

PHOTOFACT® Technical Service Data

SET 2968

MODEL CS-2722R

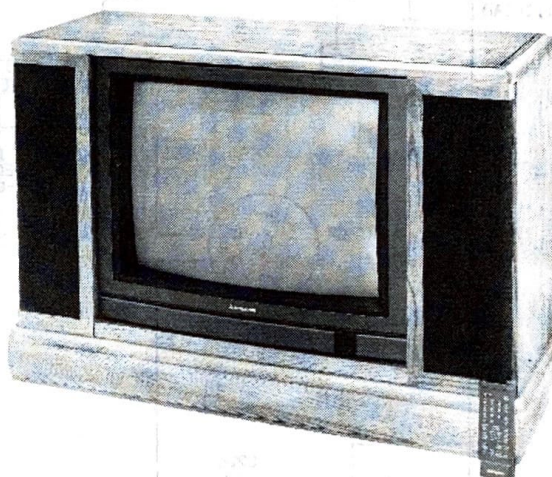
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Model CS-2722R



Complete coverage
for servicing a television receiver...

- Schematics
- Parts lists
- Component locations
- Troubleshooting guide



HOWARD W. SAMs & COMPANY

For Supplier Address,
See PHOTOFACT Annual Index

APRIL 1992 SET 2968

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SAFETY PRECAUTIONS

SERVICE WARNING

ONLY qualified service technicians who are familiar with safety checks and guidelines should perform service work. For continued SAFETY:

1. Before replacing parts, disconnect power source to protect electrostatically sensitive parts.
2. Do not attempt to modify any circuit unless so recommended by the manufacturer.
3. When servicing chassis, use an isolation transformer between the line cord and power receptacle.

SERVICING HIGH VOLTAGE AND PICTURE TUBE

Use EXTREME CAUTION when servicing the High Voltage circuits.

1. To discharge static High Voltage, connect a 10-kilohm resistor in series with a test lead between chassis and picture tube anode lead.
2. DO NOT lift picture tube by the neck.
3. ALWAYS wear shatterproof goggles when handling picture tube to protect eyes in case of implosion.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Be aware of the instructions and procedures covering x-ray radiation. In solid-state receivers and monitors, the picture tube is the only potential source of x-rays.

1. Keep an accurate High Voltage meter available at all times. Check meter calibration periodically.
2. Whenever servicing a chassis, check High Voltage at various brightness levels to be sure it is regulating properly.
3. Keep High Voltage at rated value, NO HIGHER. Excessive High Voltage may cause x-ray radiation or failure of associated components. DO NOT depend on protection circuits to keep voltage at rated value.
4. When troubleshooting a set with excessive High Voltage, avoid close contact with picture tube. DO NOT operate set longer than necessary. To locate the cause of excessive High Voltage, use a variable AC transformer to regulate voltage.
5. In present chassis, many electrical and mechanical components have safety-related characteristics which are not detectable by visual inspection. Such components are identified by a # on both the schematic and the parts list. For SAFETY, use only equivalent replacement parts when replacing these components.

SAFETY CHECKS -- FIRE AND SHOCK HAZARD

Cold Leakage Checks for Sets with Isolated Ground

1. Unplug the AC cord, connect a jumper across the plug prongs, and turn the power switch ON.
2. Use an ohmmeter to measure the resistance between the jumpered AC plug and any exposed metal cabinet parts such as antenna screw heads, control shafts, or handle brackets. Exposed metal parts with a return path should measure between 200 kilohms and 5 megohms. Parts without a return path must register infinity.

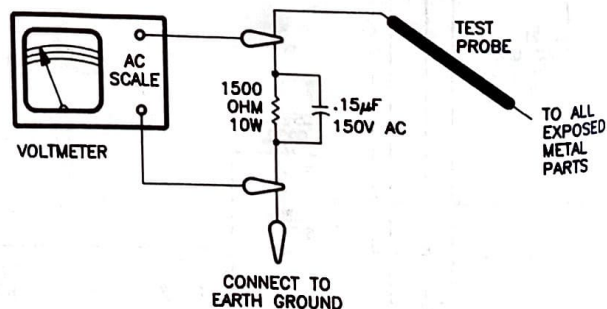
Hot Leakage Current Check

1. Plug the AC cord directly into AC outlet. DO NOT use an isolation transformer.
2. Use a 1500-ohm, 10-watt resistor in parallel with a .15-microfarad 150-volt AC capacitor to connect between any exposed metal parts on the set and a good earth ground. (See figure below.)
3. Use an AC voltmeter with at least 1000 ohms-per-volt sensitivity to measure the voltage across the resistor. Check all exposed metal parts and measure voltage at each point.
4. Voltage readings should not exceed .75 volts RMS (5 milliamps AC). Any value exceeding this limit constitutes a potential shock hazard and must be corrected.
5. If AC plug is not polarized, reverse the AC plug and repeat exposed metal part voltage measurement at each point.

GENERAL GUIDELINES

Perform a final SAFETY CHECK before returning set to customer.

1. Check repaired area for poorly soldered or de-soldered connections, and check entire circuit board for solder splashes.
2. Check inner board wiring for pinched wires or wires contacting any high-wattage resistors.
3. Check that all control knobs, shields, covers, grounds and mounting hardware have been replaced. Be sure to replace all insulators and restore proper lead dress.



TROUBLESHOOTING

POWER SUPPLY

Check the AC Fuse (F901) and DC Fuse (F951). If Fuse F901 is open, check Diode Packs (D3A0 and D953), Capacitors C901, C954, C955, C956 and Electrolytic C953. If Fuse F951 is open, check Power Regulator (IC951) and Horizontal Output Transistor (Q551). Apply 120V and check for 152V* at the cathode of D953. If 152V* is missing at the cathode of D953, check Line Filter (L901) and Power Relay (K901). If 152V* is present at the cathode of D953, check Line Filter (L901) check for 130V* at TP951E. If this voltage is missing, check for 130V* AT TP951E. If this voltage is missing, check voltages and components associated with 130V Regulator IC (IC951). If the proper voltage is present at TP951E, refer to the "Horizontal" section of this Troubleshooting guide.

*With respect to isolated ground.

HORIZONTAL

Determine if the TV list in shutdown, refer to the "High" Voltage Shutdown" section of this Troubleshooting guide. If the TV is not in shutdown, inject a horizontal signal at the base of the Horizontal output Transistor (Q551). If horizontal deflection is now present, check voltages, waveforms and components associated with pins 20, 22, 24, 25 of the Signal Control IC (IC201) and the Horizontal Driver Transistor (Q552). If there is still no horizontal sweep, check the voltages, waveforms and components associated with Q551 and the Horizontal Output Transformer (T551). Check the voltages and components associated with Diodes D552, D553, D561 and D582 for defects. The High Voltage Rectifier is part of Transformer T551 and if defective will affect the performance of the horizontal circuits. If the Horizontal oscillator is off frequency, check the voltages, waveforms and components associated with pins 24 and 25 of IC201. Horizontal linearity or foldover problems may be caused by capacitors C552 and C570 defective.

AUDIO

Select an active TV channel and check for an audio waveform at pin 2 of the MCS IC (IC350). If there is no audio, check voltages, waveforms and components associated with pins 2,3,4 and 39 of the Signal Control IC (IC201). If waveform is present at pin 2 of IC301, select a station transmitting a signal in stereo and check for audio at pins 27 and 36 of IC350. If audio is missing, check voltages, waveforms and components associated with pins 1,3 thru 11 and 14 of IC350. Check for audio waveforms in Stereo/SAP/Mono modes at pins 34 and 35 of IC350. If waveforms are missing, check voltages, waveforms and components associated with pins 13,17 thru 23 and 30 thru 35 of IC350. If waveforms are present, check for waveforms at pins 7 and 10 of the audio out IC 91(C3A2). If audio is missing, check voltages, waveforms and components associated with Audio Control IC (IC3A0) and (IC3A2).

VIDEO

Inject a video signal at TP12 and check for video on the CRT. If video is present, refer to the "IF-AGC" section of this Troubleshooting guide. If there is no video on the CRT, check for a video waveform at pin 32 of the Signal Control IC (IC201). If video is missing at pin 32 of IC201, check the voltages, waveforms and components associated with the Video Switch IC (IC2A0), THE Y/C Switch IC (IC202), Y Buffer Transistor (Q204) and 2nd Video Transistor (Q203). If video is present at pin 32 of IC201, check for a video waveform at pin 19 of IC201. If the waveform is missing, check the voltages, waveforms and components associated with pins 29 and 32 of IC201. If the waveform is present at pin 19 of IC201, check the voltages, waveforms and components associated with Y Out Transistor (Q201), CRT Output Transistors (Q201), CRT Output Transistors (Q680, Q681, Q682, Q651, Q652, Q653) and the CRT. If brightness is inadequate or cannot be controlled, check voltages and components associated with pin 29 of IC201 and pin 7 of the CRT.

TROUBLESHOOTING continued

VERTICAL

Inject a vertical signal at pin 27 of the Signal Control IC (IC201). If vertical deflection is present, check voltages, waveforms and components associated with pin 27 of IC201. If there is still no vertical deflection, check voltages, waveforms and components associated with the Vertical Output IC (IC1401). Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits, check Electrolytics C450, C452, C454, C455, C458 for defects.

SYNC

If there is no vertical or horizontal sync, check voltages, waveforms and components associated with pin 26 of the Signal Control IC (IC201). If there is no vertical sync, check the voltages, waveforms and components associated with pins 26,27 of IC201. If there is no horizontal sync, check the voltages and components associated with pins 22,24,26 of IC201.

RASTER

Check the CRT and CRT voltages. If there is no red, check the voltages and components associated with pin 16 of the Signal Control IC (IC201) and Red Output Transistor (Q651). If there is no green, check the voltages and Output Transistor (Q652). If there is no blue, check voltages and components associated with pin 18 of IC201 and Blue Output Transistor (Q653). If the raster has keystone shape, check the Deflection Yoke (L4910). If the raster has height or width problems, refer to the "Vertical", "Horizontal" and "Power Supply" sections of this Troubleshooting guide.

IF-AGC

Inject a video IF signal at the IF input and check for video on the CRT. If video is present, check the Tuner, Tuner Control, Tuner AFC circuits. If there is no video on the CRT, check for a video waveform at TP12. If video is present at TP12, refer to the "Video" section of this Troubleshooting guide. If there is no video at TP12, apply AGC bias to pin 10 of the Signal Control IC (IC201). If video is now present at TP12, check the voltages, waveforms and components associated with pins 8, 10 and 40 of IC201. If there is still no video at TP12, check the voltages, waveforms and components associated with pins 5 thru 10, 35, 37, 38, 40, 41 and 42 of IC201, the VIF Amp Transistor (Q130) and the 1st Video Transistor (Q101). A defective AGC circuit can cause an overloaded picture, excessive snow or loss of audio and video. See the AGC Voltage Chart for AGC voltages with signal.

AGC VOLTAGE CHART

IC201

Pin 8 5.6V

Pin 10 7.1V

Pin 40 7.7V

HIGH VOLTAGE SHUTDOWN

The high voltage is monitored by Diode (D582), rectifying pulses from the Horizontal Output Transformer (T551). Should the high voltage increase, the rectified voltage at the cathode of Diode D503 will also increase and trigger pin 23 of IC201 into shutdown. To troubleshoot, remove Resistor R520 from the circuit and use a variac for AC power. Start at 90VAC and increase as necessary to locate and repair the defect. Return R520 to the circuit. NOTE: Care should be taken in defeating the high voltage shutdown circuit as this may cause excessive x-ray radiation and damage to the CRT, Transformer T551 and associated components. Monitor the High Voltage and troubleshoot.

Voltages Taken in Shutdown

IC201

Pin 23 .7V

TP951E 113V

HIGH VOLTAGE SHUTDOWN TEST

Apply 120VAC, turn set on, set all customer controls for Normal operation and temporarily short cathode of D582 to cathode D503. Set should lose raster and sound. If set does not lose raster and sound the shutdown circuit should be repaired. To resume normal operation, remove AC Power and wait 30 seconds then turn set on.

CHROMA

Check for a chroma waveform at pin 34 of the Signal Control IC (IC201). If the waveform is missing, check the components associated with pin 34. Check the voltages, waveforms and components associated with Y/C Switch (IC202). If a chroma waveform is present at pin 34 of IC201, check for the proper waveforms at pins 16,17 and 18 of IC201. If these waveforms are missing, check the voltages, waveforms and components associated with pins 11 thru 18,33,34, and 35 of IC201. Check the 3.58MHz oscillator at pin 14 of IC201. Check the voltages and components associated with the color control and pin 34 of IC201. If there is inadequate tint range, check the voltages, waveforms and components associated with the tint control and pin 13 of IC201. If the proper waveforms are present at pins 16,17 and 18 of IC201, refer to the "RASTER" section of this Troubleshooting guide.

STEREO/SAP ADJUSTMENTS

COMPOSITE LEVEL

NOTE: The following adjustments were made with B&K model 2009 MTS TV-STEREO generator, connected to antenna terminals. Equivalent generator may be used.

Select PILOT, 1kHz audio frequency and L + R modulating signal. Select Stereo mode on receiver. Connect an Oscilloscope to TP-MO, low side to Ground. Adjust Composite Level Control (VR350) for a reading of 500mV p-p.

STEREO FILTER

Select SAP, 1kHz audio frequency, and L-R modulating signal. Select SAP mode on receiver. Connect an Oscilloscope to TP-N1, Low side to ground. Adjust Stereo Filter Control (VR351) for Maximum.

