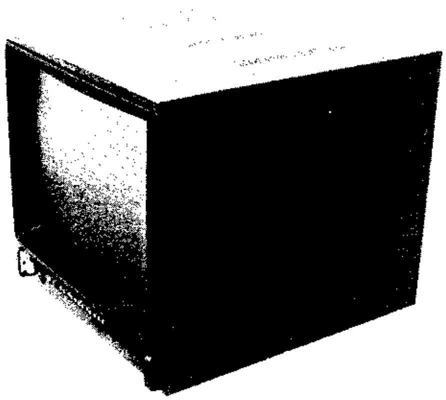
SHARP SERVICE MANUAL

S66Z9XM1900//



19″ PROFESSIONAL COLOR MONITOR

MODEL XM-1900

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original conditions and only parts identical to those specified should be used.

SPECIFICATIONS

Number of inputs	Two inputs. R.G.B. inputs (analog or TTL levels)
Video inputs	1.0Vp-p Non composite NTSC 0.7Vp-p R.G.B. 0.7Vp-p or 5.0Vp-p (TTL mode)
Sync. input	1.0～4.0Vp-p Negative
Input impedance	75 ohm/High-switchable
CRT Standard US controlled	19″ In-Line type, Black matrix, 0.44mm Dot trio pitch, Phosphor coordinates
Resolution	600 TV lines at center
Frequency response	7MHz ± 3dB
DC restoration	2.5% from 10% to 90% APL change
H-Sync. pull in range	15.734kHz ± 300Hz
Subcarrier pull in range	3.579545MHz ± 200Hz
Sync. stability	± 6dB (standard VBS signal level)
Chroma filter	Comb filter/Notch filter switchable
Chroma/Luminance delay	± 70ns Max.
Chroma/Luminance gain error	3%

Demodulation type	R-Y, B-Y
Quadrature	90° ± 2°
Chroma signal variable range	+3dB ～ −6dB (preset level reference)
Horizontal retrace	Less than 10μS
Vertical retrace	Less than 1000μS
H-AFC time constant	0.5ms/7ms-switchable
Convergence	0.5mm max. Zone 1 (circle of the picture height), 0.7mm max. outside of Zone 1
High voltage regulation	2%
Raster size stability	2%
Raster distortion	Less than 2%
Isolation between inputs	50dB (at 0−5MHz) — Input A/B
Power source	120V AC ± 10%, 50/60Hz
Power consumption	150W (Max.)
Ambient temperature	32°F−104°F (0°C−40°C)
Dimensions	Width 18.98 inches (482mm) Height 17.44 inches (443mm) Depth 20.87 inches (530mm)
Optional accessories	Rack mount Slide rails Model XM-19CT
Weight	88 lbs (40.0kg)

SHARP ELECTRONICS CORPORATION

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IMPORTANT SERVICE SAFETY PRECAUTION

- Service work should be performed only by qualified service technicians who are thoroughly familiar with all of the following safety checks and servicing guidelines.

WARNING

1. For continued safety, no modification of any circuit should be attempted.
2. Disconnect AC power cord before servicing.
3. Semiconductor heat sinks are potential shock hazards when the chassis is operating.
4. The chassis in this monitor is hot (connected to one side of the AC line).
   Use an isolation transformer between the line cord and power receptacle, when servicing this chassis.

Servicing of High Voltage System And Picture Tube

When servicing the high voltage system, remove the CRT static charge by connecting a 10k ohm Resistor in series with an insulated wire (such as a test probe) between the chassis and the anode lead. (AC line cord should be disconnected from AC outlet.)

1. Picture tube in this monitor employs integral implosion protection.
2. Replace with tube of the same type number for continued safety.
3. Do not lift picture tube by the neck.
4. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage anode completely.

X-Radiation and High Voltage Limits

1. Be sure all service personnel are aware of the procedures and instructions covering X-radiation. The only potential sources of X-rays in current solid state TV receivers is the picture tube. However, the picture tube does not emit measurable X-ray radiations if the high voltage is as specified. Only when high voltage is excessivel X-radiation capable of **penetrating the shell of the picture tube including the lead in the glass material. The important precaution is to keep the high voltage below the maximum level specified.**
2. It is essential that servicemen have available at all times an accurate high voltage meter. The calibration of this meter should be checked periodically.
3. When the high voltage regulator is operating properly there is no possibility of an X-radiation problem. Every time a color chassis is serviced, the brightness should be tested while monitoring the high voltage with a meter to be certain that the high voltage does not exceed the specified value and that it is regulating correctly.
4. When trouble shooting and taking test measurements on a receiver with excessive high voltage, avoid being unnecessarily close to the receiver. Do not operate the receiver longer than necessary to locate the cause of excessive voltage.

CAUTION

X-Ray Protection Circuit, Set Volume

1) VR301 (+B ADJ)
2) VR501 (H.V. ADJ)
3) VR502 (X-RAY PROT.)

These controls set the operation of the protection circuits against one component failure X-ray radiation caused by circuit and operational errors. The controls are set and fixed at the factory. Do not disturb the setting of these controls.

Before Returning the Monitor (Fire & Shock Hazard)

Before returning the monitor to the user, perform the following safety checks.

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as non-metallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc.
3. To be sure that no shock hazard exists, check for leakage current in the following manner.

- Plug the AC line cord directly into a 120 volt AC outlet. (Do not use an isolation transformer for this test.)
- Using two clip leads, connect a 1.5k ohm, 10 watt resistor paralleled by 0.15μF capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduit or electrical ground connected to earth ground.
- Use a VTVM or VOM with 1000 ohm per volt, or higher sensitivity to measure the AC voltage drop across the resistor (See Diagram).
- Touch the resistor to all exposed metal parts having a return path to the chassis (metal cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor.

  All checks must be repeated with the AC line cord plug connection reversed. (If necessary, a non-polarized adapter plug must be used only for the purpose of completing these checks.)

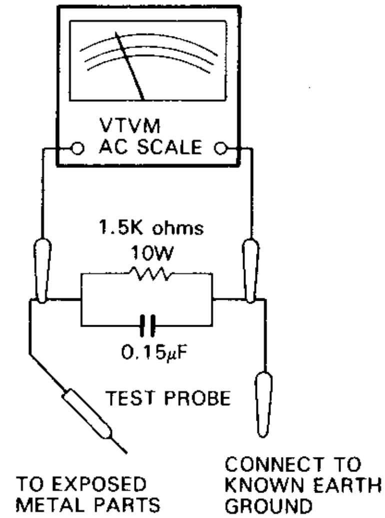
  Any reading of 0.3 volt RMS (this corresponds to 0.2 milliamp. AC) or more is excessive and indicates a potential shock hazard which must be corrected before returning the monitor to the owner.

IMPORTANT SERVICE SAFETY PRECAUTION (Continued)

Safety Notice

Many electrical and mechanical parts in television receivers have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them be necessarily increased by using replacement components rated for higher voltage, wattage, etc.

Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features are identified by "⚠" and shaded areas in the Replacement Parts Lists and Schematic Diagrams. For continued protection, replacement parts must be identical to those used in original circuit. The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire, X-radiation or other hazards.



FEATURES

- High-resolution CRT features 0.44mm dot pitch producing over 600 lines resolution. Standard U.S. controlled phosphors are used, assuring accurate color reproduction and matching with existing high quality studio monitors.
- Comb filter is provided for maximum resolution and to minimize cross color interference. A front panel switch allows selection of either the comb filter or a notch filter, whichever is needed.
- Two video inputs as well as direct RGB inputs are provided. The RGB signals can be from an analog video source or TTL for computer display.
- H-delay and V-delay functions are provided for a pulse cross display.
- Fast (0.5ms) or slow (7ms) AFC time constants can be selected. This allows you to optimally view a non-corrected VTR signal or a signal with stable time base.
- Normal and under-scanned picture modes are provided.
- Hue, chroma, contrast, brightness and aperture are individually adjustable or can be switched to preset for a precisely calibrated display.
- White balance, black balance, individual gun switches and other service adjustments are located behind a separate hinged door on the front panel. This prevents accidental misadjustment of the monitor by non-technical persons.
- An automatic/manual degauss circuit neutralized the XM-1900 from the effects of magnetic fields.
- With its low power consumption and highly reliable parts, including ICs, the high resolution picture remains sharp and stable even after many years of use.

CIRCUITRY

Power Supply Board Section

1. +100V Stabilized Circuit

1) The +100V AC voltage, obtained at the secondary side of the power transformer T301 is full-wave rectified by bridge rectifier D301. It is applied to the collector of Q303 as an unregulated DC voltage.
2) Q301 is a DC amplifier for error detection, its emitter voltage is stabilized by zener diode D305.
3) A sample of the output voltage obtained by a resistor divider, from the +100V line, is applied to Q301's base, and is compared with the emitter voltage. The error is amplified to control and stabilize the current flowing in Q302 and Q303 that are connected to Q301's collector.
4) When the +100V line voltage is reduced,for example, the base potential of Q301 is reduced, and the collector voltage is increased. This causes Q302's base potential to rise and the collector current in Q302 and Q303 to be increased, so that the emitter voltage, +100V, will be raised to the normal value.
5) D303, D306, and D304 are the protection diodes against overvoltages caused by internal discharges in the CRT, etc.

2. +12V Stabilized Circuit

Bridge rectifier D309-312 performs full-wave rectification of the +12V AC voltage abtained at the secondary side of the power transformer T301. The unregulated voltage is stabilized by IC301, 3-pin regulator to a stable +12V DC voltage.

3. −12V Stabilized Circuit

In the same way, the unregulated voltage which has been full-wave rectified by D308 is stabilized by IC302, at 12V, and is provided as the −12V DC voltage.

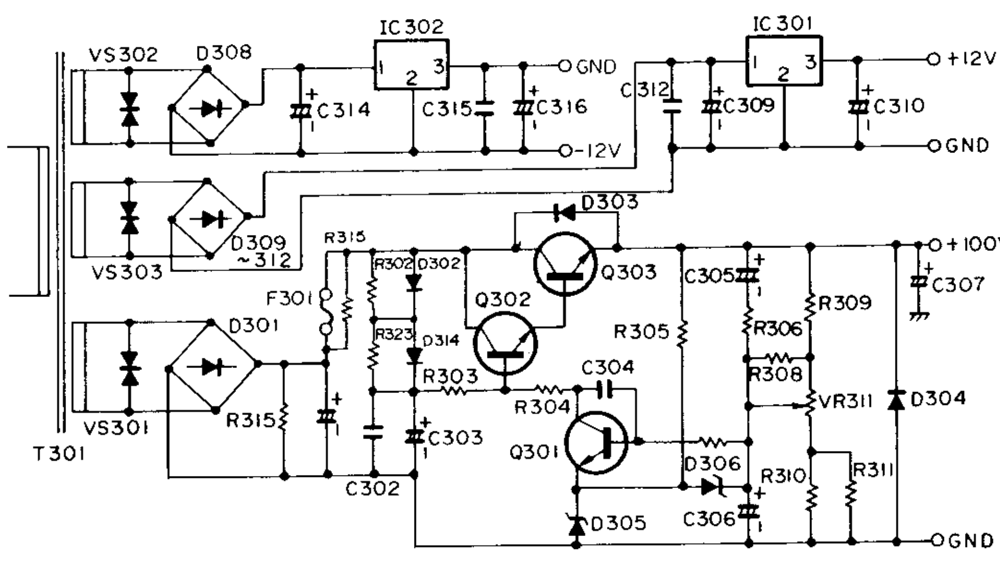


Fig. 1. +100V, +12V, −12V Stabilized Circuit

4. Degaussing Circuit

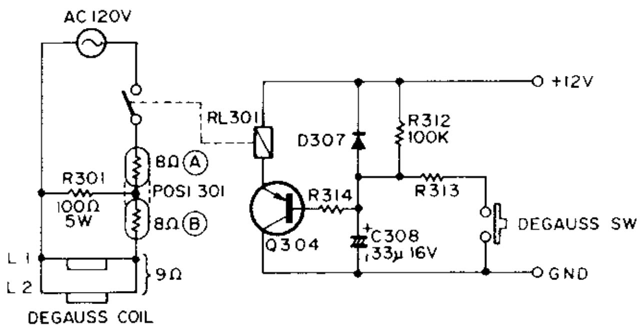


Fig. 2. Degaussing Circuit

1) This circuit uses posistors of the shunt resistor type with a cold resistance of 8Ω, so most of the currents flowing immediately after the power is turned on goes to the degaussing coil.
2) A few seconds later, the resistance in the posistors increases, to a value far greater than that of R301 (100Ω).
3) The automatic degaussing operation is performed in the following manner: if the power is turned on when the posistors are cold and C308 is discharged, the base potential of Q304 rises slowly as C308 is being charged to +12V via R312. During this time Q304 is turned on, current flows in RL301, and the Relay in the degaussing circuit closes. This causes current to flow in the degaussing coil through the posistors, achieving the degaussing of the CRT.
When C308 is fully charged, the base potential of Q304 becomes the same as that of the emitter, causing Q304 to turn off, the current in RL301 stops flowing, and the Relay in the degaussing circuit is opened. By this, the residual current in the degaussing coil is eliminated, so that undesirable jitter of images on the CRT screen, can be avoided.
4) The manual degaussing operation is performed in the following manner: when the DEGAUSS SW is pressed, the base potential of Q304 is reduced and RL301 is turned on, allowing the current to flow into the degaussing coil through the posistors, achieving the degaussing of the CRT.

5. Tally Circuit

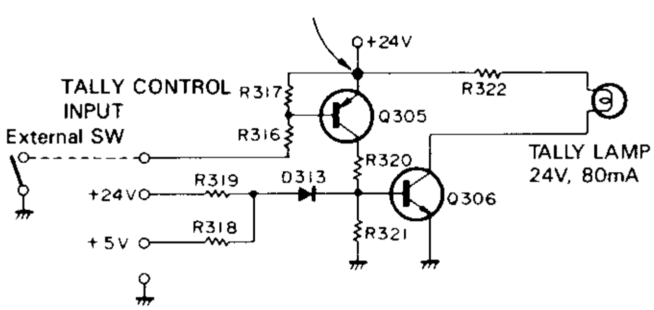


Fig. 3. Tally Circuit

1) The tally circuit allows the tally lamp to light with a +5V, +24V, or CONTACT closure input.
2) When +5V or +24V is supplied, the base voltage of Q306 increases and Q306 is turned on, causing the lamp to light.
3) For CONTACT, Q305 is turned on when the circuit is grounded using the external switch, and the base potential of Q306 is increased, allowing the lamp to light.

Decoder Board Section

1. Feedback Paired Video Amplifier

Composed of PNP-type and NPN-type transistors, this negative feedback video amplifier has a high input impedance and a low output impedance. High open loop gain insures stable gain and wide band width. It is used on this decoder unit for the video, chroma, and luminance signal amplifiers, etc.
The positive polarity video signal input to the base of Q101 is inverted and amplified by Q101, and applied to the base of Q102. The signal is again inverted and amplified by Q102. A non-inverted video signal which has been amplified is obtained at the collector of Q102. This output signal is negatively fed back to the emitter of Q101 through R106. The output signal from the collector of Q102 is a non-inverted wide band signal with stable gain determined by resistors R103, R104 and R106.

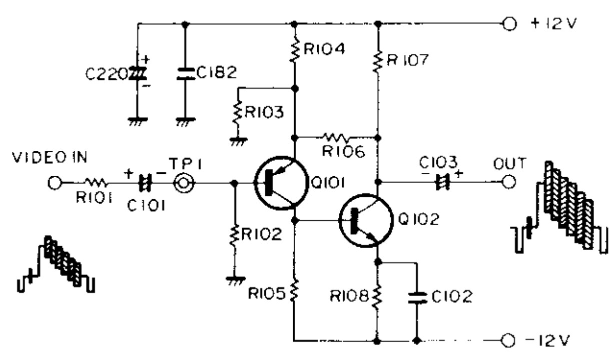


Fig. 4. Feedback Paired Video Amplifier

2. Comb-shape Filter Y-C (luminance signal - chroma signal) Separating Circuit

To separate the luminance and chroma signals in a superior manner, this monitor incorporates a comb-shape filter that greatly improves the horizontal resolution. In the NTSC system, the chroma signal is multiplexed on the luminance signal via a 3.58MHz subcarrier. If the chroma signal is not properly processed, the chroma circuits will erroneously recognize luminance signals and generate crosscolor interference. Similarly luminance circuits will recognize chroma imformation and generate dot interference.

Terminology

Frequency interleave:

To minimize cross modulation between chrominance and luminance by inserting the chroma signal energy into natural gaps of the luminance spectrum to optimally utilize the spectrum.

Cross-color interference:

The chroma signal is inserted and multiplexed into the higher frequency portion of luminance signal in the form of a chroma subcarrier signal. Therefore, when the chroma signal is separated by a conventional band-pass filter whose pass-band center is 3.579545MHz, the high frequency components of the luminance signal will be included in the chroma signal. Cross-color interference will appear on the screen if the luminance signal contained transitions falling at 3.58MHz.

Dot interference:

Interference caused by chroma subcarrier signals mixing into the higher frequency components of the luminance signal.

1) Basic theory of Y-C Separation using a Comb Filter

- Comb filter

A comb filter has frequency characteristics in which the pass bands and the attenuation bands are repeated alternately with a horizontal frequency interval (fh), as shown in Fig. 5.

Luminance signal can be separated from chroma video signal by applying the multiples signal to a comb filter that has frequency characteristics in which the maximum output is obtained at the horizontal scanning frequency fh, and integer multiplex of fh (as shown by continuous lines in Fig. 5).

Chroma signal can be separated from the luminance signal by applying the composite signal to a comb filter that has frequency characteristics in which the maximum output is obtained at the frequency fh/2, and odd multiples of fh/2, as shown by dotted lines in Fig. 5.

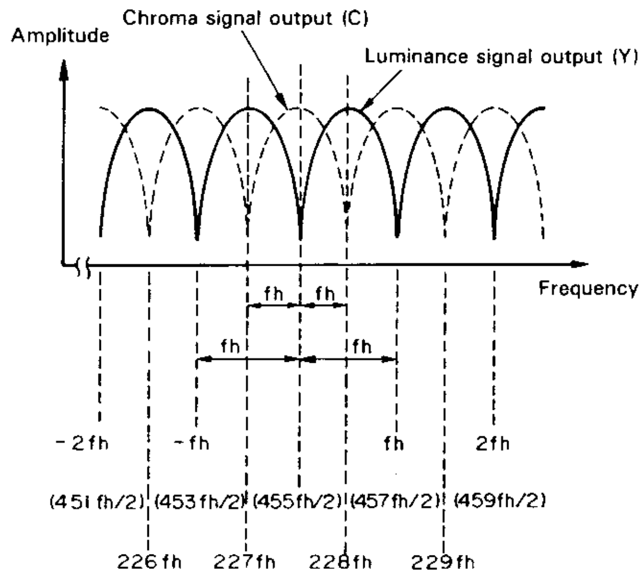


Fig. 5. Comb Filter's Characteristics

2) Operating Principle of Y-C Separation using a Comb Filter

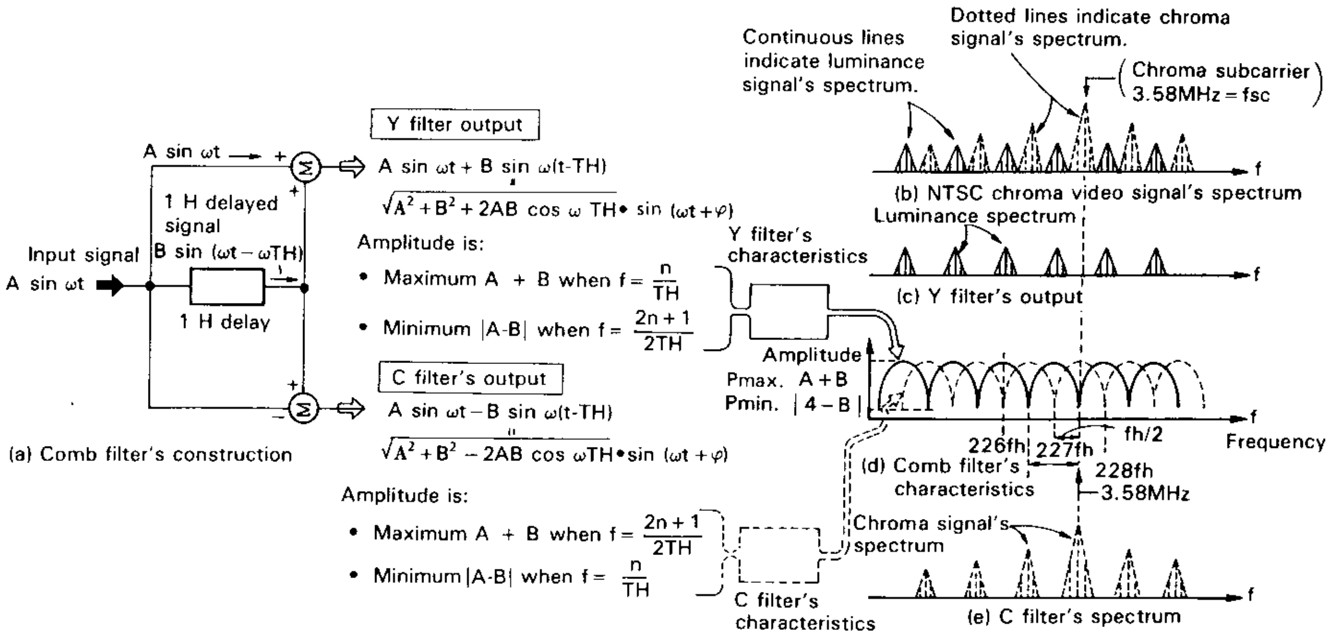


Fig. 6. Operating Principle of Y-C Separation using a Comb Filter

3) Operation of Y-C Separation Circuit using Comb Filter

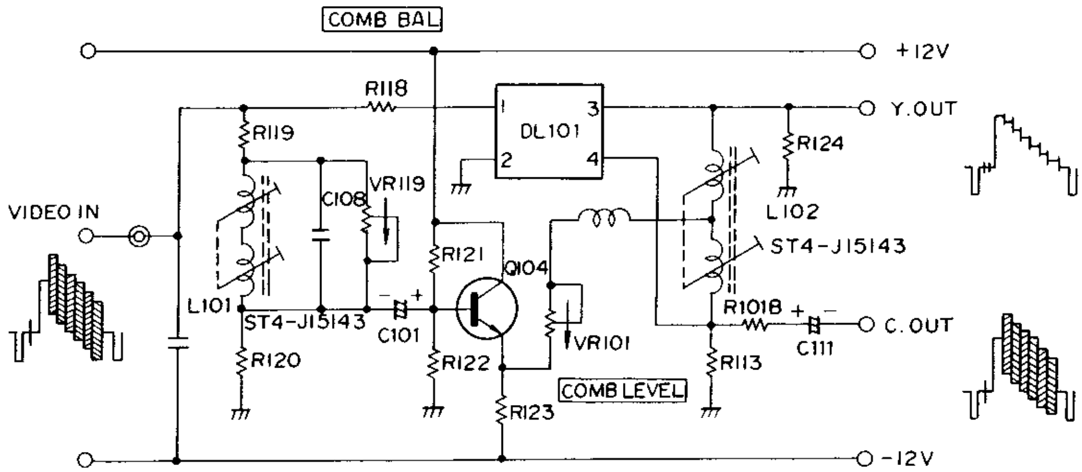


Fig. 7. Y-C Separation Circuit using Comb Filter

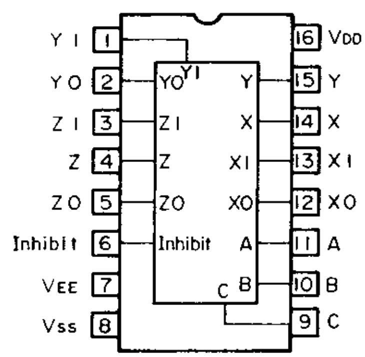
3. Analog Switch Circuit

An analog switch circuit is incorporated in this monitor for switching video and synchronizing signals electronically, as shown in Fig. 8.

Truth Table

Control Input				ON Switch		
Inhibit	Select					
	C	B	A			
0	0	0	0	Z_0	Y_0	X_0
0	0	0	1	Z_0	Y_0	X_1
0	0	1	0	Z_0	Y_1	X_0
0	0	1	1	Z_0	Y_1	X_1
0	1	0	0	Z_1	Y_0	X_0
0	1	0	1	Z_1	Y_0	X_1
0	1	1	0	Z_1	Y_1	X_0
0	1	1	1	Z_1	Y_1	X_1
1	X	X	X		—	

Pin arrangement HD14053 Multiplexer



(Top View)

Block Diagram

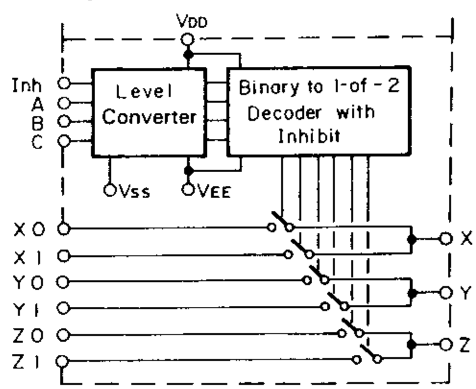


Fig. 8. C-MOS Analog Multiplexers HD14053

A 3 bit digital control signal switches the 3 × 2 channel analog switches.

4. Y-C Separation Circuit using Notch (shaped) Filter

The XM-1900 provides luminance chrominance (Y-C) separation using a comb filter of using a notch filter. This can be selected by a switch on the monitor's front panel.

In the notch filter mode the luminance signal is provided Y filtering the subcarrier components centered around 3.58MHz from the NTSC signals. It reduces the subcarrier components at 3.58MHz by approximately 26dB using trap circuits (L103/C114).

Q108 is a buffer to increase the Q in the trap circuits as well as to reduce the output impedance of the trap output. Q107 is an electronic switch that turns the notch filter circuit on and off. Decoder IC111 (Fig. 17) checks the input video signal to this monitor for the presence of a burst signal. Q107 is automatically turned on and off by a DC output obtained from the color killer output of IC111.

When there is no burst signal in the input video signal, the voltage of Q107's base is reduced, causing Q107 to turn on and the notch filter to be by passed (short-circuited).

5. Y-DELAY Cirucit

The luminance circuit signal is processed by a wideband system. The band width of the chroma signal processing circuit is approximately 0.6MHz. This generates a relative time delay of approximately 0.75μs which must be compensated.

The luminance signal obtained by the Y-C separation circuit is delayed by delay circuit DL102 approximately 0.75μs, to synchronize it with the delayed color-difference signal generated by the decoder after passing through the chroma signal amplifier. The time coincident Y and C signals are then applied to the matrix circuit.

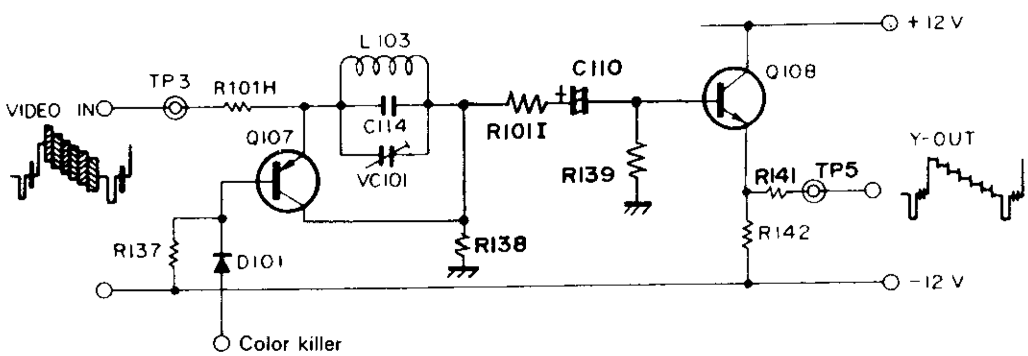


Fig. 9. Y-C Separation Circuit using Notch Filter

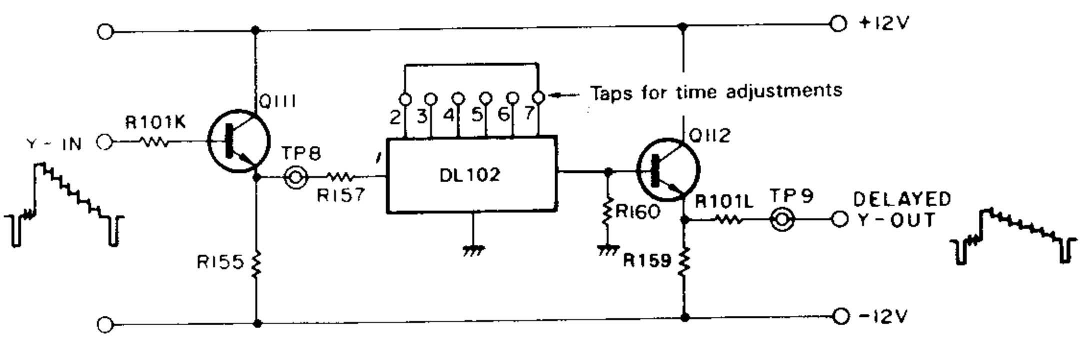


Fig. 10. Y-DELAY Circuit

6. DC (Gain) Control Video Amp Circuit (IC 109 HA11465)

This monolithic IC provides both a DC controlled contrast (variable gain) video amplifier and a sync separator circuit. The positive polarity (Y signal) signal input to Pin ⑮ on IC109 is buffered and applied to the DC controlled variable gain stage ("contrast control"). For contrast control, the video output signal level is adjusted by controlling the DC voltage at Pin ⑪ .

The sync separator section of IC109 works as follows: The video signal containing sync (VS signal) is spplied to Pin ⑯. The separated composite sync signal is output at Pin ③ after passing through the noise cancel and sync separate circuits.

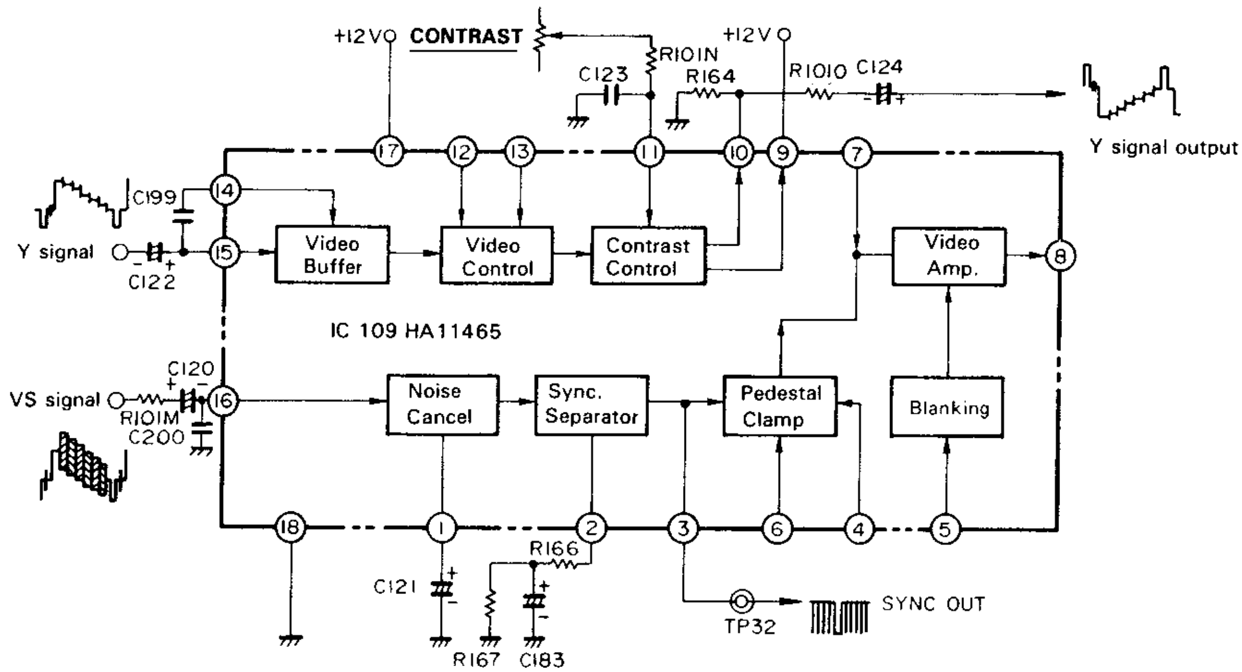


Fig. 11. DC Control VIDEO AMP Circuit

7. Aperture Compensating Circuit

When chroma-luminance separation is done with a notch filter (at 3.58MHz), luminance information that falls in the region of the chrominance notch (250-300 TV lines) is severely attenuated, with a corresponding serious effect on luminance resolution. The aperture circuit compensates for this effect. The aperture circuit, consisting of Q114, Q116 and DL3 (Fig. 12), is a variation of the open-ended type aperture circuit. The Y signal is applied to the base of Q114. Delay line DL103 is connected to the collector of Q114. C126, R172 and the effective on resistance of FET Q115 determines the amount of coupling from the emitter of Q114 into the common base stage Q116. Q116 has the other end of delay line DL103 as the collector load. The delay line delay is 140 nsec; this corresponds to 180° phase shift at 3.58MHz. The signal from the delay line and the signal from the collector of Q116 add; (maximum aperture boost occurs at 3.58MHz.) The APERTURE potentiometer adjusts the bias on the gate of FET Q115 and hence controls the effective "on" resistance of Q115. The effective resistance of Q115 adjusts the amount of frequency boost; (the amount of aperture compensation.) Emitter follower Q117 provides a low output impedance to the next stage.

