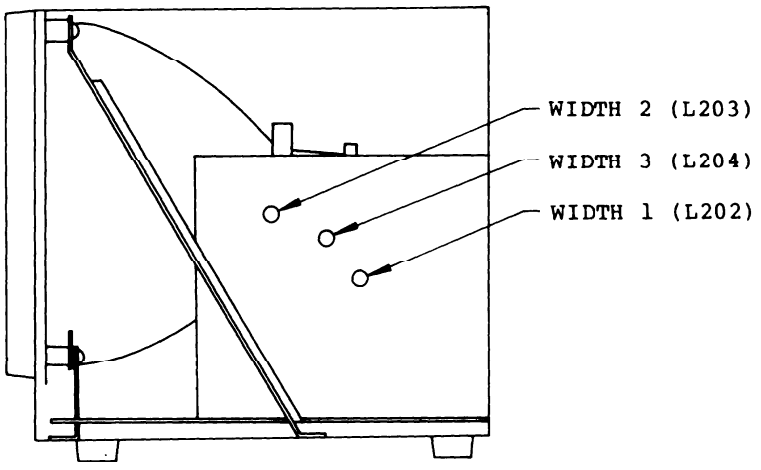


* Switch on the monitor 75-ohm termination switch.
* Set the internal/external sync. switch to internal.
* Video A/B selector switch located on the front panel.

INTERNAL ADJUSTMENTS

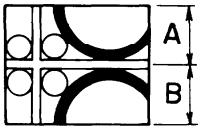
All internal controls are factory set at the optimum position. Adjustment should not be undertaken except by a qualified service technician, and only when absolutely necessary. This information is provided only as a source of reference for the qualified service technician.





* SUB CONTRAST (VR2)
  Adjust this control so that the gain of the VIDEO OUT amplifier is 38 dB.

* V. PCR POSITION (VR3) (OPTION)
  This control is used to adjust the screen position in the vertical direction during a pulse cross.
  Adjust it so that the screen position is as shown in the drawing below.



A = B

* PULSE WIDTH (VR4) (OPTION)
  Measure the pulse width using TP2, and adjust this control so that the vertical drive pulse width is about 190 μs.

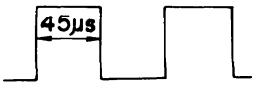
* V. LIN (VR201)
  This control is used to adjust the vertical linearity.

* V. HEIGHT (VR202)
  This control is used to adjust the vertical linearity during normal scanning.

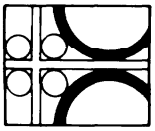
* V. SUB HEIGHT (VR203)
  This control is used to adjust the vertical amplitude during an underscan.

* FOCUS (VR301)
  Focusing adjuster.

* PULSE WIDTH (VR9)
  Measure the pulse width using TP3 and adjust this control so that the pulse width becomes about 45 μs.



* H. PCR POSITION (VR7) (OPTION)
  This control is used to adjust the screen position in the horizontal direction during a pulse cross.



* H. PULSE WIDTH (VR8)
  Measure the horizontal pulse width using TP5, and adjust this control so that the pulse width becomes about 7 μs.

* SUB BRIGHT (VR11)
  This is a sub-control for brightness.

* PCR BRIGHT (VR12) (OPTION)
  This control is used to adjust the brightness during a pulse cross.

* H. FREQUENCY (VR9)
  This is a control for horizontal frequency.

* WIDTH 1 (L202)
  This control is used to adjust the horizontal amplitude during normal scanning.

* WIDTH 3 (L204)
  This control is used to adjust the horizontal amplitude during an underscan.

* WIDTH 2 (L203)
  Normally, there is no need to adjust this control. Adjust it, however, when the horizontal blanking pulse width changes as a result of switching over between normal scan and underscan.

SERVICE AND MAINTENANCE

This picture monitor is designed to withstand long continuous service; however, it is recommendable to carry out periodical inspections for fully satisfactory performance and longer service life.

(1) The face of the picture tube is a part of a high vacuum. Scoring, scratching or applying undue presure may result in implosion of the picture tube, and serious personal injury may result.
(2) The components marked with ★ in parts list and schematic diagram are critical ones of X-ray radiation emission. Replacement of these critical components should check +12V line to +12V ±0.5V and anode voltage of CRT to 10 KV ±1KV.

It is recommended to check the following points:

- the control knobs for correct positions and correct connections
- the connectors for good connections
- the input and output circuitries for any short-circuiting
- the internal temperature for any excess temperature raises
- the soldered portions for any dis-soldering

and keep the unit inside clean.

And in service-work or repair-work, please pay attention to the following points:

- It has a portion inside where as high as 10KV voltage generates, therefore, other than qualified technician should not dislocate the monitor outer case.
- Never attach or remove connectors with power switch left turned on.
- The anode of the CRT is liable to cause discharging due to dust sticking to it, clean the anode after use and apply silicon oil for insulation.
- When replacing the CRT, making sure that the monitor has been switched off for several minutes, to allow the anode and anode cap to discharge. Those parts are often charged with a high voltage.

Transistors are used for all the elements of this monitor except for the CRT, special attention must therefore be paid to the following points since transistors are strong against mechanical shocks but weak against electric shocks.

- Utmost care must be taken when checking circuits with the unit left in operation. The circuitry must never be short-circuited by using a tester lead, etc.
- Be sure to turn off the main (power) switch before installing or removing circuitry.
- Never connect capacitors, particularly of large capacitance, while the circuitry is in operation. A connection of an uncharged capacitor of large capacitance may damage a circuitry.
- Special care should be taken when soldering transistors to prevent heat and never use a soldering iron with any AC leakage.
- When using an oscilloscope for waveform inspection, be sure to use a high impedance terminal. And when measuring some parts of transistor circuitry, it is recommended to use a vacuum tube type voltmeter rather than a conventional tester.