SAP FILTER

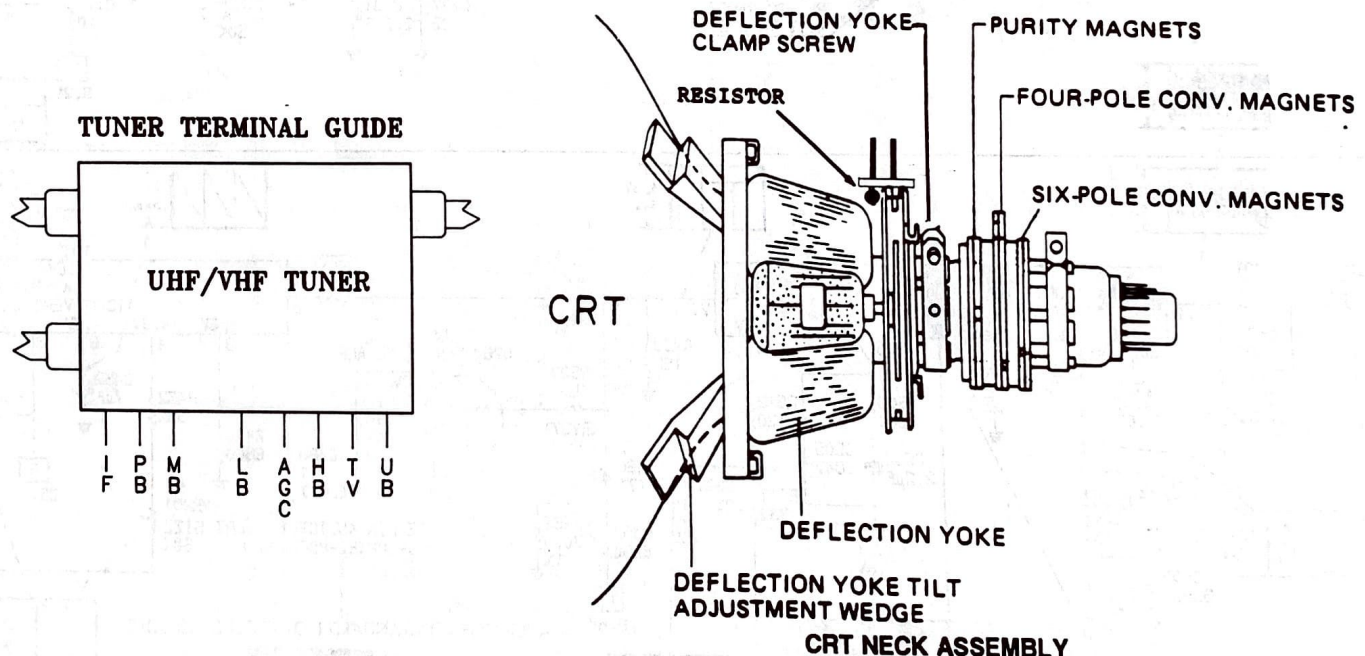
Select PILOT, 1kHz audio frequency, and L+R modulating signal. Select Stereo MODE ON RECEIVER. Connect an Oscilloscope to TP-L4, Low side to Ground. Adjust DBX Filter Control (VR3520) FOR 400mV p-p.

STEREO VCO

Select PILOT, 1kHz audio frequency, and L-R modulating signal. Select Stereo mode on receiver. Connect a Frequency Counter to TPM1. Connect a Jumper to TP-L1 AND TP-L2. Adjust Stereo VCO (VR355) for 15.75kHz. Remove Jumper.

SEPARATION AND SPECTRAL

Select PILOT, 100Hz audio frequency, and L modulating signal. Select Stereo mode on receiver. Connect an Oscilloscope to TP-M2, low side to Ground. Adjust Separation Control (VR3530) for MINIMUM amplitude of 300Hz waveform. Select 8kHz audio frequency on Generator. Adjust Spectral Control (VR354) for MINIMUM amplitude of 8kHz waveform. Repeat adjustment until no further decrease in waveform occur.



TUNER VOLTAGE CHART

	PB	MB	LB	AGC	HB	TV	UB
VHF Low Band	5.0V	12.0V	11.4V	6.8V	0V	1.2V	0V
VHF High Band	5.0V	12.0V	0V	6.8V	11.8V	4.2V	0V
UHF Band	5.0V	12.0V	0V	6.8V	0V	6.5V	11.8V

NOTE: VHF Low Band voltages taken on channel 2.
VHF High Band voltages taken on channel 7.
UHF Band voltages taken on channel 14.

MISCELLANEOUS ADJUSTMENTS

PRETUNING

Note: All procedures require an antenna connected and power applied to the set.

Auto Memory

1. Press the Mode button until "AUTO PROGRAM" is displayed on screen.
2. Press the Adjust Left or Right button to select TV or CATV.
3. Press the Enter button, available channels are scanned and stored in memory.

Add Channel

1. Press the Mode button until "Channel Memory" appears on screen.
2. Select channel, Use direct channel access button.
3. Press the Enter button to add channel.
4. Repeat step two and three to add other channels.

Delete Channel

1. Press the Mode button until "Channel Memory" appears on screen.
2. Select channel. Use direct channel access buttons.
3. Press the Cancel button to erase channel.
4. Repeat step two and three to erase other channels.
5. Press the Mode button to end process.

Set Clock

1. Press the Mode button until "Present Time Set" appears on screen.
2. Using direct access channel buttons (1-8) enter day of the week.
3. Press the Enter button.
4. Using direct access channel buttons enter the time.
5. Press the Enter button.
6. Using direct access channel buttons (1 or 2) enter AM or PM.
7. Press Enter to start clock.
8. Press the Mode button to end process.

On Timer

1. Press the mode button until "TV Program Timer" appears on screen.
2. Using direct access channel buttons (1-8) enter day of the week.
3. Press the Enter button.
4. Using direct access channel buttons enter the time.
5. Press the Enter button.
6. Using direct access channel buttons (1 or 2) enter AM or PM.
7. Press the Enter button.
8. Using direct access channel buttons to select the desired channel.
9. Press the Enter button.

10. Press the Mode button to end process.

Off Timer

1. Press the Off-T-OTR button.
2. Unit can be set to turn off after 120, to 10 minutes (in 10 minute steps) by pressing the Off-T-OTR button.

Channel Lock

1. Press the Mode button until "Lock Code and Lock Ch" appears on screen.
2. Using direct access channel buttons (0-9) enter Lock Code.
3. Press the Enter button to enter secret code.
4. Using direct access channel buttons (1-9) enter Lock Ch number.
5. Press the Enter button to end process.

This set employs digital Customer Controls, set at Midrange unless otherwise indicated, to adjust Controls proceed as follows. Press Video Function (S709), or Audio Function (S710) to Display Control Function. Press Adj Up (S707) or Adj Down (S708) to change control setting. Remote transmitter may be used.

B+ VOLTAGE CHECK

Tune in a picture. Connect a Digital DC Voltmeter to TP951E (IC951) Pin E), Low side to TP951G (IC951 Pin 5). With AC Line Voltage at 120VAC B+ should read 130 VDC+/-VDC.

HIGH VOLTAGE CHECK

Tune in a picture. Set Brightness, Color, and Contrast to MINIMUM. Connect a High Voltage probe to CRT anode and Ground. High Voltage should read 27.0KV TO 29.0KV. High voltage must never exceed 29.0KV.

RF AGC

Tune in a picture. Adjust RF AFC Control (VR100) Counterclockwise until snow appears in picture. Then adjust RF AGC Control Clockwise to a point just past where snow disappears.

SUB CONTRAST

Tune in a picture. Set Brightness, Contrast, and Color to MINIMUM. Adjust Sub Contrast Control (VR201) for visible highlights.

CHARACTER POSITION

Tune in a picture. Press "DISP" button on remote transmitter. Adjust OSC Control (VR701) to place alphanumerical displays in the center of screen.

COLOR PURITY

(Caution: Some sets employ a CRT with neck assemblies permanently bonded to CRT. DO NOT attempt to remove these assemblies.

MISCELLANEOUS ADJUSTMENTS continued

Operate receiver for at least 15 minutes. Use a degaussing coil to demagnetize the CRT and mounting hardware. Set Color, Contrast, Red Cut Off (VR653), Blue Cut Off (VR655) TO Minimum Brightness to produce a visible raster, Green Cut Off (VR654) to produce a green raster. Loosen the Deflection Yoke clamp screw, remove rubber wedges and slide the Deflection Yoke clamp screw, remove rubber wedges and slide the Deflection Yoke forward to obtain a vertical green band. Preset the purity tabs to top center. Rotate and spread the tabs of the purity magnets in equal and opposite directions, or in the same direction while maintaining relative spacing of tabs until the green band is centered on the screen. Move the Deflection Yoke (L491) forward until a uniform green screen is obtained. Tighten the Deflection Yoke clamp screw slightly. Check Red and Blue Purity.

COLOR TEMPERATURE ADJUSTMENT B/W TRACKING

Tune in picture. Set Brightness, Contrast, Color, Red Cut Off (VR653), Green Cut Off (VR654), Blue Cut Off (VR655), and Screen (VR702B) to MINIMUM. Set Red Drive (VR651) and Blue Drive (VR652) Controls to Midrange. Disconnect Service Jumper (TPEX). Slowly advance Screen Control until a horizontal line of one color is just visible. Advance the Cut Off Control of that color slightly for a clearly dominant color. Adjust 2 Cut Off Controls not of the visible color to obtain a dim white line. Reconnect Service Jumper. Set Brightness, and Contrast to Maximum. Adjust the Blue and Red Drive Controls for best Black and White picture. Check tracking at low and high brightness. If necessary, readjust controls for best white balance.

HORIZONTAL WIDTH

Tune in a crosshatch pattern. Adjust Horizontal Width Control (VR5A3) until picture extends just beyond edges of screen.

PINCUSHION

Tune in a crosshatch pattern. Adjust PCC Amp (VR5A2) AND PCC Phase (VR5A1) for straight vertical lines at the left sides of picture.

HORIZONTAL BIAS

Tune in a crosshatch pattern. Set Bias Control (VR5A4) to fully counterclockwise position. Reduce Horizontal width by adjusting Horizontal Width Control (VR5A3) until sides are visible. Adjust Bias Control Clockwise until horizontal width just begins to change. Return horizontal width to Normal with Horizontal Width Control VR5A3.

COLOR PURITY

Operate receiver for at least 15 minutes. Use a degaussing coil to demagnetize the CRT and mounting hardware. Disconnect the B connector to produce a yellow raster. Loosen the Deflection Yoke clamp screw, remove rubber wedges and slide the Deflection Yoke forward

to obtain a vertical yellow band. Preset the purity tabs to top center. Rotate and spread the tabs of the purity magnets in equal and opposite direction, or in the same direction while maintaining relative spacing of tabs until the yellow band is centered on the screen. Slide the Deflection Yoke backwards until a uniform yellow screen is obtained. Tighten the Deflection Yoke clamp screw slightly. Check Red, Green, and Blue Purity. Red raster is obtained by disconnecting B and G connectors. Green and Blue rasters are obtained by shorting the base and emitter of the Red Output (Q651), and disconnecting the B or G connectors.

CONVERGENCE

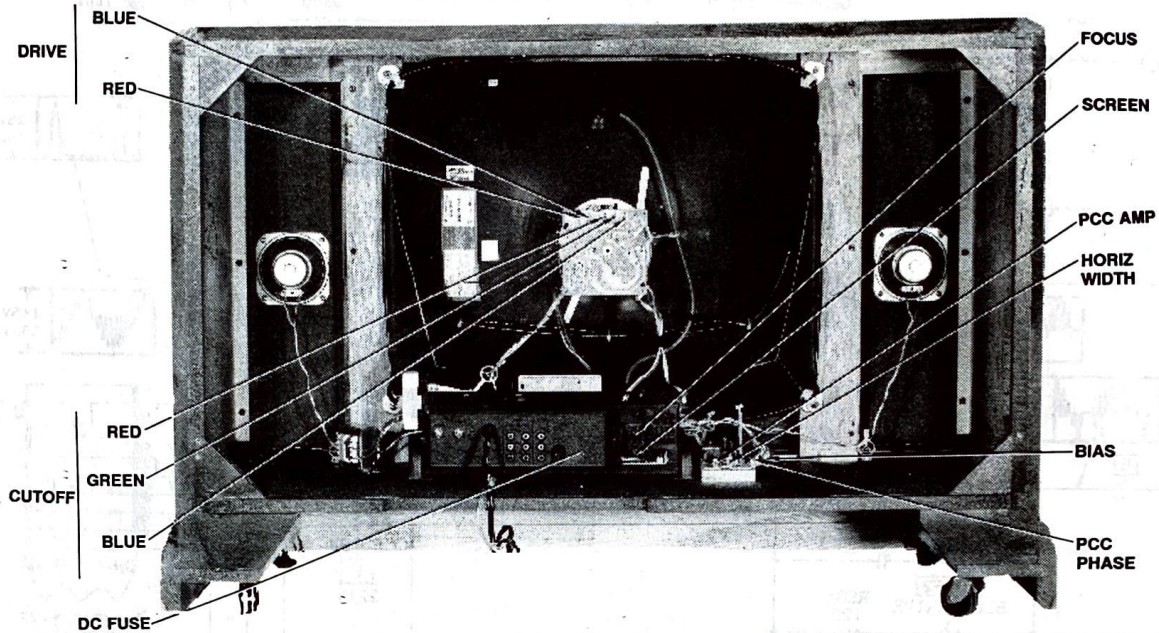
(Caution: Some sets employ a CRT with neck assemblies permanently bonded to CRT. DO NOT attempt to remove these assemblies.)