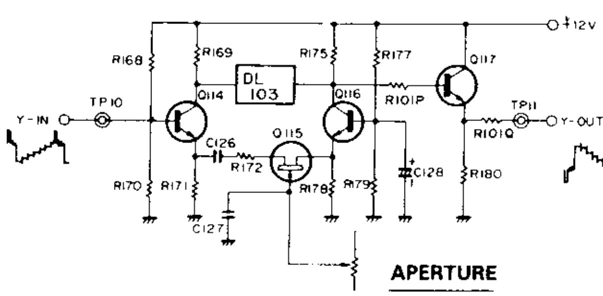


Fig. 12 Aperture Compensation Circuit

8. Brightness Control Circuit

After processing in the aperture compensation circuit, the Y signal is amplified by Q118 and Q119. The emitter follower Q120 provides a low output impedance for clamp circuit Q121. Q121 is "on" for the duration of the "0 Volt Clamp Pulse" signal to clamp the Y signal at GND potential. The Y signal is then applied to analog switch IC110. Here the bright pulse is added; The Y signal at Pin ⑭ is switched to the DC level on Pin ⑫, established by the "Brightness" adjustments, for the duration of the "bright pulse" signal. The negative phase "bright pulse" is generated by the monostable multi IC108b and is applied to IC110 Pin ③ through R201. In their normal condition, Pins ③ and ④ are connected and the "bright pulse" controls Switch C via Pin ⑪. The Y signal is applied to Pin ⑬ when Switch B is turned on; when Pins ① and ⑮ are connected. The "bright pulse" turns on Switch C, connects Pins ⑬ and ⑭ during the scanning period and connects Pins ⑫ and ⑭ for the duration of the "bright pulse" in the blanking period. The signal appearing at the base of Q122 (TP14) has the BRIGHT pulse added as shown in Fig. 13-d.

For brightness control the BRIGHT pulse is used after the blanking interval is clamped. When the PULSE-CROSS display mode is selected, Pins ⑤ and ④ of Switch A are connected and the brightness adjustments are disabled.

When the SET-UP mode is selected, Pins ② and ⑮ of Switch B are connected. The Y signals is disconnected and a fixed level at 0V is applied to the base of Q122.

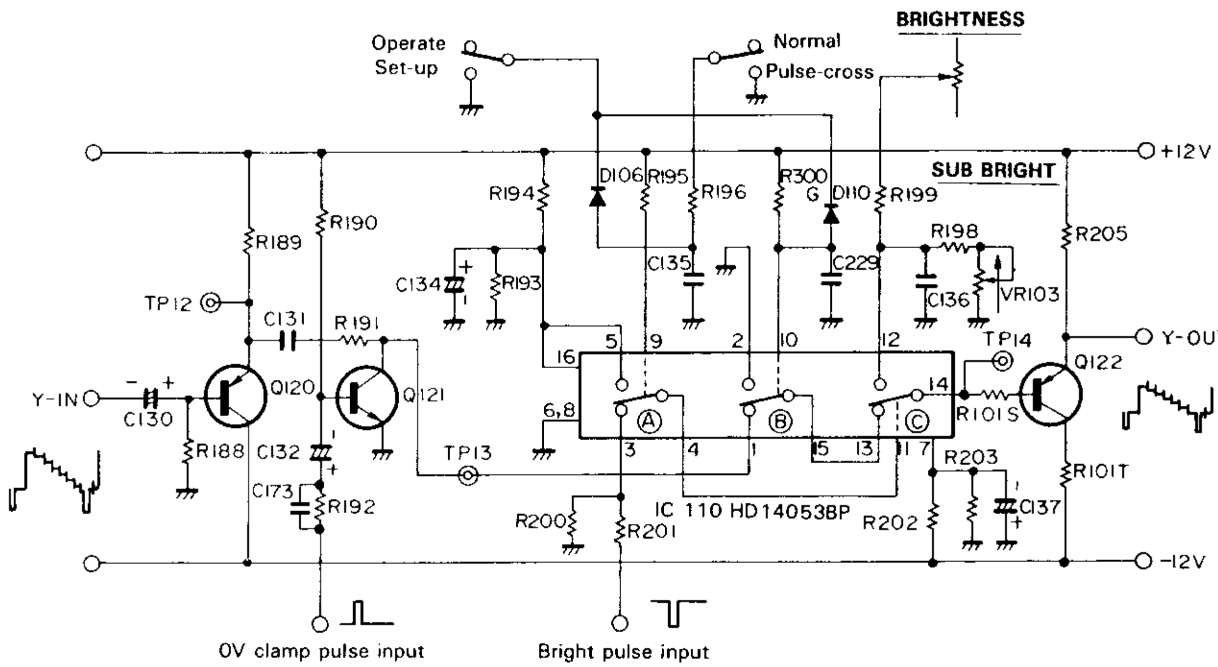


Fig. 13. Clamp & Brightness Control Circuit

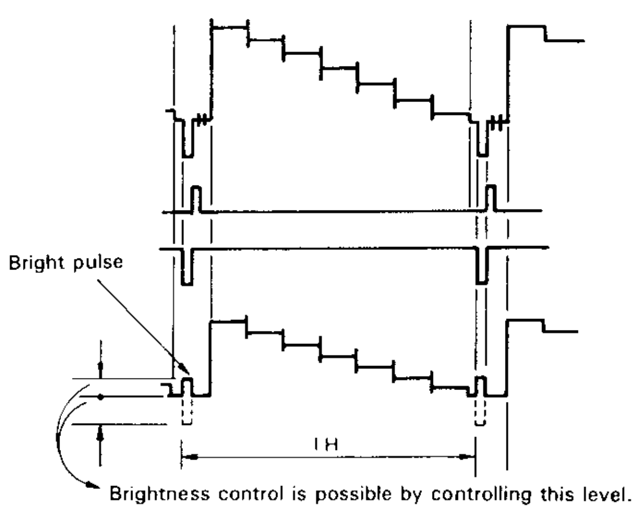


Fig. 13-a. Y Signal

Fig. 13-b. 0V Clamp Pulse

Fig. 13-c. Bright Pulse

Fig. 13-d. Y Signal with Bright Pulse Added (TP14)

9. Matrix Circuit

This circuit generates the R, G and B color signals by combining the Y signal (with BRIGHT pulse) from IC110 and the color difference signals R-Y, G-Y and B-Y from the demodulator IC111 in a resistive matrix (see Fig. 14 and Fig. 15).

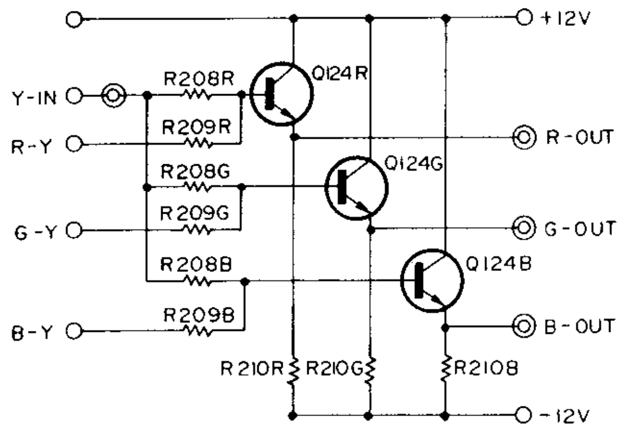


Fig. 14. Matrix Circuit

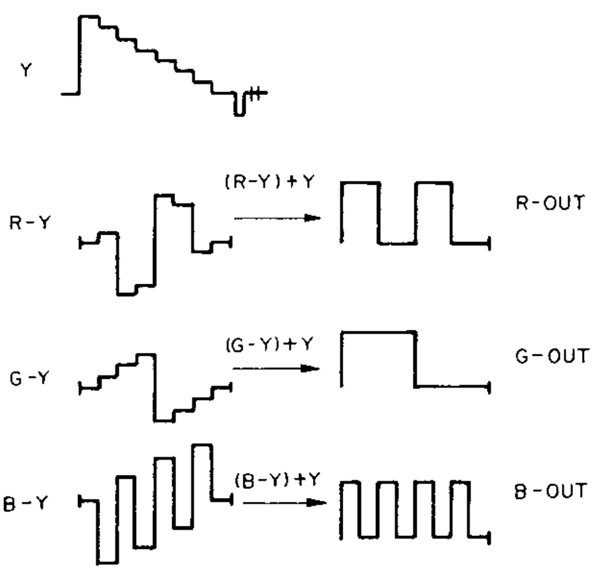


Fig. 15. Matrix-synthesized Waveforms

10. Band-Pass Filter Circuit

When the COMB filter mode is selected, the chroma signal which has been Y-C separated by the comb filter is applied to the Band-pass filter circuit by IC102. In the NOTCH filter mode, the NTSC signal is applied directly to the band pass filter by IC102. The band-pass filter shown in Fig. 16 has a bandwidth of approximately ±600kHz centered at 3.58MHz and thereby removes the Y signal components and retains the chroma subcarrier components. The chroma subcarrier component is amplified by the feedback video amplifier Q134 and Q135. The output level is adjustable by VR120. This signal is applied to Pin ⑮ of IC102.

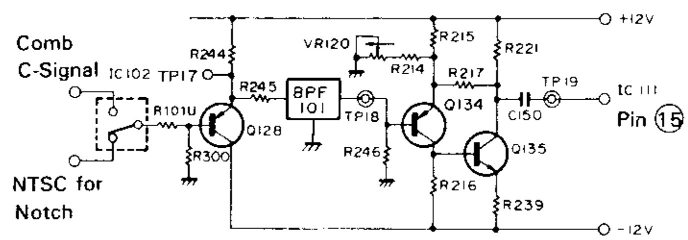


Fig. 16. Band-Pass Filter Circuit

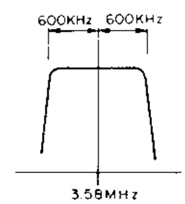


Fig. 16-a. Band-Pass Filter Characteristics

11. Chroma System Circuit (IC111 HA11580)

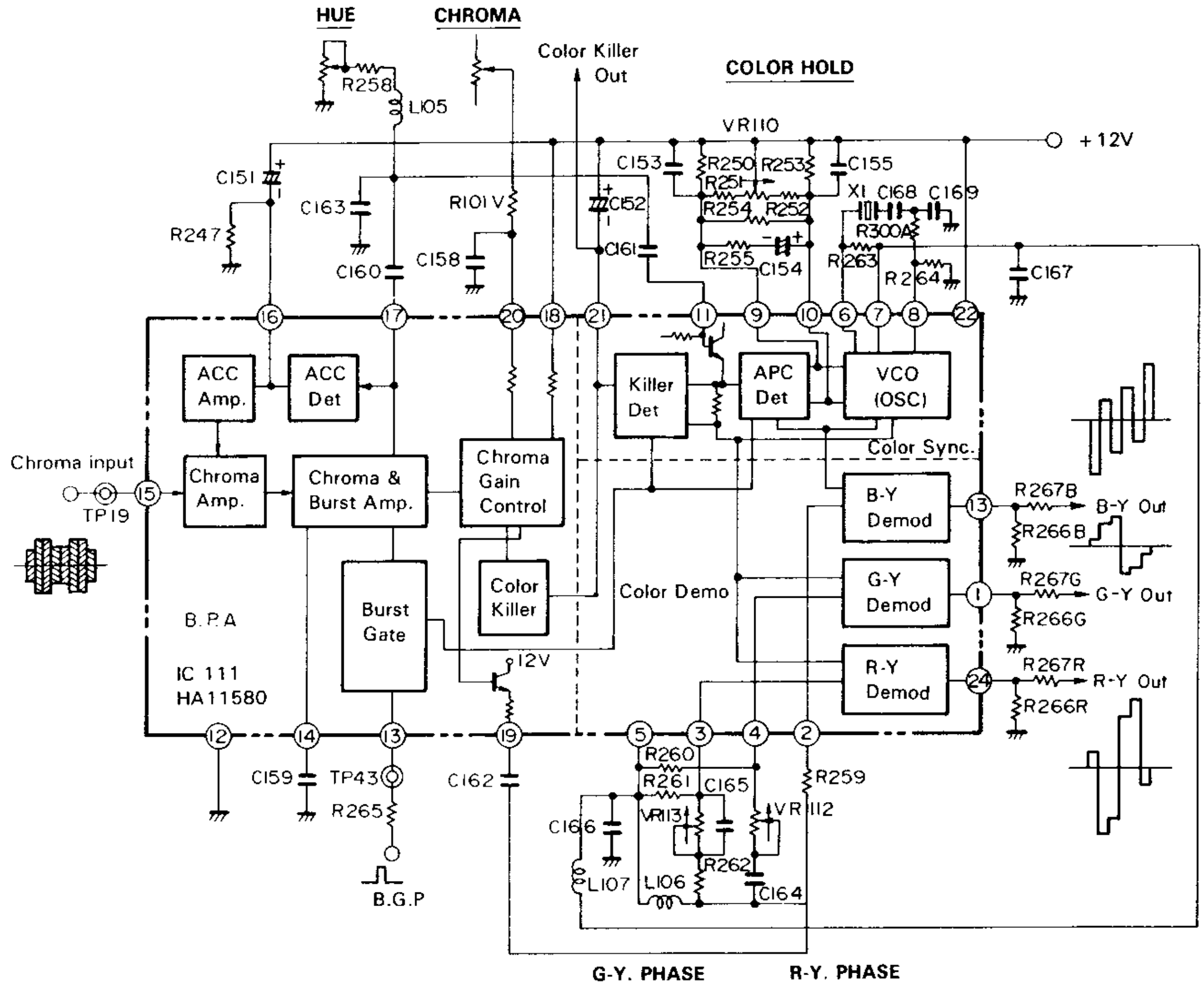


Fig. 17. Chroma System Circuit

■ Features of IC 111 HA11580

- Band-Pass amplifier
  - ○ Peak detection type ACC detector
  - ○ ACC & killer adjustments are unnecessary.
  - ○ DC color control
- Color sync
  - ○ APC type subcarrier regenerator
  - ○ Transformerless VCO (Voltage Controlled Oscillator)
- Color demodulator
  - ○ 3 axes demodulation
  - ○ Regenerated subcarrier is derived from color sync in the IC

• Band-Pass Amplifier System

1) The chroma signal that has passed through the band-pass filter circuit (Fig. 16) and which bandwidth has been limited to 3.58MHz ± 600kHz is input to the chroma amplifier IC111 Pin ⑮.
2) The gain of the chroma amplifier is controlled by ACC (Automatic Chroma Gain Control) of the peak detecting type. The output of the chroma Amp is applied to the chroma and burst amplfier where burst and chroma are separated.
3) The separated burst signal is applied to the ACC detector where the peak burst amplitude is detected and the gain of the chroma amp controlled via the ACC Amp. The chroma subcarrier is amplified by a second BPA (Band Pass Amp) (located inside the chroma gain control circuit). This signal is applied to the color killer circuit and also output on Pin ⑲ and applied to each demod via coupling cap C162.
4) The gain of the second BPA is controlled via a DC control voltage from the CHROMA control connected to Pin ⑳ .

• Color Sync Circuit System
(3.58MHz Oscillator Function)

1) An APC (Automatic Phase Control) type chroma synchronizing circuit is used. A CW (Continuous Wave) signal is generated by a VCO (Voltage Controlled Oscillator). The VCO is controlled by a PLL (Phase Locked Loop).
2) The VCO is an oscillator which frequency varies linearly with the control voltage applied to it. The crystal is inserted in the feedback loop. The frequency and phase are controlled by the phase detection output voltage from the APC Det circuit.
3) Since the pull in range of the VCO at 3.58MHz is very narrow, a stable crystal type VCO is used to avoid drift with time and varying temperatures.

(APC Det Function)
CW (local subcarrier)

1) The APC Det circuit generates the APC detection output by comparing the phase of the burst signal, (which has been advanced by 90° from the burst axis) and that of the CW signal which is at the B-Y axis.
2) The burst signal obtained at the Chroma & Burst Amp is advanced approximately 90° by passing it through the hue control circuit, and applied to the APC detection circuit at Pin ⑪.
3) From the VCO, a CW signal is applied, whose phase has been further advanced by 90° from that of the burst signal, which has already been advanced by 90° from the B-Y axis phase.
4) When the VCO frequency is normal (3.579545MHz): The burst gate pulse is added to the cohstant gate current portion, permitting the complex differential amplifier to be actuated only during the gate pulse period. During this period, the phase comparison between the 90° -advanced burst signal and the 90° -advanced CW signal is performed, and the detection output (the potential difference between Pins ⑨ and ⑩ filtered by LPF R255, C154) becomes 0.
5) When the CW's frequency becomes lower than 3.579545, the phase is delayed and the phase difference between CW and the burst signal becomes smaller than 90°, so that the detection output will be in the relationship of Vpin9<Vpin10.
6) When CW's frequency becomes higher the phase is advanced:
The detection output will be in the relationship of Vpin9>Vpin10.

• Chroma Demodulator Circuit System

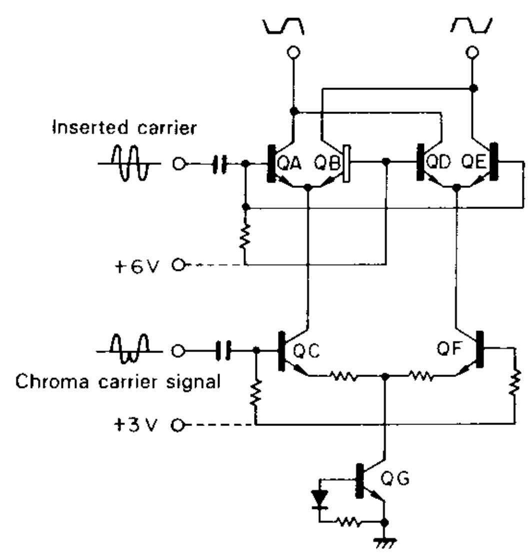


Fig. 18. Collector cross-coupled type double-balanced demodulator

[Principle of Operation]

1) The chroma carrier signal is applied to the lower stage, QC and QF, and the inserted carrier to the upper stage, QA, QB, QD, and QE connected in the double-balanced connections. QA plus QE, and QB plus QD in the upper stage are turned on and off alternately by the positive and negative half-waves, respectively, switching on and off the carrier chroma signal.
2) This means that the 2 differential pairs in the upper stage are acting as an electronic bipolar double-throw switch that turns on and off the carrier chroma signal with the period of the inserted carrier. (Fig. 18a.)
3) Fig. 18-b shows the phase relation between the chroma carrier signal and the inserted carrier, and the relationship between the waveform of the current flowing in the double-balanced connections and the supplied color-difference signal.
4) The chroma carrier signal is applied to the base of QC. QA and QD which are turned on and off alternately for each half cycle of the inserted carrier so that current waveform iAD is generated; QB and QE are turned on and off alternately for each half cycle so that current waveform iBE is generated. The voltage change of the output (the average current), the polarity is inverted: EAD is positive and EBE is negative.
5) The (color-difference) output becomes positive when the phases of the chroma carrier signal and the inserted carrier are the same, negative when the phases are inverted, and 0 when the phases are different by 90°.
6) For a chroma carrier signal whose phase is changed continuously 360°, the output from the chroma demodulator changes in a sinusoidal manner, as shown in Fig. 18-c.

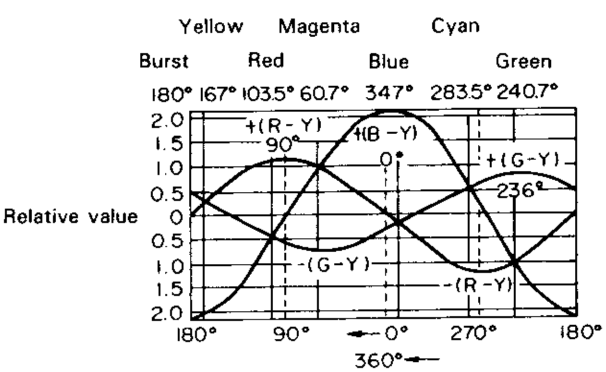


Fig. 18-c. Chroma Demodulator Output for 360° Change of Chroma Carrier Signal Phase Relative to The Inserted Carrier Phase.

7) The output from the R-Y demodulation stage becomes maximum positive at phase R-Y (90°), maximum negative at phase -(R-Y) (270°), and 0 at phase -(B-Y) (0°) and at phase B-Y (180°).
8) In the same way, the output from the B-Y demodulation stage becomes maximum positive at phase B-Y (180°), maximum negative at phase -(B-Y) (0°), and 0 at phase R-Y (90°) and at phase -(R-Y) (270°).
9) G-Y demodulation is done by using an inserted carrier phase of 236°. The characteristic shown for the G-Y output curve in Fig. 18-c is obtained by setting the demodulation gain to compensate level coefficient G-Y/0.701.

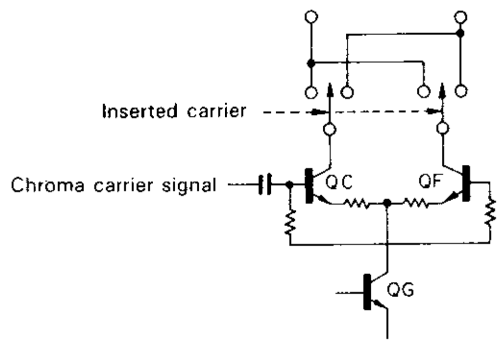


Fig. 18-a. Bipolar double-throw switch

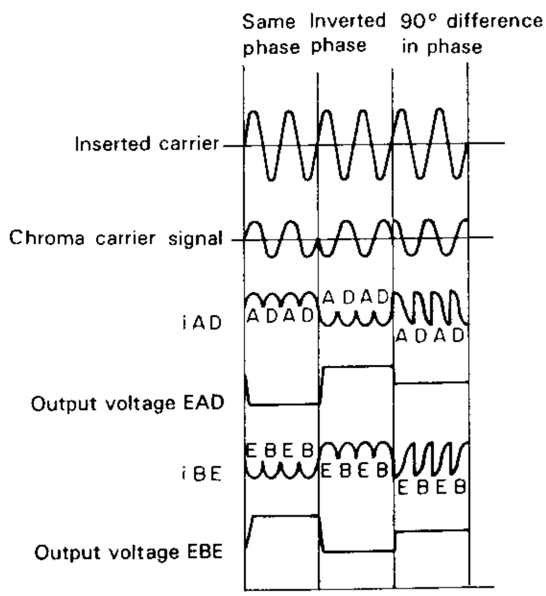


Fig. 18-b. Operating waveforms

12. Color Killer Circuit

When the input signal is B/W (contains no burst signal), the killer voltage at Pin ㉑ of IC111 (Fig. 17) is +7.6V DC, Q126 is turned on and the emitter Q127 is turned off, switch Q107 is turned on, the notch filter is short-circuited, allowing the B/W signal to pass through at full bandwidth. When the input signal contains color (burst signal contained), the killer voltage at Pin ㉑ of IC111 becomes +5.9V, Q126 is turned off, Q127 is turned on, and switch Q107 is turned off, activating the notch filter.

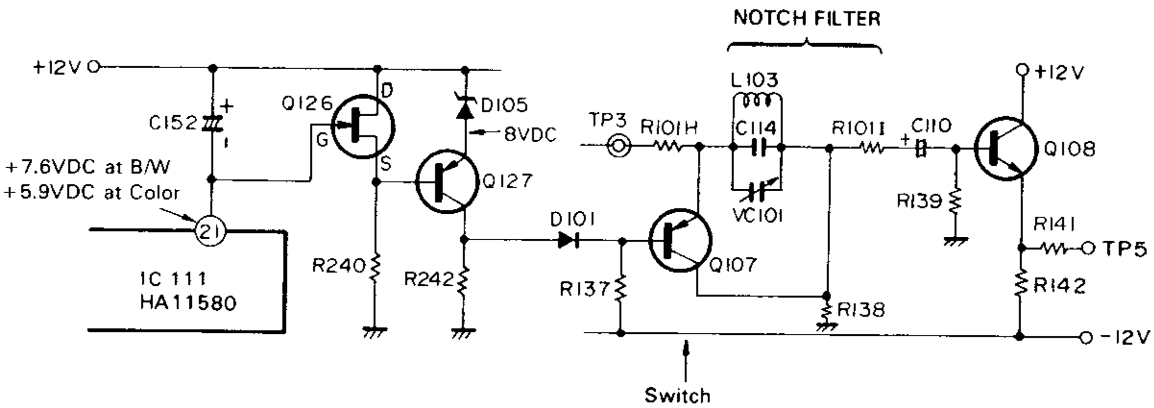


Fig. 19. Color Killer Circuit

13. Low-Pass Filter Circuit

The chroma demodulating process of IC111 inherently generates (spectral) components at harmonics of 3.58MHz as well as signal components at the modulating frequency we want to recover.

The high frequency harmonics of 3.58MHz are eliminated by low-pass filters connected to each color signal output. The signal to the next stage contains only the low frequency modulation we want to recover. The level of each color differce signal can be adjusted by variable attenuators VR114R, VR114G and VR114B. The NTSC/RGB selector switch selects R-Y, B-Y or G-Y recovered from the NTSC signal or R, G, B from th R, G, B input direct, and is applied to the matrix circuit.

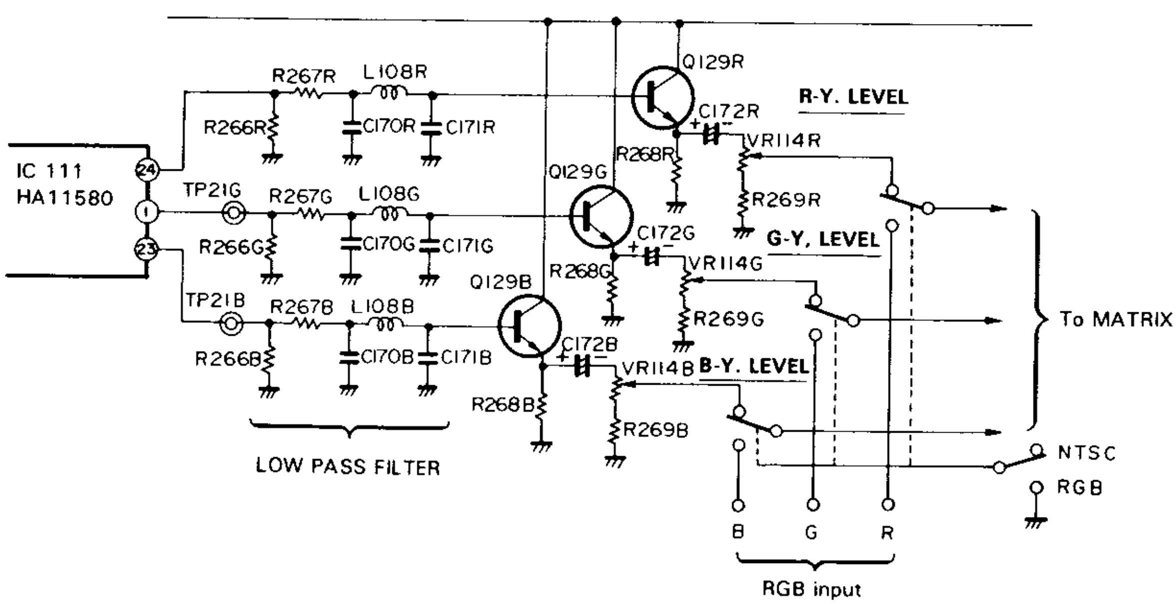


Fig. 20. Low-Pass Filter Circuit

14. Synchronization Select Circuit

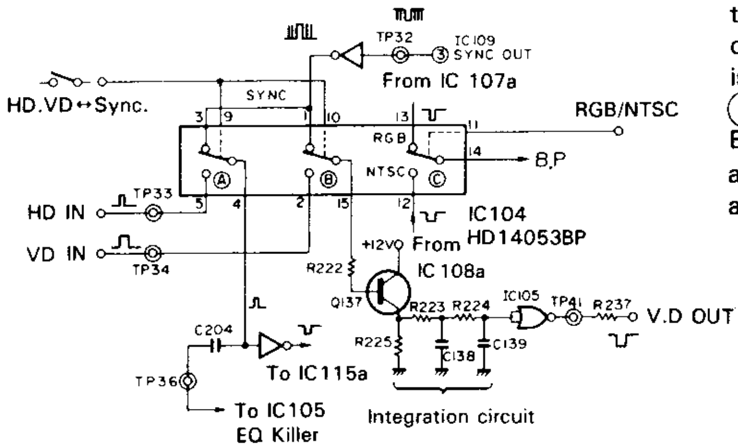


Fig. 21. Synchronization Select Circuit

1) HD.VD./SYNC Selection
   In the RGB input mode, select Switches are (A) and (B) in IC104; they select HD and VD direct or HD and VD derived from composite sync. In the NTSC mode, select Switches (A) and (B) of IC104; select between INT SYNC or EXT SYNC as the synchronizing signal for the pulse process and deflection circuits.
   When composite sync is selected, the equalizing pulses at 1/2H rate during the vertical interval are removed by the EQ killer circuit to generate the H drive pulse.
   VD (Vertical Drive) is derived by a standard integrating circuit from the composite sync signal.

2) RGB/NTSC Selection
   Select switch (C) on IC104 is used for selecting the position (phase) where the BRIGHT pulse for brightness control is added for RGB or NTSC. The pulse is added to the back porch of video blanking for RGB, and during the SYNC period for NTSC.

15. EQ Killer Circuit

This circuit is used for eliminating the 1/2H equalizing pulses of the V.SYNC period. The SYNC applied to (a) is differentiated by C204 and R228 and becomes waveform (b). The monostable circuit IC106a is triggered at the rise time of the pulses so that a pulse (c) with a larger pulse width than 1/2H is obtained. By gating (c) and (a) at IC105, a trigger pulse (d) with a period of 1H is obtained, from which the equalizing and serration pulses are eliminated.