PM-970 PARTS LIST

※MARKED VALUES ARE SUBJECT TO CHANGE WITHOUT NOTICE.
★MARKED PARTS ARE CRITICAL COMPONENTS OF X-RAY RADIATION.
⚠MARKED PARTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY.
IN CASE OF REPLACING THESE PARTS, USE THE PARTS SPECIFIED BY IKEGAMI.

(1) MAIN CHASSIS

NO.	PARTS	DESCRIPTION
CN501	Coaxial Receptacle	BNC-BR-D or BNC-RB3-8A
CN502	Coaxial Receptacle	BNC-BR-D or BNC-RB3-8A
CN503	Coaxial Receptacle	BNC-BR-D or BNC-RB3-8A
CN504	Coaxial Receptacle	BNC-BR-D or BNC-RB3-8A
CN505	Faston Tab	43031-2 or 17001-3
CN506	Faston Receptacle	STO-41T-187N or 170037-2
CN507	Connector Housing	W-A5005-1N#02
	Contact	W-T0504-11
CN508	Connector Housing	W-A5002-1N#02
	Contact	W-T0504-11
CN509	Connector Housing	171822-6
	Contact	170262-1
CN510	Connector Socket	Mab 3100S (Option)
F501	Fuse	1.0A ..... 100V - 120V 0.5A ..... 220V - 240V
F501-a	Fuse Holder	X-N1161 ..... 100V - 120V F-7175 ..... 220V - 240V
★⚠IC501	Integrated Circuit	SI-3122V
★⚠L501	Deflection Yoke	ST4-B0402
⚠PC501	Power Cord	SJT cord or CEE cord
⚠SW501	Power Switch	P-2021-F1-COC
★⚠T501	Power Transformer	ST4-B72048-A1;100V ST4-B72090-B1;120V ST4-B72048-C1;220V/240V
★⚠V501	Cathode Ray Tube	230BTB4 or equ.
C501	Polyester Film Capacitor	0.1μF 100WV

(2) MAIN P.W.B. MODULE

NO.	PARTS	DESCRIPTION		
C1	Electrolytic Capacitor	47μF	16WV	
C2	Electrolytic Capacitor	47μF	16WV	(Option)
C3	Electrolytic Capacitor	47μF	16WV	(Option)
C4	Electrolytic Capacitor	47μF	16WV	
C5	Not Used			
C6	Electrolytic Capacitor	100μF	16WV	
C7	Electrolytic Capacitor	100μF	16WV	
C8	Electrolytic Capacitor	0.47μF	50WV	
C9	Electrolytic Capacitor	3.3μF	50WV	

NO.	PARTS	DESCRIPTION		
C10	Electrolytic Capacitor	1μF	50WV	
C11	Tantalum Capacitor	3.3μF	16WV	
※C12	Not Used			
※C13	Ceramic Capacitor	47pF	50WV	
※C14	Ceramic Capacitor	33pF	50WV	
※C15	Ceramic Capacitor	6pF	50WV	
※C16	Ceramic Capacitor	100pF	50WV	
※C17	Ceramic Capacitor	330pF	50WV	
※C18	Ceramic Capacitor	68pF	50WV	
C19	Metalized Polyester Film Capacitor	0.47μF	100WV	
C20	Not Used			
C21	Not Used			
C22	Not Used			
C23	Not Used			
C24	Ceramic Capacitor	100pF	50WV	
C25	Polypropylene Film Capacitor	0.01μF	630WV	
C26	Polyester Film Capacitor	0.022μF	50WV	
C27	Electrolytic Capacitor	1μF	50WV	
C28	Electrolytic Capacitor	47μF	16WV	
C29	Polyester Film Capacitor	0.01μF	50WV	
C30	Polyester Film Capacitor	0.022μF	50WV	
C31	Polyester Film Capacitor	0.01μF	50WV	
C32	Electrolytic Capacitor	100μF	16WV	
C33	Electrolytic Capacitor	220μF	16WV	(Option)
C34	Not Used			
C35	Polyester Film Capacitor	0.1μF	50WV	(Option)
C36	Polyester Film Capacitor	0.01μF	50WV	(Option)
C37	Polyester Film Capacitor	0.033μF	50WV	(Option)
C38	Electrolytic Capacitor	100μF	16WV	
C39	Ceramic Capacitor	100pF	50WV	
C40	Ceramic Capacitor	220pF	50WV	
C41	Polyester Film Capacitor	0.01μF	50WV	
C42	Polyester Film Capacitor	0.01μF	50WV	(Option)
C43	Ceramic Capacitor	330pF	50WV	(Option)
C44	Polyester Film Capacitor	0.01μF	50WV	
C45	Ceramic Capacitor	220pF	50WV	
C46	Electrolytic Capacitor	0.47μF	50WV	
C47	Polyester Film Capacitor	0.027μF	50WV	
C48	Ceramic Capacitor	100pF	50WV	
※C49	Not Used			
C50	Polyester Film Capacitor	0.022μF	50WV	
C51	Polyester Film Capacitor	0.022μF	50WV	
C52	Polyester Film Capacitor	0.01μF	50WV	
C53	Electrolytic Capacitor	220μF	16WV	
C54	Polypropylene Film Capacitor	0.0039μF	50WV	
C55	Polyester Film Capacitor	0.001μF	50WV	
C56	Polyester Film Capacitor	0.01μF	50WV	
C57	Polyester Film Capacitor	0.01μF	50WV	
C58	Electrolytic Capacitor	100μF	16WV	
★⚠C59	Polypropylene Film Capacitor	0.056μF	400WV	