Operate receiver for 15 minutes. Connect a color bar generator to the antenna terminals and tune in a dot pattern. Set Contrast Control to MINIMUM. Set Brightness as necessary. Adjust 4 pole magnets to converge the red and blue dots at the center of the screen. Adjust the 6 pole magnets to converge the red/blue dots over the green dots at the center of the screen. NOTE; Rotate the two tabs of each set of magnets equally and opposite to converge vertically and rotate both tabs in the same direction to converge horizontally. Four and six pole magnets interact, repeat adjustment until center convergence is correct. Tighten locking ring. Tune in a crosshatch pattern. Remove rubber wedges between the Deflection Yoke (L4910) and the CRT. Tilt Deflection Yoke up or down to converge the vertical lines at the top and bottom of the screen and the horizontal lines at the top and bottom of the screen and the vertical lines at the left and right sides of the screen. Repeat convergence procedure if necessary to obtain the best overall convergence. Replace the rubber wedges. Tighten Deflection Yoke clamp screw.

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MODEL CS-2722R

CABINET - REAR VIEW



TEST JIG HOOKUP

Function	Chek-A-Color Adapter No.	PC Board Plug	Pin	Color
CRT	B239	# DY	1	Red
Yoke	D482		2	Blue
Yoke Setting	YP1A		3	Yellow
Comments	Focus Tap		4	Black

The listing of any available replacement part herein in no case constitutes a recommendation, warranty, or guarantee by Howard W. Sams & Company as to the quality and suitability of such replacement part. The numbers of the listed parts have been compiled from information furnished to Howard W. Sams & Company by the manufacturers of the specific type of replacement part listed.

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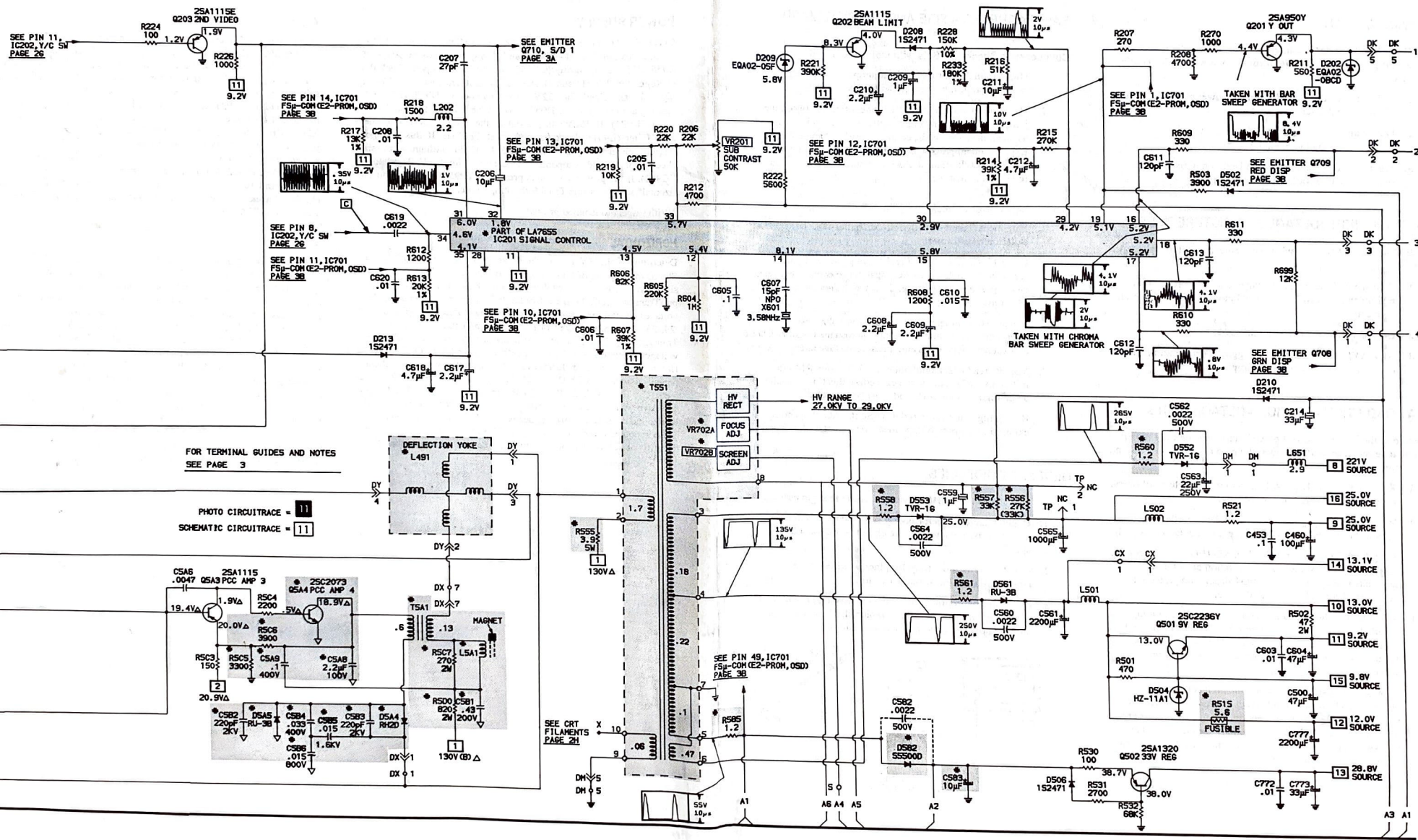


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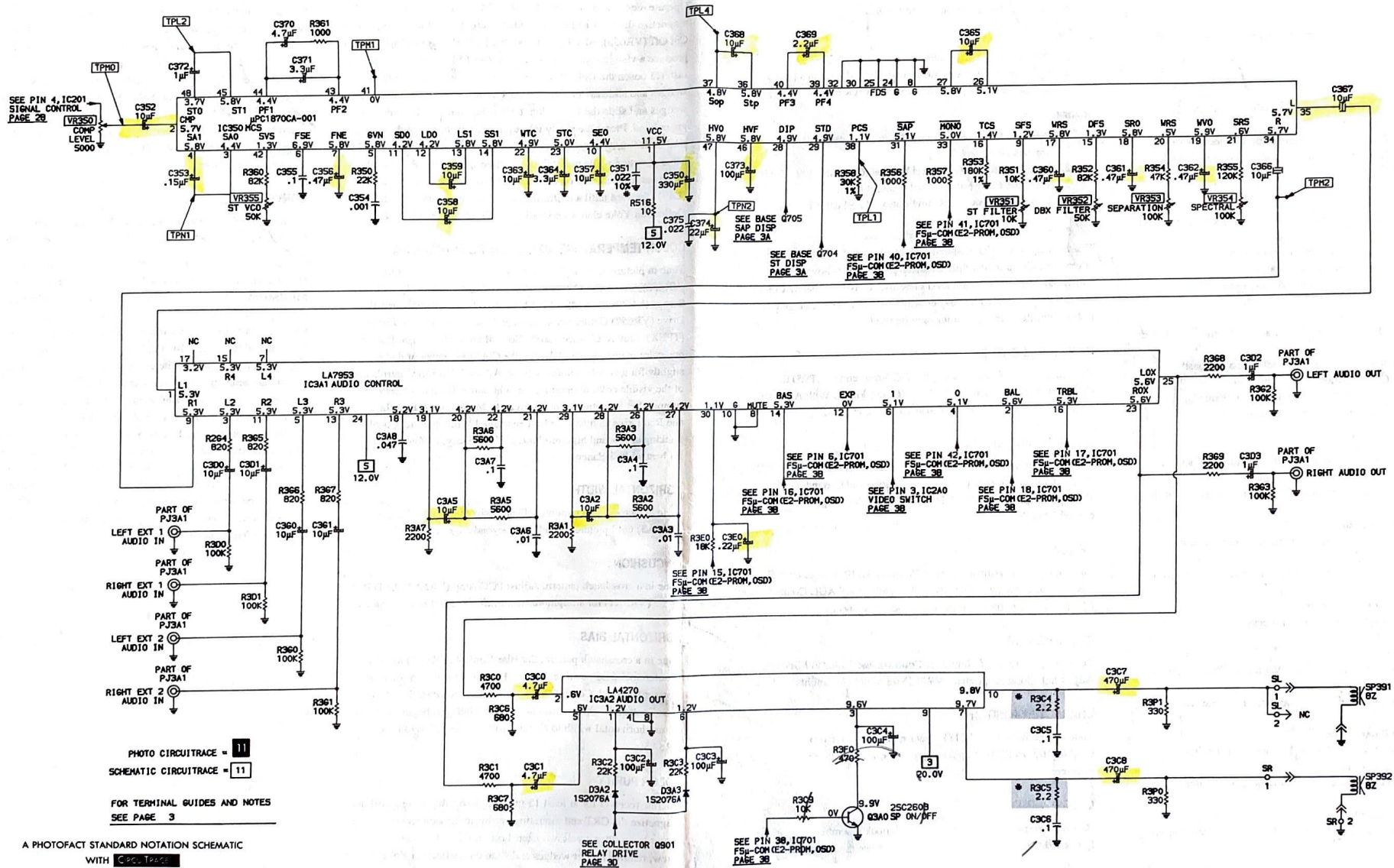
TELEVISION SCHEMATIC continued

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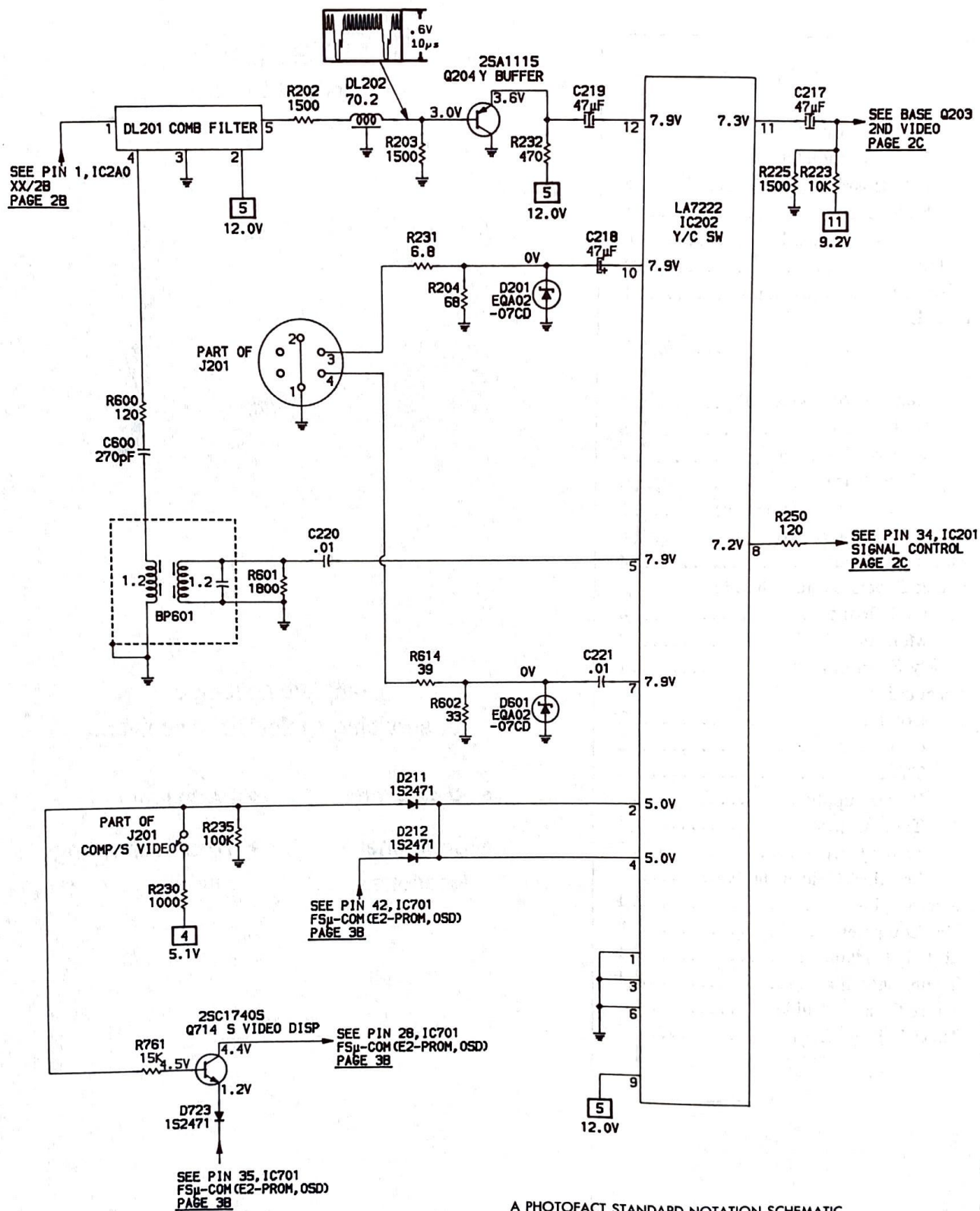
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STEREO/SAP SCHEMATIC