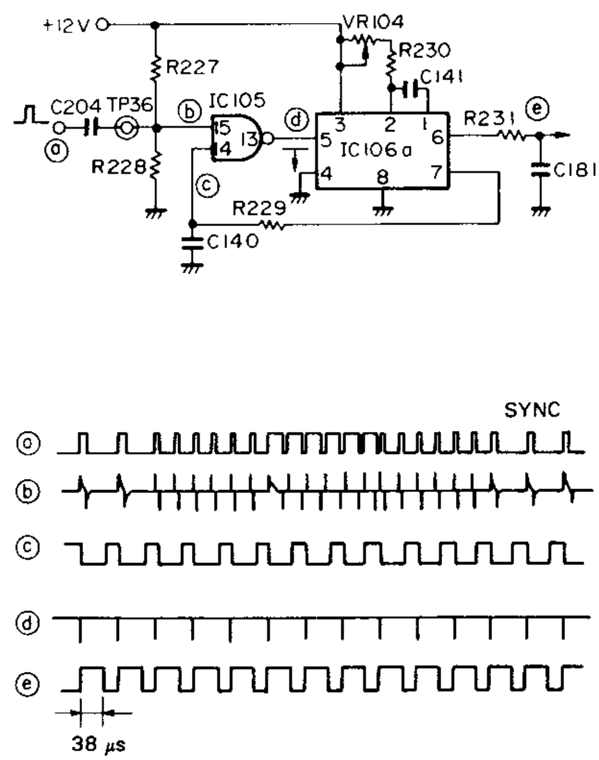


Fig. 22. EQ Killer Circuit

16. Pulse Process Circuit

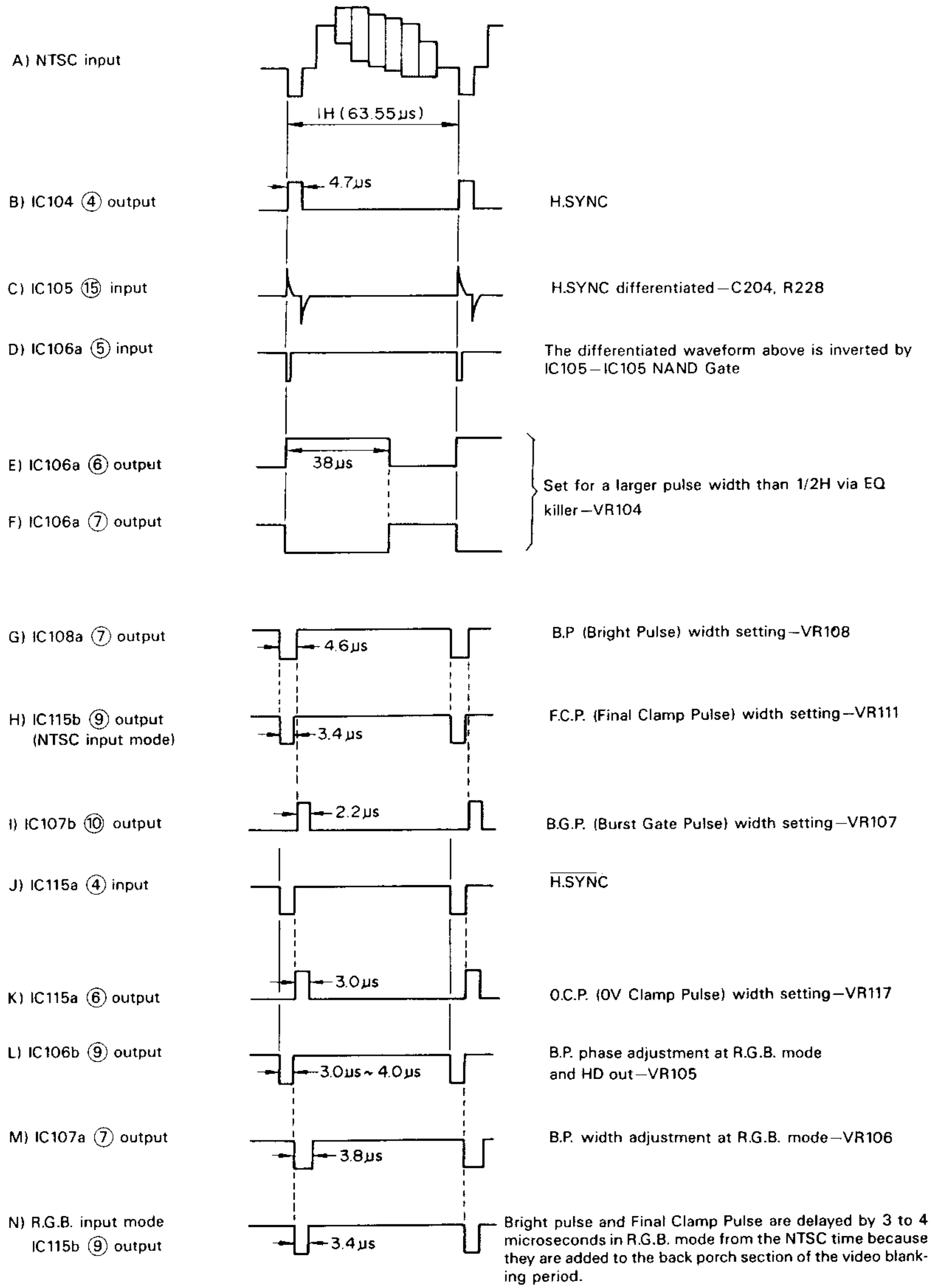
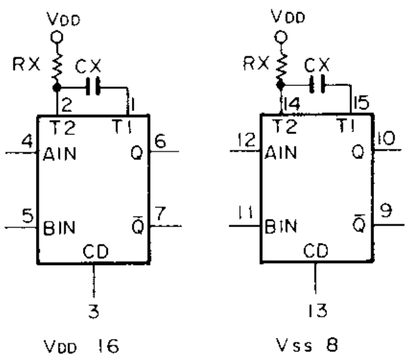


Fig. 23. Pulse Process Timing Chart

1) A Burst Gate Pulse (BGP) is supplied to the demodulation circuit. The BGP is a negative pulse whose phase is adjusted by VR108 and whose pulse width is set by VR107.
2) The BRIGHT pulse for the NTSC input mode is a negative pulse whose pulse width is set by VR108. The Bright pulse is supplied to the brightness control circuit.
3) The BRIGHT Pulse for the RGB input mode is delayed by 3 to 4 microseconds relative to the NTSC mode, for the RGB mode bright pulse is added to the back porch of video blanking. For the 3 to 4 microseconds delay, VR105 adjusts the phase at IC106b and VR106 adjusts the pulse width at IC107a. The output negative pulse is supplied to the brightness control circuit.
4) The width of the pulse which perform the 0V clamp before the brightness control is set by VR117.
5) The Final Clamp pulse is generated from the B.P (Bright Pulse) and the Final Clamp pulse width is set by VR111. The pulse is supplied to the video output amp.



INPUT			OUTPUT		NOTE
A	B	CD	Q	Q̄	
↑	H	H	⊓	⊔	OUTPUT PULSE
↑	L	H	L	H	INHIBIT
H	↓	H	L	H	INHIBIT
L	↓	H	⊓	⊔	OUTPUT PULSE
X	X	L	L	H	INHIBIT

*Don't care.

Fig. 24. Block Diagram of TC4528 or MC14528BP, and Truth Table

17. Video Amplifier Circuit

1) Video amplifier chain consists of preamp, feedback clamp for DC restoration, and video output amplifier. The maximum video gain from the preamp's input to the final output (cathode of CRT) is approximately 40dB.
2) The video amplifier is provided with 3 identical circuits for the R, G, and B channels, each providing identical performance and functions.
3) In Fig. 25, the R signal demodulated by the matrix circuit is applied to Pin ⑮ of Pre Amp IC113R.
4) IC113, the DC control video amplifier explained in section 6, can vary the video gain by the R-drive control connected to Pin ⑪.
5) The negative video signal appearing at Pin ⑩ of IC113 is amplified and its polarity inverted by Q126. A positive video signal is obtained at the collector.
6) The feedback clamp circuit including the video output Amp consists of Q130R, Q132R, Q133R, D102R, D103R, IC114R, and R-BACK GND regulator.
7) The video signal applied to the base of Q130 is amplified by the compound circuit consisting of Q132R and Q133R. A negative video signal is obtained at the collector of Q133R, which is applied to the R cathode as the cathode drive signal for the CRT.
8) The negative video signal appearing at Q133R's collector has a certain DC potential. This DC potential is sampled after being divided by R294R and R295R and applied to a feedback clamp for the purpose of DC restoration.
9) The FCP (Final Clamp Pulse) that is applied to the base of Q131R is of negative polarity. Q131R functions as a switch that turns <u>on</u> during the active scanning period and turns <u>off</u> during the blanking period.
10) Transistor Q131R, diodes D102R and D103R and capacitor C115R from S&H (Sample and Hold) circuit. During the active scanning period Q131R is on, D102R and D103R are reverse biased; (high impedance). During the blanking period when the FCP is low, Q131R turns off and hold capacitor C115R charges to the same potential as at the junction of R294R and R295R via Resistor R289R and the now forward conducting (low impedance) diodes D102R and D103R.
11) R284R is the discharge path (controlled leak) for hold capacitor C115R to follow the output DC in both directions. The sampled output DC level is applied to Pin ③ of IC114R.
12) A DC voltage regulated by R-BACK GND is applied to IC114R's pin ② as a comparison voltage, the difference between the comparison voltage and the sampled output voltage at Pin ③ becomes the input to the operational Amp IC114R, where it is amplified. The output is Pin ⑥.
13) The voltage that appears at Pin ⑥ of IC114R is connected through R280R and becomes the base bias signal of Q130R and subsequently becomes the operating bias signal of Q132R. By means of this DC restoration feedback clamp, the DC potential of the output signal during the FCP duration of blanking is accurately fixed.

14) Example of DC Restoration Loop Operation
If the DC potential of the output (collector of Q133R) becomes higher, the voltage at the junction of R294R and R295R rises. This increase is transferred to hold capacitor C115R during the next occurrence of the FCP. This increase is then applied to the ⊕ input of amplifier IC114R. The output Pin ⑥ becomes more positive, effectively increasing the bias voltage at the base of Q130R. The collector current of Q132 and Q133 increases, effectively lowering the collector voltage of Q133 and thereby restoring the original condition.

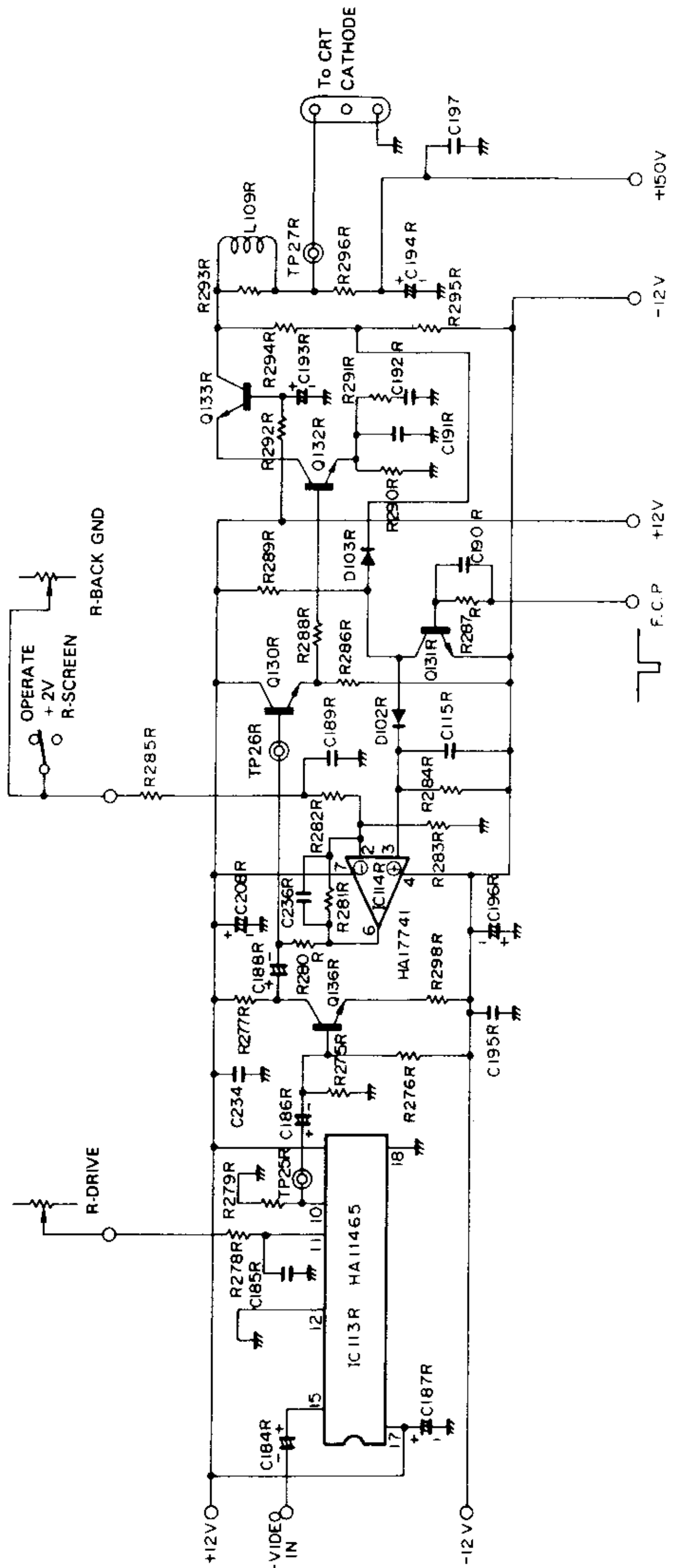


Fig. 25. Video AMP Circuit

Rear Panel Board Section

1. This board consists of the following circuits and functions:

- o Video input A-B select circuit
- o Video input NTSC signal-RGB signal select circuit
- o SYNC INT-EXT select circuit
- o SYNC EXT-G.SYNC select circuit
- o RGB signal contrast control circuit
- o HD positive/negative polarity select circuit
- o VD positive/negative polarity select circuit
- o VIDEO A, B input connectors and 75Ω-HIGH switch
- o SYNC input connector and 75Ω-HIGH switch
- o R, G, B input connector and 75Ω-HIGH switch
- o TTL (RGB/HD VD) input connector
- o RGB input - TTL input selection

2. Video Input A-B Select Circuit (Fig.26)

1) The A-B selection of the NTSC video signal is performed by diode and analog switches.
2) Each NTSC signal applied to the video A input connector and the video B input connector is applied to a diode switch connected to Q804's emitter and Q805's emitter.
3) The video A−B select switch employs +12V. When video A is selected, D803 conducts and the video B signal at Q805's emitter is grounded via diode D803. The video A signal at Q804's emitter passes through D802 and appears at the video output via the analog switch IC802. D801 at the video A side is off.

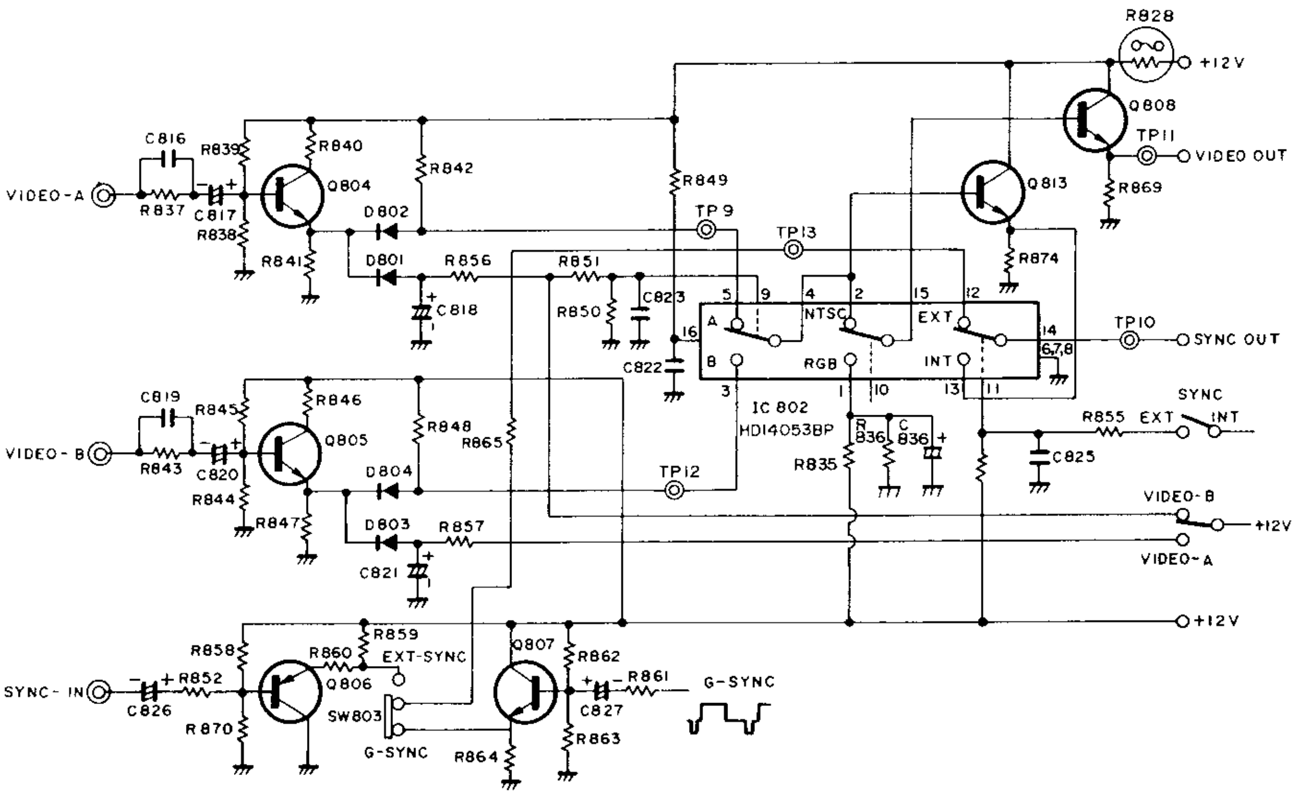


Fig. 26. VIDEO, SYNC Select Circuit

3. SYNC INT-EXT Select Circuit (Fig. 26)

1) When INT SYNC is selected with the NTSC mode, the NTSC CVBS (Chroma Video Blanking Sync) is applied to Pin ⑬ of analog switch IC802 and transferred to Pin ⑭ as SYNC out.
2) When EXT SYNC mode is selected the external sync signal applied to the SYNC IN connector is applied to Pin ⑫ on IC802 via Q806 and switch SW803 and tranferred to IC802 Pin ⑭ SYNC OUT.

4. EXT SYNC/G.SYNC Select Circuit (Fig. 26)

In the RGB mode, the G.SYNC signal (G signal with SYNC added) or EXT SYNC signal can be selected by SW803 to be the effective SYNC source.

5. Video Input NTSC-RGB Select Circuit

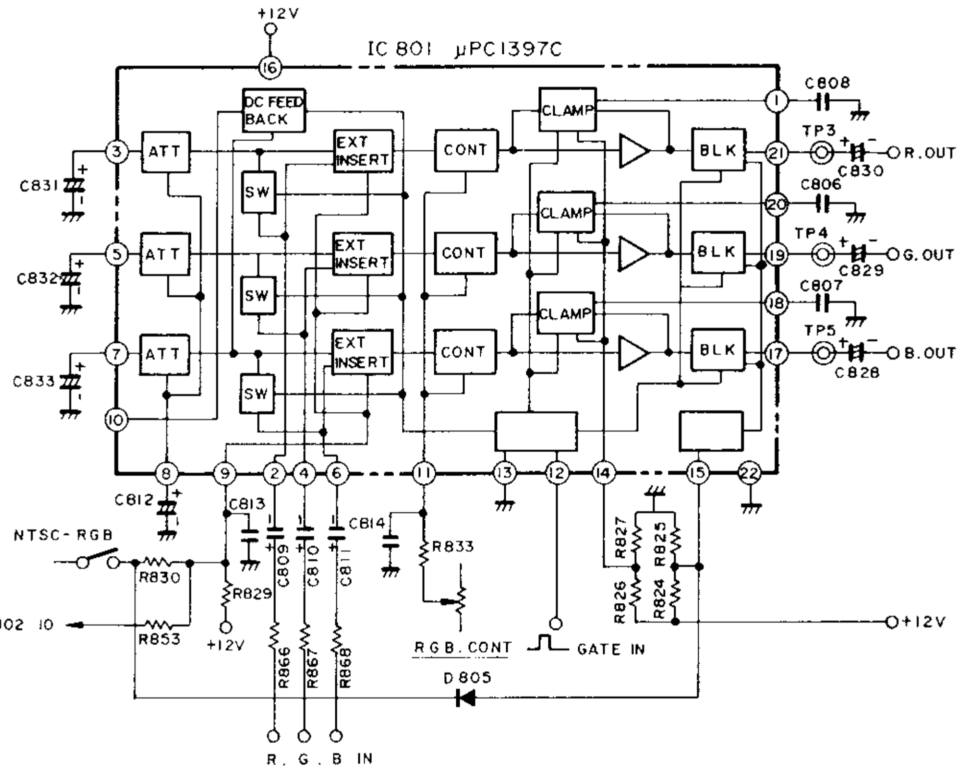


Fig. 27. Video Input NTSC-RGB Select Circuit

1) The selection between NTSC video and RGB is accomplished by switch IC802 (Fig. 26) and switch IC801 (Fig. 27).
2) The R, G, B input signals are applied to Pins ②, ④ and ⑥ of IC801 through emitter followers. When the NTSC/RGB mode select switch is set to RGB, the R, G, B signals go through the contrast control, clamp, and a BLK circuit in IC801. The R, G, and B outptus are on Pins ②, ⑲ and ⑰ of IC801.
3) IC801 consists of an analog switch contrast control, clamp, BLK, and MIX circuits. The IC allows CONT (contrast) to be DC-controlled, and wideband RGB signals to pass through.

6. HD/VD Positive/Negative Polarity Select Circuit

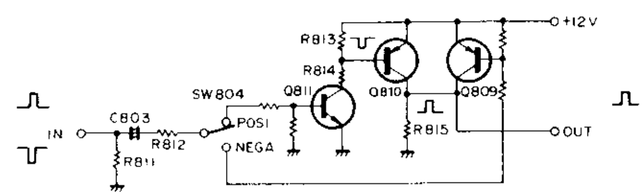


Fig. 28. Positive/Negative Polarity Select Circuit

When POS/NEG switch SW804 is set to posi- and a positive pulse is applied to the input (IN) in Fig. 28, the pulse is switched by Q811 and Q810 and a positive pulse is obtained from the output (OUT).
When a negative pulse is applied and switch SW804 is set to negative, Q809 is switched and a positive output is obtained.

Deflection Board Section

1. H.Delay/V.Delay Circuit

1) The (negative) HD pulse is generated by removing the 1/2H pulses of the V.SYNC period. This is done by the EQ Killer circuit on the decoder board. The pulse is then applied to the base of Q403. A positive pulse appears at the collector of Q403.
2) The positive pulse at Q403's collector is directly input to Pin ④ on IC402. This one-shot is triggered by the rising portion of the positive pulse. A pulse width corresponding to the H.Delay amount is generated. This width is regulated by VR407 (H.DELAY POSI).
3) The Q output from IC402a Pin ⑥ is selected for normal use and the Q output Pin ⑦ is selected for H-DELAY by analog switch IC403C. The output of IC403 Pin ⑮ is applied to Pin ⑫ as the trigger pulse of IC402b (the pulse shaping circuit for H.DEF). A negative pulse of approximately 4.7 microseconds width is obtained at Pin ⑨ of IC402. This pulse is applied to Pin ⑩ of IC404.
4) The V SYNC pulse is derived by an integrator on the decoder board. Switch Q401 generates a positive pulse at the collector.
5) The Q401 output pulse is applied to IC401. A pulse of approx. 3H width in phase with VD results at IC401b Pin ⑩ in the normal mode. The width is adjustable by the V.DEF Adjustment. In the V.DELAY mode the 3H Vertical pulse at IC401b Pin ⑩ is delayed by 1/2V. The delay is adjustable by the V.DELAY adjustment.

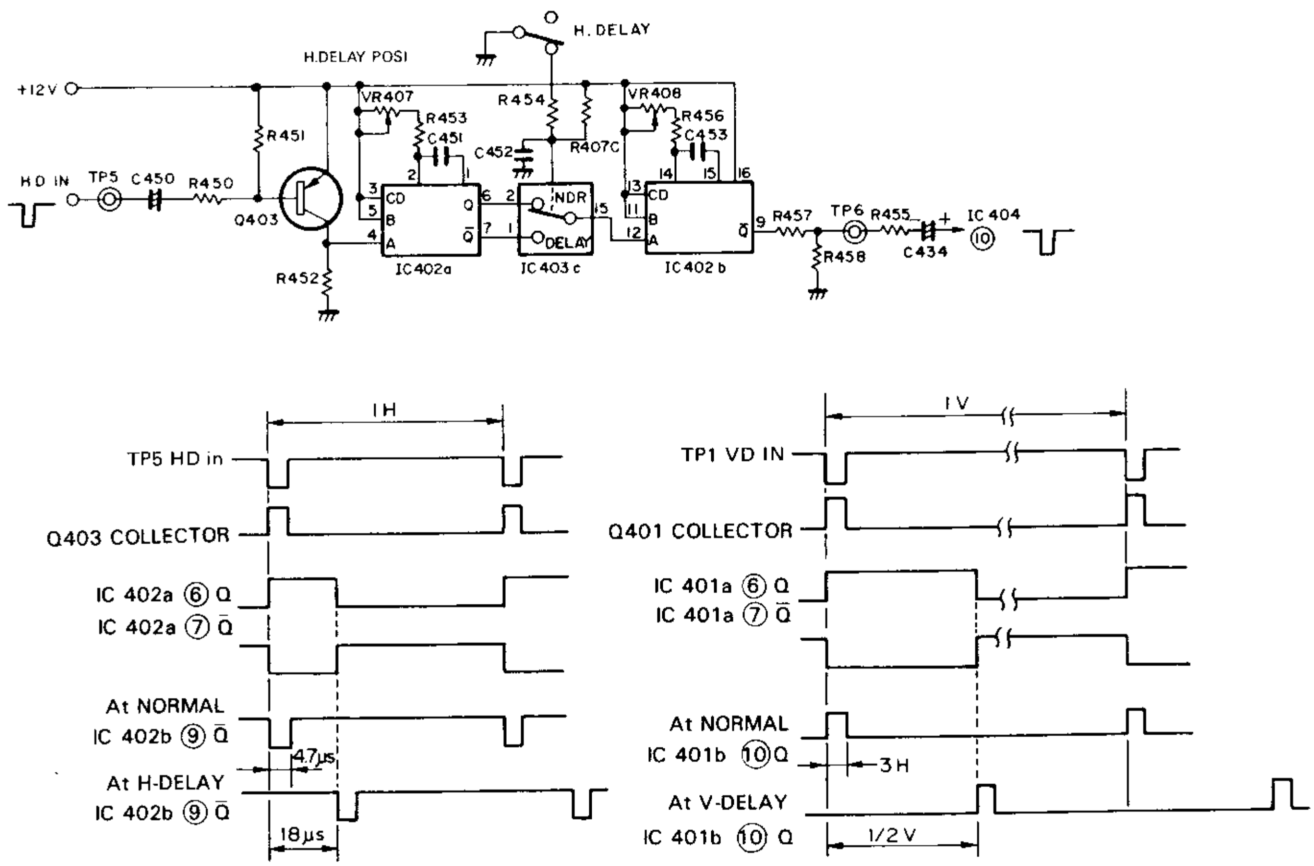


Fig. 29. H.DELAY/V.DELAY Circuit and Waveforms

2. Horizontal Deflection Circuit (Horizontal Oscillation, AFC, Drive)

1) Fig. 30 shows the horizontal deflection circuit; horizontal oscillator, H-AFC, H-drive, etc. IC404 is for deflection signal processing, and vertical deflection.
2) The H pulse input to Pin ⑩ on IC404 passes through the sync separator, and is applied to the H-AFC circuit
3) The horizontal output pulse is divided by the capacitive divider in horizontal output circuit and is inverted by Q404. It enters Pin ⑪ on IC405b as a negative trigger pulse. Its pulse width is determined by IC405a, the phase is controlled by one-shot IC405b. The IC405a output pulse is integrated by R459 and C455 into a sawtooth pulse, it is then applied to IC404 Pin ⑪ as the AFC pulse.
4) The H pulse that has passed through the sync separator circuit and the AFC pulse from the horizontal output are phase-compared by the AFC circuit. The detected component becomes the AFC control voltage. The AFC time constant is determined by C435, R439, and C428 and is connected to IC404's Pin ⑫. The voltage is applied to the horizontal VCO to control the horizontal oscillation frequency.
5) Selection of H/AFC time constant is made by IC436.
6) H. phase control, can be performed without changing the H. frequency by controlling the pulse width of one-shot IC405b using VR409.
7) The pulse output of the VCO passes through the H. pre-drive circuit and is output from IC404 Pin ⑮ as the H. drive pulse.
8) The voltage for X-RAY protection is obtained by dividing the output pulse of the high voltage generation. If the high voltage becomes excessive the amplitude of the pulses at X-RAY PROT in exceed the zener voltage of D402 and are filtered by C440. This voltage is applied to Pin ⑯ of IC404 to stop horizontal drive. Thereby disabling the HV.

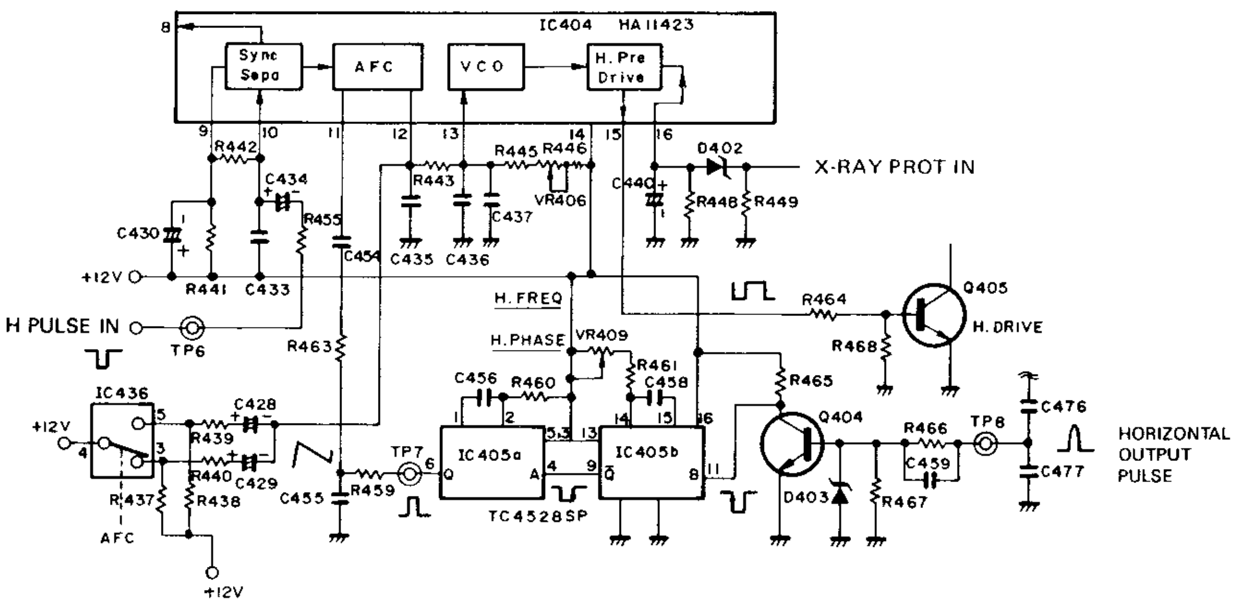


Fig. 30 Horizontal Deflection Circuit

3. Vertical Deflection Circuit

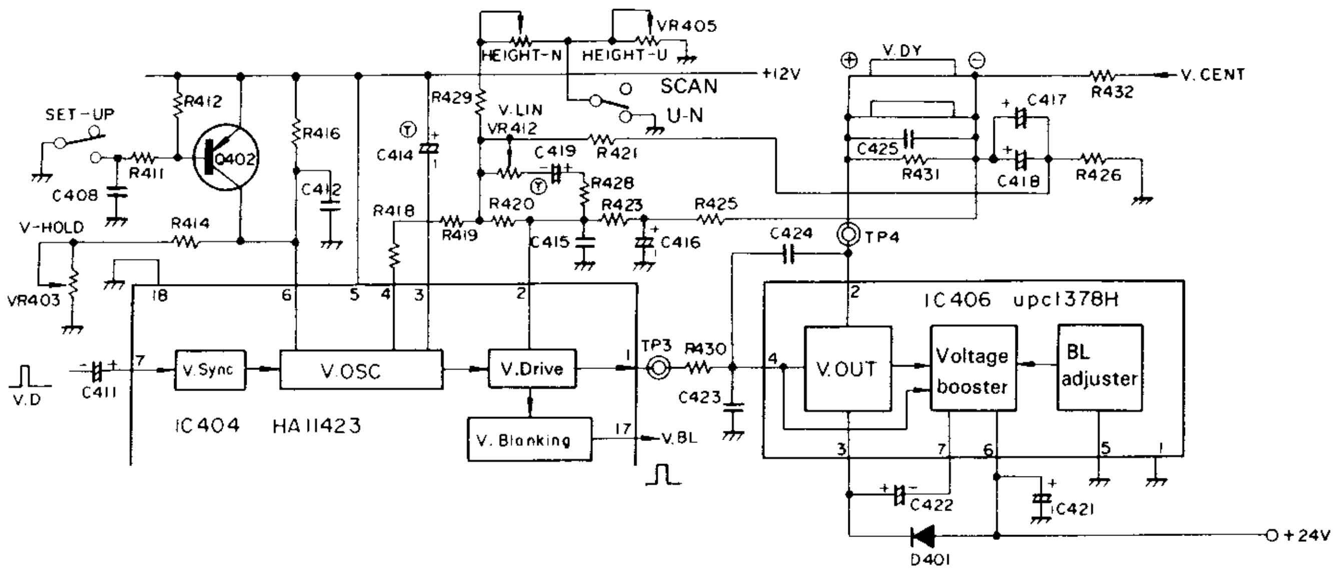


Fig. 31 Vertical Deflection Circuit

1) The V.D. pulse generated by the V-DELAY circuit is input to IC404 Pin ⑦ as the vertical deflection pulse, and is applied to the V.OSC circuit via V.SYNC Amp as a trigger pulse.
2) The V.OSC runs free with a time constant determined by C414, R416, R414, and VR403 at 50-60Hz. The oscillations are synchronized by the trigger pulse applied through V.SYNC.
3) The synchronized V pulse from the V.OSC is converted to a sawtooth waveform and is amplified by the V. drive circuit. The sawtooth output from Pin ①of IC404 is the V. drive signal.
4) IC406 is used for the vertical deflection output. The power consumption in this IC is considerably reduced by using a power bootstrap circuit which doubles the supply voltage only during the blanking period.
5) The V. drive signal is applied to V.DY after its output is amplified by IC406. D401 and C422 which compose a bootstrap circuit and doubles the voltage of the power supply only during the blanking period.
6) V.BL is generated by the V. blanking circuit in IC404. The output from Pin ⑰ is applied to the blanking mix circuit.
7) Since the ⊕ side of the DC voltage on V.DY is fixed, the direction of the current flowing in V.DY can be varied by adjusting the ⊖ side potential by the V.CENT circuit. This processes the V. CENTER adjustment.
8) Q402 is a circuit to inhibit vertical deflection while the set-up switch is on.
When the set-up switch is on, the base of Q402 is grounded. +12V is applied at Pin ⑥of IC404 and the V.OSC is stopped.