NO.	PARTS	DESCRIPTION	
★⚠C60	Polypropylene Film Capacitor	0.056μF	400WV
★⚠C61	Polypropylene Film Capacitor	0.047μF	400WV
C62	Electrolytic Capacitor	1000μF	16WV
C63	Electrolytic Capacitor	10uF	160WV
C64	Electrolytic Capacitor	10uF	160WV
C65	Polyester Film Capacitor	0.047μF	600WV
C66	Polyester Film Capacitor	0.01μF	50WV
C67	Electrolytic Capacitor	4.7μF	50WV
C68	Metalized Polyester Film Capacitor	0.22μF	100WV
C69	Electrolytic Capacitor	47μF	16WV
C70	Electrolytic Capacitor	1000μF	16WV
C71	Electrolytic Capacitor	100μF	16WV
C72	Electrolytic Capacitor	47μF	16WV
C73	Ceramic Capacitor	100pF	50WV
CN1	Connector Housing	171822-7	
	Contact	170262-1	
CN2	Faston Receptacle	STO-41T-187N or 170037-2	
CN3	Connector Plug	171825-2	
CN4	Connector Housing	171822-8	
	Contact	170262-1	
D1	Not Used		
D2	Not Used		
D3	Diode	1SS81	
D4	Diode	RF-01F	
D5	Not Used		
D6	Not Used		
D7	Diode	1S1588	
D8	Diode	1S1588	
D9	Diode	EM-1Z	
D10	Diode	RG-4	
D11	Diode	RG-4	
D12	Diode	RF-01F	
D13	Diode	RU-1A	
D14	Diode	RU-1A	
IC1	Integrated Circuit	HD14066B	(Option)
IC2	Integrated Circuit	HA11465A	
IC3	Integrated Circuit	TC4538B	(Option)
IC4	Integrated Circuit	TC4053B	
IC5	Integrated Circuit	TC4528B	
IC6	Integrated Circuit	TC4528B	(Option)
IC7	Integrated Circuit	AN5753	
※L1	Micro Inductor	10μH	
L2	Micro Inductor	22μH	
L3	Micro Inductor	33μH	

NO.	PARTS	DESCRIPTION			
Q1	Transistor	2SC1815(Y)			(Option)
Q2	Transistor	2SC1815(Y)			(Option)
Q3	Transistor	2SC1815(Y)			
Q4	Transistor	2SC2441			
Q5	Transistor	2SA1015(Y)			
Q6	Transistor	2SA1015(Y)			
Q7	Transistor	2SC1815(Y)			
Q8	Transistor	2SC3591			
R1	Carbon Film Resistor	75	ohms	1/4W	
R2	Carbon Film Resistor	12K	ohms	1/4W	(Option)
R3	Carbon Film Resistor	18K	ohms	1/4W	(Option)
R4	Carbon Film Resistor	1K	ohms	1/4W	(Option)
R5	Carbon Film Resistor	33K	ohms	1/4W	(Option)
R6	Carbon Film Resistor	3.3K	ohms	1/4W	(Option)
R7	Carbon Film Resistor	75	ohms	1/4W	
R8	Carbon Film Resistor	18K	ohms	1/4W	(Option)
R9	Carbon Film Resistor	12K	ohms	1/4W	(Option)
R10	Carbon Film Resistor	1K	ohms	1/4W	(Option)
R11	Carbon Film Resistor	33K	ohms	1/4W	(Option)
R12	Carbon Film Resistor	3.3K	ohms	1/4W	(Option)
R13	Carbon Film Resistor	1M	ohms	1/4W	(Option)
R14	Carbon Film Resistor	18K	ohms	1/4W	
R15	Carbon Film Resistor	12K	ohms	1/4W	
R16	Carbon Film Resistor	1K	ohms	1/4W	
R17	Carbon Film Resistor	10	ohms	1/4W	
R18	Carbon Film Resistor	150	ohms	1/4W	
R19	Not Used				
R20	Not Used				
R21	Not Used				
R22	Not Used				
R23	Not Used				
R24	Carbon Film Resistor	22	ohms	1/4W	
R25	Carbon Film Resistor	82K	ohms	1/4W	
R26	Carbon Film Resistor	560	ohms	1/4W	
R27	Carbon Film Resistor	1K	ohms	1/4W	
R28	Carbon Film Resistor	1K	ohms	1/4W	(Option)
R29	Carbon Film Resistor	5.6K	ohms	1/4W	
R30	Carbon Film Resistor	22K	ohms	1/4W	
R31	Carbon Film Resistor	1.2K	ohms	1/4W	
※R32	Carbon Film Resistor	270	ohms	1/4W	
R33	Carbon Film Resistor	470	ohms	1/4W	
※R34	Carbon Film Resistor	470	ohms	1/4W	
R35	Carbon Film Resistor	2.2K	ohms	1/4W	
※R36	Carbon Film Resistor	2.7K	ohms	1/4W	
R37	Carbon Film Resistor	56K	ohms	1/2W	
R38	Carbon Film Resistor	47	ohms	1/4W	
R39	Cement Filled Fixed Resistor	3.3K	ohms	7W	
R40	Carbon Film Resistor	2.7K	ohms	1/4W	