COMB FILTER SCHEMATIC



A PHOTOFACT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE**

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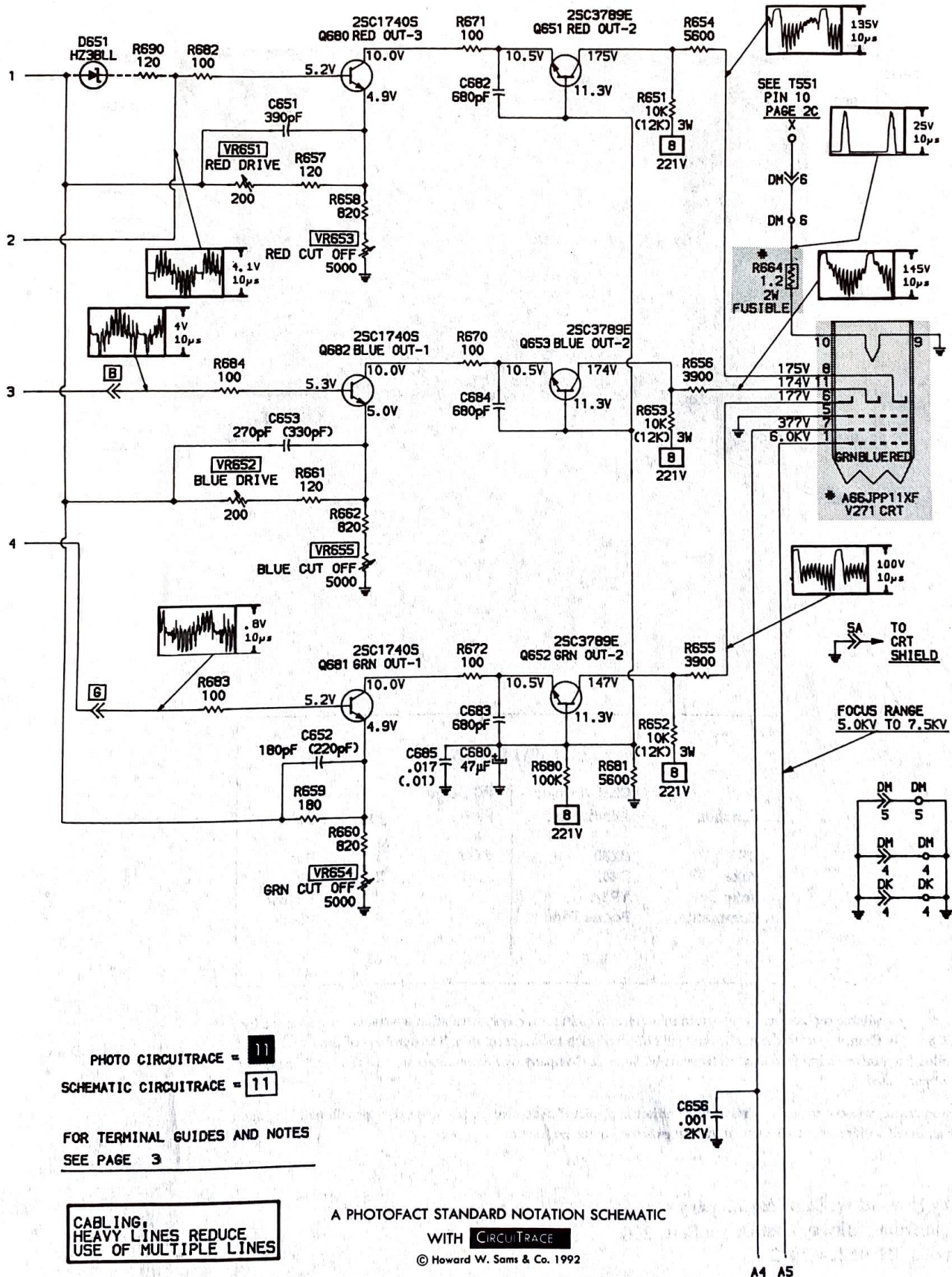
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SCHEMATIC CIRCUITRACE = 11

FOR TERMINAL GUIDES AND NOTES

SEE PAGE 3

CRT SCHEMATIC



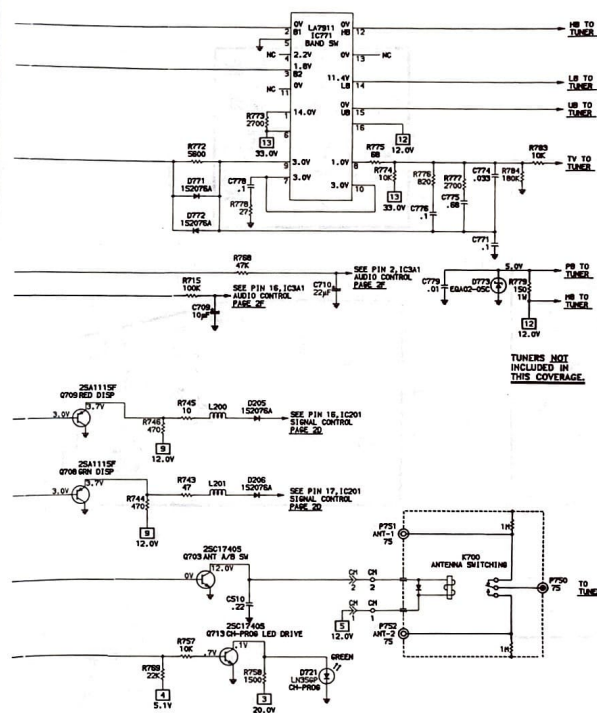
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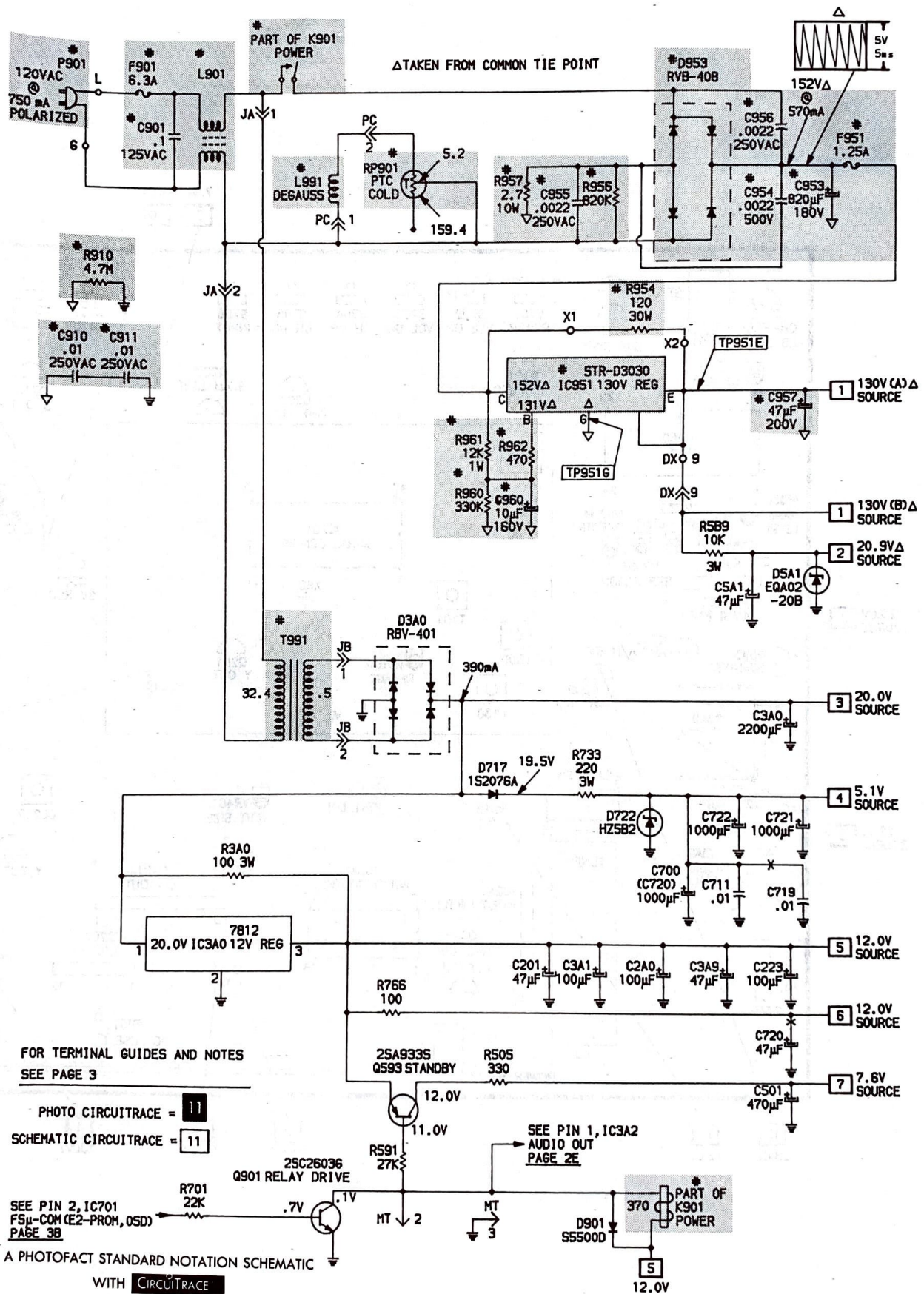
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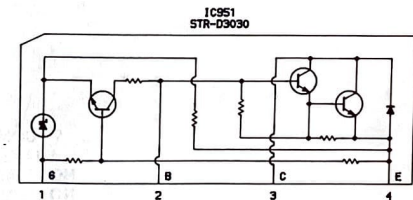
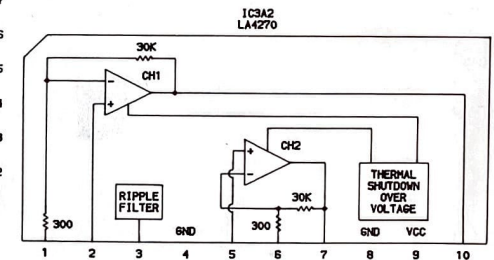
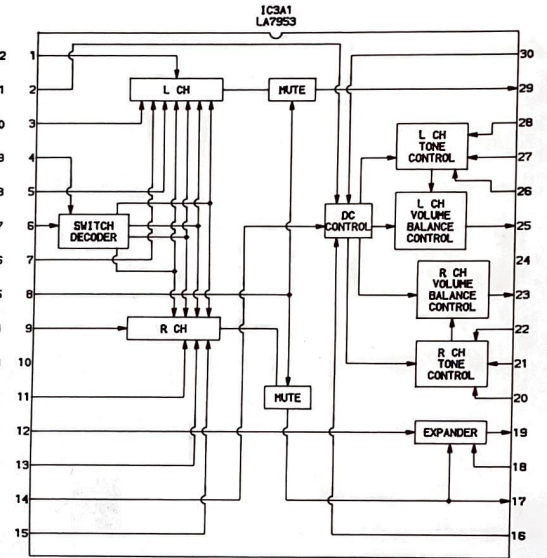
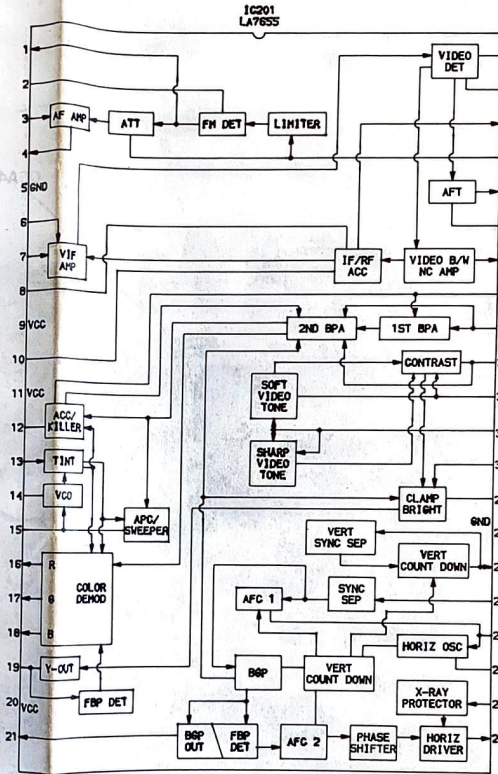
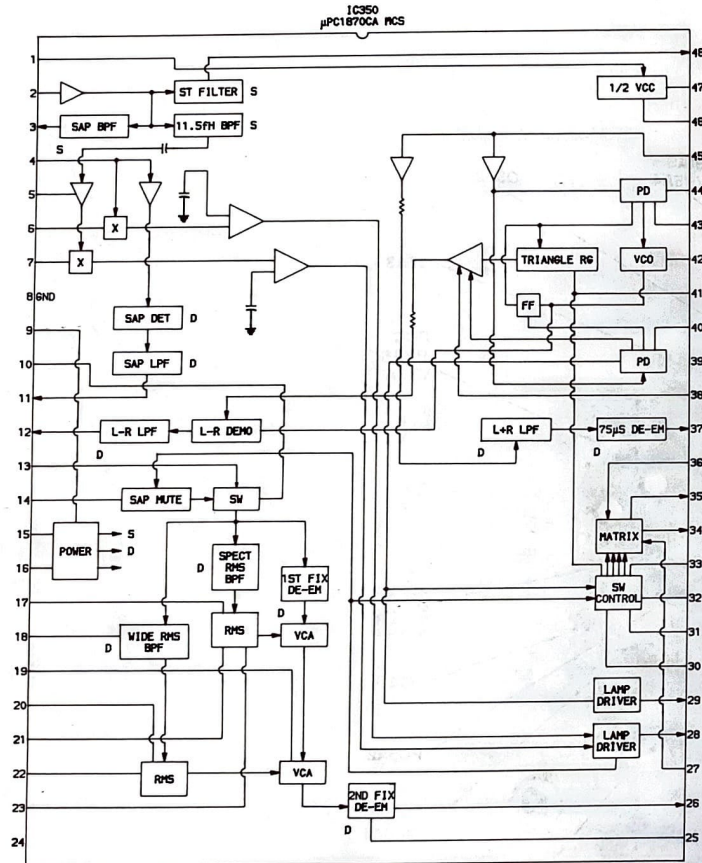
TRANO 7