4. Blanking Mix Circuit

1) A positive V.BLK pulse is applied to Q407's base from Pin (17) of IC404.
2) An H. pulse voltage divided from the horizontal output circuit is applied to Q408's base.
3) At the common collectors of Q407 and Q408, the H. and V.BLK pulses are inverted and mixed, generating a negative BLK pulse. The pulse is clamped to the GND potential during the scanning period by D507 in the high voltage generating circuit, and is applied to G1 on the CRT as a negative pulse in relation to GND to accomplish CRT blanking.

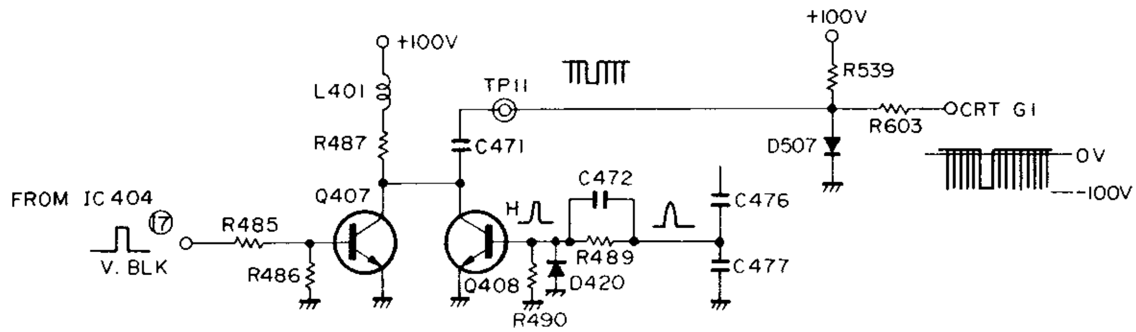


Fig. 32. Blanking Mix Circuit

5. Horizontal Deflection Output Circuit

1) The H. drive transformer T402 drives two H.OUT transistors, Q414 base and Q506 base. (On H.V. circuit)
2) Q414 is a horizontal output transistor and incorporated damper-diode. Q414 is turned on during the scanning period and turned off during the blanking period. By this switching action, a horizontal output pulse of approximately 800Vp-p with a pulse width of approximately 10μs appears at the collector.
3) In this circuit, the horizontal deflection output circuit and the FBT (flyback transformer) high voltage generating circuit are separated from each other for improved high voltage regulation.
4) T403 is a dummy output transformer for the horizontal output circuit. The horizontal deflection current flows in H.DY, width coil, and H-LIN coil.
5) L404, D413, and D414 make up the H. centering control circuit. L404 is a choke coil for the AC component, allowing only the DC component to pass through. D413 and D414 change the direction of the current according to the center position of the horizontal centering control.
6) The width control on this monitor is done by controlling the +B voltage in the horizontal output circuit. Q409, D405, and Q410 generate the emitter reference voltage of Q411. By varying the width control, the current flowing into Q412 and Q413 changes the +B voltage applied to T403, enabling width control.

Example of Width Control Circuit Operation

If the Q411 base voltage is reduced by the width control in comparison to the emitter voltage, less current will flow in Q411, causing the collector voltage to rise. This causes the base potential of Q412 and Q413 to rise. This increases the voltage applied to the high side of T403. The deflection current increases causing a larger width of the CRT to be scanned.

6. Edge Pincushion Distortion Correcting Circuit

1) Correction of edge pincushion distortion is performed by the following method: the parabolic waveform obtained by integrating the vertical deflection pulse is mixed at the base of Q411 (the DC amplifier for width control), and is superimposed on the +B voltage in the H.OUT circuit. This enables the correction of edge pincushion distortion.
2) The vertical deflection pulse becomes a parabolic waveform after passing through an integrating circuit consisting of R475, VR410, and C465. By controlling VR410, the SIDE PIN PHASE can be controlled.
3) Q406 is the amplifier for the V. parabolic waveform. The amplified V. parabolic waveform is level-controlled by VR411 SIDE PIN ADJ and is applied to Q411's base. A parabolic current is superimposed on the current flowing in Q411, Q412, and Q413, allowing edge pincushion distortion to be corrected.

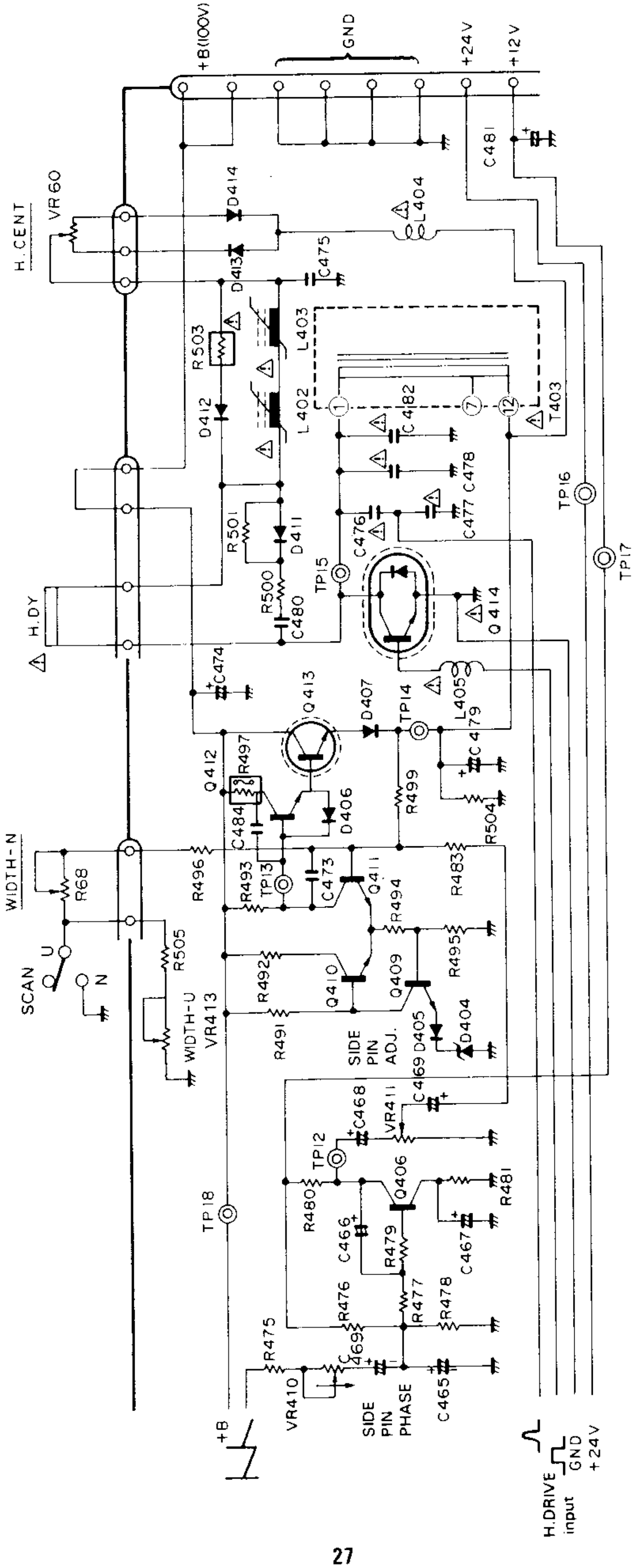


Fig. 33. Horizontal Deflection Output Circuit

High Voltage Generation Board Section

The high voltage circuit generates voltages required for the electrodes in the CRT, as well as −12V and +150V voltages for driving circuit.

1. High Voltage Stabilized Circuit

1) The high voltage generated by the FBT (FLYBACK TRANSFORMER) T501 is applied to the anode of the CRT. The high voltage is divided and applied to Q503's base.
2) The emitter of Q503 is fixed to a reference voltage generated by Q501, D501, D508, and Q502.
3) Any variation in the high voltage is sampled at the base of Q503 and compared with Q503's emitter potential. The resulting difference is DC-amplified by Q503, and appears at the collector to control the current flowing in Q504 and Q505.
4) Q505 is in series with the +B voltage line for the high voltage generating circuit. By changing the current in Q505, the +B voltage is controlled, enabling high voltage control.
5) When the high voltage is reduced slightly, Q503's base potential is lowered, reducing the current in Q503. Then the collector voltage rises, the current flowing in Q504 and Q505 is increased, and the +B voltage of the FBT is increased. This results in a rise of the high voltage correcting for the initial lowering.

2. High Voltage Generating Circuit

1) The drive pulse appearing at the secondary side of drive transformer T401 in the horizontal deflection circuit drives the base of the output transistor Q506. Q506 is switched "on" during the scanning period and "off" during the blanking period. Q506 has the primary side of the FBT as a load.
2) The FBT T501 generates the high voltage for the CRT, focus voltage for G4, screen voltage for G2, heater voltae (pulse illumination), and the +24V and +150V voltages.

3. ABL (Automatic Brightness Limiting) Circuit

1) The negative side of the high voltage power supply for the CRT is connected to the +B voltage (+100V). Normally, the potential at the cathode side of D506 is positive against the anode of D506, so D506 is cut off.
2) When the beam current in the CRT is increased, exceeding a certain value, the potential at the cathode side of D506 becomes negative against the anode, caused by the voltage drop in R538, D506 conducts to reduce the G1 potential and the beam current, achieving the ABL operation.

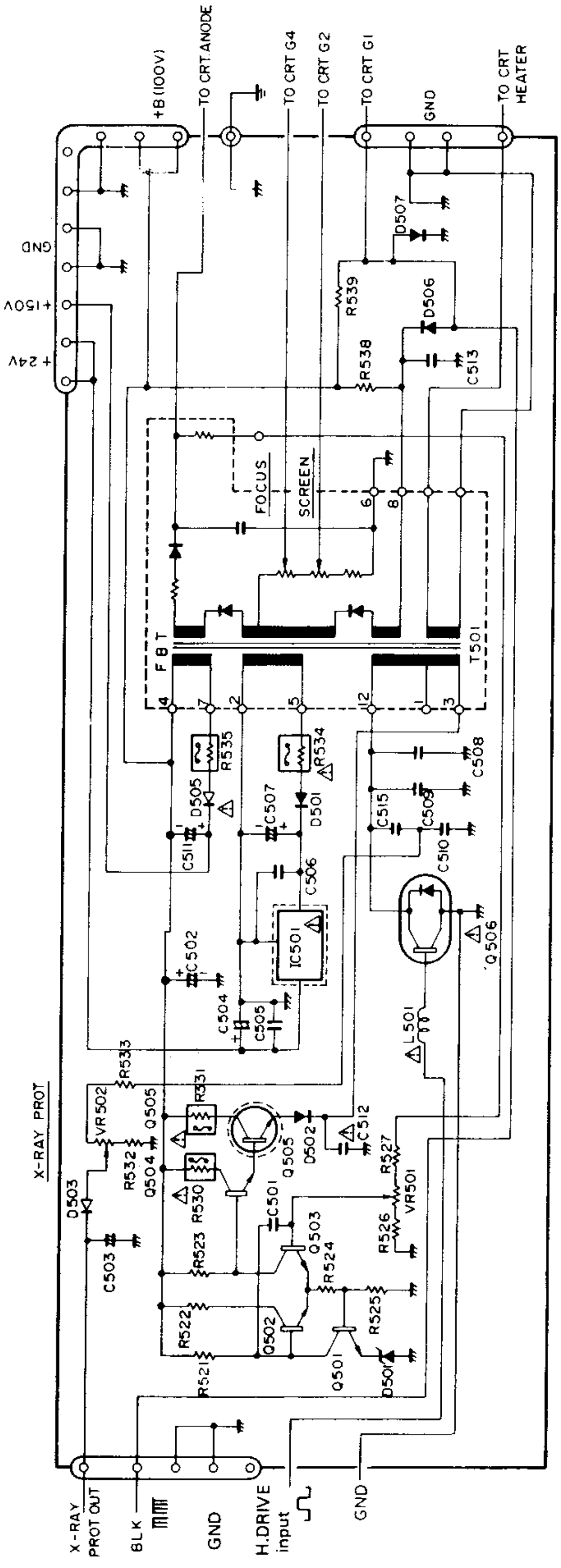


Fig. 34. High Voltage Generating Circuit

CRT REPLACEMENT

Caution for Handling the CRT

1. When replacing the CRT with a new one, be sure to use a CRT carrying the same designation. (For X-ray protection and ensured electrical characteristics, mechanical dimensions, and implosion-proof effect, use only the designated CRT.)
2. Do not apply shock or vibration when handling the CRT.
3. When carrying CRT, do not hold it by the neck, but by the face side with both hands.
4. The electrode pins on the CRT are easily bent. Be extremely cautions not to bend any pin when inserting the socket.
5. The anode section may be charged with static high voltage. Be sure to discharge the anode before handling the CRT.

MONITOR DISASSEMBLY AND CRT REPLACEMENT

I. Case Removal

1) Removal of Side Panel (Right)
   Loosen 4 × M3 binding screws Ⓐ and 4 flat washers Ⓑ, and remove the right side-panel.

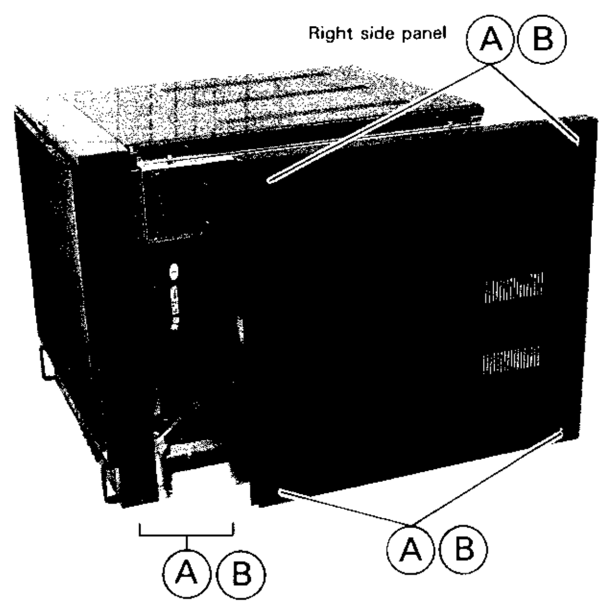


Fig. 35

2) Removal of Side Panel (Left)
   Loosen 4 × M3 binding screws Ⓒ, and 4 flat washers Ⓓ, and remove the left side-panel.

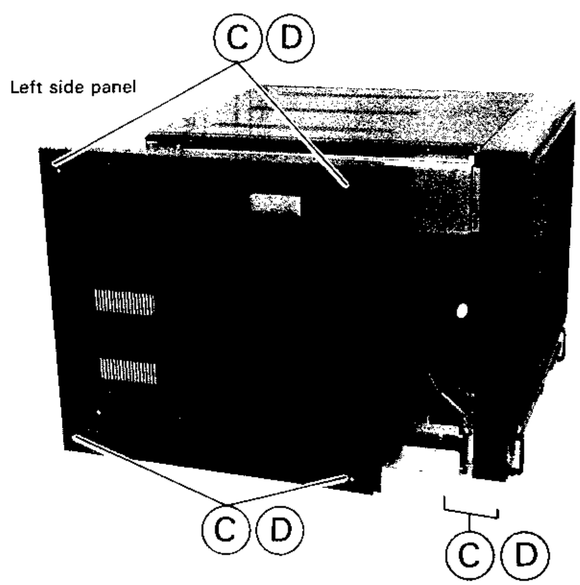


Fig. 36

3) Removal of Top Panel (left)
Loosen M3 countersunk screw (E), and 4 × M3 binding screws (F), and remove the top panel.

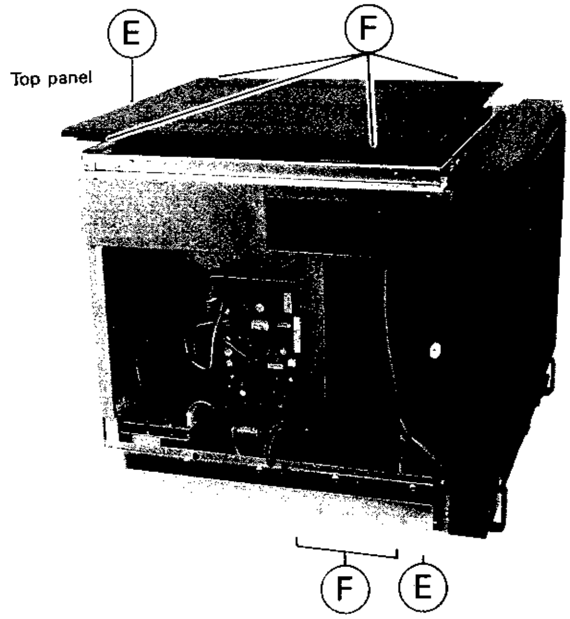


Fig. 37

4) Removal of Back Panel
Loosen 9 × M3 binding screws (G), and 9 × flat washers (H), and remove the back panel.

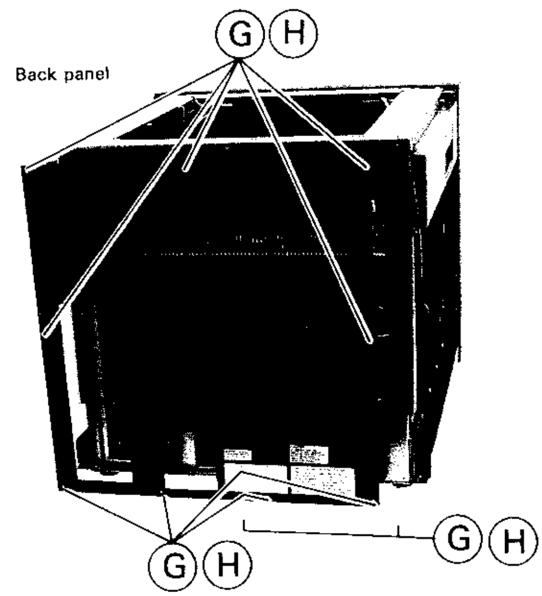


Fig. 38

II. CRT Removal

1) Front Unit Removal
Loosen 3 × M4 screws (I) on the bottom and remove the front unit.

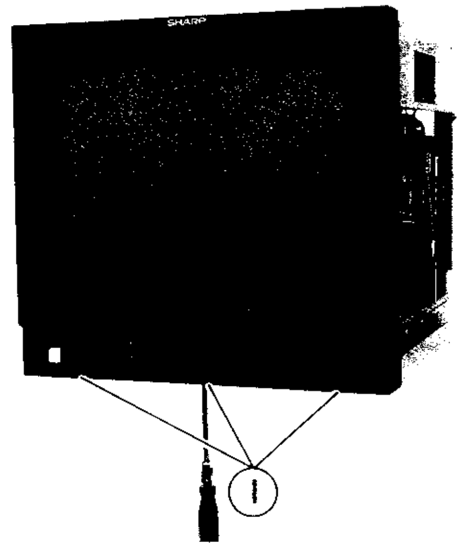


Fig. 39

2) Front Unit Connector Detachment
Pull out the front unit, remove the connectors, and detach the front unit from the main unit.

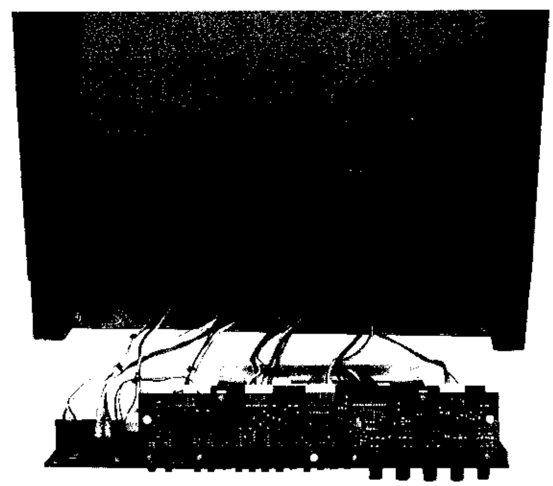


Fig. 40

3) Front Case Removal
Loosen 2 × M4 screws (J) at the bottom front and 3 × M3 screws (K) on the top; remove the front case.

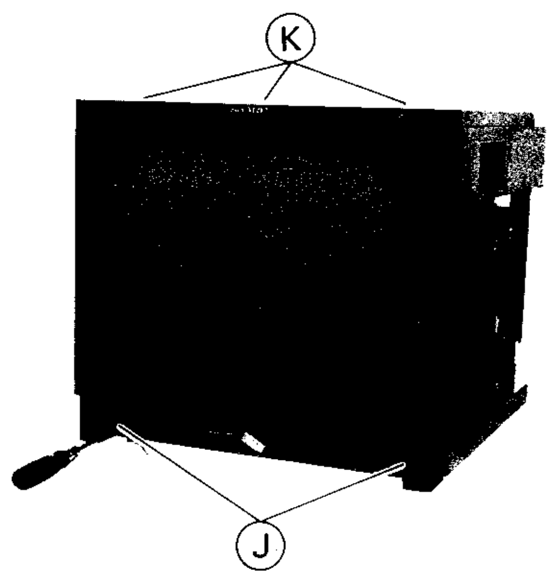


Fig. 41

4) CRT Wiring Removal
Remove the anode lead, CRT socket, and degaussing coil from the CRT.

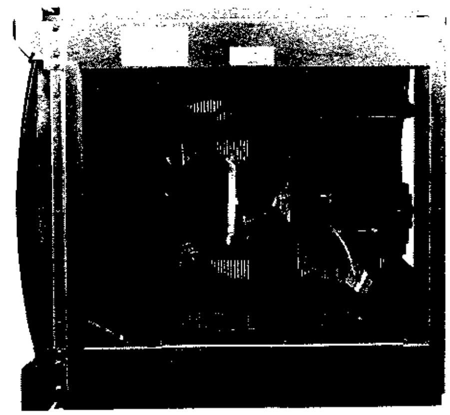


Fig. 42

5) CRT Removal
Loosen 4 × M6 hexagonal head CRT attachment bolts Ⓛ, and remove the CRT gently.

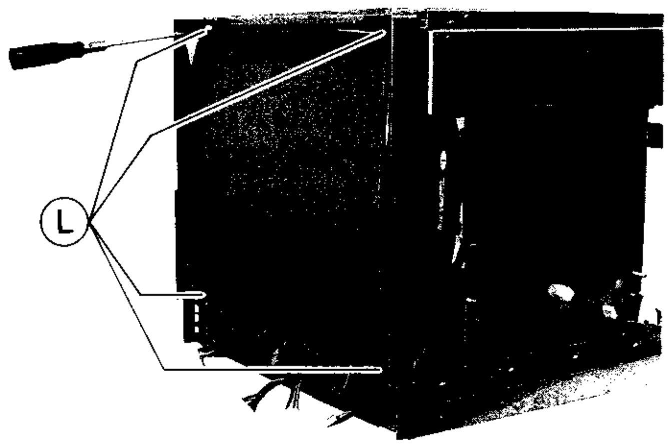
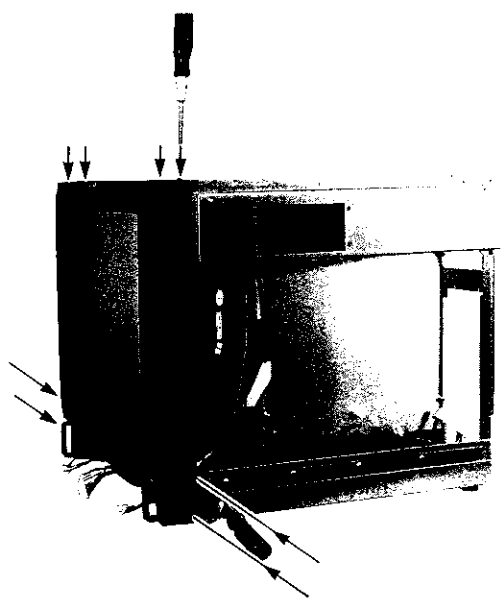


Fig. 43

6) CRT and Escutcheon Gap Adjustment
If CRT replacement creates a gap between the CRT face and the escutcheon, adjust the CRT by moving it back and forth while loosening the eight adjustment screws (4 × M4 screws on top and 2 × M4 screws on each sides).

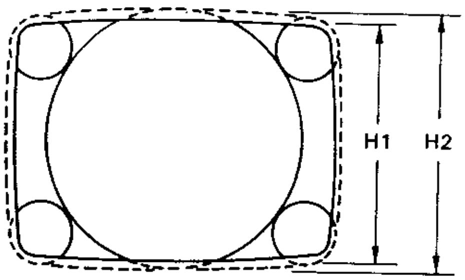


ADJUSTMENT

CRT ADJUSTMENTS

I. Adjustments of VR405 (Height U/S) and VR83 (Height)

① Input a monoscope signal. (Fig. 45)
② Set the SCAN select on the front panel to NORMAL.
③ Adjust VR83 inside the hinged door of the front panel so that a picture shown below is displayed on the screen:



H1: Display area
H2: Video signal dispaly period
H2/H1 × 100 = 104%

Fig. 45

④ Set the SCAN select switch on the front panel to UNDER.
⑤ Adjust VR405 so that a picture as a shown below is displayed on the screen:

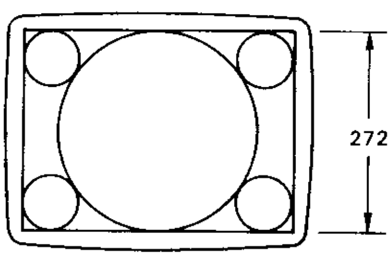


Fig. 46

II. Adjustment of VR412 (V.LIN)

① Input a crosshatch signal.
② Adjust VR412 so that H3 and H4, and H5 and H6 become equal, respectively.

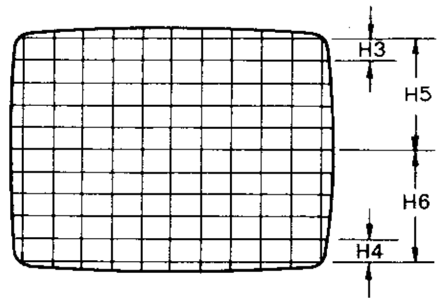


Fig. 47

③ The V amplitude varies by making LIN adjustment. Repeat adjustments until no improvement can be made.

III. Adjustment of VR406 (H.FREQ.)

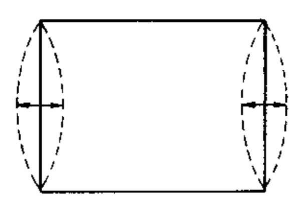
a) Remove CN401.
b) Connect a frequency counter probe to TP8.
c) Adjust VR406 so that the counter indicates 15.73kHz.

IV. Adjustment of VR409 (H.Phase)

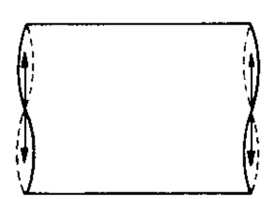
a) Set the SCAN select switch on the front panel to UNDER.
b) Adjust VR409 so that the image is displayed is at the center of the raster.

V. Adjustments of VR410 (Side Pin Phase) and VR411 (Side Pin ADJ.)

a) Input a crosshatch signal.
b) Adjust VR410 and VR411 so that the edge pin-cushion distortion is corrected. (Fig. 48)



Manner of correction by VR411

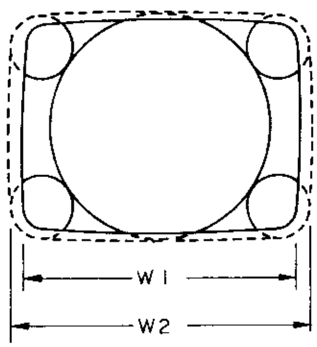


Manner of correction by VR410

Fig. 48

VI. Adjustments of VR413 (Width-U) and VR84 (Width)

① Input a monoscope signal.
② Set the SCAN switch on the front panel to NORMAL.
③ Adjust VR84 inside the hinged door of the front panel so that a picture as shown below is dispalyed on the screen:



W1: Display area
W2: Video signal display period
W2/W1 × 100 = 104%

Fig. 49

④ Set the SCAN select switch on the front panel to UNDER.
⑤ Adjust VR413 so that a picture as shown below is displayed on the screen:

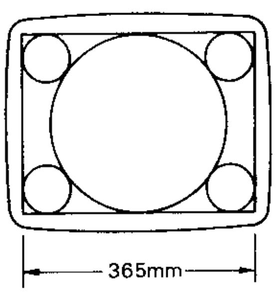


Fig. 50

VII. Adjustments of VR82 (V.CENT) and VR81 (H.CENT)

① Set the SCAN select switch on the front panel to UNDER.
② Adjust VR82 inside the hinged door of the front panel so that the image is displayed at the center of the display area (vertically).
③ Adjust VR81 inside the hinged door of the front panel so that the raster scans the center of the display area (horizontally).

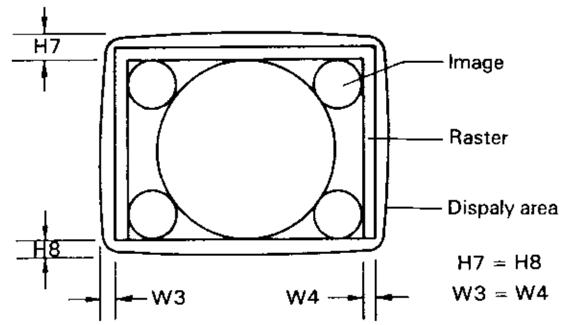


Fig. 51

VIII. Purity/Convergence Adjustment

1. Purity Adjustment

a Display a green raster on the screen.
b Degauss the entire surface of the screen.
c Align the knobs on the purity magnet horizontally, as shown below, this is so that the magnetic field is minimized.

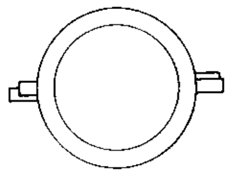


Fig. 52

d Move the deflecting yoke slightly forward. Adjust the knobs on the purity magnet, opening them symmetrically as shown, so that the green pattern is positioned at the center of the screen.

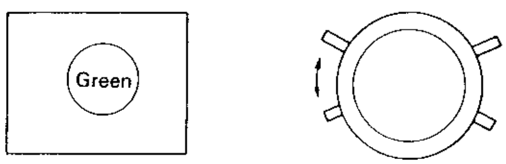
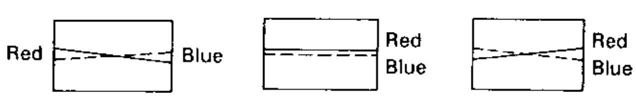


Fig. 53

e Adjust the purity magnet and the position of the deflecting yoke so that green raster is displayed over the entire screen.
Verify that purity of every color has been achieved.
f Turn on set up switch so that one horizontal line (for each color) is displayed on the screen.