NO.	PARTS	DESCRIPTION			
R41	Carbon Film Resistor	120	ohms	1/4W	
※R42	Carbon Film Resistor	75	ohms	1/4W	
R43	Carbon Film Resistor	10K	ohms	1/4W	
R44	Carbon Film Resistor	1.5M	ohms	1/4W	
R45	Not Used				
R46	Not Used				
R47	Not Used				
R48	Not Used				
R49	Not Used				
R50	Carbon Film Resistor	1K	ohms	1/4W	
R51	Carbon Film Resistor	1M	ohms	1/2W	
R52	Carbon Film Resistor	1K	ohms	1/4W	
R53	Carbon Film Resistor	330K	ohms	1/4W	
R54	Carbon Film Resistor	27K	ohms	1/4W	
R55	Carbon Film Resistor	680	ohms	1/4W	
R56	Carbon Film Resistor	1.5K	ohms	1/4W	
R57	Carbon Film Resistor	7.5K	ohms	1/4W	
R58	Carbon Film Resistor	2.2K	ohms	1/4W	
R59	Carbon Film Resistor	10K	ohms	1/4W	
R60	Carbon Film Resistor	4.7K	ohms	1/4W	
R61	Carbon Film Resistor	75	ohms	1/4W	
R62	Carbon Film Resistor	10K	ohms	1/4W	(Option)
R63	Carbon Film Resistor	10	ohms	1/4W	(Option)
R64	Carbon Film Resistor	68K	ohms	1/4W	(Option)
R65	Carbon Film Resistor	33K	ohms	1/4W	(Option)
R66	Carbon Film Resistor	3.3K	ohms	1/4W	(Option)
R67	Carbon Film Resistor	10K	ohms	1/4W	(Option)
R68	Carbon Film Resistor	10K	ohms	1/4W	(option)
R69	Not Used				
R70	Carbon Film Resistor	680	ohms	1/2W	
R71	Carbon Film Resistor	3.3K	ohms	1/4W	
R72	Carbon Film Resistor	10	ohms	1/4W	
※R73	Carbon Film Resistor	100K	ohms	1/4W	
R74	Carbon Film Resistor	10	ohms	1/4W	(Option)
R75	Carbon Film Resistor	22K	ohms	1/4W	(Option)
R76	Carbon Film Resistor	10	ohms	1/4W	
R77	Carbon Film Resistor	10K	ohms	1/4W	
R78	Carbon Film Resistor	10K	ohms	1/4W	
R79	Carbon Film Resistor	1.2K	ohms	1/4W	
R80	Carbon Film Resistor	39	ohms	1/4W	
R81	Carbon Film Resistor	18K	ohms	1/4W	
R82	Carbon Film Resistor	27K	ohms	1/4W	
R83	Carbon Film Resistor	470	ohms	1/4W	
R84	Carbon Film Resistor	2.2K	ohms	1/4W	
R85	Carbon Film Resistor	68K	ohms	1/4W	
R86	Carbon Film Resistor	470	ohms	1/4W	
R87	Carbon Film Resistor	3.3K	ohms	1/4W	
R88	Carbon Film Resistor	150	ohms	1/4W	
R89	Metal Oxide Film Resistor	2.2K	ohms	1W	
R90	Metal Oxide Film Resistor	10	ohms	1W	

NO.	PARTS	DESCRIPTION
R91	Carbon Film Resistor	100 ohms 1/4W
R92	Carbon Film Resistor	100K ohms 1/2W
R93	Not Used	
R94	Carbon Film Resistor	270K ohms 1/4W
R95	Carbon Film Resistor	33K ohms 1/4W
R96	Carbon Film Resistor	3.3K ohms 1/4W
R97	Carbon Film Resistor	100K ohms 1/4W
R98	Carbon Film Resistor	3.3K ohms 1/4W
R99	Carbon Film Resistor	12K ohms 1/4W
R100	Carbon Film Resistor	100K ohms 1/4W
⚠R101	Fusing Resistor	3.3 ohms 1/4W
※R102	Carbon Film Resistor	68K ohms 1/4W
R103	Carbon Film Resistor	100K ohms 1/4W (Option)
※R104	Carbon Film Resistor	100K ohms 1/4W (Option)
R105	Carbon Film Resistor	47 ohms 1/4W
R106	Carbon Film Resistor	100 ohms 1/4W
R107	Carbon Film Resistor	100 ohms 1/4W
SW1	Slide Switch	SLP-2-1022F
SW2	Slide Switch	SLP-2-1022F
SW3	Slide Switch	SLP-2-1022F
SW4	Push Switch	ESB-6251 (Option)
SW5	Push Switch	ESB-6251 (Option)
SW6	Push Switch	ESB-6251
SW7	Push Switch	ESB-6251
★⚠T1	Flyback Transformer	ST4-B0403
T2	H.Drive Transformer	ST4-B0329
VR1	Variable Resistor	10K ohms lin.taper
VR2	Variable Resistor	1K ohms lin.taper
VR3	Variable Resistor	50K ohms lin.taper (Option)
VR4	Variable Resistor	100K ohms lin.taper (Option)
VR5	Variable Resistor	50K ohms lin.taper
VR6	Variable Resistor	200K ohms lin.taper
VR7	Variable Resistor	200K ohms lin.taper (Option)
VR8	Variable Resistor	50K ohms lin.taper
VR9	Variable Resistor	500 ohms lin.taper
VR10	Variable Resistor	1K ohms lin.taper
VR11	Variable Resistor	100K ohms lin.taper
VR12	Variable Resistor	300K ohms lin.taper (Option)
VR13	Variable Resistor	300K ohms lin.taper
E1	P.W.B.	PMP-97-11