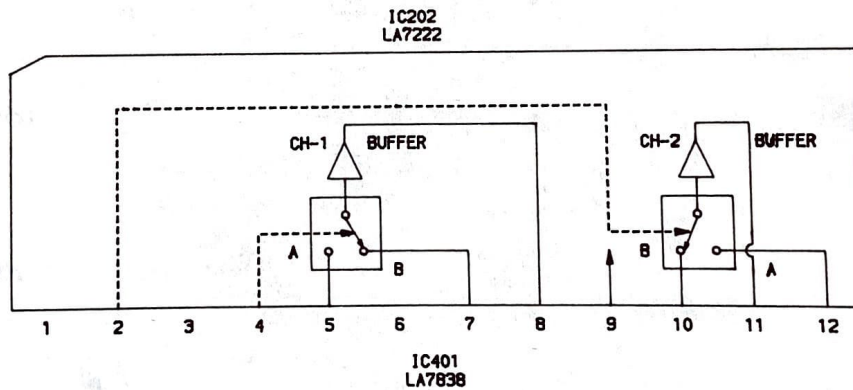
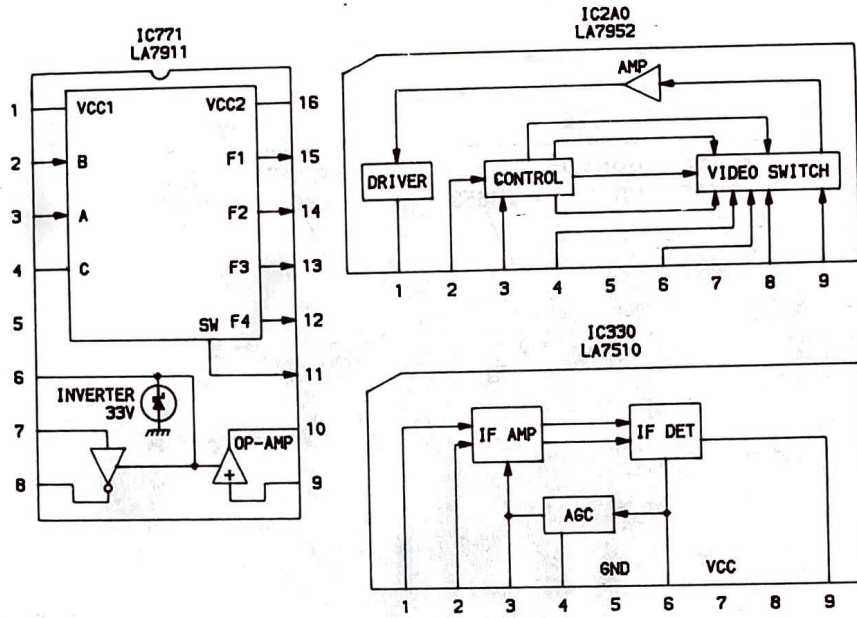
D POWER SUPPLY SCHEMATIC



IC FUNCTIONS



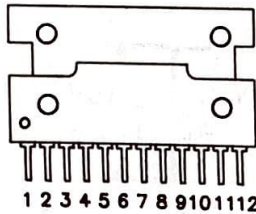
IC FUNCTIONS continued



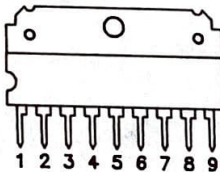
TERMINAL GUIDE AND NOTES



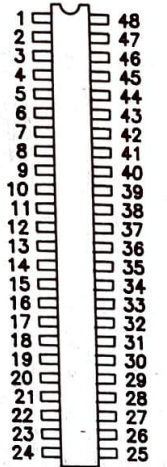
IC201
TOP VIEW



IC202
FRONT VIEW



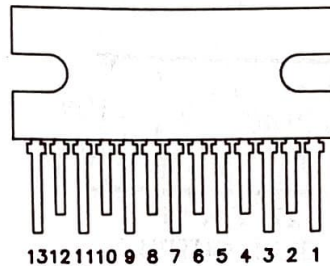
IC330
FRONT VIEW



IC350
TOP VIEW



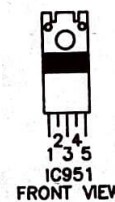
IC701
TOP VIEW



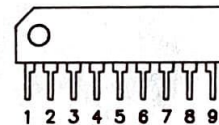
IC401
FRONT VIEW



IC771
TOP VIEW



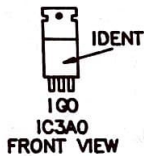
IC951
FRONT VIEW



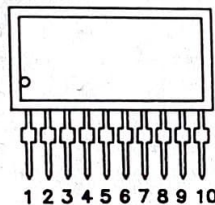
IC2A0
FRONT VIEW



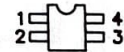
IC702
BOTTOM VIEW



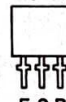
IC3A0
FRONT VIEW



IC3A2
FRONT VIEW



PC5A1, PC5A2
TOP VIEW



Q101, Q593, Q680
THRU Q682, Q702
THRU Q705, Q711
Q712 THRU Q714
Q780
FRONT VIEW



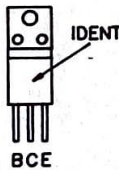
Q130, Q201, 502
BOTTOM VIEW



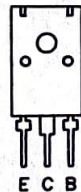
Q202 THRU Q204
Q3A0, Q5A1 THRU
Q5A3, Q708 THRU
Q710, Q901
BOTTOM VIEW



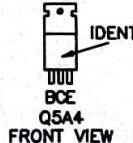
Q501, Q552
BOTTOM VIEW



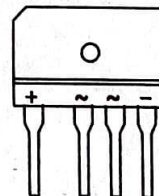
Q551
FRONT VIEW



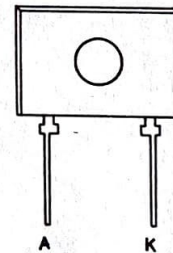
Q651 THRU Q653
FRONT VIEW



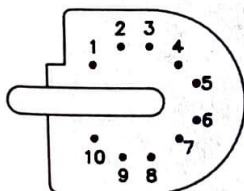
Q5A4
FRONT VIEW



D953, D3A0
FRONT VIEW



D721
FRONT VIEW



T551
BOTTOM VIEW

For SAFETY use only equivalent replacement part, see parts list.

--- Circuitry not used in some versions
--- Circuitry used in some versions

* Nominal value
+ Ground
+ Chassis
Common tie point

Waveforms and voltages are taken from ground, unless noted otherwise.

Waveforms: triggered scope, keyed rainbow generator.
Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltage maintained as shown at input.
Voltages measured with digital meter, no signal.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.

Capacitors are 50 volts or less.

5% or greater unless noted.

Electrolytic capacitors are 50 volts or less.

20% or greater unless noted.

Resistors are 1/2W or less.

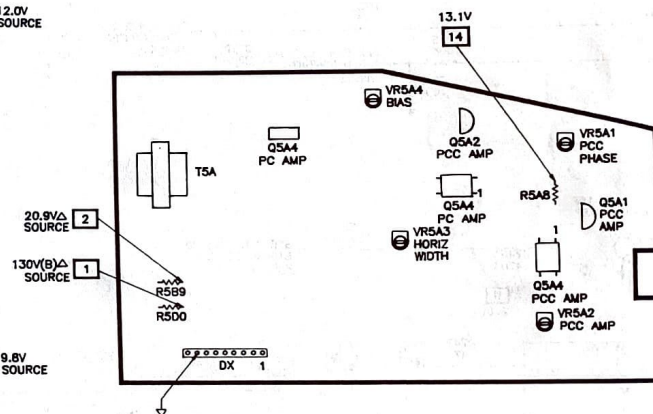
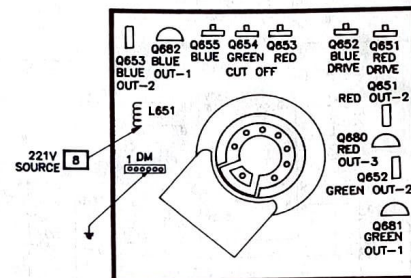
5% or greater unless noted.

Value in () used in some versions.

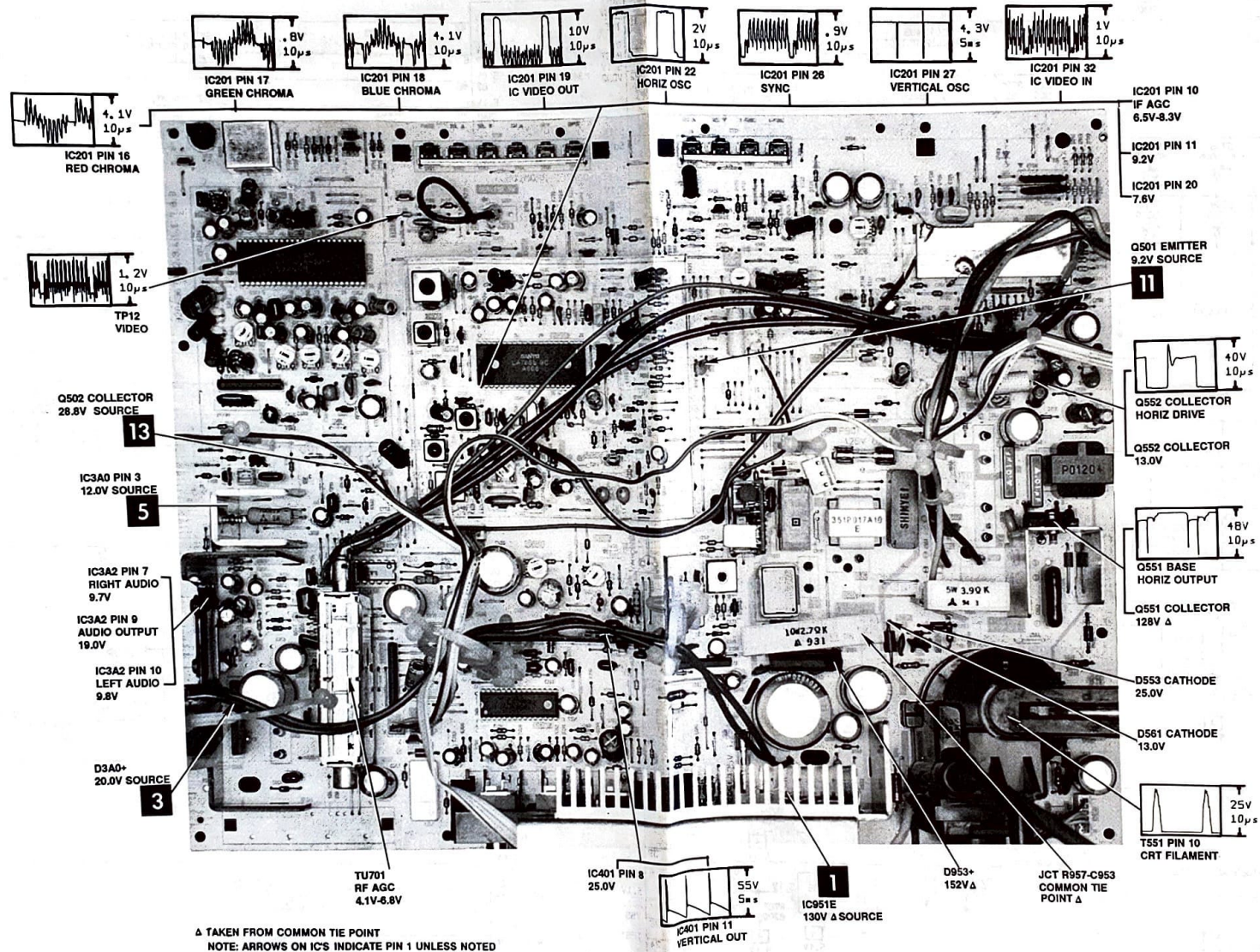
Measurements with switching as shown, unless noted.