54(a) 54(b) 54(c)

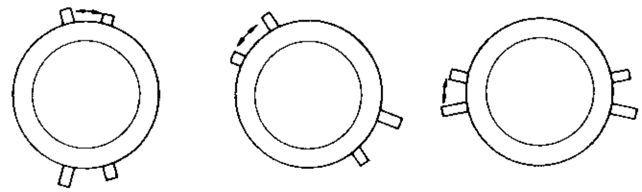
Fig. 54

Confirm that the horizontal lines are parallel as shown in Figure 54(b) above. If they are crossing as shown in 54(a) or 54(c), turn the deflection yoke so that the lines are in parallel as shown in 54(b).

2. Adjustment of Purity Magnet

The purity magnet functions correspond to the opening of the magnet from the closed condition. VRS (Vertical Raster Shaft) and purity can be adjusted according to the positions of the knobs, as shown above. Make adjustment according to the picture condition.

(a) Upright positions of the knob VRS changes.
(c) Side positions of the knob Purity changes.



(b) Diagonal positions of the knob Purity and VRS change.

Fig. 55

3. Static Convergence Adjustment

a Input a crosshatch pattern signal.
b Adjust the focus knob so that the vertical line at the center becomes clear and fine.
c Turn the 4-pole magnet so that the blue line is aligned with the red line at the center of the screen. Then, turn the 6-pole magnet so that the green line is aligned to the blue and red lines, generating a white line at the center.

<Reference>

- **Beam shifting by 4-pole magnet**

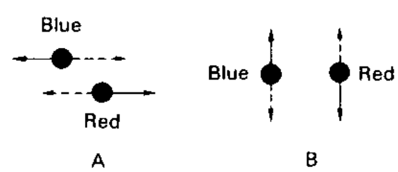


Fig. 56

By turning a set of knobs in mutually reverse directions, beams can be shifted in direction (A) or (B). (Broken lines indicate the case when each knob is turned in the reverse direction.) By turning the set of knobs in the same direction, move (A) or (B) can be selected, and a move combining (A) and (B) is also possible.

• Beam shifting by 6-pole magnet

Fig. 57

In the same way as with the 4-pole magnet, beams can be moved with the 6-pole magnet by turning a set of knobs in mutually reverse directions. The green beam moves very little. But because blue and red beams move at the same time, the green beam looks like it is being moved. As with the 4-pole magnet, move (A) or (B) can be selected by turning the set of knobs in the same direction.

4. Coarse Adjustment of Dynamic Convergence

a Display two colors, blue and red, on the screen.

b Move the deflecting yoke vertically so that vertical lines of red and blue are aligned, as shown in the drawing below left. When the lines cannot be completely aligned with each other, make adjustment so that the mis-convergence amount at left (a) and right (a') become the same.

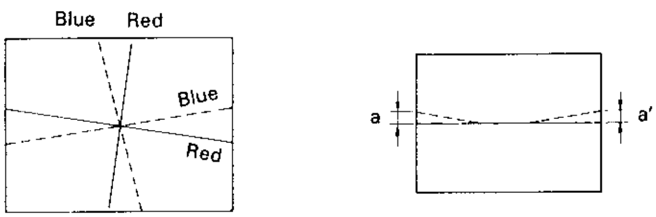


Fig. 58

c Move the deflecting yoke horizontally so that blue and red horizontal lines at the 12 o'clock and 6 o'clock positions on the screen are aligned with each other. When the lines cannot be completely aligned with each other, make adjustment so that mis-convergence amount at top (b) and bottom (b') become the same.

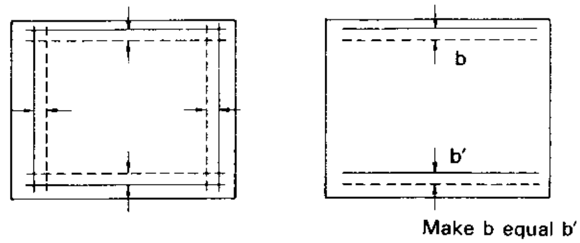


Fig. 59

d The adjustment of dynamic convergence shown in item b and c is called "Crossing Adjustment". When the optimal convergence cannot be obtained by this adjustment, observe the position where mis-convergence is maximum, and make this adjustment to reduce the mis-convergence of this point, so that optimal convergence quality is obtained as a whole.

This completes the purity, raster rotation, and convergence adjustments.

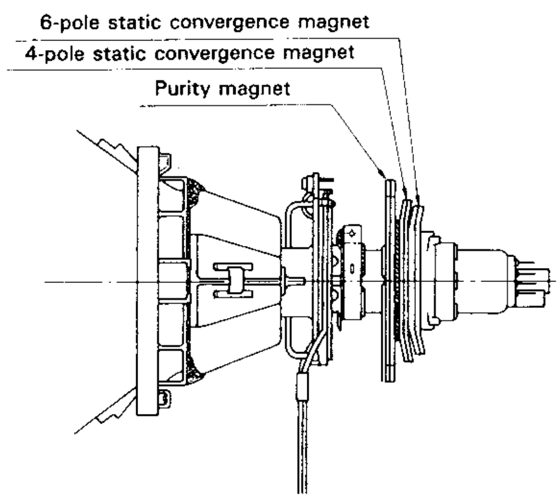


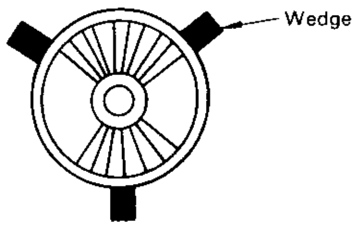
Fig. 60

5. Fastening

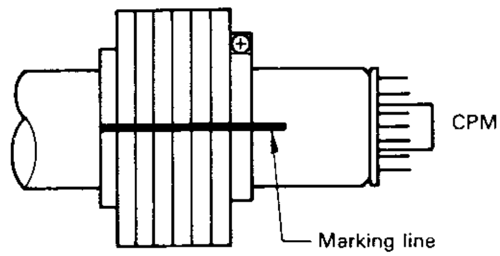
a Close the CPM (Convergence Purity Magnet) lock ring. (Do not turn any knob at this time.)

b Tighten the fastening screw on the deflecting yoke with Phillips type screwdriver or fitting (for thumbscrew). (Tighten snugly only. Do not over-tighten.)

c Apply silastic or RTV to the front and back side of the wedges (Front: 0.4g, Back: 0.2g). Remove protective paper on the back of the double coated adhesive tape. Insert 3 wedges between the bulb and the deflecting yoke at an interval of 120°, and press each wedge to the adhesive tape portion so that it is strongly fastened to the bulb.



Take caution that no wedge is slanted or bent.



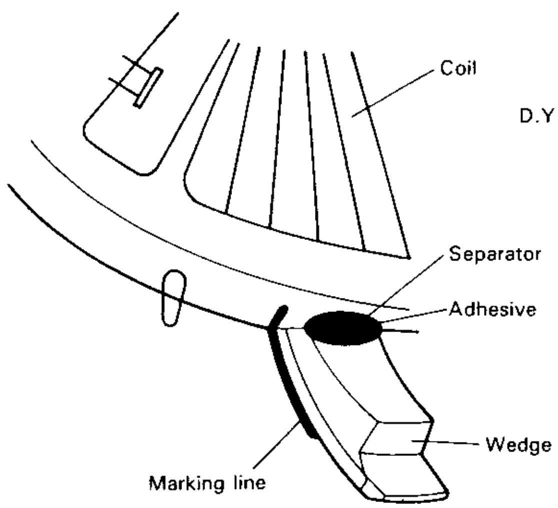


Fig. 61

Decoder Unit Adjustment

To make the following adjustments, apply a standard 1Vp-p NTSC color bar signal (100 IRE VIDEO 40 IRE SYNC) as the video input signal.

SECTION-I. Adjustment on Decoder Board

A VR101 (Comb Level), L101, L102

① Connect the oscilloscope probe to TP6.
② Adjust VR101, L101, L102 so that the video level becomes 0.3Vp-p.

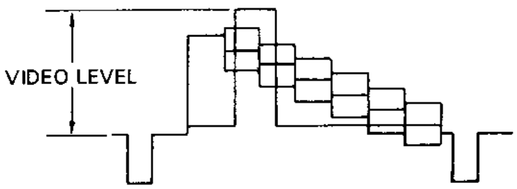


Fig. 62

B VR119, L101, L102

① Before performing this adjustment, adjust VR101.
② Connect the oscilloscope probe to TP7.
③ Adjust VR119, L101, and L102 so that the waveform shown in below.

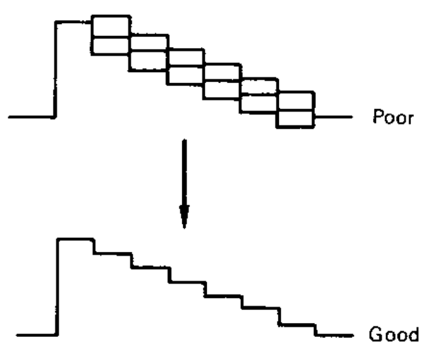


Fig. 63

C VC101

① Connect the oscilloscope probe to TP5.
② Adjust VC101 using the same criterion as shown in Figure 63.

D VR102 (Y Level 1)

① Before performing this adjustment, adjust VR101, VR119, L101, L102, and VC101.
② Connect the oscilloscope probe to TP8.
③ Set the "FILTER" switch on the front panel to the NOTCH position, and measure the level of the waveform.
④ Then, set the "FILTER" switch to the COMB position, and adjust VR102 so that the waveform level becomes the same as the level when the switch is set to the NOTCH position.

E VR103 (SUB. BRT)

① Connect the oscilloscope probe to TP15.
② The brightness control on the front panel fully clockwise turn it.
③ Adjust the brightness pulse level so that it becomes 0.45V by adjusting VR103.

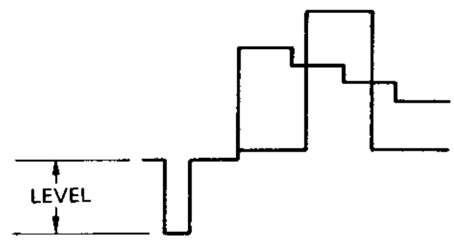


Fig. 64

F VR104 (Pulse Width)

① Connect the oscilloscope probe to TP38.
② Adjust the T-period in Figure 65 so that it becomes 38μs using VR104.

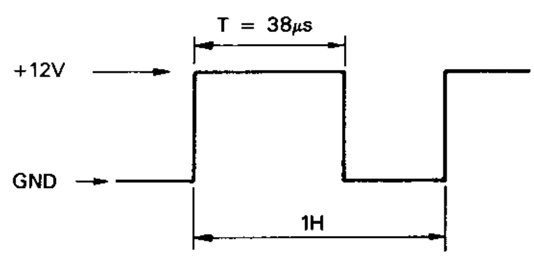


Fig. 65

G VR105 (R.G.B., B.P. Phase), VR106 (R.G.B., B.P. Width)

VR105 adjusts the phases of the bright pulse and the final clamp pulse for the R.G.B. and the TTL modes. VR106 set the width of the bright pulse. For the details refer to section III-A.

H VR107 (B.G.P. Width)

① Connect the oscilloscope probe to TP43.
② Adjust VR107 so that the pulse width of the burst gate pulse at TP43 becomes 2.2μs, as shown in below.

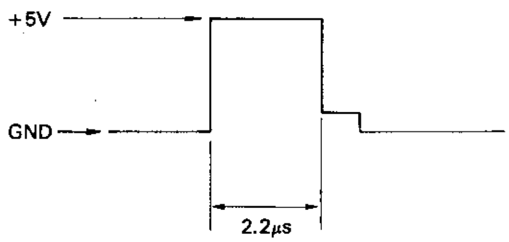


Fig. 66

I VR108 (B.P. Width)

① Confirm that the "NTSC/RGB" switch on the front panel is set to the NTSC position.
② Connect the oscilloscope CH1 probe to TP17 and CH2 probe to TP43. (Use a two-channel oscilloscope.)
③ Adjust VR108 so that the relationship between H. SYNC of TP17 and burst gate pulse of TP43 becomes T=5.6μs.

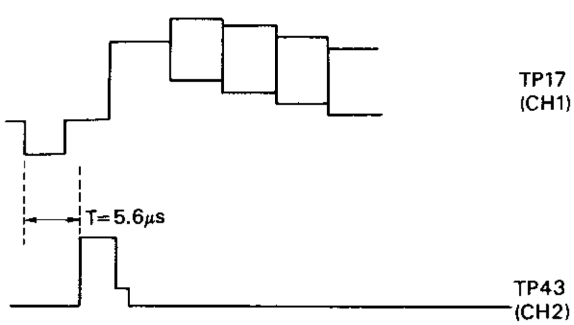


Fig. 67

J VR115 (Chroma Level 1)

① Before performing this adjustment, adjust VR101, VR119, L101, and L102.
② Connect th oscilloscope probe to TP19.
③ Set the "FILTER" switch on the front panel to the NOTCH position, and observe the waveform on TP19.
④ Set the "FILTER" switch to the COMB position, and adjust VR115 so that the waveform level becomes the same as the level when the switch is set to the NOTCH position.

K VR120 (Chroma Level 2)

① Before performing this adjustment, adjust VR115.
② Connect the oscilloscope probe to TP19.
③ Adjust VR120 so that the level shown in Figure 68 becomes 1.0Vp-p.

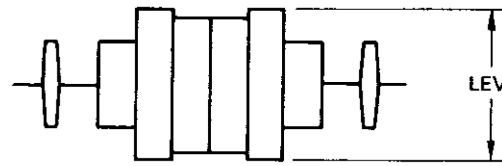


Fig. 68

L VR110 (Color Hold)

① Before performing this adjustment, adjust VR120, VR107 and VR108.
② Move the 'CHROMA" control on the front panel, off preset. Turn clockwise until the index dot or knob points to 30'clock. FILTER switch is at NOTCH position.
③ Turn VR114V (B-Y Level) fully clockwise.
④ Connect the oscilloscope probe to TP22B.
⑤ Rotate "HUE" control clockwise off preset.
⑥ While maintaining the waveform shown in Figure 69, turn VR110 and the "HUE" control simultaneously. Set VR110 at the position where the noise level shown in the diagram is minimized.

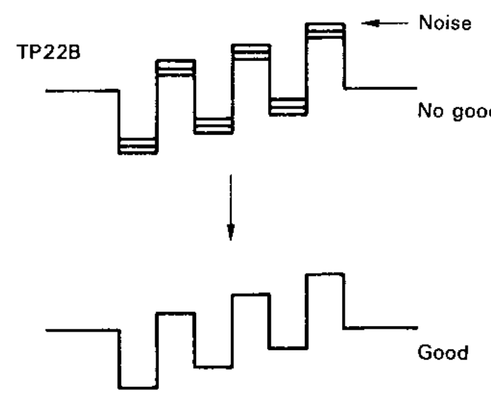


Fig. 69

M VR111 (F.C.P. Width)

① Connect the oscilloscope probe to TP44.

② Adjust VR111 so that the pulse width T of the final clamp pulse becomes 3.4μs.

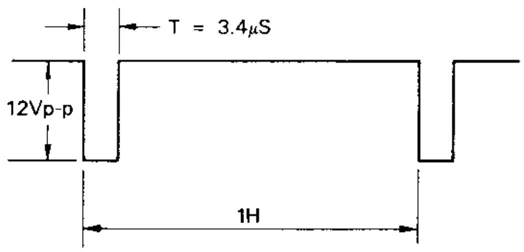


Fig. 70

N VR112 (G-Y Phase), VR113 (R-Y Phase)

VR112 controls the color phase G-Y, and VR113 controls the color phase R-Y. Refer to Section II, C for details.

O VR114R, G, B (R-Y, G-Y, B-Y Level)

VR114R, G, B control the R-Y, G-Y, and B-Y signal levels, respectively. Refer to Section II, C for details.

P VR116 (Y Level 2)

① Before performing this adjustment, adjust VR102.

② Rotate the "CONTRAST" control on the front panel fully clockwise.

③ Connect the oscilloscope probe to TP13.

④ Adjust VR116 so that the video level becomes 1.8Vp-p.

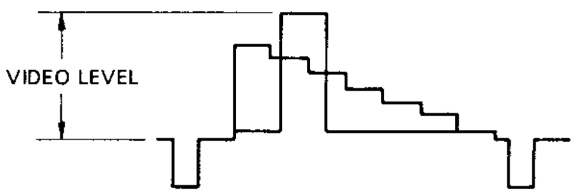


Fig. 71

Q VR117 (O.C.P Width)

① Connect the oscilloscope prove to TP40.

② Adjust the pulse width T of the 0V clamp pulse so that it becomes 3μs using VR117 (Fig. 72).

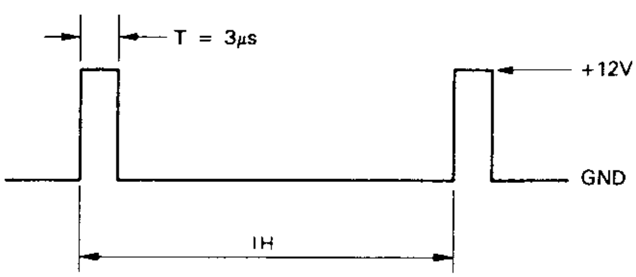


Fig. 72

R VR118R, G, B (R Gain, G Gain, B Gain)

There are the controls for adjusting the levels of R, G, and B channels when the R.G.B. or TTL input mode is used. Refer to section III, B for details.

S VR122 (Cut Off Adj.)

① Move the "CONTRAST" volume on the front panel off preset and turn the volume knob slightly clockwise so that the preset mark of the knob comes to the leftmost position.

② Turn VR122 counterclockwise little by little for the picture on the screen to disappear.

SECTION-II. General Adjustment of Decoder Unit

Perform the general adjustment of the decoder unit with the following procedures:

A Perform all adjustments under Section I excluding G, N, O and R.

B Luminance Signal Level Adjustment

① Set the "MODE" switch on the front panel to the MONO mode, and the "FILTER" switch to the COMB position.

② Turn the contrast control fully clockwise.

③ Connect the oscilloscope probe to TP27R.

④ Adjust the "R DRIVE" control inside the hinged door of the front panel so that the video level becomes 50Vp-p.

⑤ In the same manner, connect probe TP27G and TP27B with the oscilloscope and adjust the "G DRIVE" and "B DRIVE" controls on the front panel so that their respective video levels become 50Vp-p.

⑥ Set the "CONTRAST" control on the front panel to the original preset condition, and connect the probe to TP27R.

⑦ Turn the "NTSC CONTRAST" preset control inside the hinged door of the front panel and adjust the video level to 40vp-p. (Fig. 73)

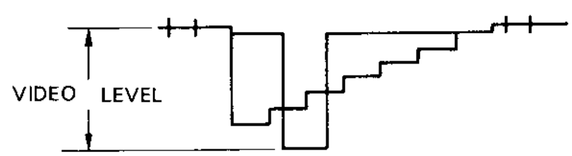


Fig. 73

Note: White balance is not completely adjusted by the above adjustments. Perform the required fine adjustment of white balance by referring to section II-D.

C Color Level Adjustment

① Set the "MODE" switch on the front panel to the AUTO mode, and the "FILTER" switch to the COMB position.
② Set the "CONTRAST", "HUE", and "CHROMA" controls to the preset condition.
③ Turn VR114B fully clockwise.
④ Connect the oscilloscope probe to TP27B. The waveform shown in Figure 74 is obtained.

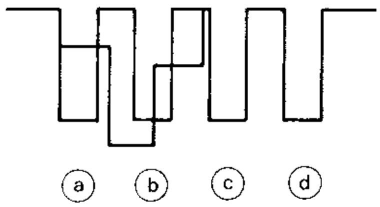


Fig. 74

⑤ Adjust peaks ⓐ and ⓓ in this waveform (Fig. 74) to the same height by turning the "CHROMA" preset control inside the hinged door of the front panel. Then adjust peaks ⓑ and ⓒ to the same height by turning the "HUE" preset control. After adjustment all ⓐ, ⓑ, ⓒ, and ⓓ peaks have the same height.
⑥ Connect the oscilloscope probe to TP27G.
⑦ Adjust peaks ⓐ, ⓑ, ⓒ, and ⓓ to the same height as shown in Figure 75 by turning VR114G and VR112. Be sure not to move the "CHROMA" or "HUE" preset controls inside the hinged door.

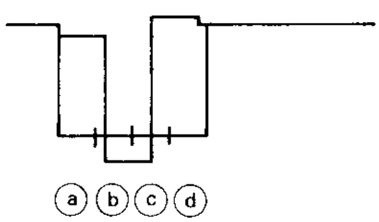


Fig. 75

⑧ Connect the oscilloscope probe to TP27R.
⑨ Adjust peaks ⓐ, ⓑ, ⓒ, and ⓓ to the same height as shown in Figure 76 by turning VR114R and VR113. Be sure not to move the "CHROMA" or "HUE" preset control inside the hinged door.

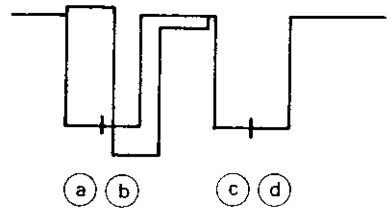


Fig. 76

This completes the color level adjustments.

D White Balance Adjustment

① Set the "MODE" switch on the front panel to the MONO mode.
② Press the "SET UP" switch inside the hinged door of the front panel to enable the SET UP condition. The vertical deflection is suppressed at this time, and the one line raster displayed on the screen consists of 3 components an R, G, and B scan.
③ Adjust the "BACKGROUND" controls for each channel inside the hinged door so that each section of the raster becomes faintly visible (It is essential that the R, G, and B components are adjusted to the same luminance.) If any channel cannot be adjusted, slightly turn the "SCREEN" control on the HV board until the lowest color comes up.
After completing the above adjustments, press the "SET UP" switch once again to full scan.
④ Make sure that the black portion of the pix (low light bar) is of the same luminance. If any low light bar is colored, make a fine adjustment of the "BACKGROUND" control inside the hinged door to eliminate the coloring.
⑤ For the 100% white portion (high light bar), adjust the "G DRIVE" or "B DRIVE" control inside the hinged door to eliminate coloring of the high light bar so that it becomes white. Do not move the "R DRIVE" control at this time.[1]
⑥ After completing the white balance adjustment, set the "MODE" switch back to the AUTO mode.

Note 1: If appropriate instrumentation is available adjust the RGB drive controls to achieve white at 6500°K and 30 foot lamborts (with contrast set to preset).

SECTION-III. Adjustment for R.G.B. Signal Input

To use this monitor with R.G.B. input signals, make the following adjsutments. To use the unit in the NTSC mode only, the following adjustments are not necessary.

A VR105 (R.G.B. B.P. Phase), VR106 (R.G.B. B.P. Width)

Since the timing between the R.G.B. signals supplied to the monitor and the synchronizing signals is not fixed, adjustment must be performed individually for each signal input to the monitor.

① Set the "NTSC/RGB" switch on the front panel to the RGB position, and set the switches on the rear panel board (VB/TTL switch, EXT/GS switch, HD/VD positive/negative switch) to positions corresponding to the signal to be input.
② Connect the oscilloscope CH1 porbe to TP23G and the CH2 probe to TP42 (Use a two-channel oscilloscope.)
③ Adjust VR106 so that the bright pulse width T becomes 3.8μs (Figure 77).
④ If the green mode with SYNC is used (Figure 77), adjust VR105 so that the bright pulse comes within the back porch period.

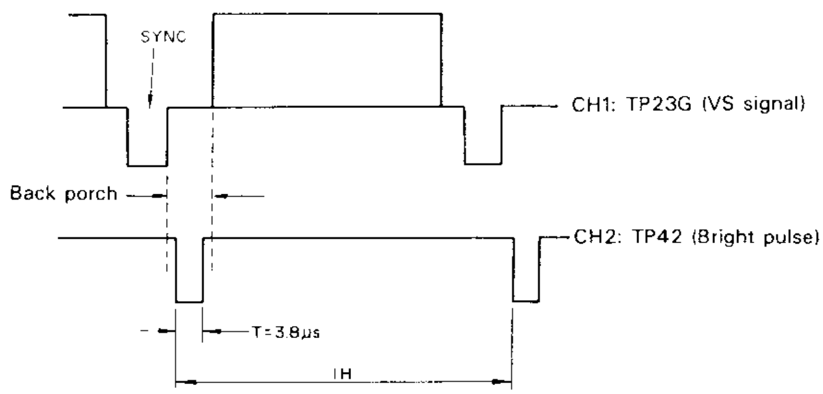


Fig. 77

⑤ If the green mode without SYNC is used (Figure 78), adjust VR105 so that the bright pulse comes to the proper position within the video blanking period.

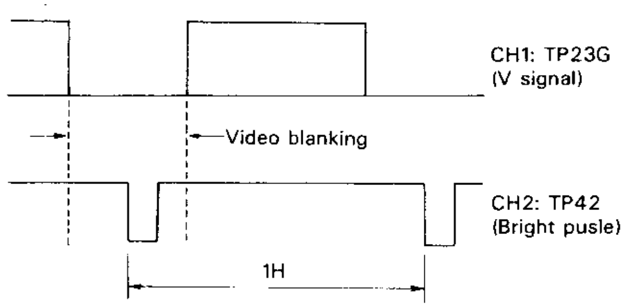


Fig. 78

B VR118R, G, B (R Gain, G Gain, B Gain)

When using this unit in the R.G.B. mode, adjust white balance by using the following steps.

① Input a white signal to the R.G.B. or TTL input.
② Set the "NTSC/RGB" switch on the front panel to the RGB position, and the internal switches on the rear panel to the positions corresponding to the signal to be adjusted.
(Operate the VB/TTL, EXT/G.S., HD/VD positive/negative switches.)
③ Color balance of the black portions (low light bars) has already been adjusted by the white balance adjustment under Section II-D. Turn VR118G and VR118B to eliminate coloring of the white portions (high light bars). (Do not move R GAIN, which serves as reference.)

DEF BOARD SECTION

I. Adjustment of VR403 (V. Hold)

① Turn VR403 clockwise until the monitor looses vertical lock. (The frequency becomes higher.)

② Turn VR403 counterclockwise to the position where synchronization starts. Turn the VR still further in the same direction to the point where interlace is good.

II. Adjustments of VR401 (V. Delay Posi.) and VR407 (H. Delay Posi.)

① Press the V-DELAY and H-DELAY switches on the front panel.
Adjust VR401 and VR407 so that the BL period of the signal appears on the CRT screen, as shown in Fig. 79:

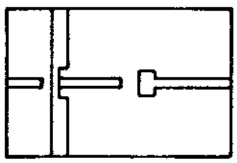


Fig. 79

② Connect the oscilloscope probe to TP1 and TP2. (Use a two-channel oscilloscope.)

③ Adjust VR401 so that the phases of the maesuring waveforms become as shown in Fig. 80 (V-DELAY):

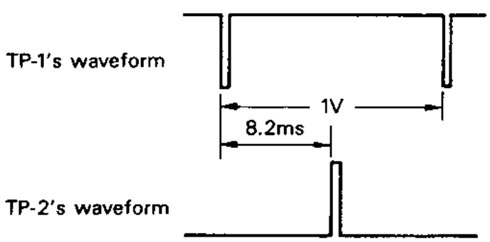


Fig. 80

④ Connect the probe to TP5 and TP6.

⑤ Adjust VR407 so that the phases of the measuring waveforms become as shown in Fig. 81 (H-DELAY).

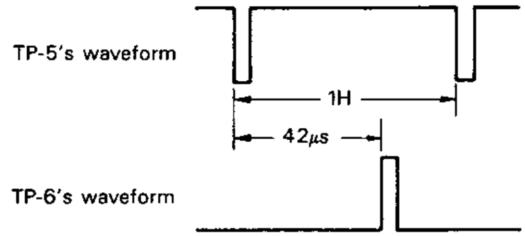


Fig. 81

III. Adjustment of VR402 (V. Pulse Width) and VR408 (H. Pulse Width)

① Connect the oscilloscope probe to TP2.

② Adjust VR402 so that the pulse width of the displayed waveform becomes as shown in Fig. 82:

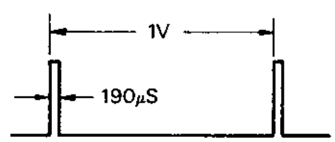


Fig. 82

③ Connect the probe to TP6.