(3) SUB P.W.B. MODULE

NO.	PARTS	DESCRIPTION		
⚠C201	Electrolytic Capacitor	4700μF		35WV
C202	Polyester Film Capacitor	0.01μF		50WV
C203	Electrolytic Capacitor	100μF		16WV
C204	Polyester Film Capacitor	0.01μF		50WV
C205	Tantalum Capacitor	0.33μF		35WV
C206	Tantalum Capacitor	4.7μF		16WV
C207	Tantalum Capacitor	4.7μF		16WV
C208	Electrolytic Capacitor	10μF		50WV
C209	Electrolytic Capacitor	10μF		50WV
C210	Electrolytic Capacitor	220μF		16WV
C211	Electrolytic Capacitor	1000μF		16WV
C212	Electrolytic Capacitor	470μF		16WV
C213	Polyester Film Capacitor	0.01μF		50WV
C214	Electrolytic Capacitor	10μF		25WV
C215	Polyester Film Capacitor	0.0022μF		200WV
⚠C216	High Voltage Capacitor Block	MSC22-02C		
C217	Electrolytic Capacitor	10μF		50WV
C218	Electrolytic Capacitor	1μF		50WV
CN201	Connector Plug	W-P3505#02		
CN202	Connector Plug	W-P3502#02		
CN203	Connector Plug	171825-7		
CN204	Connector Plug	171825-8		
CN205	Connector Plug	171825-6		
⚠D201	Diode	D5FB10		
D202	Diode	EM-1Z		
D203	Diode	RU-4		
D204	Diode	1S1588		
D205	Diode	1SS81		
IC201	Integrated Circuit	AN5763		
★L201	H.Linearity Coil	ST4-B0338-C		
★L202	H.Width Coil	ST4-B0408-C		
★L203	H.Width Coil	ST4-B0413		
★L204	H.Width Coil	ST4-B0408-B		
⚠R201	Cement Filled Fixed Resistor	47	ohms	7W
R202	Carbon Film Resistor	56K	ohms	1/4W
R203	Carbon Film Resistor	6.8	ohms	1/4W
R204	Carbon Film Resistor	1.2K	ohms	1/4W
R205	Carbon Film Resistor	15K	ohms	1/4W
R206	Carbon Film Resistor	75K	ohms	1/4W
R207	Carbon Film Resistor	12K	ohms	1/4W
⚠R208	Fusing Resistor	4.7	ohms	1/2W
R209	Carbon Film Resistor	10	ohms	1/4W
R210	Carbon Film Resistor	1K	ohms	1/4W
R211	Carbon Film Resistor	680	ohms	1/4W

NO.	PARTS	DESCRIPTION
R212	Metal Oxide Film Resistor	220 ohms 1W
R213	Metal Oxide Film Resistor	330 ohms 2W
R214	Carbon Film Resistor	1 ohm 1/2W
R215	Carbon Film Resistor	1.5K ohms 1/4W
R216	Carbon Film Resistor	100 ohms 1/4W
R217	Carbon Film Resistor	6.8K ohms 1/4W
R218	Carbon Film Resistor	56K ohms 1/2W
R219	Carbon Film Resistor	10K ohms 1/4W
RL201	Relay	G2U-114P
TH201	Thermistor	TD5-C310
VR201	Variable Resistor	10K ohms lin.taper
VR202	Variable Resistor	100K ohms lin.taper
VR203	Variable Resistor	100K ohms lin.taper
VS201	Varistor	SNR-14D47K
E201	P.W.B.	PMP-97-21

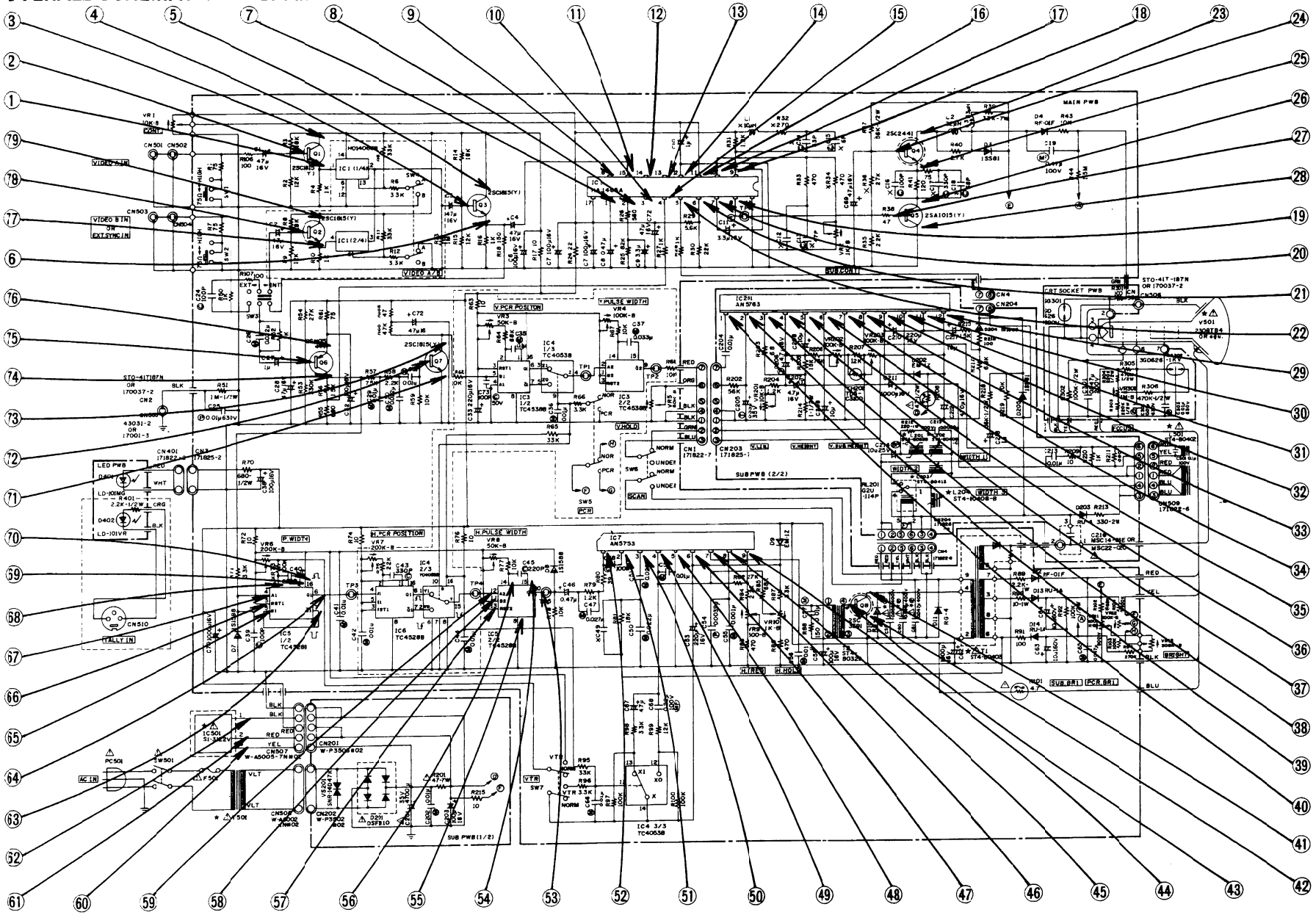
(4) CRT SOCKET P.W.B.