MITSUBISHI

MODEL CS-2722R

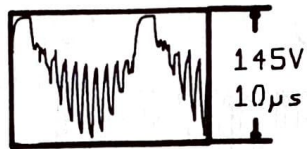


MAIN BOARD

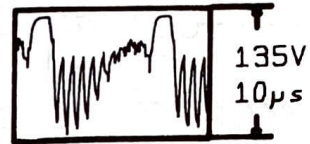


Δ TAKEN FROM COMMON TIE POINT
NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

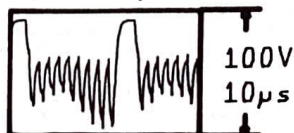
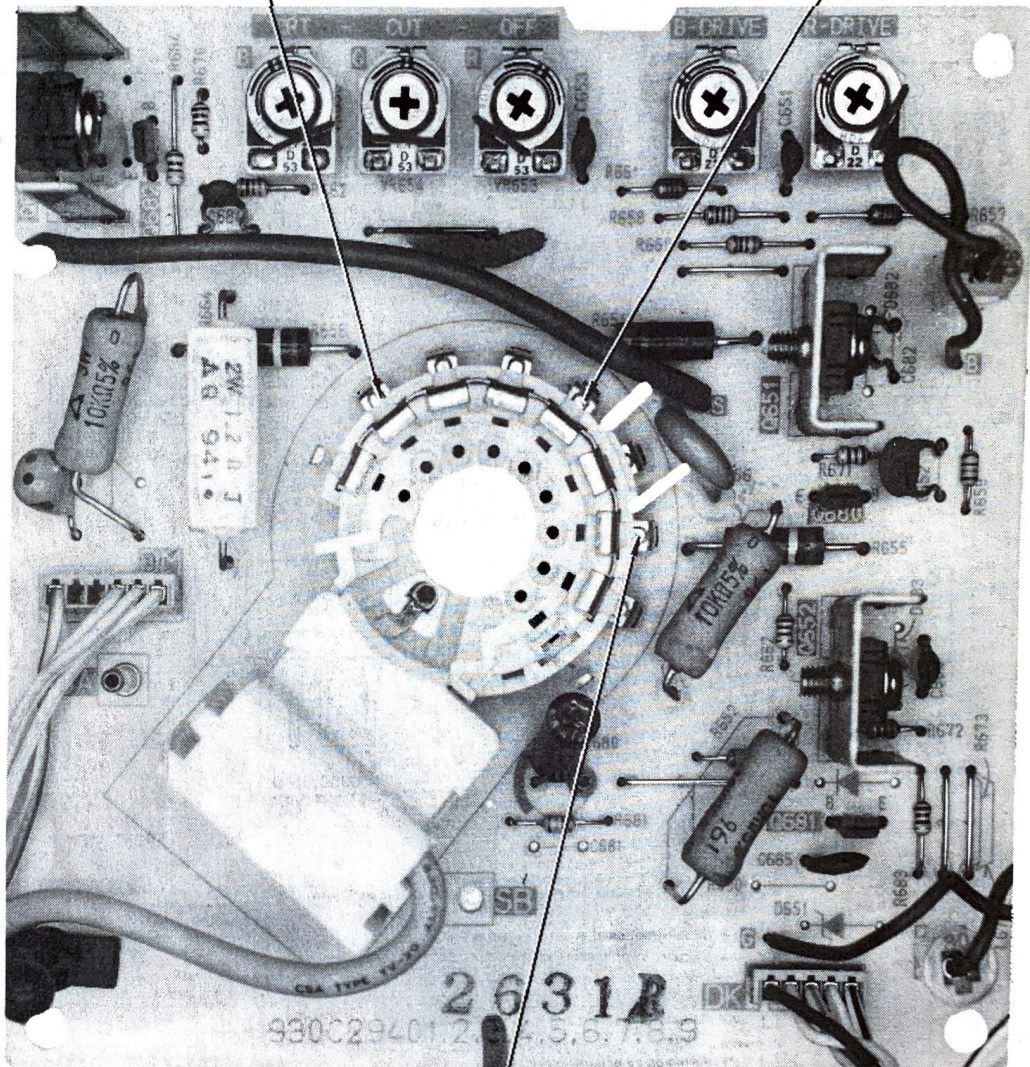
CRT BOARD



**V271 PIN 11
BLUE OUTPUT**

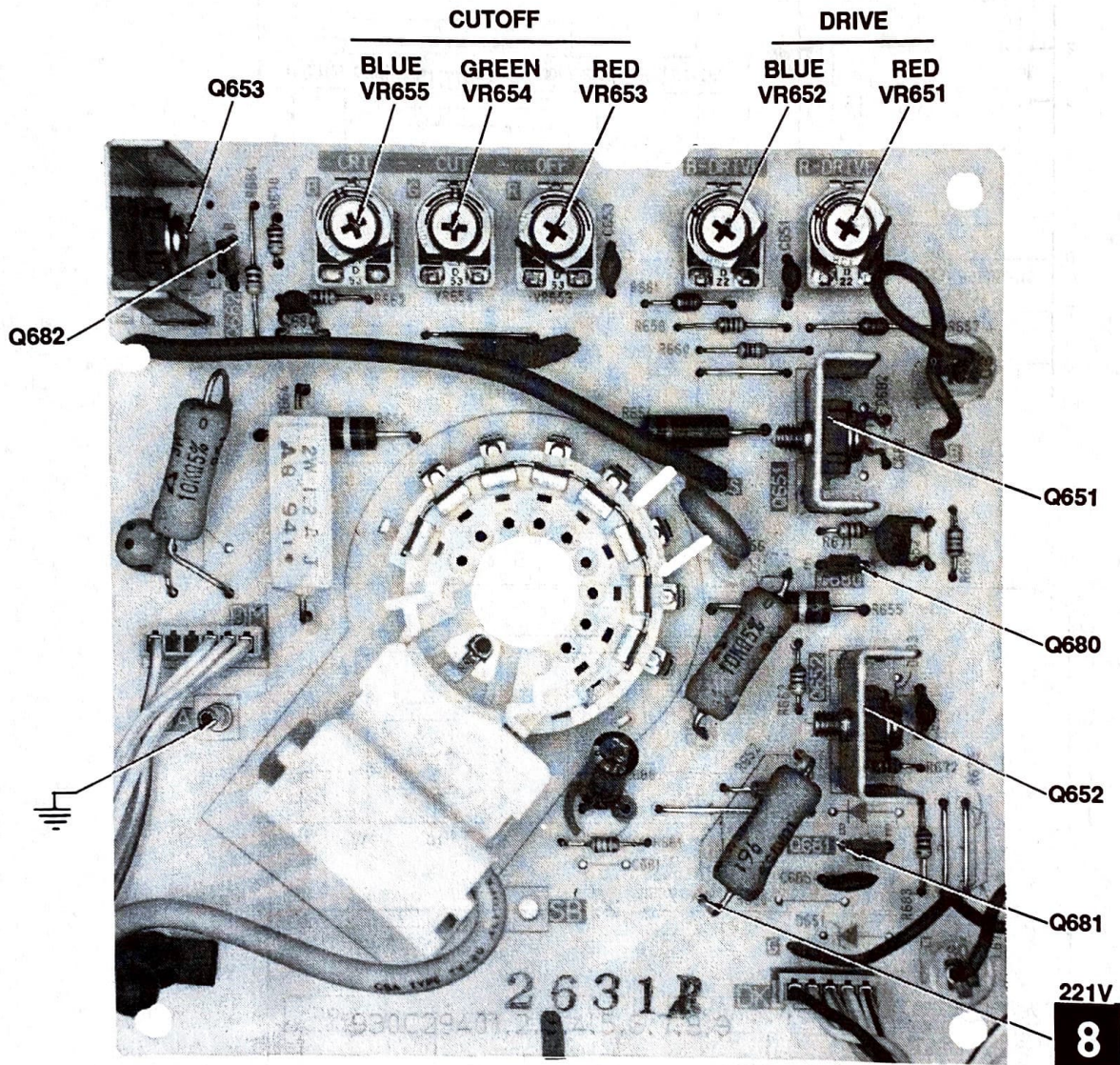


**V271 PIN 8
RED OUTPUT**



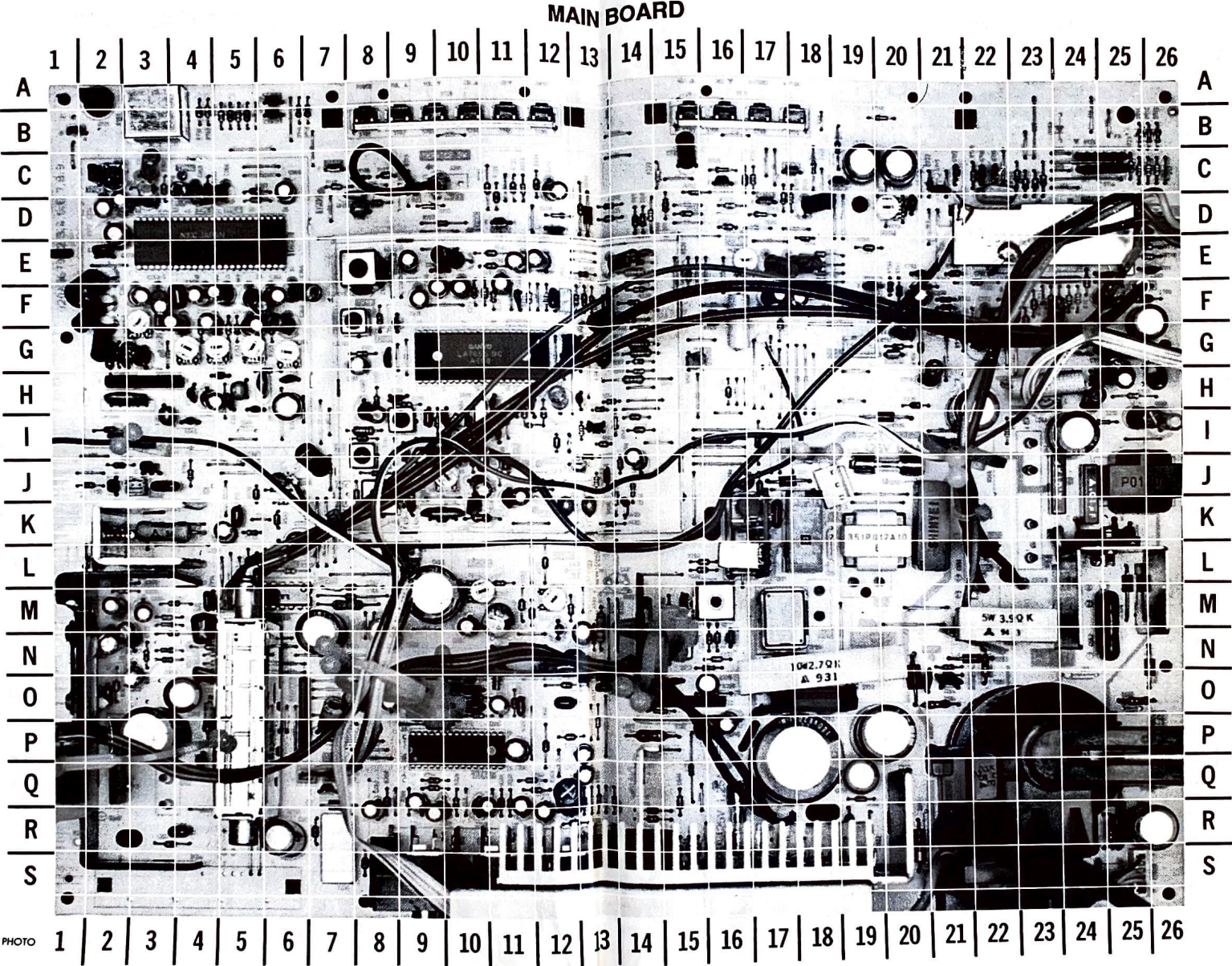
**V271 PIN 6
GREEN OUTPUT**

CRT BOARD



MODEL CS-2722R





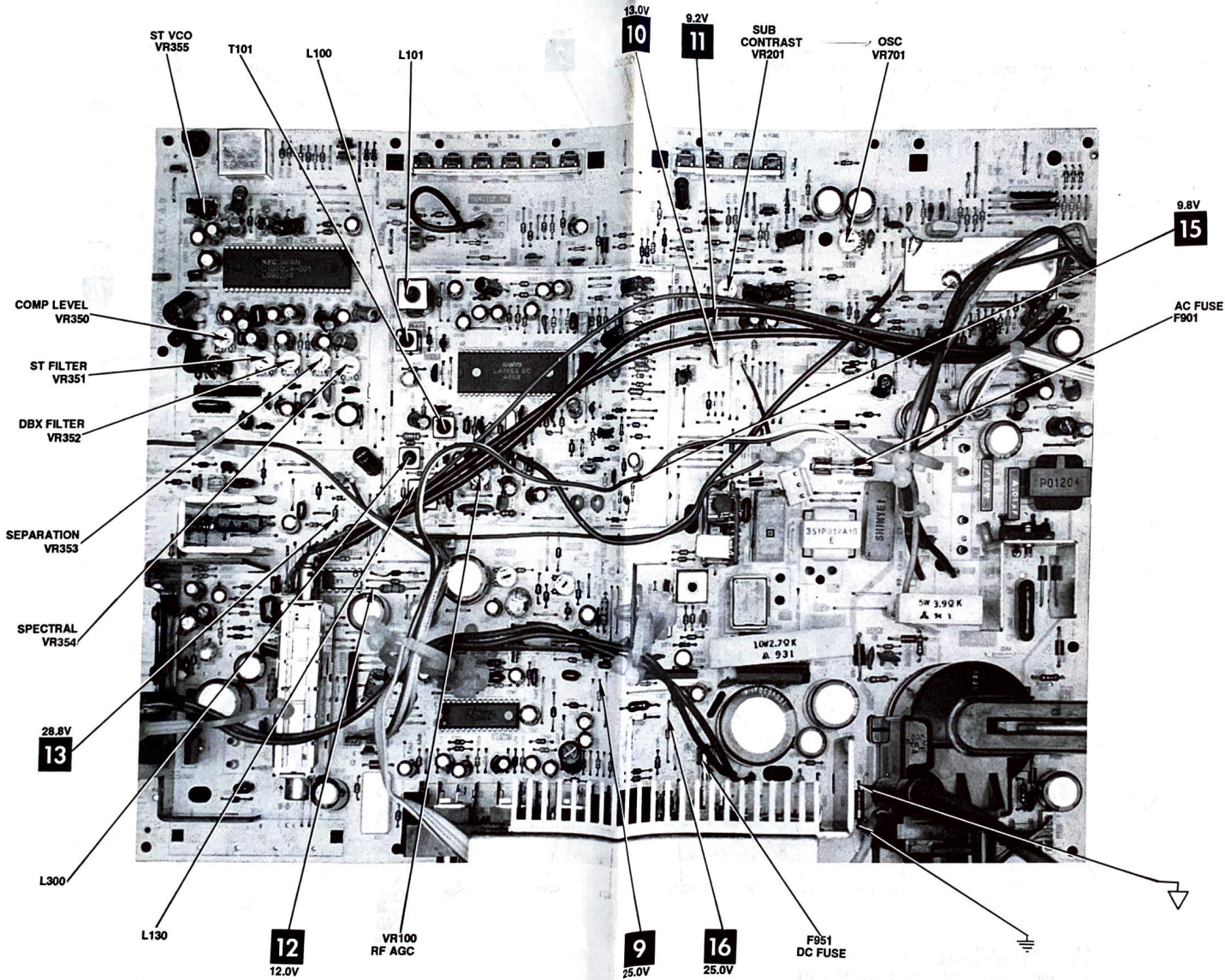
MAIN BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE

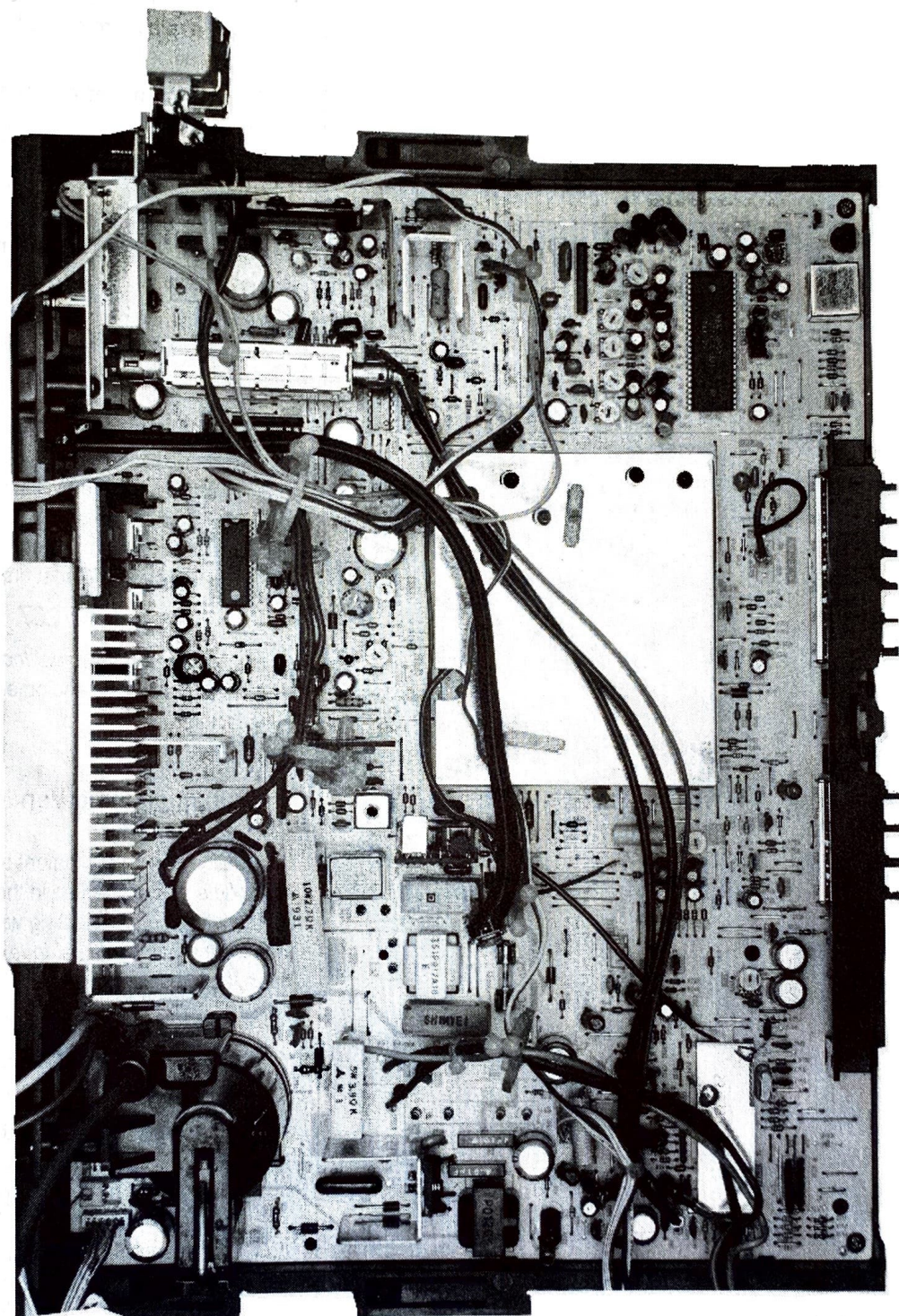
BP330	H-5	C356	F-3	C500	I-14	C717	C-21	D506	J-6
BP601	M-14	C357	F-4	C501	H-12	C718	C-20	D552	Q-25
C100	G-8	C358	E-4	C502	I-13	C719	C-21	D553	N-21
C101	G-7	C359	E-4	C504	E-12	C720	F-20	D561	N-20
C102	F-8	C360	F-5	C505	F-12	C721	B-20	D582	N-25
C103	E-8	C361	F-5	C506	F-13	C722	B-19	D593	D-13
C104	E-8	C362	F-6	C507	F-13	C723	B-15	D594	H-19
C105	I-6	C363	F-6	C510	J-3	C725	C-17	D601	Q-15
C106	H-8	C364	E-6	C511	H-12	C727	N-4	D710	A-19
C107	H-9	C365	C-6	C552	M-24	C771	K-5	D711	B-25
C108	H-9	C366	F-2	C556	G-25	C772	K-6	D712	B-26
C110	I-10	C367	F-2	C557	G-26	C773	K-6	D713	B-26
C139	I-8	C368	C-4	C559	H-24	C774	L-4	D715	A-6
C200	J-16	C369	C-4	C560	N-20	C775	M-4	D716	A-6
C201	K-17	C370	C-3	C561	I-24	C776	M-4	D717	L-1
C205	E-14	C371	C-3	C562	R-25	C777	M-6	D719	D-17
C206	E-9	C372	C-2	C563	R-25	C778	L-5	D720	C-18
C207	E-9	C373	D-2	C564	0-21	C779	P-4	D721	A-2
C208	E-14	C374	C-2	C563	R-25	C781	E-22	D722	C-21
C209	E-10	C373	D-2	C564	0-21	C795	E-20	D723	B-18
C210	E-11	C374	C-2	C565	H-21	C901	J-20	D730	C-16
C211	e-11	C375	C-2	C570	K-23	C910	J-24	D771	D-26
C212	H-6	C3A0	P-3	C583	H-26	C911	J-23	D772	D-26
C214	H-25	C3A1	P-11	C600	M-15	C953	P-17	D773	P-4
C217	H-6	C3A2	0-8	C603	G-12	C954	0-17	D901	J-17
C218	O-16	C3A9	K-4	C604	G-12	C955	N-17	D953	Q-18
C219	N-15	C3C0	M-3	C605	I-10	C956	0-18	DK	K-8
C220	N-15	C3C1	M-2	C606	G-14	C957	P-19	DL201	K-16
C221	P-15	C3C2	M-2	C607	H-10	C960	Q-19	DL202	M-15
C221	P-15	C3C3	M-2	C610	I-11	CF100	C-7	DM	S-25
C223	0-15	C3C4	M-2	C611	I-11	CF501	F-12	DY	J-23
C230	F-20	C3C5	R-3	C612	H-11	CM	J-2	F901	I-19
C231	F-21	C3C6	0-2	C612	H-11	D201	R-15	F951	R-16
C2A0	0-7	C3C7	R-6	C613	H-11	D202	I-13	IC201	G-9
C2A2	Q-8	C3C8	0-3	C617	E-9	D203	E-20	IC202	0-14
C2G0	Q-10	C3D0	Q-9	C618	F-9	D205	J-11	IC2A0	0-6
C2G1	Q-12	C3D1	Q-9	C619	G-14	D206	J-11	IC330	G-2
C301	I-8	C3D2	Q-12	C620	G-14	D208	D-12	IC350	D-3
C302	H-8	C3D3	P-12	C700	F-25	D210	I-24	IC3A0	K-2
C330	G-2	C3E0	0-7	C701	F-22	D211	0-14	IC3A1	P-9
C331	G-3	C3G0	Q-11	C703	F-17	D212	N-15	IC3A2	N1
C332	H-4	C3G1	Q-11	C704	F-17	D213	D-9	IC401	N-12
C333	H-4	C400	F-11	C705	E-17	D3A0	P-2	IC701	D-22
C334	H-4	C401	E-11	C706	E-17	D3A1	Q-7	IC702	G-22
C335	G-6	C450	M-12	C707	G-23	D3A2	M-3	IC771	L-5
C336	G-4	C452	M-12	C708	F-23	D3A3	N-3	IC951	S-18
C337	H-5	C453	N-12	C709	G-21	D401	D-20	J201	R-14
C340	H-4	C454	M-10	C710	G-25	D410	M-13	JA	L-19
C350	E-2	C455	L-9	C711	E-25	D451	N-11	JB	Q-3
C351	D-2	C458	M-8	C712	E-25	D490	J-13	K3A1	R-7
C352	E-2	C459	0-12	C713	E-25	D501	D-14	K901	K-18
C353	E-4	C459	0-12	C714	C-24	D502	I-13	L100	F-7
C354	F-3	C460	M-10	C715	C-22	D503	F-13	L101	E-7
C355	F-3	C480	0-13	C716	C-22	D504	J-14	L102	D-8

MAIN BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE continued

L501	I-16	R207	I-13	R3C3	N-3	R531	J-6	R731	F-22
L502	P-14	R208	I-12	R3C4	R-3	R532	K-6	R732	E-22
L554	L-25	R210	H-14	R3C5	0-2	R552	H-23	R733	K-1
L700	F-25	R211	J-13	R3C6	L-2	R554	H-25	R734	A-5
L710	F-17	R212	C-13	R3C7	N-3	R555	M-22	R735	A-5
L901	K-19	R213	C-9	R3D0	Q-10	R556	N-21	R736	A-5
MT	G-19	R214	F-14	R3D1	Q-9	R557	N-21	R737	A-4
PC	M-18	R215	F-14	R3E0	N-7	R558	N-22	R738	H-16
PJ3A1	S-8	R216	F-10	R3G0	Q-12	R560	R-24	R739	E-20
PW	J-18	R217	E-14	R3G1	Q-11	R561	0-21	R741	E-20
Q101	C-7	R218	E-14	R3G2	Q-13	R585	0-25	R743	F-16
Q130	J-10	R219	E-14	R3G2	Q-13	R585	0-25	R744	F-19
Q201	I-12	R220	D-13	R3G3	Q-13	R591	I-2	R745	F-16
Q202	D-12	R221	D-13	R3G5	Q-11	R600	L-15	R746	F-19
Q203	D-11	R222	C-14	R2G7	Q-11	R601	M-15	R749	D-16
Q204	M-16	R223	C-11	R3G8	P12	R602	Q-14	R750	C-16
Q3A2	Q7	R224	C-11	R3G9	P-12	R604	H-10	R751	C-16
Q501	G-15	R225	C-11	R3P0	R-6	R605	I-10	R752	C-15
Q502	J-6	R226	C-11	R3P1	D-8	R606	G-14	R753	D-16
Q551	K-24	R228	F-10	R400	E-10	R607	G-14	R755	C-17
Q552	G-24	R230	H-20	R402	F-11	R608	J-11	R756	C-17
Q593	J-2	R231	R-15	R403	E-10	R609	H-11	R757	A-2
Q702	E-23	R232	N-16	R450	M-13	R610	H-11	R758	J-1
Q703	I-3	R233	F-10	R452	M-12	R611	H-12	R759	C-23
Q704	A-6	R235	N-14	R453	M-11	R612	F-14	R760	C-23
Q705	A-6	R250	O-15	R454	M-11	R613	F-14	R761	M-15
Q708	E-19	R270	I-12	R455	0-12	R614	R-14	R762	L-7
Q709	F-19	R2G0	Q-8	R456	M-13	R699	I-11	R763	L-7
Q710	C-16	R2G1	Q-11	R457	L-11	R700	J-4	R764	M-8
Q711	C-17	R2G2	Q-12	R460	I-22	R701	G-20	R765	D-19
Q712	C-17	R2G3	R-12	R480	N-13	R702	F-21	R766	F-20
Q713	B-1	R2G4	Q-9	R492	K-13	R703	F-21	R767	E-24
Q714	C-18	R300	I-8	R493	J-14	R705	F-23	R768	F-24
Q780	J-13	R301	H-8	R500	D-14	R706	F-21	R769	A-4
Q901	G-20	R330	G-2	R501	G-15	R707	F-21	R772	D-26
R100	F-8	R331	G-5	R502	F-16	R708	E-18	R773	L-6
R101	G-8	R350	F-3	R503	I-13	R709	E-18	R774	L-5
R102	D-9	R351	F-4	R504	H-13	R710	E-18	R775	L-5
R103	E-8	R355	F-5	R505	D-13	R711	E-18	R776	N-4
R105	C-8	R356	C-5	R506	H-13	R712	E-18	R777	N-4
R106	C-8	R357	C-5	R507	E-13	R713	F-23	R778	K-5
R109	H-9	R358	C-4	R508	F-12	R714	F-23	R779	0-4
R110	H-9	R360	C-3	R509	F-12	R715	F-24	R783	N-4
R110	H-9	R361	C-3	R510	F-13	R718	E-25	R784	N-4
R111	I-9	R3A0	K-3	R511	D-14	R719	E-23	R785	C-10
R132	I-8	R3A1	N-7	R512	F-13	R720	C-26	R786	F-20
R133	K-9	R3A2	0-9	R514	D-18	R721	C-25	R787	F-20
R199	N-4	R3A3	0-9	R515	M-7	R722	C-25	R788	E-21
R200	I-17	R3A5	0-10	R516	I-2	R723	C-25	R790	A-4
R201	J-17	R3A6	0-10	R517	H-4	R724	B-24	R800	I-13
R201	J-17	R3A6	0-10	R518	J-7	R725	C-23	R910	R-20
R202	L-15	R3A7	0-11	R520	E-15	R726	C-23	R956	N-17
R203	M-16	R3C0	M-3	R521	-13	R728	C-22	R957	N-18
R204	R-15	R3C1	M-3	R522	L-12	R729	D-20	R960	Q-19
R206	D-15	R3C2	M-3	R530	J-5	R730	F-23		