④ Adjust VR408 so that the pulse width of the displayed waveform becoms as shown in Fig. 83:

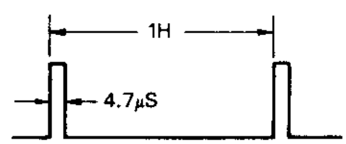
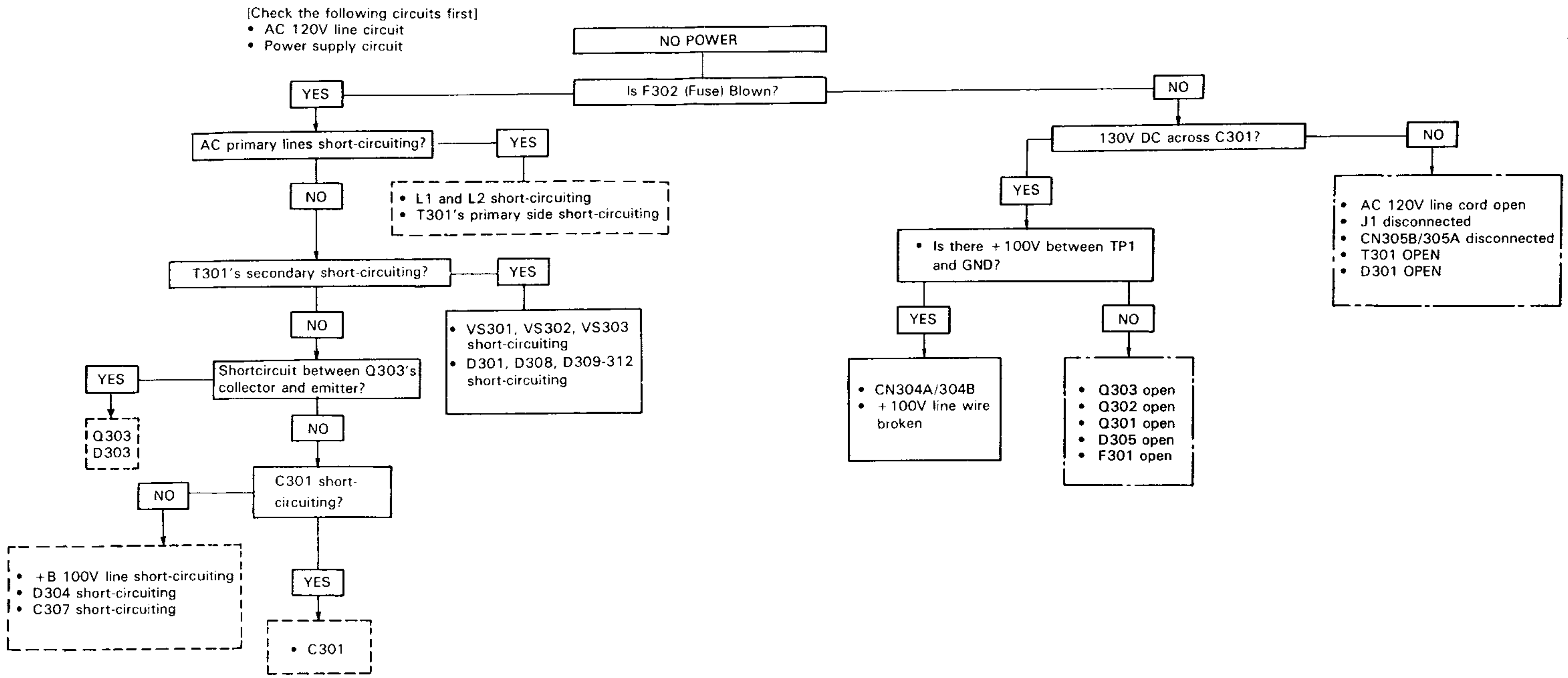
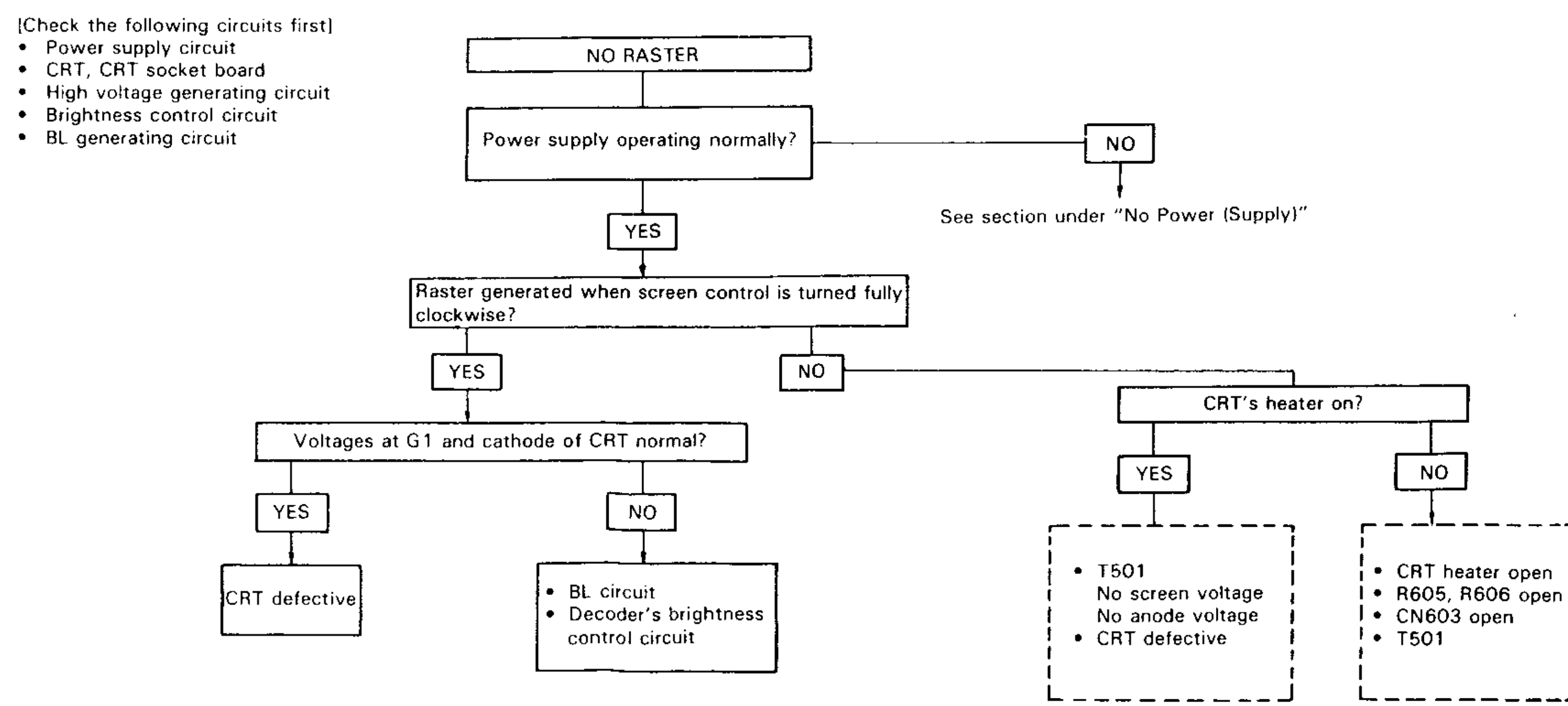


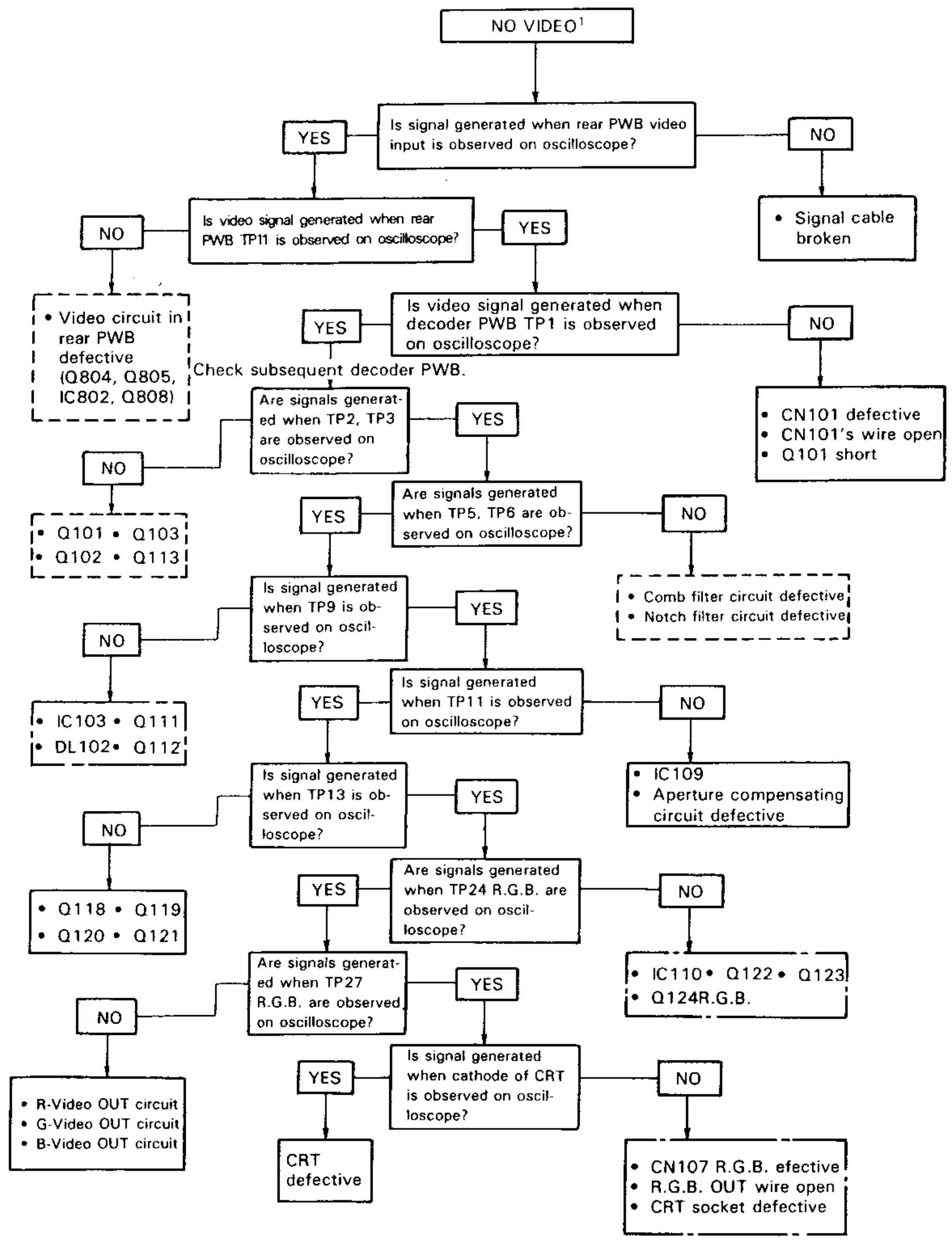
Fig. 83

'ROUBLE SHOOTING TABLE





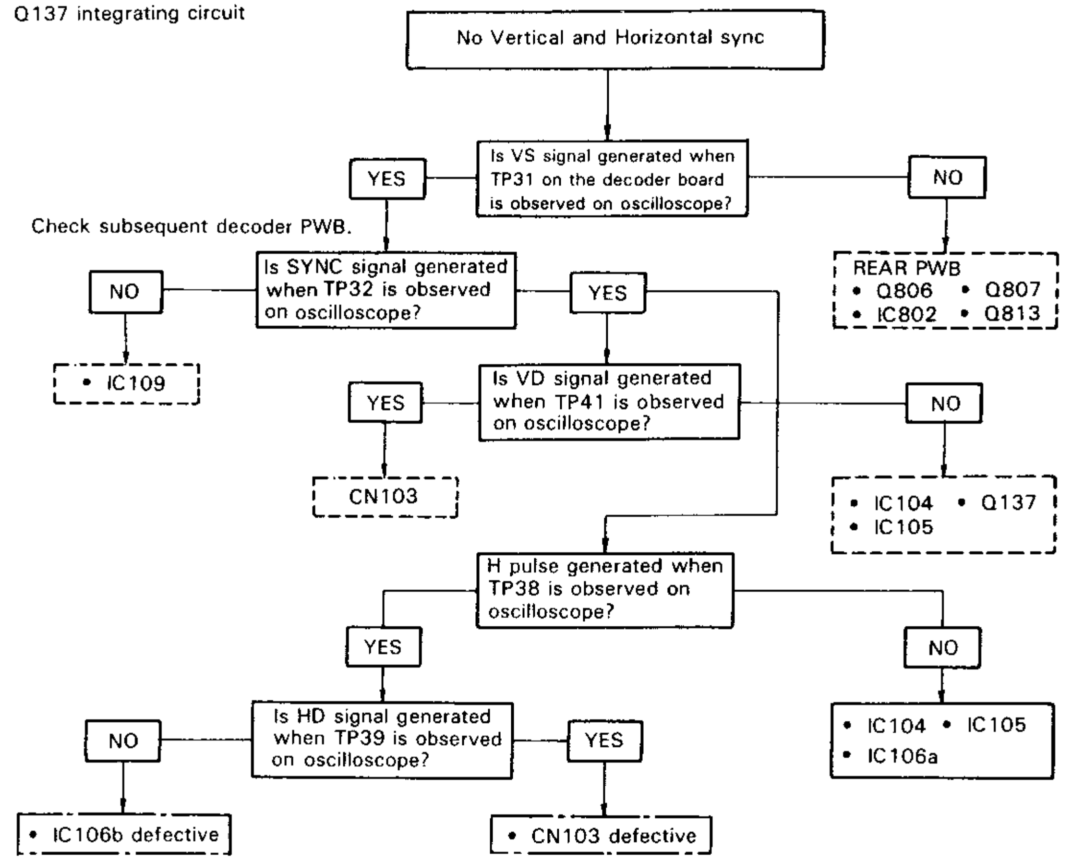
the following circuits first]
PWB video circuit
ɔder PWB Y signal circuit
ɔder PWB video OUT



Note[1]: When checking for "NO VIDEO" turn Brightness and Contrast control fully clockwise.

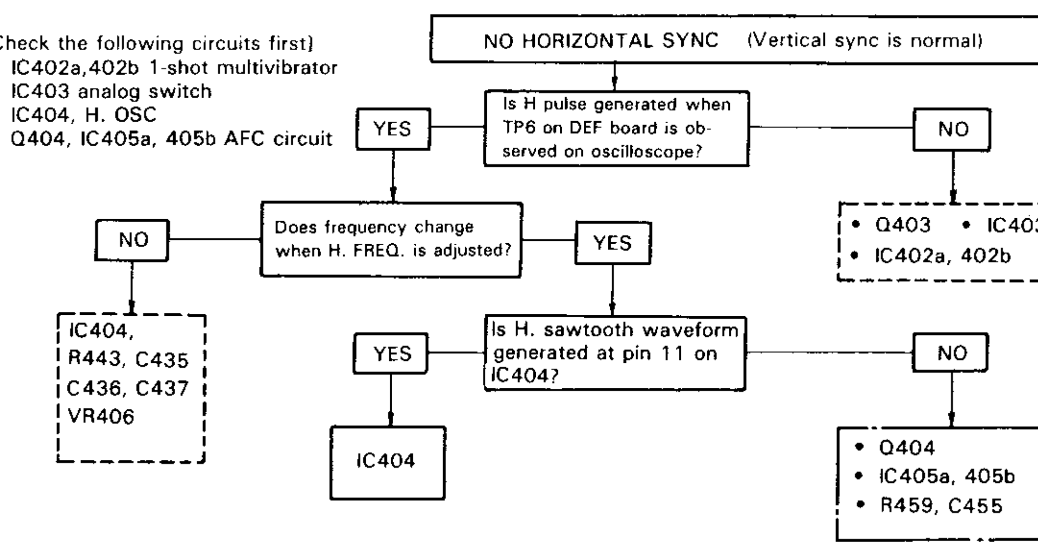
[Check the following circuits first]

- IC109 SYNC separation circuit
- IC106 one-shot multiplexer
- Q137 integrating circuit

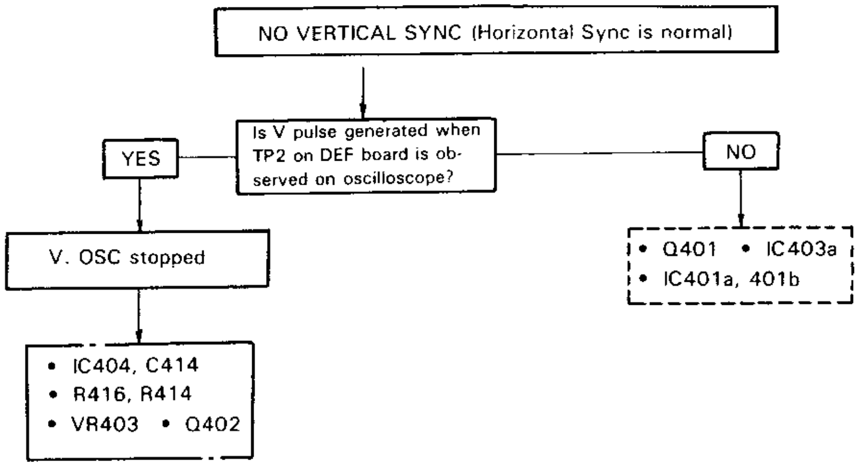


[Check the following circuits first]

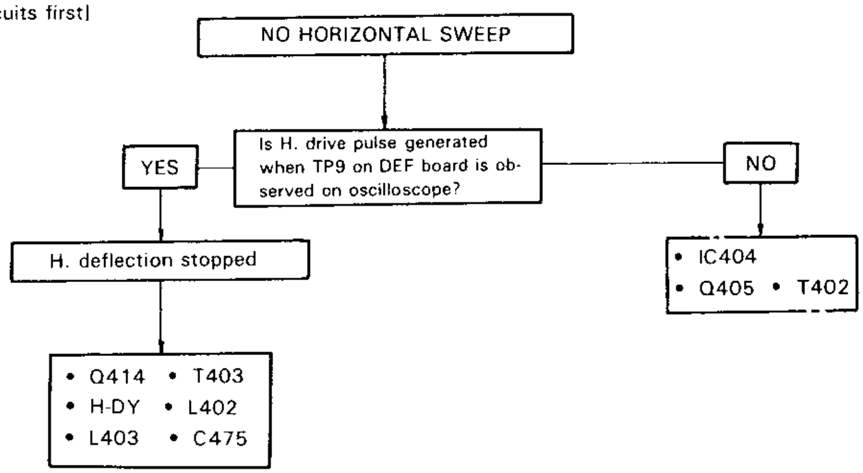
- IC402a,402b 1-shot multivibrator
- IC403 analog switch
- IC404, H. OSC
- Q404, IC405a, 405b AFC circuit



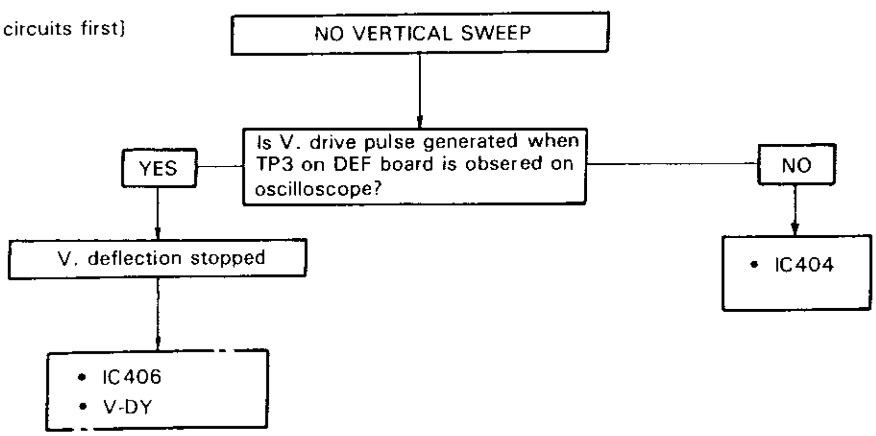
[Check the following circuits first]
- IC401a,401b 1-shot multiplexer
- IC403a analog switch
- IC404, V. OSC

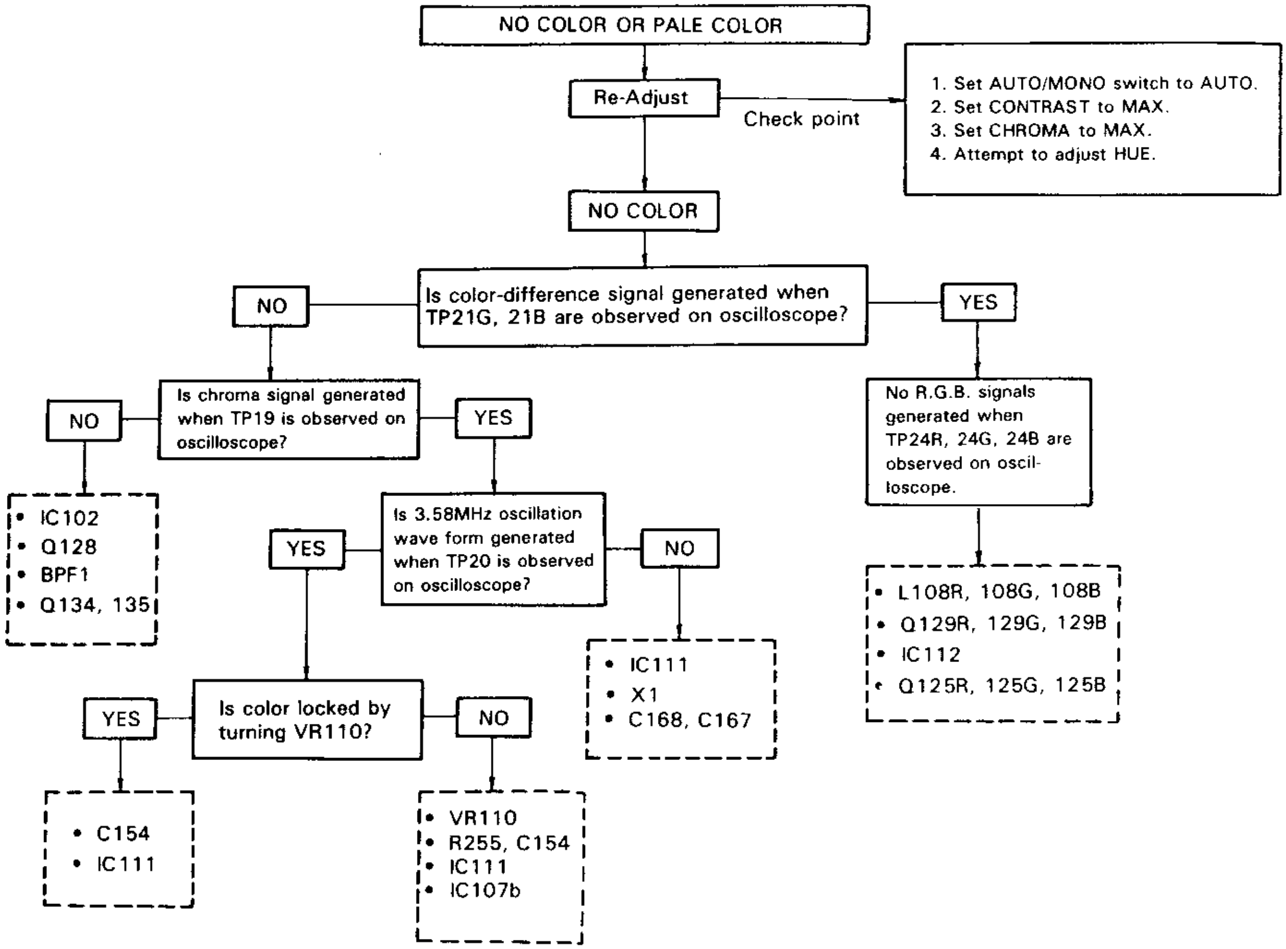


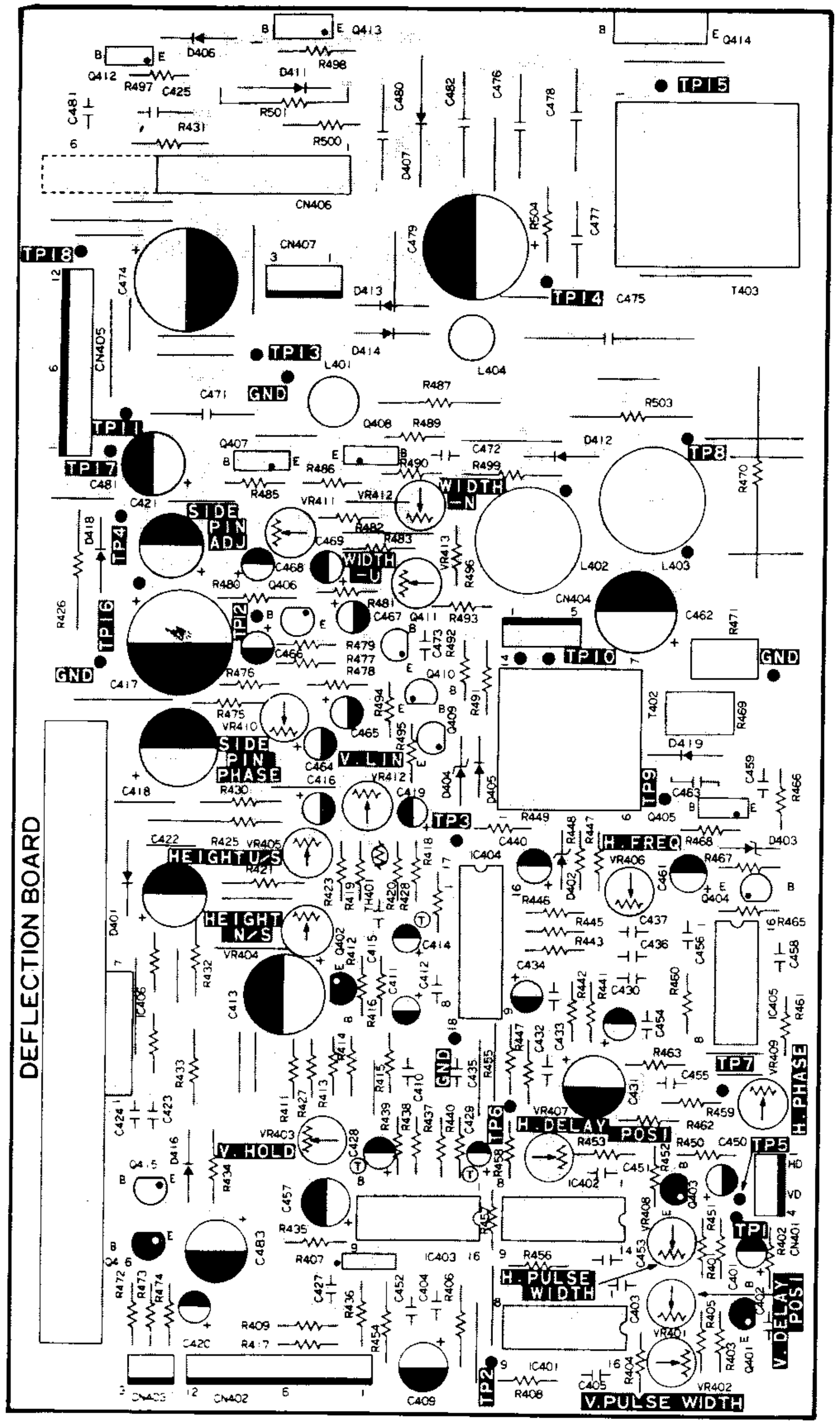
[Check the following circuits first]
- IC 404
- H. drive circuit
- H. output circuit



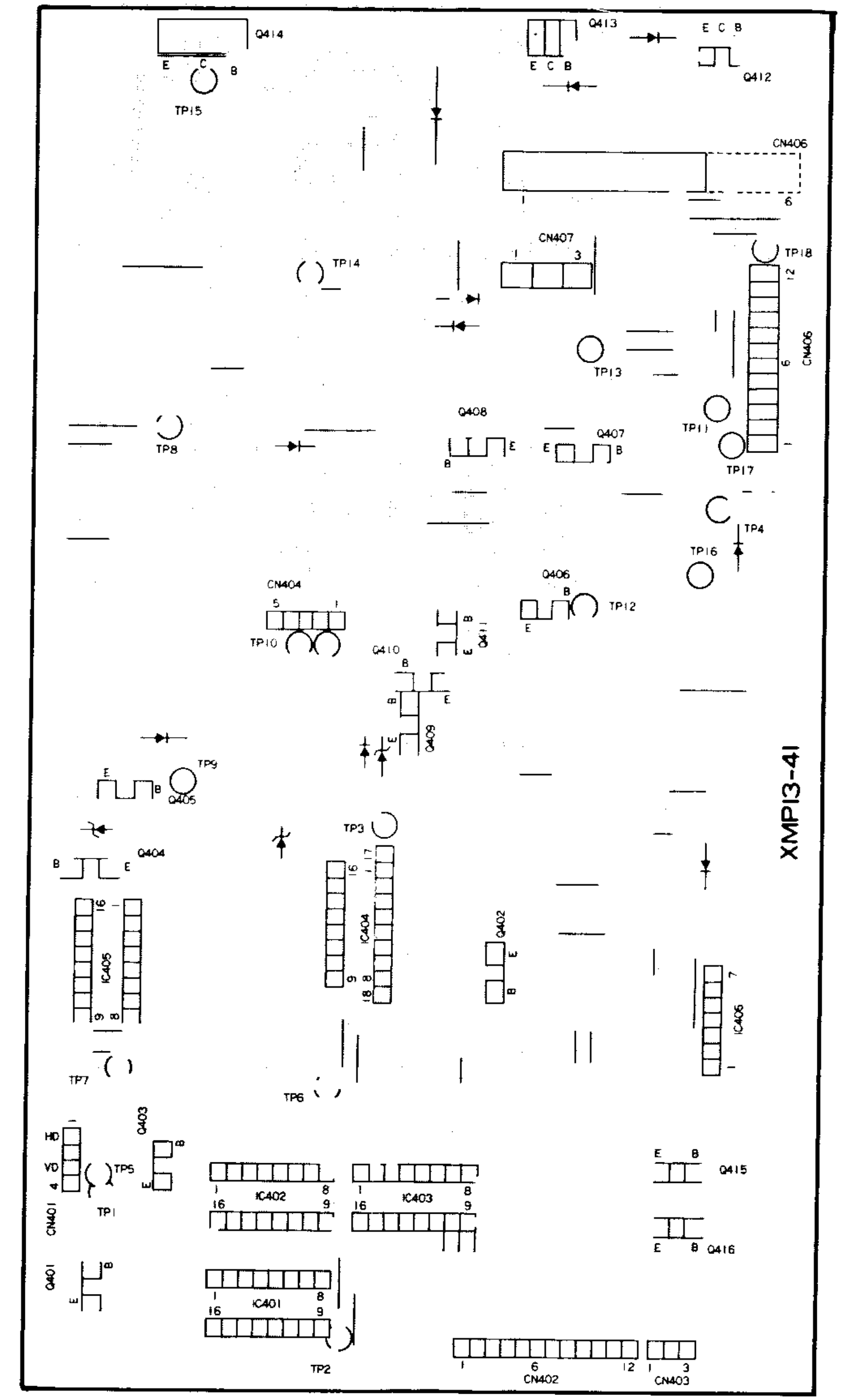
[Check the following circuits first]
- IC404
- V. output Circuit



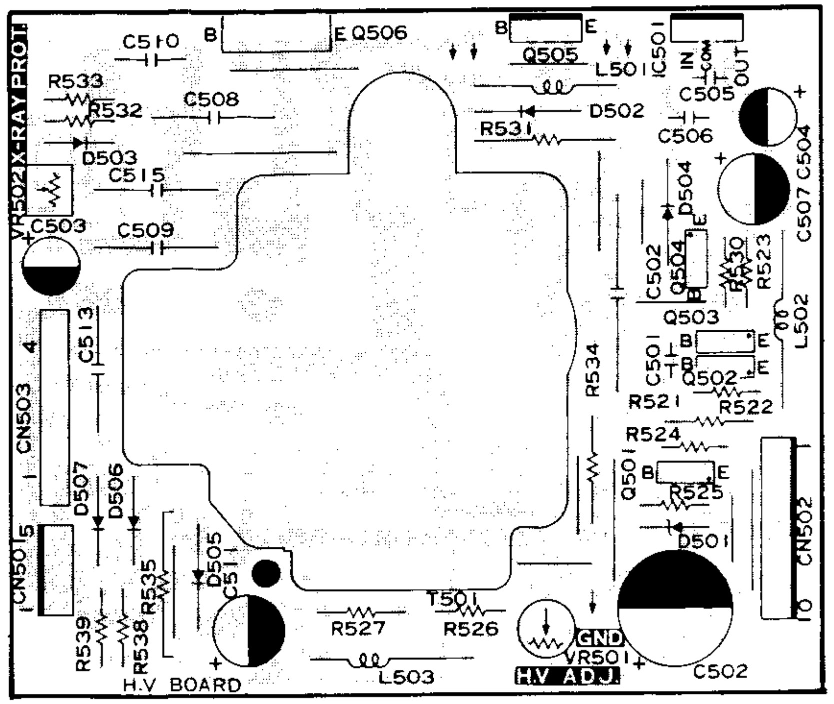

NO COLOR OR PALE COLOR
Re-Adjust
Check point
1. Set AUTO/MONO switch to AUTO.
2. Set CONTRAST to MAX.
3. Set CHROMA to MAX.
4. Attempt to adjust HUE.
NO COLOR
Is color-difference signal generated when TP21G, 21B are observed on oscilloscope?
NO
YES
Is chroma signal generated when TP19 is observed on oscilloscope?
NO
YES
• IC102
• Q128
• BPF1
• Q134, 135
Is 3.58MHz oscillation wave form generated when TP20 is observed on oscilloscope?
YES
NO
• IC111
• X1
• C168, C167
Is color locked by turning VR110?
YES
NO
• C154
• IC111
• VR110
• R255, C154
• IC111
• IC107b
No R.G.B. signals generated when TP24R, 24G, 24B are observed on oscilloscope.
• L108R, 108G, 108B
• Q129R, 129G, 129B
• IC112
• Q125R, 125G, 125B



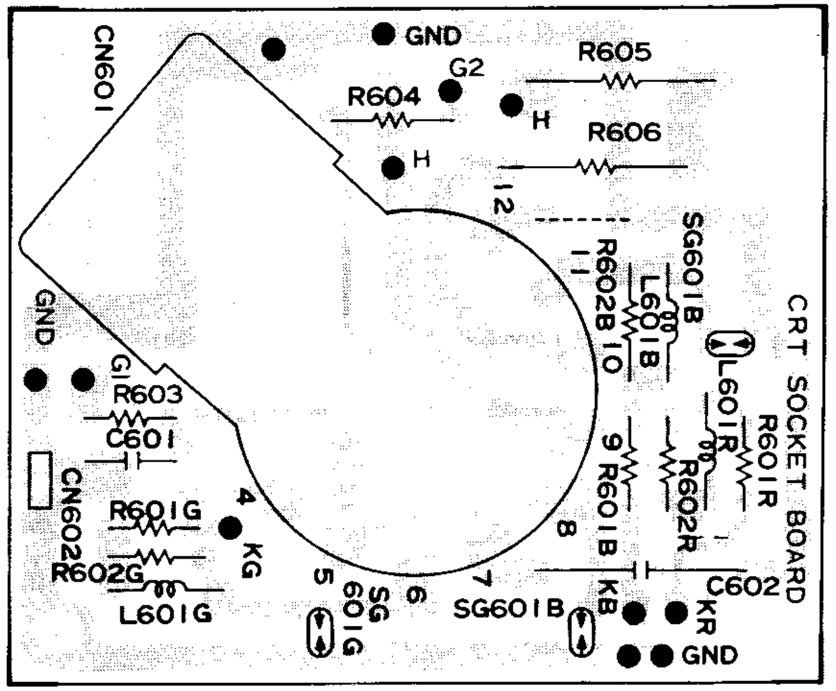
Deflection PWB (Component Side)