NO.	PARTS	DESCRIPTION
C301	Polyester Film Capacitor	0.047μF 200WV
C302	Polypropylene Film Capacitor	0.01μF 630WV
C303	Polypropylene Film Capacitor	0.01μF 630WV
CN301	CRT Socket	4126-2
CN302	Faston Tab	47008
R301	Carbon Film Resistor	100 ohms 1/4W
R302	Carbon Film Resistor	100K ohms 1/2W
R303	Carbon Film Resistor	220K ohms 1/2W
R304	Carbon Film Resistor	220K ohms 1/2W
R305	Carbon Film resistor	470K ohms 1/2W
R306	Carbon Film Resistor	470K ohms 1/2W
SG301	Spark Gap	GD626-300V
SG302	Spark Gap	3GD626-1KV
VR301	Variable Resistor	1M ohms lin.taper
E301	P.W.B.	PMP-97-31

(5) LED P.W.B.

NO.	PARTS	DESCRIPTION
D401	LED	LD-101MG
D402	LED	LD-101VR (Option)
R401	Carbon Film Resistor	2.2K ohms 1/2W (Option)
CN401	Connector Housing	171822-2
	Contact	170262-1
E401	P.W.B.	PMP-97-40

OVERALL SCHEMATIC DIAGRAM



AC IN	T 101	F 501
100V	ST4-B72048-A1	1.0A 250V
120V	ST4-B72090-B1	1.0A 250V
220 / 200V	ST4-B72048-C1	0.5A 250V

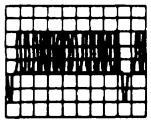
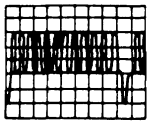
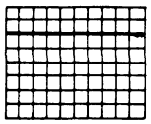
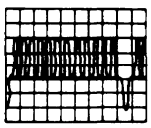
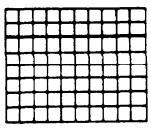
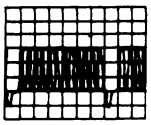
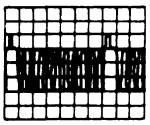
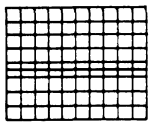
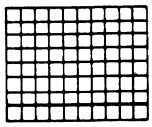
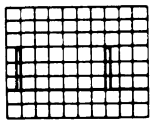
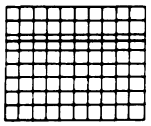
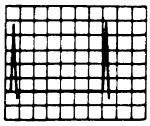
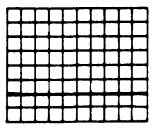
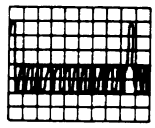
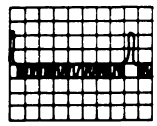
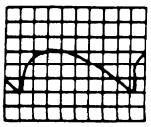
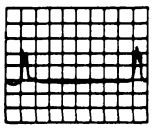
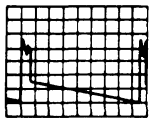
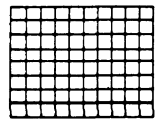
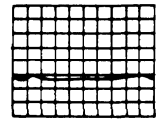
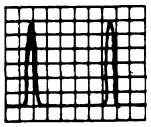
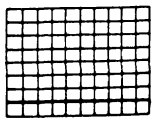
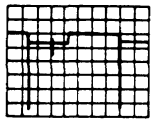
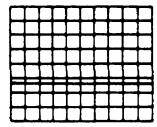
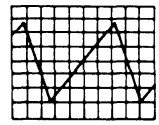
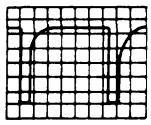
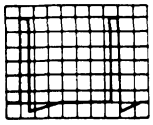
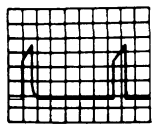
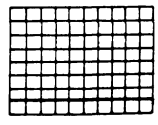
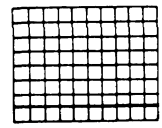
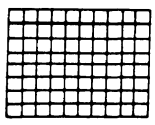
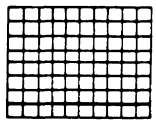
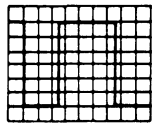
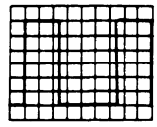
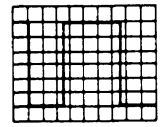
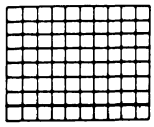
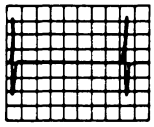
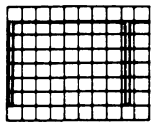
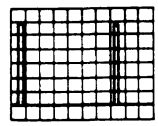
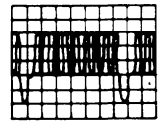
NOTE 1. Resistors are in ohms, 1/4W unless otherwise specified.