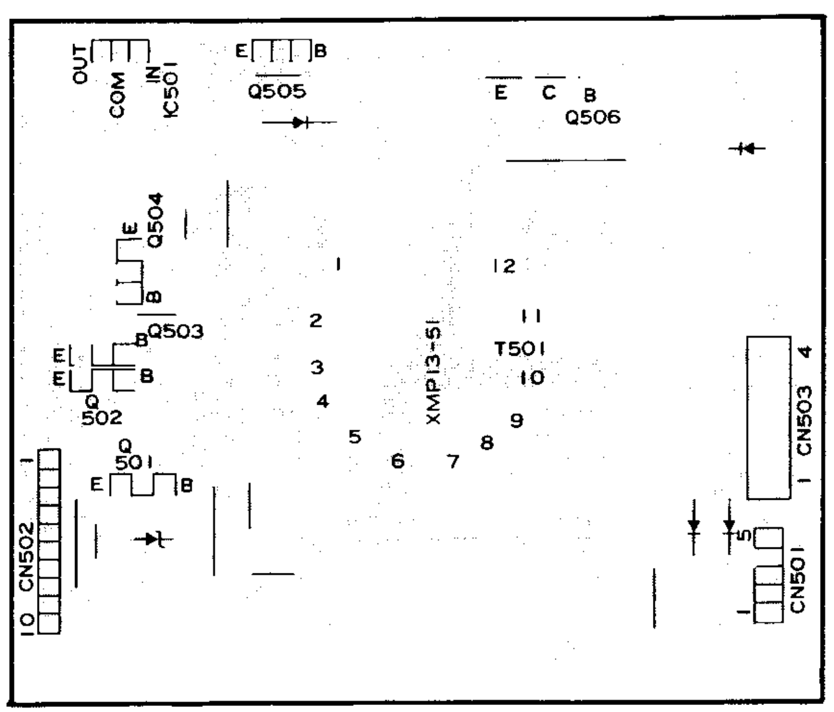
Deflection PWB (Wiring Side)



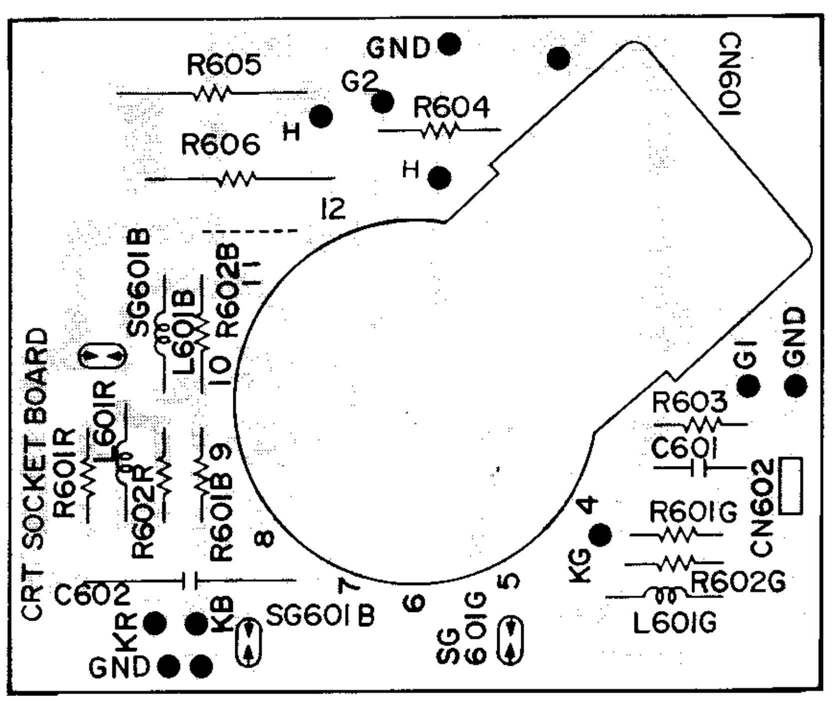
HV PWB (Component Side)



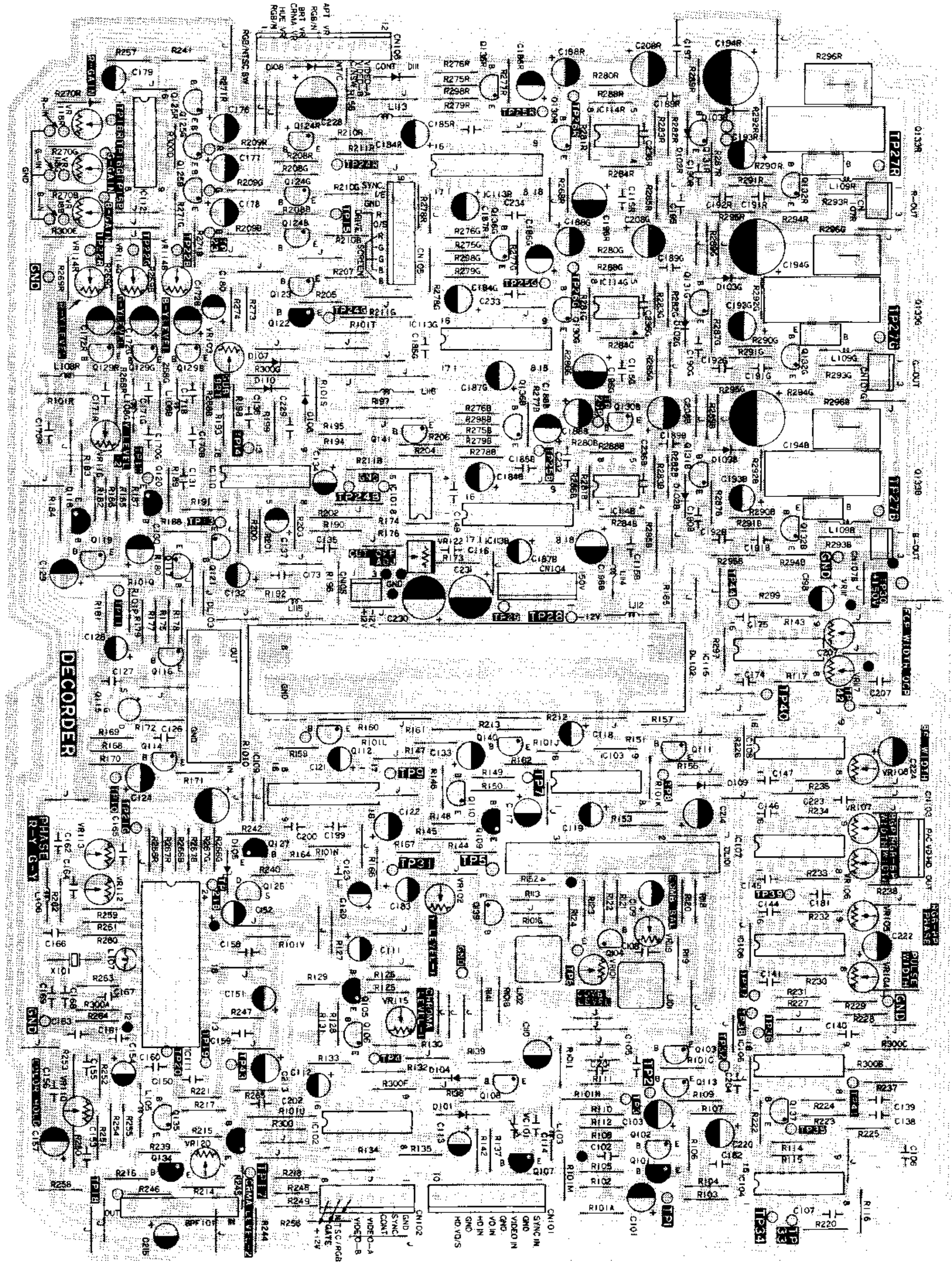
CRT Socket PWB (Component Side)



HV PWB (Wiring Side)



CRT Socket PWB (Wiring Side)



Decoder PWB

REPLACEMENT PARTS LIST

Many electrical and mechanical parts have special safety-related characteristics.
These characteristics are often not evident from visual inspection nor can the protection apporded by them necessarily be obtained by using replacement components rated for higher voltage, wattasge, etc. Replacement parts which have these special safety characteristic are identified in this manual; electical components having such features are identified by shaded areas in the Replacment Parts Lists and Schematic Diagrams.
The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire to other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

If you are an end user, contact the Sharp Authorized Dealer from whom you purchased the color monitor.

Sharp Authorized Dealers;
To have your order filled promptly and correctly please furnish the following informations.

1. MODEL NO. 2. REF. NO.
3. PART NO. 4. DESCRIPTION

Contact your nearest SHARP Parts Center for ordering information;

Mahwah, New Jersy	(201) 529-8200
Countryside, Illinois	(312) 482-9292
Carson, Calif.	(213) 637-9488

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
	MAIN CHASSIS	
⚠ V101	97AM48JBY02X/C	CRT
	COILS	
⚠ L1, ⚠ L2	97AST4-J26036	Degauss Coil
	MISCELLANEOUS	
CN2b	97A171822-9	Connector Housing
CN3b	97A1-171822-0	Connector Housing
CN4b	97A171822-8	Connector Housing
CN51b	97A1-171822-2	Connector Housing
CN61b	97A171822-2	Connector Housing
CN82b	97A171822-5	Connector Housing
CN83b	97A171822-7	Connector Housing
CN103b	97A171822-5	Connector Housing
CN104b	97A171822-7	Connector Housing
CN105b	97A171822-9	Connector Housing
CN106b	97A1-171822-2	Connector Housing
CN108b	97A171822-3	Connector Housing
CN109b	97A171822-2	Connector Housing
CN401b	97A171822-4	Connector Housing
CN402b	97A1-171822-2	Connector Housing
CN403b	97A171822-3	Connector Housing
CN405b	97A1-171822-2	Connector Housing
CN407b	97A171822-5	Connector Housing
CN501b	97A171822-5	Connector Housing
CN502b	97A1-171822-0	Connector Housing
	97A170262-2	Connector Contact
CN304b	97A1-480624-0	Connector Housing
	97A350036-1	Connector Contact
CN408b	97A43031-2	Connector
CN602b	97A170037-2	Connector
⚠	97A0033A-0089A	Power Cord
	FRONT PANEL PWB (1) CIRCUIT	
	97AXMP1921MOD	Printed Wiring Board Assemblies
	TRANSISTOR	
Q4	VS2SC1815YW-1	Transistor
	CONTROLS	
VR1	97AV16S25FB500	Variable Resistor with Switch
VR2	97AV16S25FB10K	Variable Resistor with Switch
VR3	97AV16GS25FB5K	Variable Resistor with Switch
VR4	97AV16S25FB10K	Variable Resistor with Switch
VR5	97AV16S25FB2K	Variable Resistor with Switch
	RESISTORS	
R1	VRD-RT2EE102J	Carbon Film
R2	VRD-RT2EE333J	Carbon Film
R8	VRD-RT2EE471J	Carbon Film
R9	VRD-RT2EE270J	Carbon Film
R10	VRD-RT2EE682J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R11	VRD-RT2EE562J	Carbon Film
R12	VRD-RT2EE332J	Carbon Film
R13	VRD-RT2EE472J	Carbon Film
R14	VRD-RT2EE392J	Carbon Film
R15	VRD-RT2EE153J	Carbon Film
R16	VRD-RT2EE223J	Carbon Film
R17	VRD-RT2EE102J	Carbon Film
R18	VRD-RT2EE332J	Carbon Film
	CAPACITORS	
C1	97ASM16VB47	Electrolytic
C2	97ASM16VB47	Electrolytic
C3	97ASM16VB47	Electrolytic
	MISCELLANEOUS	
SW1	97AESB-621404	Push Switch
SW2	97AESB-621403	Push Switch
CN1a	97A171826-4	Connector
CN2a	97A171826-9	Connector
CN3a	97A1-171826-0	Connector
CN4a	97A171826-8	Connector
CN5a	97A1-171826-2	Connector
CN81b	97A171822-3	Connector Housing
	97A170262-2	Connector Contact
	FRONT PANEL PWB (2) CIRCUIT	
	97AXMP1971MOD	Printed Wiring Board Assemblies
	CONTROLS	
VR51	97ARJC097PK20K	Variable Resistor
VR52	97ARJC097PK20K	Variable Resistor
VR53	97ARJC097PK20K	Variable Resistor
VR54	97AGF06SB2K	Variable Resistor
VR55, 56	97AGF06SB5K	Variable Resistor
VR57	97ATM10KPHB500	Variable Resistor
VR58	97ATM10KPHB10K	Variable Resistor
VR59, 60	97ATM10KPHB5K	Variable Resistor
VR61	97ATM10KPHB10K	Variable Resistor
VR62	97ATM10KPHB2K	Variable Resistor
	RESISTORS	
R51	VRD-RT2EE333J	Carbon Film
R52	VRD-RT2EE104J	Carbon Film
R53	VRD-RT2EE333J	Carbon Film
R54	VRD-RT2EE104J	Carbon Film
R55	VRD-RT2EE333J	Carbon Film
R56	VRD-RT2EE104J	Carbon Film
R57	VRD-RT2EE682J	Carbon Film
R58	VRD-RT2EE562J	Carbon Film
R59	VRD-RT2EE822J	Carbon Film
R60	VRD-RT2EE562J	Carbon Film
R61	VRD-RT2EE822J	Carbon Film
R62	VRD-RT2EE562J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R63	VRD-RT2EE472J	Carbon Film
R64	VRD-RT2EE153J	Carbon Film
R65	VRD-RT2EE223J	Carbon Film
R66	VRD-RT2EE472J	Carbon Film
R67	VRD-RT2EE392J	Carbon Film
R68	VRD-RT2EE102J	Carbon Film
R69	VRD-RT2EE332J	Carbon Film
	CAPACITORS	
C51	97ASM16VB47	Electrolytic
C52	97ASM16VB47	Electrolytic
	MISCELLANEOUS	
SW51	97AESB-62151	Push Switch
CN51a	97A1-171826-2	Connector
CN5b	97A1-171822-2	Connector Housing
	97A170262-2	Connector Contact

FRONT PANEL PWB (3) CIRCUIT

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1991M0D	Printed Wiring Board Assemblies
	CONTROLS	
VR81	97AWR188KPB50	Variable Resistor
VR82	97ATM10KV8B20K	Variable Resistor
VR83	97ATM10KV8B200	Variable Resistor
VR84	97ATM10KV8B50K	Variable Resistor
	MISECLLANEOUS	
CN81a	97A171825-3	Connector
CN82a	97A172106-3	Connector
CN83a	97A171825-7	Connector

FRONT PANEL CHASSIS

REF. NO.	PART NO.	DESCRIPTION
D1	97ASEL1310G	LED with Holder
	MISCELLANEOUS	
PL1	97ARM10-12/50	Lamp (BA, Swan Type)
PL1	97AB5500BA9	Bracket (Swan Type)
⚠ SW3	97AHLS208K	Seesaw Switch
CN1b	97A171822-4	Connector Housing
	97A170262-2	Connector Contact
CN61a	97A172211-2	Connector Housing
	97A170429-2	Connector Contact
⚠ CN305b	97A350780-1	Connector Housing
	97A350690-3	Connector Contact
	97A170037-2	Connector

DECODER PWB

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1916MōD	Printed Wiring Board Assemblies

REF. NO.	PART NO.	DESCRIPTION
	INTEGRATED CIRCUITS	
IC101	97AHA1812PS	Integrated Circuit
IC102, 103, 104	97AHD14053BP	Integrated Circuit
IC105	97AHD14572UB	Integrated Circuit
IC106, 107 108	97AMC14528BP	Integrated Circuit
IC109	97AHA11465	Integrated Circuit
IC110	97AHD14053BP	Integrated Circuit
IC111	97AHA11580	Integrated Circuit
IC112	97AHD14053BP	Integrated Circuit
IC113R, 113G, 113B	97AHA11465	Integrated Circuit
IC114R, 114G, 114B	97AHA17741PS	Integrated Circuit
IC115	97AMC14528BP	Integrated Circuit
	TRANSISTORS	
Q101	VS2SA1015Y/1E	Transistor
Q102, 103, 104	VS2SC1815YW-1	Transistor
Q105	VS2SA1015Y/1E	Transistor
Q106	VS2SC1815YW-1	Transistor
Q107	VS2SA1015Y/1E	Transistor
Q108	VS2SC1815YW-1	Transistor
Q102	VS2SA1015Y/1E	Transistor
Q110, 111, 112, 113, 114	VS2SC1815YW-1	Transistor
Q115	97A3SK14	Field Effect Transistor
Q116, 117	VS2SC1815YW-1	Transistor
Q118	VS2SA1015Y/1E	Transistor
Q119	VS2SC1815YW-1	Transistor
Q120	VS2SA1015Y/1E	Transistor
Q121	97A2SC641KC	Transistor
Q122	VS2SA1015Y/1E	Transistor
Q123, 124R, 124G, 124B, 125R, 125G, 125B,	VS2SC1815YW-1	Transistor
Q126	97A2SK128R	Field Effect Transistor
Q127, 128	VS2SA1015Y/1E	Transistor
Q129R, 129G, 129B, 130R, 130G, 130B, 131R, 131G, 131B	VS2SC1815YW-1	Transistor

REF. NO.	PART NO.	DESCRIPTION
Q132R, 132G, 132B	97A2SC1973	Transistor
Q133R, 133G, 133B	97A2SC2611	Transistor
Q134	VS2SA1015Y/ 1E	Transistor
Q135, 136R, 136G, 136B, 137, 139, 140, 141	VS2SC1815YW- 1	Transistor
DIODES		
D101, 102R 102G, 102B, 103R, 103G, 103B, 104	97A1S2075K	Diode
D105	97AHZ-4B-2	Zener Diode
D106, 107, 108, 109, 110, 111,	97A1S2075K	Diode
CONTROLS		
VR101	97AGFP061B500	Variable Resistor
VR102	97ARVG707V102M	Variable Resistor
VR103	97ARVG707V202M	Variable Resistor
VR104	97ARVG707V503M	Variable Resistor
VR105, 106, 107, 108,	97ARVG707V103M	Variable Resistor
VR110	97ARVG707V104M	Variable Resistor
VR111	97ARVG707V103M	Variable Resistor
VR112, 113	97ARVG707V102M	Variable Resistor
VR114R, 114G, 114B	97ARVG707V501M	Variable Resistor
VR115, 116	97ARVG707V102M	Variable Resistor
VR117	97ARVG707V103M	Variable Resistor
VR118R, 118G, 118B	97ARVG707V102M	Variable Resistor
VR119	97AGFP061B1K	Variable Resistor
VR120,	97ARVG707V102M	Variable Resistor
VR122	97AGFP061B10K	Variable Resistor

REF. NO.	PART NO.	DESCRIPTION
RESISTORS		
R101A, 101B, 101C	VRD-RT2EE101J	Carbon Film
R101G	VRD-RT2EE101J	Carbon Film
R101H	VRD-RT2EE151J	Carbon Film
R101I, 101J, 101K, 101L, 101M, 101N, 101O, 101P, 101Q, 101R, 101S, 101T, 101U, 101V,	VRD-RT2EE101J	Carbon Film
R102	VRD-RT2EE473J	Carbon Film
R103	VRD-RT2EE222J	Carbon Film
R104	VRD-RT2EE103J	Carbon Film
R105	VRD-RT2EE472J	Carbon Film
R106, 107	VRD-RT2EE222J	Carbon Film
R108	VRD-RT2EE331J	Carbon Film
R109	VRD-RT2EE333J	Carbon Film
R110	VRD-RT2EE823J	Carbon Film
R111, 112	VRD-RT2EE332J	Carbon Film
R113	VRD-RT2EE221J	Carbon Film
R114, 115	VRD-RT2EE333J	Carbon Film
R116	VRD-RT2EE102J	Carbon Film
R117	VRD-RT2EE472J	Carbon Film
R118	VRD-RT2EE331J	Carbon Film
R119, 120	VRD-RT2EE221J	Carbon Film
R121	VRD-RT2EE473J	Carbon Film
R122	VRD-RT2EE273J	Carbon Film
R123	VRD-RT2EE332J	Carbon Film
R124	VRD-RT2EE221J	Carbon Film
R125	VRD-RT2EE471J	Carbon Film
R126	VRD-RT2EE472J	Carbon Film
R127	VRD-RT2EE473J	Carbon Film
R128	VRD-RT2EE332J	Carbon Film
R129	VRD-RT2EE472J	Carbon Film
R130	VRD-RT2EE222J	Carbon Film
R131	VRD-RT2EE331J	Carbon Film
R132, 133, 134, 135	VRD-RT2EE332J	Carbon Film
R137	VRD-RT2EE333J	Carbon Film
R138	VRD-RT2EE561J	Carbon Film
R139	VRD-RT2EE473J	Carbon Film
R141	VRD-RT2EE101J	Carbon Film
R142	VRD-RT2EE103J	Carbon Film
R143	VRD-RT2EE682J	Carbon Film
R144	VRD-RT2EE471J	Carbon Film
R145	VRD-RT2EE103J	Carbon Film
R146, 147	VRD-RT2EE222J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R148	VRD-RT2EE473J	Carbon Film
R149	VRD-RT2EE472J	Carbon Film
R150	VRD-RT2EE271J	Carbon Film
R151	VRD-RT2EE333J	Carbon Film
R152	VRD-RT2EE103J	Carbon Film
R153	VRD-RT2EE332J	Carbon Film
R154	VRD-RT2EE332J	Carbon Film
R155	VRD-RT2EE152J	Carbon Film
R156	VRD-RT2EE102J	Carbon Film
R157	VRD-RT2EE511G	Carbon Film
R159	VRD-RT2EE332J	Carbon Film
R160	VRD-RT2EE511G	Carbon Film
R161	VRD-RT2EE473J	Carbon Film
R162	VRD-RT2EE103J	Carbon Film
R164	VRD-RT2EE332J	Carbon Film
R165	VRD-RT2EE102J	Carbon Film
R166	VRD-RT2EE561J	Carbon Film
R167	VRD-RT2EE823J	Carbon Film
R168	VRD-RT2EE473J	Carbon Film
R169	VRD-RT2EE332J	Carbon Film
R170	VRD-RT2EE273J	Carbon Film
R171	VRD-RT2EE471J	Carbon Film
R172	VRD-RT2EE330J	Carbon Film
R173	VRD-RT2EE752J	Carbon Film
R174	VRD-RT2EE392J	Carbon Film
R175	VRD-RT2EE511G	Carbon Film
R176	VRD-RT2EE224J	Carbon Film
R177	VRD-RT2EE473J	Carbon Film
R178	VRD-RT2EE471J	Carbon Film
R179	VRD-RT2EE273J	Carbon Film
R180	VRD-RT2EE222J	Carbon Film
R181	VRD-RT2EE473J	Carbon Film
R182	VRD-RT2EE472J	Carbon Film
R183	VRD-RT2EE471J	Carbon Film
R184	VRD-RT2EE472J	Carbon Film
R185, 186	VRD-RT2EE222J	Carbon Film
R187	VRD-RT2EE331J	Carbon Film
R188	VRD-RT2EE473J	Carbon Film
R189	VRD-RT2EE222J	Carbon Film
R190	VRD-RT2EE683J	Carbon Film
R191	VRD-RT2EE100J	Carbon Film
R192	VRD-RT2EE122J	Carbon Film
R193, 194	VRD-RT2EE332J	Carbon Film
R195	VRD-RT2EE333J	Carbon Film
R196	VRD-RT2EE332J	Carbon Film
R197	VRD-RT2EE682J	Carbon Film
R198	VRD-RT2EE471J	Carbon Film
R199	VRD-RT2EE333J	Carbon Film
R200, 201, 202, 203	VRD-RT2EE332J	Carbon Film
R204	VRD-RT2EE682J	Carbon Film
R205	VRD-RT2EE223J	Carbon Film
R206	VRD-RT2EE103J	Carbon Film
R207	VRD-RT2EE332J	Carbon Film
R208R, 208G, 208B, 209R, 209G, 209B	VRD-RT2EE152J	Carbon Film
R210R, 210G, 210B	VRD-RT2EE332J	Carbon Film
R211R, 211G, 211B	VRD-RT2EE101J	Carbon Film
R212, 213	VRD-RT2EE332J	Carbon Film
R214	VRD-RT2EE471J	Carbon Film
R215	VRD-RT2EE103J	Carbon Film
R216	VRD-RT2EE472J	Carbon Film
R217	VRD-RT2EE821J	Carbon Film
R220	VRD-RT2EE102J	Carbon Film
R221	VRD-RT2EE222J	Carbon Film
R222	VRD-RT2EE102J	Carbon Film
R223, 224	VRD-RT2EE222J	Carbon Film
R225	VRD-RT2EE332J	Carbon Film
⚠ R226	97AERQ14AJ100P	Fusible Resistor
R227	VRD-RT2EE332J	Carbon Film
R228	VRD-RT2EE152J	Carbon Film
R229	VRD-RT2EE153J	Carbon Film
R230	VRD-RT2EE223J	Carbon Film
R231	VRD-RT2EE222J	Carbon Film
R232	VRD-RT2EE562J	Carbon Film
R233	VRD-RT2EE472J	Carbon Film
R234	VRD-RT2EE332J	Carbon Film
R235	VRD-RT2EE682J	Carbon Film
R237, 238	VRD-RT2EE102J	Carbon Film
R239	VRD-RT2EE101J	Carbon Film
R240	VRD-RT2EE473J	Carbon Film
R241	VRD-RT2EE332J	Carbon Film
R242	VRD-RT2EE152J	Carbon Film
R244, 245, 246	VRD-RT2EE102J	Carbon Film
R247	VRD-RT2EE152J	Carbon Film
R250, 251, 252, 253	VRD-RT2EE333J	Carbon Film
R254	VRD-RT2EE753J	Carbon Film
R255	VRD-RT2EE122J	Carbon Film
R257	VRD-RT2EE332J	Carbon Film
R258	VRD-RT2EE820J	Carbon Film
R259, 260	VRD-RT2EE471J	Carbon Film
R261	VRD-RT2EE911J	Carbon Film
R262	VRD-RT2EE391J	Carbon Film
R263	VRD-RT2EE511G	Carbon Film
R264	VRD-RT2EE822J	Carbon Film
R265	VRD-RT2EE472J	Carbon Film
R266R, 266G, 266B	VRD-RT2EE272J	Carbon Film
R267R, 267G, 267B	VRD-RT2EE331J	Carbon Film
R268R, 268G, 268B	VRD-RT2EE332J	Carbon Film
R269R, 269G, 269B	VRD-RT2EE102J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R270R, 270G, 270B	VRD-RT2EE471J	Carbon Film
R271R, 271G, 271B	VRD-RT2EE332J	Carbon Film
R273, 274	VRD-RT2EE332J	Carbon Film
R275R, 275G, 275B	VRD-RT2EE683J	Carbon Film
R276R, 276G, 276B	VRD-RT2EE273J	Carbon Film
R277R, 277G, 277B	VRD-RT2EE122J	Carbon Film
R278R, 278G, 278B	VRD-RT2EE101J	Carbon Film
R279R, 279G, 279B	VRD-RT2EE332J	Carbon Film
R280R, 280G, 280B	VRD-RT2EE333J	Carbon Film
R281R, 281G, 281B	VRD-RT2EE224J	Carbon Film
R282R, 282G, 282B	VRD-RT2EE153J	Carbon Film
R283R, 283G, 283B	VRD-RT2EE153J	Carbon Film
R284R, 284G, 284B	VRD-RT2EE474J	Carbon Film
R285R, 285G, 285B	VRD-RT2EE101J	Carbon Film
R286R, 286G, 286B	VRD-RT2EE332J	Carbon Film
R287R, 287G, 287B	VRD-RT2EE333J	Carbon Film
R288R, 288G, 288B	VRD-RT2EE101J	Carbon Film
R289R, 289G, 289B	VRD-RT2EE123J	Carbon Film
R290R, 290G, 290B	VRD-RT2EE750G	Carbon Film
R291R, 291G, 291B	VRD-RT2EE220J	Carbon Film
R292R, 292G, 292B	VRD-RT2EE102J	Carbon Film
R293R, 293G, 293B	VRD-RT2EE102J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R294R, 294G, 294B	VRD-RT2EE104J	Carbon Film
R295R, 295G, 295B	VRD-RT2EE912J	Carbon Film
R296R, 296G, 296B	97AMNR05N332K	Metal Oxide Film
R297	VRD-RT2EE104J	Carbon Film
R298R, 298G, 298B	VRD-RT2EE471J	Carbon Film
R299	VRD-RT2EE221J	Carbon Film
R300	VRD-RT2EE473J	Carbon Film
R300A	VRD-RT2EE471J	Carbon Film
R300B, 300C	VRD-RT2EE222J	Carbon Film
R300D	VRD-RT2EE333J	Carbon Film
R300E	VRD-RT2EE102J	Carbon Film
R300F, 300G	VRD-RT2EE333J	Carbon Film
TRIMMER		
VC101	97ACV05D2001	Variable Capacitor
CAPACITORS		
C101	97ASM16VB47	Electrolytic
C102	97AECCR1H220JC	Ceramic
C103	97ASM16VB47	Electrolytic
C105, 106, 107	97AT92MC1H104K	Polyester Film
C108	97AECCR1H221K	Ceramic
C109	97ASM50VB10	Electrolytic
C110	97ASM16VB47	Electrolytic
C111, 112, 113	97ASM50VB10	Electrolytic
C114	97AECCR1H390JC	Ceramic
C115R, 115G, 115B	97AT92MC1H104K	Polyester Film
C116	97AT92MC1H102K	Polyester Film
C117	97ASM16VB47	Electrolytic
C118, 119	97ASM50VB10	Electrolytic
C120	97ASM50VB1	Electrolytic
C121	97ASM50VBR47	Electrolytic
C122	97ASM16VB47	Electrolytic
C123	97AT92MC1H104K	Polyester Film
C124	97ASM16VB47	Electrolytic
C125	97ASM16VB100	Electrolytic
C126	97AT92MC1H473K	Polyester Film
C127	97AT92MC1H104K	Polyester Film
C128	97ASM50VB10	Electrolytic
C129, 130	97ASM16VB47	Electrolytic
C131	97AT92MC1H104K	Polyester Film
C132	97ASM50VBR47	Electrolytic
C133	97ASM16VB47	Electrolytic
C134	97ASM50VB10	Electrolytic

REF. NO.	PART NO.	DESCRIPTION
C135, 136	97AT92MC1H104K	Polyester Film
C137	97ASM50VB10	Electrolytic
C138, 139	97AT92MC1H103K	Polyester Film
C140	97AT92MC1H102K	Polyester Film
C141	97AT92PP2A102J	Polyester Film
C144, 145, 146, 147	97AECCR1H471K	Ceramic
C149, 150	97AT92MC1H103K	Polyester Film
C151, 152	97ASM50VB1	Electrolytic
C153	97AT92MC1H223K	Polyester Film
C154	97ASM50VB4R7	Electrolytic
C155	97AT92MC1H223K	Polyester Film
C156	97AT92MC1H103K	Polyester Film
C157	97ASM16VB47	Electrolytic
C158	97AT92MC1H104K	Polyester Film
C159	97AT92MC1H103K	Polyester Film
C160	97AECCR1H470JC	Ceramic
C161	97AT92MC1H103K	Polyester Film
C162	97AT92MC1H104K	Polyester Film
C163	97AECCR1H470JC	Ceramic
C164	97AECCR1H560JC	Ceramic
C165	97AECCR1H470JC	Ceramic
C166	97AT92MC1H103K	Polyester Film
C167	97AECCR1H820JC	Ceramic
C168	97AECCR1H220JC	Ceramic
C169	97AECCR1H180JC	Ceramic
C170R, 170G, 170B	97AECCR1H151K	Ceramic
C171R, 171G, 171B	97AECCR1H221K	Ceramic
C172R, 172G, 172B	97ASM16VB47	Electrolytic
C173	97AECCR1H470JC	Ceramic
C174	97AECCR1H331K	Ceramic
C175	97AECCR1H471K	Ceramic
C176, 177, 178	97ASM16VB47	Electrolytic
C179, 180	97ASM50VB10	Electrolytic
C181	97AECCR1H470JC	Ceramic
C182	97AT92MC1H104K	Polyester Film
C183	97ASM50VB3R3	Electrolytic
C184R, 184G, 184B	97ASM16VB47	Electrolytic
C185R, 185G, 185B	97AT92MC1H104K	Polyester Film
C186R, 186G, 186B	97ASM16VB47	Electrolytic
C187R, 187G, 187B,	97ASM50VB10	Electrolytic
C188R, 188G, 188B	97ASM50VB10	Electrolytic
C189R, 189G, 189B	97AT92MC1H104K	Polyester Film
C190R, 190G, 190B	97AECCR1H101K	Ceramic
C191R, 191G, 191B	97AECCR1H561K	Ceramic
C192R, 192G, 192B	97AECCR1H821K	Ceramic
C193R, 193G, 193B	97ASM16VB47	Electrolytic
C194R, 194G, 194B	97ASM250VB22	Electrolytic
C195	97AT92MC1H104K	Polyester Film
C196R, 196G, 196B	97ASM16VB100	Electrolytic
C197	97AECQM2473KZ	Polyester Film
C198	97ASM50VB1	Electrolytic
C199	97AECCR1H560JC	Ceramic
C200	97AECCR1H221K	Ceramic
C204	97AECCR1H331K	Ceramic
C207	97AECCR1H151K	Ceramic
C208R, 208G, 208B	97ASM16VB100	Electrolytic
C213	97ASM16VB47	Electrolytic
C214	97ASM16VB100	Electrolytic
C215	97ASM16VB47	Electrolytic
C220	97ASM16VB47	Electrolytic
C222	97ASM16VB47	Electrolytic
C223	97AT92MC1H104K	Polyester Film
C224	97ASM16VB47	Electrolytic
C228	97ASM16VB470	Electrolytic
C229	97AT92MC1H104K	Polyester Film
C230, 231	97ASM16VB470	Electrolytic
C232, 233, 234	97AT92MC1H104K	Polyester Film
C236R, 236G, 236B	97AT92MC1H102K	Polyester Film