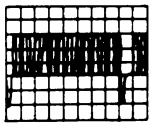
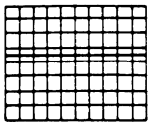
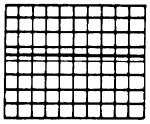
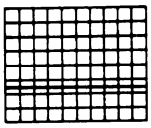
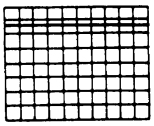
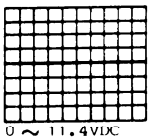
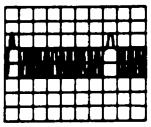
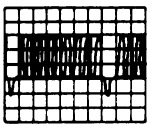
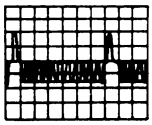
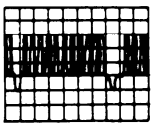
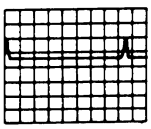
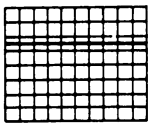
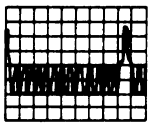
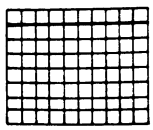
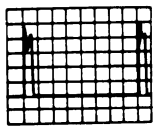
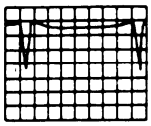
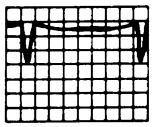
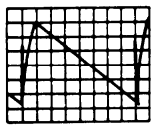
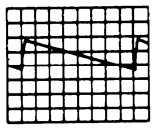
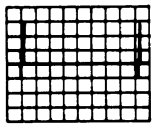
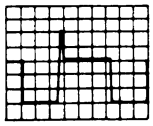
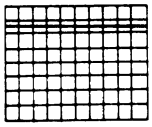
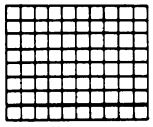
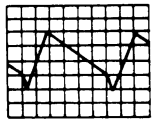
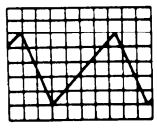
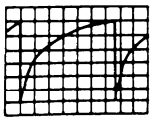
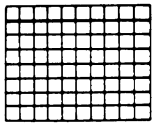
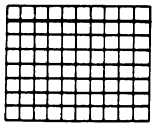
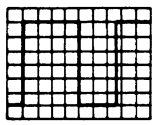
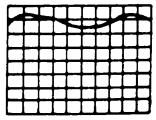
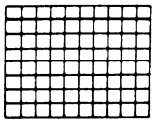
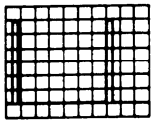
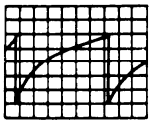
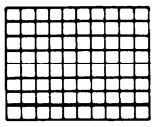
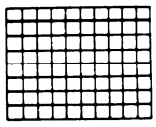
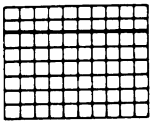
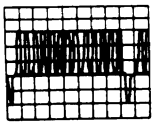
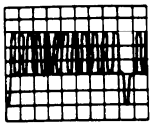
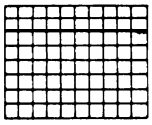
: Fusing resistor.

2. Capacitors are in farads, 50WV unless otherwise specified.
Ⓣ : Tantalum cap. Ⓜ : polyester film cap. Ⓒ : ceranic cap.
Ⓟ : Polypropyrene film cap. —‖— : Electrolytic cap.
Ⓜ‖ : Metallized polyester film cap.

3. ※ Marked values are subject to change without notice.
4. ★ Marked components are critical components of X-ray radiation.
5. ⚠ Marked components have special characteristics important to safety. In case replacing these parts, use the parts specified by Ikegami.

6. Last parts number
All over: PC501, SW501, F501, T501, CN510, IC501, DY501, V501, C501
Main PWB: IC7, Q8, D14, VR13, T2, L3, SW7, CN4, R107, C73
Sub PWB: IC201, CN205, R219, C218, TH201, RL201, D205, L204, VS201, VR203
CRT socket PWB: R306, C303, SG302, CN302, VR301
LED PWB: D402, R401

① Q1-E  0.2V 2ms/DIV	② Q1-B  0.2V, 2ms/DIV	③ Q1-C  11.8VDC/ 2V, 2ms/DIV	④ Q3-B  0.2V, 2ms/DIV	⑤ Q3-C  11.8VDC/ 2V, 2ms/DIV
⑪ IC2-15  0.2V, 10 µs/DIV	⑫ IC2-14  0.5V, 10 µs/DIV	⑬ IC2-13  4.9VDC/ 2V, 10 µs/DIV	⑭ IC2-12  GND/ 2V, 10 µs/DIV	⑮ IC2-4  1V, 10 µs/DIV
㉑ IC2-6  9.1VDC/ 2V, 10 µs/DIV	㉒ IC2-5  1V, 10 µs/DIV	㉓ Q4-C  GND/ 2V, 2ms/DIV	㉔ Q4-B  2V, 2ms/DIV	㉕ Q4-E  2V, 2ms/DIV
㉛ IC201-10  0.5V, 2ms/DIV	㉜ IC201-9  5V, 2ms/DIV	㉝ IC201-8  5V, 2ms/DIV	㉞ IC201-7  GND/ 2V, 2ms/DIV	㉟ IC201-6  0.2V, 2ms/DIV
㊶ Q8-C  20V, 10 µs/DIV	㊷ Q8-E  GND/ 2V, 10 µs/DIV	㊸ Q8-B  2V, 10 µs/DIV	㊹ IC7-9  2,8VDC/ 2V, 10 µs/DIV	㊺ IC7-8  0.5V, 10 µs/DIV
㊿① IC7-2  2V, 10 µs/DIV	㊿② IC7-1  1V, 10 µs/DIV	㊿③ IC5-10  2V, 10 µs/DIV	㊿④ IC5-15  GND/ 2V, 10 µs/DIV	㊿⑤ IC5-8  GND/ 2V, 10 µs/DIV
(61) IC501-2  12VDC/ 2V, 2ms/DIV	(62) IC501-1  GND/ 2V, 2ms/DIV	(63) IC5-7  2V, 10 µs/DIV	(64) IC5-6  2V, 10 µs/DIV	(65) IC5-5  2V, 10 µs/DIV
(71) Q7-E  GND/0.2V, 2ms/DIV	(72) Q7-B  0.2V, 2ms/DIV	(73) Q7-C  2V, 2ms/DIV	(74) Q6-C  2V, 10 µs/DIV	(75) Q6-B  2V, 10 µs/DIV