COILS AND OTHERS

REF. NO.	PART NO.	DESCRIPTION
L101, 102	97AST4-J15143	Variable Inductor
L103	97ALAL04NA330K	Choke Coil
L105	97ALAL04NA100K	Choke Coil
L106	97ALAL04NA681K	Choke Coil
L107	97AEL0606R681K	Choke Coil
L108R, 108G, 108B	97ALAL04NA101K	Choke Coil
L109R, 109G, 109B	97ALAL04NA220K	Choke Coil

REF. NO.	PART NO.	DESCRIPTION
L112, 113, 114	97ALAL04NA101K	Choke Coil
L115, 116	97ALAL04NA101K	Choke Coil
DL101	97APDL-633B-VD	COMB Filter
DL102	97AST-9256A	Y-Delay Line
DL103	97ADL501A1406C	Aperture Delay Line
BPF101	97AF080	Band Pass Filter
X101	97AST-401561	Crystal Oscilator
	MISCELLANEOUS	
CN101a	97A1-171825-0	Connector
CN102a	97A171825-8	Connector
CN103a	97A171825-5	Connector
CN104a	97A171825-7	Connector
CN105a	97A171825-9	Connector
CN106a	97A1-171825-2	Connector
CN107Ra, 107Ga, 107Ba, 108a,	97A171825-3	Connector
CN109a	97A172211-2	Connector Housing
	97A170429-2	Connector Contact
CN101b	97A1-171822-0	Connector Housing
CN102b	97A171822-8	Connector Housing
CN802b	97A1-171822-2	Connector Housing
CN803b	97A171822-9	Connector Housing
CN804b	97A171822-4	Connector Housing
	97A170262-2	Connector Contact

POWER PWB

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1933MōD	Printed Wiring Board Assemblies
	INTEGRATED CIRCUITS	
⚠ IC301, ⚠ 302	97AHA17812P	Integrated Circuit
	TRANSISTORS	
Q301, 302	97A2SD669AC	Transistor
Q303	97A2SC2837	Transistor
Q304	97A2SA1193K	Transistor
Q305	VS2SA1015Y/1E	Transistor
Q306	97A2SD789C	Transistor
	DIODES	
⚠ D301	97ARB404LF-F	Diode
D302	97AE202	Diode
⚠ D303, ⚠ 304	97ARM1A	Diode
★ D305	97AHZ-7B-3	Zener Diode
⚠ D306	97AHZ-5C-1	Zener Diode
D307	97A1S2075K	Diode
⚠ D308	97ARB152	Diode
⚠ D309, ⚠ 310, ⚠ 311, ⚠ 312	97ARM1A	Diode
D313	97A1S2075K	Diode
D314	97AE202	Diode
⚠ VS301	97ASNR14A150K	Ceramic Varistor
⚠ VS302	97ASNR10A60K	Ceramic Varistor
⚠ VS303	97ASNR10A50K	Ceramic Varistor
⚠ POSI301	97A451B028R140	Posistor
	CONTROL	
VR301	97AGF06PB500	Variable Resistor
	RESISTORS	
R301	97AMNS05N101J	Metal Oxide Film
R302	97AR75X563J	Carbon Film
R303	97AR75X332J	Carbon Film
R304	97AR75X103J	Carbon Film
R305	97ARSF2BL2223J	Metal Oxide Film
⚠ R306	97AERD2FCG102P	Fusible Resistor
R307	VRD-RT2EE101J	Carbon Film
R308	VRD-RT2EE472J	Carbon Film
R309	97AR75X563J	Carbon Film
R310	VRD-RT2EE223J	Carbon Film
R311	VRD-RT2EE562J	Carbon Film
R312	VRD-RT2EE104J	Carbon Film
R313	VRD-RT2EE101J	Carbon Film
R314	VRD-RT2EE102J	Carbon Film
R315	97ARSF1BL1473J	Metal Oxide Film
R316	VRD-RT2EE333J	Carbon Film
R317	VRD-RT2EE332J	Carbon Film
R318	VRD-RT2EE472J	Carbon Film
R319	VRD-RT2EE223J	Carbon Film
R320	VRD-RT2EE223J	Carbon Film
R321	VRD-RT2EE332J	Carbon Film
R322	97AR75X560J	Carbon Film
R323	97AR75X563J	Carbon Film
	CAPACITORS	
⚠ C301	97ANM160VR1000	Electrolytic
C302	97AECQM2473KZ	Polyester Film
C303	97ASM160VB22	Electrolytic
C304	97AECKR1H101K	Ceramic
C305	97ASM160VB3R3	Electrolytic
C306	97ASM50VB1	Electrolytic
C307	97ASM160VB100	Electrolytic
C308	97ASM16VB33	Electrolytic
C309	97ASM35VP2200	Electrolytic
C310	97ASM16VB100	Electrolytic
C312	97AT92MC1H224K	Polyester Film
C314	97ASM35VB2200	Electrolytic
C315	97AT92MC1H473K	Polyester Film
C316	97ASM16VB100	Electrolytic
	MISCELLANEOUS	
F301	97A85BK0806	Fuse Holder
⚠ F301	97AMGC-2	Fuse
⚠ RL301	97ATV12D1-0	Relay
CN301a	97ATV50P-06-V1	Connector
CN302a	97A350786-1	Connector
CN303a	97A171825-4	Connector
CN304a	97A1-480625-0	Connector Housing
	97A350037-1	Connector Contact

REF. NO.	PART NO.	DESCRIPTION
POWER CHASSIS		
TRANSFORMER		
⚠ T301	97AST4-J19009B	Power Transformer
MISCELLANEOUS		
F302	97ASN1301	Fuse Holder
⚠ F302	97AMGC-4	Fuse
⚠ J1	97ANC174	3P Inlet
J2	97AA-D6002	4P Push Tarminal
CN301b	97ATV50H-06-A1	Connector Housing
	97A003T-2100	Connector Contact
CN302b	97A350777-1	Connector Housing
	97A350689-3	Connector Contact
CN303b	97A171822-4	Connector Housing
	97A170262-2	Connector Contact
⚠ CN305a	97A350779-1	Connector Housing
	97A350689-3	Connector Contact
DEFLECTION PWB		
	97AXMP1942MōD	Printed Wiring Board Assemblies
INTEGRATED CIRCUITS		
IC401	97AHD14538BP	Integrated Circuit
IC402	97ATC4528BP	Integrated Circuit
IC403	97AHD14053BP	Integrated Circuit
IC404	97AHA11423	Integrated Circuit
IC405	97ATC4528BP	Integrated Circuit
IC406	97AμPC1378H	Integrated Circuit
TRANSISTORS		
Q401, 402, 403	VS2SA1015Y/1E	Transistor
Q404	VS2SC1815YW-1	Transistor
Q405	97A2SC2899	Transistor
Q406	VS2SC1815YW-1	Transistor
Q407, 408	97A2SC2611	Transistor
Q409, 410, 411	97A2SC2610	Transistor
Q412	97A2SC2611	Transistor
Q413	97A2SD1138C	Transistor
⚠ Q414	97A2SD1453	Transistor
Q415	97A2SD789PC	Transistor
Q416	97A2SB740C	Transistor
DIODES		
D401	97AEM1Z	Diode
D402, 403	97AHZ-5C-1	Zener Diode
D404	97AHZ-12A-2	Zener Diode
D405	97A1S2075K	Diode
D406	97AEM1Z	Diode
D407	97ARM1A	Diode
D411	97ARH2F	Diode
D412	97ARH1B	Diode
D413, 414	97ARU2	Diode
D416	97AEM1Z	Diode
D418	97ARM1A	Diode
D419	97ARU1A	Diode
D420	97A1S2075K	Diode
CONTROLS		
VR401	97ARVG707V503M	Variable Resistor
VR402	97ARVG707V104M	Variable Resistor
VR403	97ARVG707V502M	Variable Resistor
VR405	97ARVG707V201M	Variable Resistor
VR406	97ARVG707V202M	Variable Resistor
VR407	97ARVG707V104M	Variable Resistor
VR408	97ARVG707V503M	Variable Resistor
VR409, 410, 411, 412	97ARVG707V103M	Variable Resistor
VR413	97ARVG707V303M	Variable Resistor
RESISTORS		
R401, 402	VRD-RT2EE472J	Carbon Film
R403	VRD-RT2EE103J	Carbon Film
R404	VRD-RT2EE332J	Carbon Film
R405	VRD-RT2EE683J	Carbon Film
R406	VRD-RT2EE332J	Carbon Film
R407	97ARKC18B33KJ	Resistor Network
R408	VRD-RT2EE103J	Carbon Film
⚠ R409	97AERQ14AJ100P	Fusible Resistor
R411, 412	VRD-RT2EE332J	Carbon Film
R414	VRD-RT2EE562J	Carbon Film
R415	VRD-RT2EE332J	Carbon Film
R416, 417	VRD-RT2EE103J	Carbon Film
R418	VRD-RT2EE123J	Carbon Film
R419	VRD-RT2EE102J	Carbon Film
R420	VRD-RT2EE123J	Carbon Film
R421	VRD-RT2EE101J	Carbon Film
R423	VRD-RT2EE153J	Carbon Film
R425	VRD-RT2EE752J	Carbon Film
⚠ R426	97AERQ2AJ4R7S	Fusible Resistor
⚠ R427	97AERQ14AJ100P	Fusible Resistor
R428	VRD-RT2EE103J	Carbon Film
R429	VRD-RT2EE680J	Carbon Film
R430	VRD-RT2EE101J	Carbon Film
R431	97ASN14K2H196F	Metal Film
R432	97AR75X221J	Carbon Film
R433, 434	97AR75X101J	Carbon Film
⚠ R435	97AERQ14AJ100P	Fusible Resistor
R436	VRD-RT2EE332J	Carbon Film
R437, 438	VRD-RT2EE104J	Carbon Film
R439	VRD-RT2EE332J	Carbon Film
R440	VRD-RT2EE103J	Carbon Film
R441	VRD-RT2EE683J	Carbon Film
R442, 443	VRD-RT2EE473J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R445	VRD-RT2EE912J	Carbon Film
R446	VRD-RT2EE821J	Carbon Film
⚠ R447	97AERQ14AJ100P	Fusible Resistor
R448	VRD-RT2EE103J	Carbon Film
R449	VRD-RT2EE183J	Carbon Film
R450	VRD-RT2EE472J	Carbon Film
R451	VRD-RT2EE103J	Carbon Film
R452	VRD-RT2EE332J	Carbon Film
R453	VRD-RT2EE104J	Carbon Film
R454	VRD-RT2EE332J	Carbon Film
R455	VRD-RT2EE472J	Carbon Film
R456	VRD-RT2EE103J	Carbon Film
R457	VRD-RT2EE682J	Carbon Film
R458	VRD-RT2EE222J	Carbon Film
R459	VRD-RT2EE103J	Carbon Film
R460	VRD-RT2EE223J	Carbon Film
R461	VRD-RT2EE562J	Carbon Film
⚠ R462	97AERQ14AJ100P	Fusible Resistor
R463	VRD-RT2EE102J	Carbon Film
R464	VRD-RT2EE471J	Carbon Film
R465	VRD-RT2EE332J	Carbon Film
R466	VRD-RT2EE683J	Carbon Film
R467	VRD-RT2EE103J	Carbon Film
R468	VRD-RT2EE472J	Carbon Film
R469	97AMNR02N562K	Metal Oxide Film
R470	97AMPS10N102K	Metal Oxide Film
R472, 473	VRD-RT2EE102J	Carbon Film
R474	VRD-RT2EE103J	Carbon Film
R475	VRD-RT2EE153J	Carbon Film
R476	VRD-RT2EE104J	Carbon Film
R477	VRD-RT2EE223J	Carbon Film
R478	VRD-RT2EE473J	Carbon Film
R479	VRD-RT2EE102J	Carbon Film
R480	VRD-RT2EE222J	Carbon Film
R481	VRD-RT2EE102J	Carbon Film
R483	VRD-RT2EE153J	Carbon Film
R485	VRD-RT2EE103J	Carbon Film
R486	VRD-RT2EE472J	Carbon Film
R487	97AERG3CJ472S	Metal Oxide Film
R489	VRD-RT2EE333J	Carbon Film
R490	VRD-RT2EE103J	Carbon Film
R491	97AR75X273J	Carbon Film
R492	VRD-RT2EE223J	Carbon Film
R493	VRD-RT2EE473J	Carbon Film
R494	VRD-RT2EE183J	Carbon Film
R495	VRD-RT2EE682J	Carbon Film
R496	VRD-RT2EE563J	Carbon Film
⚠ R497	97AERQ14AJ221P	Fusible Resistor
R499	VRD-RT2EE473J	Carbon Film
R500	97AR75X471J	Carbon Film
R501	97ARSF2BL2683J	Metal Oxide Film
⚠ R503	97AERQ2CJ681S	Fusible Resistor
R504	97AR75X104J	Carbon Film
R505	VRD-RT2EE682J	Carbon Film

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION
C401	97ACS15E1VR22K	Tantalum
C402	97AT92MC1H222K	Polyester Film
C403	97AT92MC1H104K	Polyester Film
C404	97AT92MC1H103K	Polyester Film
C405	97AT92MC1H332K	Polyester Film
C408	97AT92MC1H103K	Polyester Film
C409	97ASM16VB100	Electrolytic
C410	97AT92MC1H103K	Polyester Film
C411	97ACS15E1V010K	Tantalum
C412	97AT92MC1H222K	Polyester Film
C413	97ASM16VB1000	Electrolytic
C414	97ACS15E1V2R2K	Tantalum
C415	97AT92MC1H223K	Polyester Film
C416	97ASM50VB3R3	Electrolytic
C417	97ASM35VB1000	Electrolytic
C418	97ASM35VB470	Electrolytic
C419	97ACS15E1V010K	Tantalum
C421	97ASM35VB470	Electrolytic
C422	97ASM35VB100	Electrolytic
C423	97AT92MC1H222K	Polyester Film
C424	97AECKR2H221KB	Ceramic
C425	97AECQM1473KZ	Polyester Film
C427	97AT92MC1H103K	Polyester Film
C428	97ACS15E1E4R7K	Tantalum
C429	97ACS15E1VR47K	Tantalum
C430	97ASM50VB10	Electrolytic
C431	97ASM16VB470	Electrolytic
C432	97AT92MC1H473K	Polyester Film
C433	97AECCR1H221K	Ceramic
C434	97ASM50VB1	Electrolytic
C435	97AT92MC1H472K	Polyester Film
C436	97AT92PP1H472K	Polypropylene Film
C437	97AT92MC1H152K	Polyester Film
C440	97ASM16VB47	Electrolytic
C450	97ASM50VB10	Electrolytic
C451	97AECCR1H331K	Ceramic
C452	97AT92MC1H103K	Polyester Film
C453	97AECCR1H221K	Ceramic
C454	97AT92MC1H473K	Polyester Film
C455	97AT92MC1H472K	Polyester Film
C456	97AECCR1H331K	Ceramic
C457	97ASM16VB100	Electrolytic
C458	97AECCR1H101K	Ceramic
C459	97AECCR1H330JC	Ceramic
C461	97ASM16VB100	Electrolytic
C462	97ASM160VB22	Electrolytic
C463	97AECKD3D681KB	Ceramic
C464	97ASM25VB22	Electrolytic
C465	97ASM50VBR22	Electrolytic
C466	97ASM50VBR33	Electrolytic
C467	97ASM25VB22	Electrolytic
C468	97ASM16VB47	Electrolytic
C469	97ASM50VB10	Electrolytic
C471	97ADM93N2E224K	Polyester Film
C472	97AECCR1H221K	Ceramic
C473	97AECKR2H221KB	Ceramic
C474	97ASM160VB100	Electrolytic
C475	97ADHS200125J	Polypropylene Film
⚠ C476	97AECWH12102JR	Polypropylene Film
⚠ C477	97AECQF4223JZ	Polypropylene Film
⚠ C478	97AECWH12332JR	Polypropylene Film
C479	97ASM160VB47	Electrolytic
C480	97AECWH12102JR	Polypropylene Film
C481	97ASM16VB220	Electrolytic
⚠ C482	97AECWH12332JR	Polypropylene Film
C483	97ASM35VB100	Electrolytic
C484	97AECKR2H471KB	Ceramic

COILS AND TRANSFORMERS

REF. NO.	PART NO.	DESCRIPTION
L401	97AFL-7H332J	Choke Coil
⚠ L402, ⚠ 403	97AST4-000745M	H. Linearity Coil

REF. NO.	PART NO.	DESCRIPTION
⚠ L404	97AFL-7H122J	Choke Coil
⚠ L405	97AST4-000876	Choke Coil
⚠ T402	97AST4-000743	H. Drive Transformer
⚠ T403	97AST4-000744	H. Output Transformer
	MISCELLANEOUS	
CN401a	97A171825-4	Connector
CN402a	97A1-171825-2	Connector
CN403a	97A171825-3	Connector
CN404a	97A171825-5	Connector
CN405a	97A1-171825-2	Connector
CN406a	97ATS80P-06-V1	Connector
CN407a	97A172106-3	Connector
CN408a	97A170037-2	Connector

H. V PWB

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1953MōD	Printed Wiring Board Assemblies
	INTEGRATED CIRCUIT	
⚠ IC501	97AHA17824P	Integrated Circuit
	TRANSISTORS	
Q501, 502, 503	97A2SC2610	Transistor
Q504	97A2SC2611	Transistor
Q505	97A2SD1138C	Transistor
⚠ Q506	97A2SD1455	Transistor
	DIODES	
D501	97AHZ-6C-2	Zener Diode
D502	97ARM1A	Diode
D503	97A1SS82	Diode
D504	97ARU2	Diode
D505	97ARU1B	Diode
D506, 507	97ARM1A	Diode
D508	97AHZ-6C-2	Zener Diode
	CONTROLS	
VR501	97AGF06PB200K	Variable Resistor
VR502	97AGF06PB1K	Variable Resistor
	RESISTORS	
R521	97AR75X333J	Carbon Film
R522	VRD-RT2EE223J	Carbon Film
R523	VRD-RT2EE823J	Carbon Film
R524	VRD-RT2EE223J	Carbon Film
R525	VRD-RT2EE622J	Carbon Film
R526	97ASN14K2E474F	Metal Film
R527	VRD-RT2EE104J	Carbon Film
⚠ R530	97AERQ14AJ221P	Fusible Resistor
⚠ R531	97AERQ2AJ2R2S	Fusible Resistor
R532	VRD-RT2EE682J	Carbon Film
R533	VRD-RT2EE152J	Carbon Film
⚠ R534	97AERQ1AJ4R7S	Fusible resistor
⚠ R535	97AERQ2AJ4R7S	Fusible Resistor
R538	VRD-RT2EE124J	Carbon Film
R539	VRD-RT2EE474J	Carbon Film
	CAPACITORS	
C501	97AT92MC1H333K	Polyester Film
C502	97ASM160VB100	Electrolytic
C503	97ASM16VB100	Electrolytic
C504	97ASM35VB100	Electrolytic
C505	97AT92MC1H473K	Polyester Film
C506	97AT92MC1H224K	Polyester Film
C507	97ASXE50VB470	Electrolytic
C508	97AECWH12392JR	Polyester Film
C509	97AECWH12332JR	Polyester Film
C510	97AECQM2473KZ	Polyester Film
C511	97ASM100VB47	Electrolytic
⚠ C512	97ASM250VB2R2	Electrolytic
C513	97ADM93N2E224K	Polyester Film
C515	97AECWH12102JR	Polypropylene Film
	COIL AND TRANSFROMER	
⚠ L501	97AST4-000878	Inductor
T501	97AST4-J19008	Flyback Transformer
	MISCELLANEOUS	
CN501a	97A171825-5	Connector
CN502a	97A1-171825-0	Connector
CN503a	97ATV50P-04-V1	Connector
CN404b	97A171822-5	Connector Housing
	97A170262-2	Connector Contact
CN505b	97A1951R	Connector Housing
	97A1381	Connector Contact
CN506b	97A350866-1	Connector Housing
	97A350689-3	Connector Contact

CRT SOCKET PWB

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1962MōD	Printed Wiring Board Assemblies
	RESISTORS	
R601R, 601G, 601B	VRD-RT2EE221J	Carbon Film
R603	VRD-RT2EE221J	Carbon Film
R604	97AR75X104J	Carbon Film
⚠ R606	97AERQ2CJ1R0S	Fusible Resistor
	CAPACITOR	
C602	97AECQE10473MZ	Polyester Film
	MISCELLANEOUS	
SG601R, 601G, 601B	97AGD626-300V	Spark Gap
CN601	97AHPS17601500	CRT Socket

REF. NO.	PART NO.	DESCRIPTION
CN602a	97A47008	Connector
CN107Rb, 107Gb, 107Bb	97A171822-3	Connector Housing
	97A170262-2	Connector Contact
CN503b	97ATV50H-04-A1	Connector Housing
	97A003T-2100	Connector Contact
CN505b	97A1951P	Connector Housing
	97A1380	Connector Contact
CN506b	97A350865-1	Connector Housing
	97A350561-3	Connector Contact

REAR PANEL PWB

REF. NO.	PART NO.	DESCRIPTION
	97AXMP1984MōD	Printed Wiring Board Assemblies
INTEGRATED CIRCUITS		
IC801	97AμPC1397	Integrated Circuit
IC802	97AHD14053BP	Integrated Circuit
TRANSISTORS		
Q801R, 801G, 801B	VS2SC1815YW-1	Transistor
Q802	97ADTA114N	Transistor
Q803,	VS2SA1015Y/1E	Transistor
Q804, 805	VS2SC1815YW-1	Transistor
Q806	VS2SA1015Y/1E	Transistor
Q807, 808	VS2SC1815YW-1	Transistor
Q809	97ADTA114N	Transistor
Q810	VS2SA1015Y/1E	Transistor
Q811, 812	97ADTC114N	Transistor
Q813	VS2SC1815YW-1	Transistor
DIODES		
D801, 802, 803, 804, 805	97A1S2075K	Diode
RESISTORS		
R801R, 801G, 801B	VRD-RT2EE750G	Carbon Film
R802R, 802G, 802B	VRD-RT2EE472J	Carbon Film
R803R, 803G, 803B	VRD-RT2EE104J	Carbon Film
R804R, 804G, 804B	VRD-RT2EE104J	Carbon Film
R805R, 805G, 805B	VRD-RT2EE102J	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R806	VRD-RT2EE751J	Carbon Film
R807	VRD-RT2EE241J	Carbon Film
R808	VRD-RT2EE751J	Carbon Film
R809	VRD-RT2EE241J	Carbon Film
R810	VRD-RT2EE751J	Carbon Film
R811	VRD-RT2EE102J	Carbon Film
R812, 813	VRD-RT2EE233J	Carbon Film
R814	VRD-RT2EE682J	Carbon Film
R815	VRD-RT2EE332J	Carbon Film
R816	VRD-RT2EE101J	Carbon Film
R817	VRD-RT2EE102J	Carbon Film
R818, 819	VRD-RT2EE332J	Carbon Film
R820	VRD-RT2EE682J	Carbon Film
R821	VRD-RT2EE332J	Carbon Film
R822	VRD-RT2EE101J	Carbon Film
R823	VRD-RT2EE241J	Carbon Film
R824	VRD-RT2EE103J	Carbon Film
R825, 826, 827	VRD-RT2EE223J	Carbon Film
⚠ R828	97AERQ14AJ100P	Fusible Resistor
R829	VRD-RT2EE333J	Carbon Film
R830	VRD-RT2EE102J	Carbon Film
R831	VRD-RT2EE333J	Carbon Film
R833	VRD-RT2EE101J	Carbon Film
R835, 836	VRD-RT2EE153J	Carbon Film
R837	VRD-RT2EE472J	Carbon Film
R838, 839	VRD-RT2EE104J	Carbon Film
R840	VRD-RT2EE101J	Carbon Film
R841	VRD-RT2EE102J	Carbon Film
R842	VRD-RT2EE392J	Carbon Film
R843	VRD-RT2EE472J	Carbon Film
R844, 845	VRD-RT2EE104J	Carbon Film
R846	VRD-RT2EE101J	Carbon Film
R847	VRD-RT2EE102J	Carbon Film
R848	VRD-RT2EE392J	Carbon Film
R849	VRD-RT2EE102J	Carbon Film
R850	VRD-RT2EE333J	Carbon Film
R851, 852, 853	VRD-RT2EE102J	Carbon Film
R854	VRD-RT2EE333J	Carbon Film
R855	VRD-RT2EE102J	Carbon Film
R856, 857	VRD-RT2EE152J	Carbon Film
R858	VRD-RT2EE104J	Carbon Film
R859	VRD-RT2EE561J	Carbon Film
R860	VRD-RT2EE472J	Carbon Film
R861	VRD-RT2EE102J	Carbon Film
R862, 863	VRD-RT2EE104J	Carbon Film
R864	VRD-RT2EE332J	Carbon Film
R865, 866, 867, 868	VRD-RT2EE101J	Carbon Film
R869	VRD-RT2EE332J	Carbon Film
R870	VRD-RT2EE104J	Carbon Film
R871, 872, 873	VRD-RT2EE750G	Carbon Film

REF. NO.	PART NO.	DESCRIPTION
R874	VRD-RT2EE332J	Carbon Film
R875	VRD-RT2EE562J	Carbon Film
R876	VRD-RT2EE472J	Carbon Film
	CAPACITORS	
C801R, 801G, 801B	97AECCR1H470JC	Ceramic
C802R 802G, 802B	97ASM16VB47	Electrolytic
C803, 804	97ASM16VB10BP	Electrolytic
C C805	97ASM16VB100	Electrolytic
C C806, 807, 808	97AT92MC1H473K	Polyester Film
C809, 810, 811	97ASM16VB47	Electrolytic
C812	97ASM16VB33	Electrolytic
C813, 814, 815	97AT92MC1H104K	Polyester Film
C816	97AECCR1H470JC	Ceramic
C817	97ASM16VB47	Electrolytic
C818	97ASM50VB10	Electrolytic
C819	97AECCR1H470JC	Ceramic
C820	97ASM16VB47	Electrolytic
C821	97ASM50VB10	Electrolytic
C822, 823	97AT92MC1H104K	Polyester Film
C824	97ASM50VB10	Electrolytic
C825	97AT92MC1H104K	Polyester Film
C826, 827	97ASM50VB1	Electrolytic
C828, 829, 830	97ASM16VB47	Electrolytic
C831, 832, 833	97ASM50VB1	Electrolytic
C834, 835	97ASM16VB47	Electrolytic
C836	97ASM50VB10	Electrolytic
C837	97AECCR1H220JC	Ceramic
	MISCELLANEOUS	
SW801R, 801G, 801B	97ASSB-022	Slide Switch
SW802	97ASSA-042	Slide Switch
SW803	97ASSS-012	Slide Switch
SW804	97ASSS-022	Slide Switch
SW805, 806, 807	97ASSB-022	Slide Switch
CN801a	97A171825-7	Connector
CN802a	97A1-171825-2	Connector
CN803a	97A171825-9	Connector
CN804a	97A171825-4	Connector
CN801b	97A171822-7	Connector Housing
	97A170262-2	Connector Contact
J801R, 801G, 801B, 802R, 802G, 802B, 803, 804, 805, 806, 807, 808	97ABNC-BR3-6	BNC Connector
J809	97ANEZ-9P	Connector

CABINET AND MECHANICAL PARTS

REF. NO.	PART NO.	DESCRIPTION
MAIN UNIT		
1-1	97A4J1901000	Handle Bracket Left
1-2	97A4J1901100	Handle Bracket Right
1-3	97A4J1901200	Front Handle
1-4	97A4B5501000	Spring
1-5	97A4J1503500	CRT Socket Cover
1-6	97A4J1909300	Handle Bracket
1-7	97A4J0601700	Spacer
1-8	97A3J1901300	Reinforcement Fitting (Front)
1-9	97A3J1901400	Reinforcement Fitting (Top Left)
1-10	97A3J1901500	Reinforcement Fitting (Top Right)
1-11	97A3J1901600	Reinforcement Fitting (Left)
1-12	97A3J1901700	Reinforcement Fitting (Right)
1-13	97A3J1901800	Handle Arm (Left)
1-14	97A3J1901900	Handle Arm (Right)
1-15	97A3J1902000	Case Bracket
1-16	97A3J1902100	DEF Unit Support
1-17	97A3J1902900	DEC PWB Bracket Panel
1-18	97A2J1904600	Escutcheon
1-19	97A2J1902200	Front Case
1-20	97A2J1902300	Rear Frame
1-21	97A2J1902400	Chassis
1-22	97A2J1902500	Side Case (Left)
1-23	97A2J1902600	Side Case (Right)
1-24	97A2J1902700	Upper Case
1-25	97A2J1902800	Rear Panel
1-26	97A4J1904700	Model Panel
1-27	97A4B0511400	High Voltage Caution Label
1-28	97A4Z0M05200	Service Personnel Warning Label
1-29	97A4J1507300	Fuse Label 4A
1-30	97A4J1507400	CRT Handling Label
1-31	97A4J1507800	User Caution Label
1-32	97A4Z0000100	Badge "SHARP"
1-33	97A4Z0CS2400	Push Nut
1-34	97A4ZB321200	Spring Washer
1-35	97A4Z00K2900	Rubber Foot
1-36	97A4ZCKN1000	CKN Clamp
1-37	97A4Z3701800	Harness Clip
1-38	97A4ZA195200	Handle
1-39	97A4ZDP25000	Hole Plug
1-40	97A4Z0006200	Path Lock
1-41	97A4Z0061600	PWB Holder
1-42	97A4Z00K2900	Foot
1-43	97ASNFGC4010	Screw
DECODER UNIT		
2-1	97A4J1502700	Decoder Unit Radiator

REF. NO.	PART NO.	DESCRIPTION
REAR UNIT		
3-1	97A4J1502800	Bush for BNC
3-2	97A4J1502900	Color for BNC
3-3	97A3J1903000	Connector Panel
3-4	97A3J1903100	Rear Indication Panel
DEFLECTION UNIT		
4-1	97A4J1501800	DEF Unit Radiator
4-2	97A4J1502000	Resistor Bracket Panel
4-3	97A3J1501700	DEF Unit Radiator
4-4	97A3J1501900	HV PWB Bracket Panel
4-5	97A2J1501600	DEF Unit Bracket Panel
4-6	97A490108500	High Voltage Warning Label
4-7	97A4J1507500	Service Personnel Warning Label
4-8	97A4Z0036700	Screw Grommet
4-9	97A4Z0162000	Cable Clip
4-10	97A4B0042400	Washer
POWER UNIT		
5-1	97A4J1502200	Power Unit Radiator
5-2	97A4J1501500	Power Unit Indication Label
5-3	97A2J1502100	Power Unit Bracket Panel
5-4	97A4B0042400	Washer
5-5	97A4J1507200	Fuse Label 2A
FRONT UNIT		
6-1	97A4J1903200	Front Panel Left
6-2	97A4J1903400	Spring Bracket
6-3	97A4J1903700	Spring
6-4	97A4J1903600	Knob
6-5	97A4Z0111900	VR Knob
6-6	97A4J1909200	Hinge
6-7	97A4J1909100	Plate Nut
6-8	97A3J1906700	Door
6-9	97A3J1903900	Front PWB Holder
6-10	97A3J1904000	Front VR Panel
6-11	97A3J1904200	PWB Cover
6-12	97A2J1904300	Front Unit Bracket Panel
6-13	97A2J1904400	Front Panel Right
6-14	97A4Z0007500	Canoe Clip
RACK MOUNT		
7-1	97A4J1905000	Rack Mount Screw
7-2	97A4J1905700	Decoration Washer
7-3	97A4J9111100	Stopper
POWER CABLE		
8-1	97A0033A-0089A	Power Cable

XM-1900

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