⑥ Q3-E  0.2V, 2ms/DIV	⑦ IC2-1  6.9VDC/ 2V 10 μs/DIV	⑧ IC2-2  6.9VDC/ 2V, 10 μs/DIV	⑨ IC2-16  3,4VDC/ 2V, 10 μs/DIV	⑩ IC2-3  11.4VDC/ 2V, 10 μs/DIV
⑯ IC2-11  0 ～ 11.4VDC 2V, 10 μs/DIV	⑰ IC2-10  0.2V, 10 μs/DIV	⑱ IC2-9  0.2V, 10 μs/DIV	⑲ IC2-8  2V, 10 μs/DIV	⑳ IC2-7  0.2V, 10 μs/DIV
㉖ Q5-E  2V, 2ms/DIV	㉗ Q5-B  8.7VDC/ 2V, 2ms/DIV	㉘ Q5-C  20V, 2ms/DIV	㉙ IC201-12  11.5VDC/ 2V, 2ms/DIV	㉚ IC201-11  2V, 2ms/DIV
㊱ IC201-5  0.1V, 2ms/DIV	㊲ IC201-4  0.1V, 2ms/DIV	㊳ IC201-3  0.1V, 2ms/DIV	㊴ IC201-2  1V, 2ms/DIV	㊵ IC201-1  2V, 2ms/DIV
㊻ IC7-7  5V, 10 μs/DIV	㊼ IC7-6  11.2VDC/ 2V, 10 μs/DIV	㊽ IC7-5  GND/ 2V, 10 μs/DIV	㊾ IC7-4  0.2V, 10 μs/DIV	㊿ IC7-3  0.2V, 10 μs/DIV
⑤⑥ IC5-14  2V, 10 μs/DIV	⑤⑦ IC5-13  11.8VDC/ 2V, 10 μs/DIV	⑤⑧ IC5-11  11.8VDC/ 2V, 10 μs/DIV	⑤⑨ IC5-12  2V, 10 μs/DIM	⑥⓪ IC501-3  2V, 2ms/DIV
⑥⑥ IC5-3  11.8VDC/ 2V, 10 μs/DIV	⑥⑦ IC5-4  2V, 10 μs/DIV	⑥⑧ IC5-2  2V, 10 μs/DIV	⑥⑨ IC5-1  GND/ 2V, 10 μs/DIV	⑦⓪ IC5-16  11.8VDC/ 2V, 10 μs/DIV
⑦⑥ Q6-E  11,9VDC/ 2V, 10 μs/DIV	⑦⑦ Q2-E  0.2V 2ms/DIV	⑦⑧ Q2-B  0.2V, 2ms/DIV	⑦⑨ Q2-C  11.8VDC/ 2V, 2ms/DIV	

SPECIFICATIONS FOR PM-970

Picture Tube	23 cm (9") diagonal, Implosion protected Type 230BTB4 or equivalent
Video Input Level	1.0 volt(p-p), composite or 0.7 volts (p-p), non-composite
Video Input Impedance	75 ohms or higher, switchable
Sync Input Level	4.0 volts(p-p), negative
Sync Input Impedance	75 ohms or high, switchable
Video Frequency Response	10MHz +1dB, -3dB (refer to 100 KHz)
Horizontal Resolution	750 lines or better at center
Signal-to-Noise Ratio	Hum Noise: -60dB or less Sync Noise: -40dB or less
Linearity	2% or less of picture height (refer to ballchart)
DC Restoration	Built-in
Scanning System	625/50 CCIR or 525/60 EIA
Power Requirement	100V 50/60Hz 120V 60Hz 220/240V 50Hz
Power Consumption	38 watts approx.
Environmental Temperature	-10°C to +50°C
Dimensions (WHD)	219.5 x 219.5 x 240 mm
Weight	5.3 kg (11.7 lbs.) approx.

·Design and specifications are subject to change for improvement.

IKEGAMI ELECTRONICS (U.S.A.), INC.

HEADQUARTERS:	37 BROOK AVENUE, MAYWOOD, NEW JERSEY 07607 Phone: (201) 368-9171
WEST COAST OFFICE:	3445 KASHIWA STREET, TORRANCE, CALIF. 90505 Phone: (213) 534-0050
SOUTHWEST OFFICE:	13721 OMEGA ROAD, DALLAS, TEXAS 75234 Phone: (214) 233-2844
MIDWEST OFFICE:	747 CHURCH ROAD, UNITS C4 & C5, ELMHURST, ILL. 60126 Phone: (312) 834-9774
SOUTHEAST OFFICE:	6201 JOHNS ROAD, SUITE #5, TAMPA, FL 33614 Phone: (813) 884-2046

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