MAIN BOARD



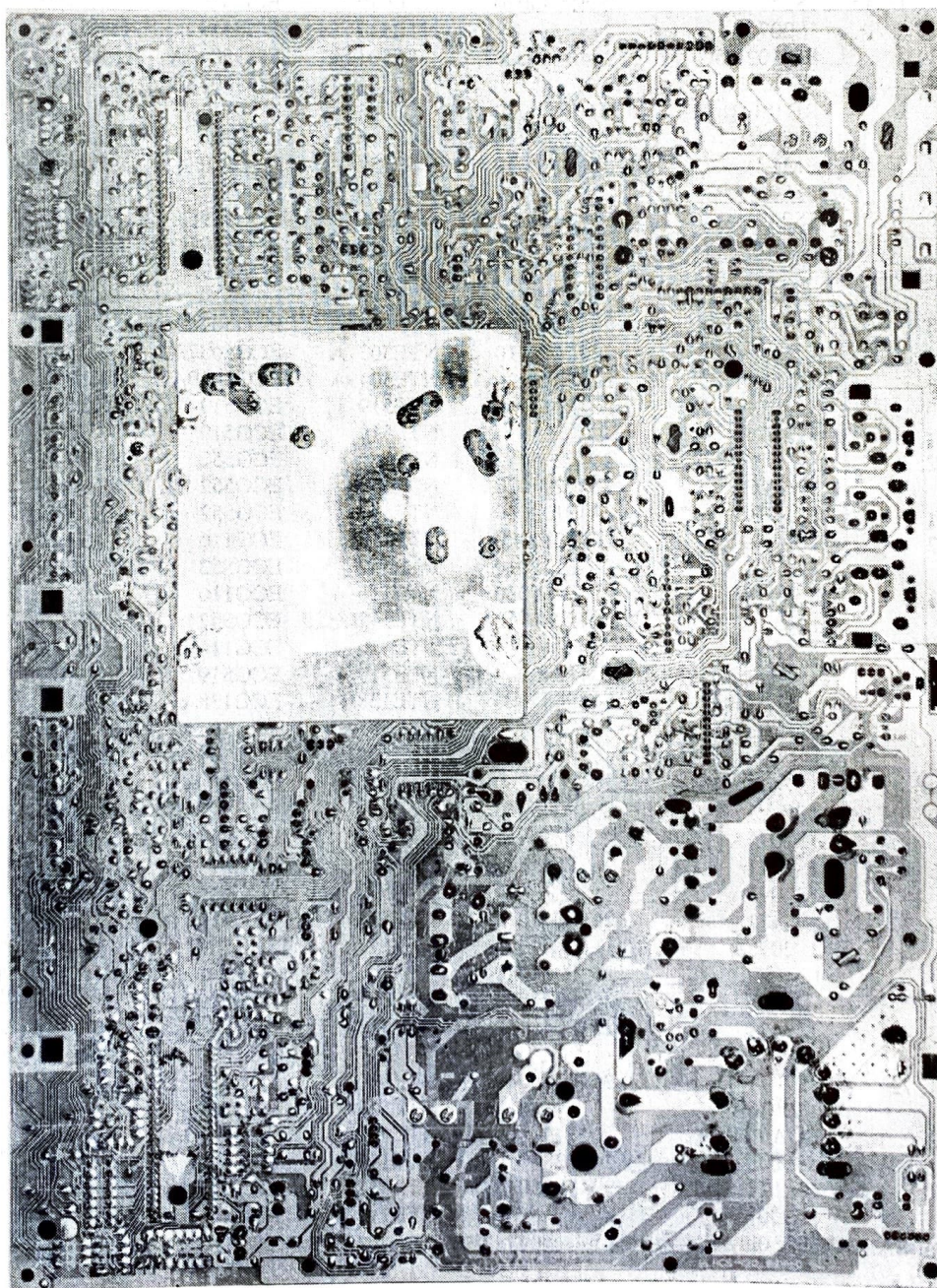


MITSUBISHI

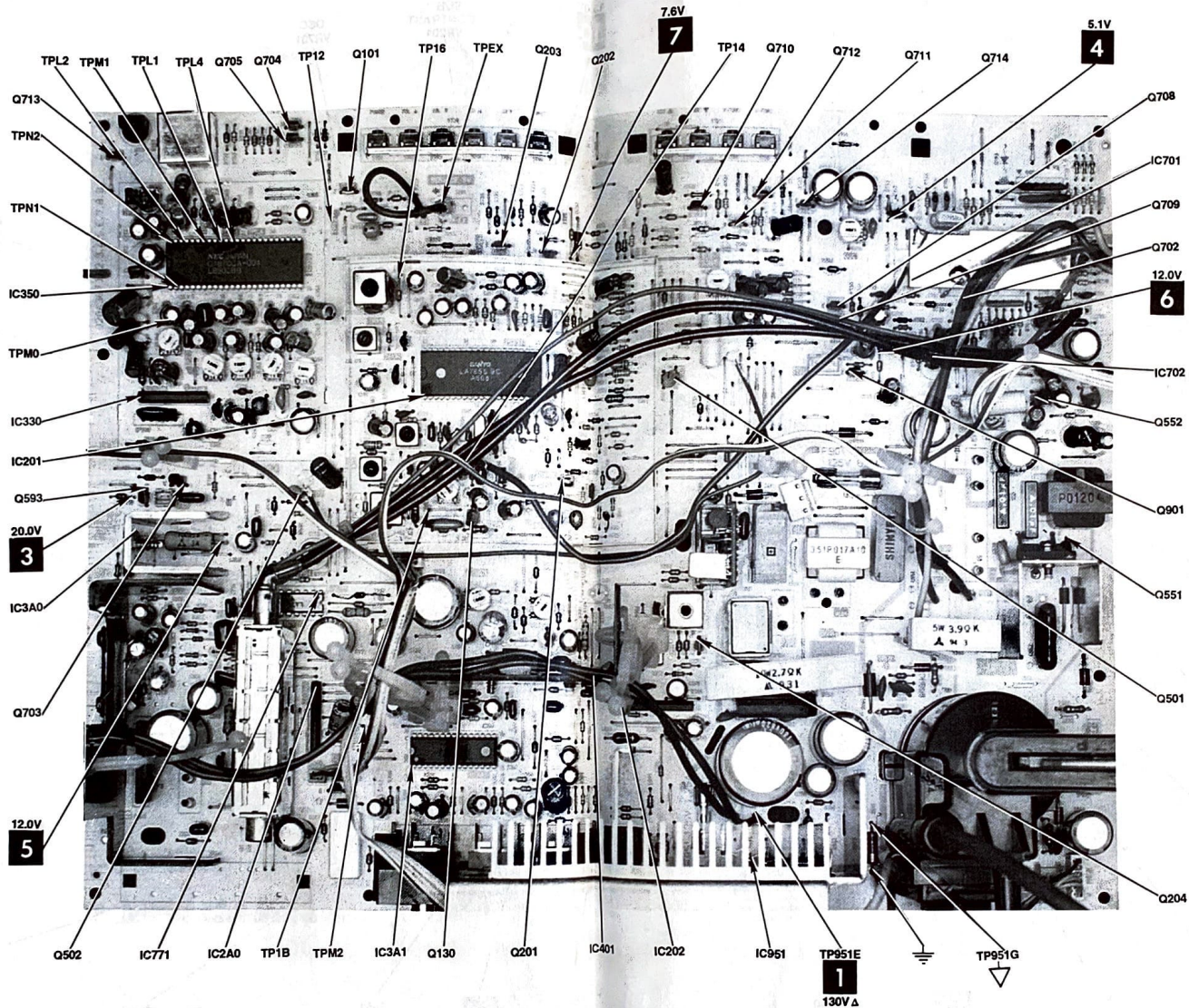
MODEL CS-2722R

MAIN BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE continued

S702	A-8	SF131	K-9	TP16	E-8	TPM2	P-7	VR401	L-12
S703	A-9	SF330	H-2	TP951E	R-18	TPN1	E-3	VR402	L-10
S704	A-10	T101	H-8	TP951G	R-18	TPN2	C-2	VR701	D-20
S705	A-11	T551	P-23	TPEX	C-9	VR100	J-9	X601	H-10
S706	A-12	T552	J-25	TPL1	D-4	VR201	E-16	X701	C-22
S707	A-15	TP	S-24	TPL2	D-3	VR350	F-2	Z701	A-3
S708	A-16	TP1B	J-9	TPL4	D-5	VR351	G-4		
S709	A-17	TP12	C-7	TPM0	F-3	VR352	G-4		
S710	A-17	TP14	I-10	TPM1	D-4	VR353	G-5		

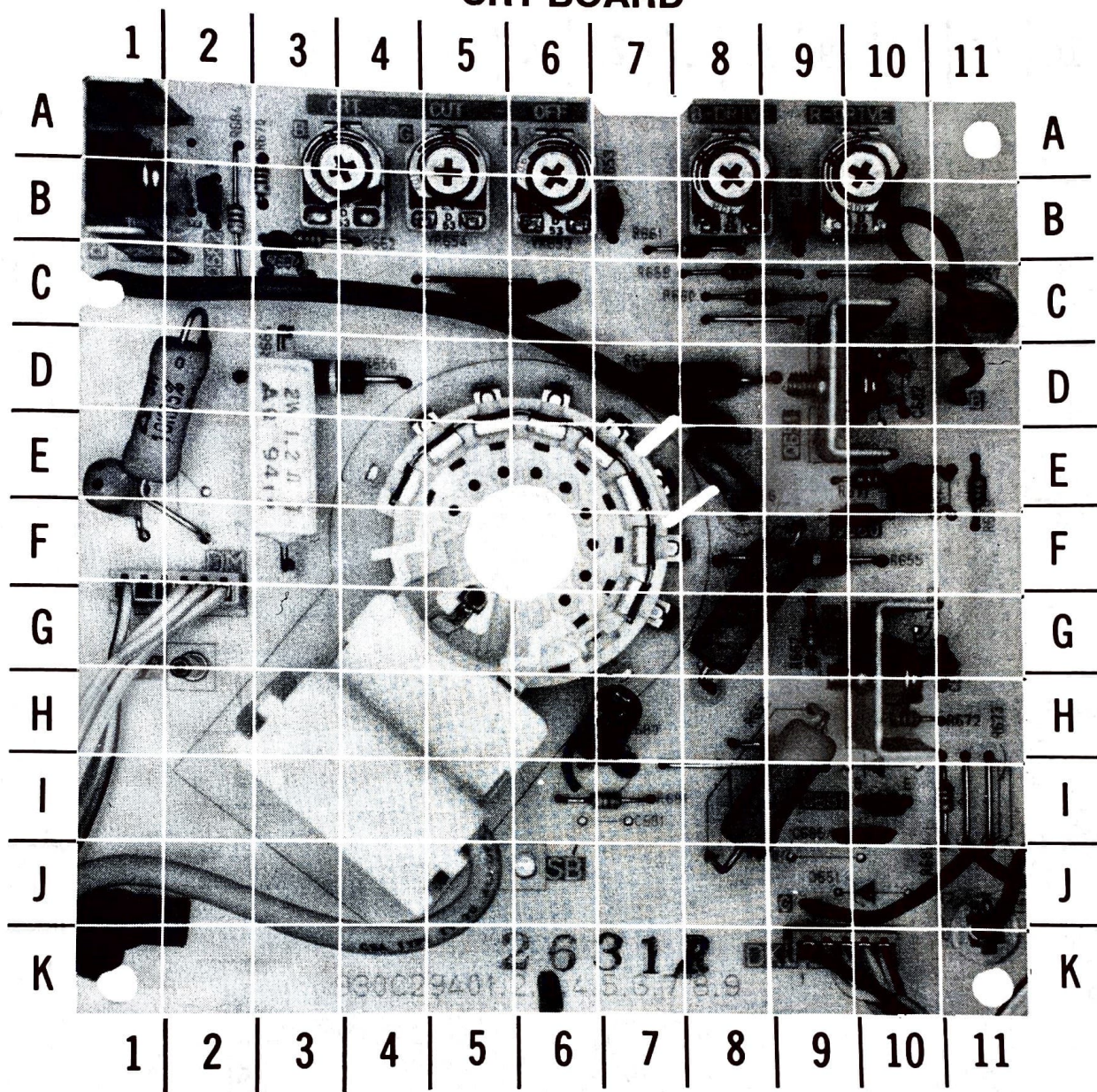


MAIN BOARD



▽ COMMON TIE POINT
Δ TAKEN FROM COMMON TIE POINT
NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED
NOTE: ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

CRT BOARD

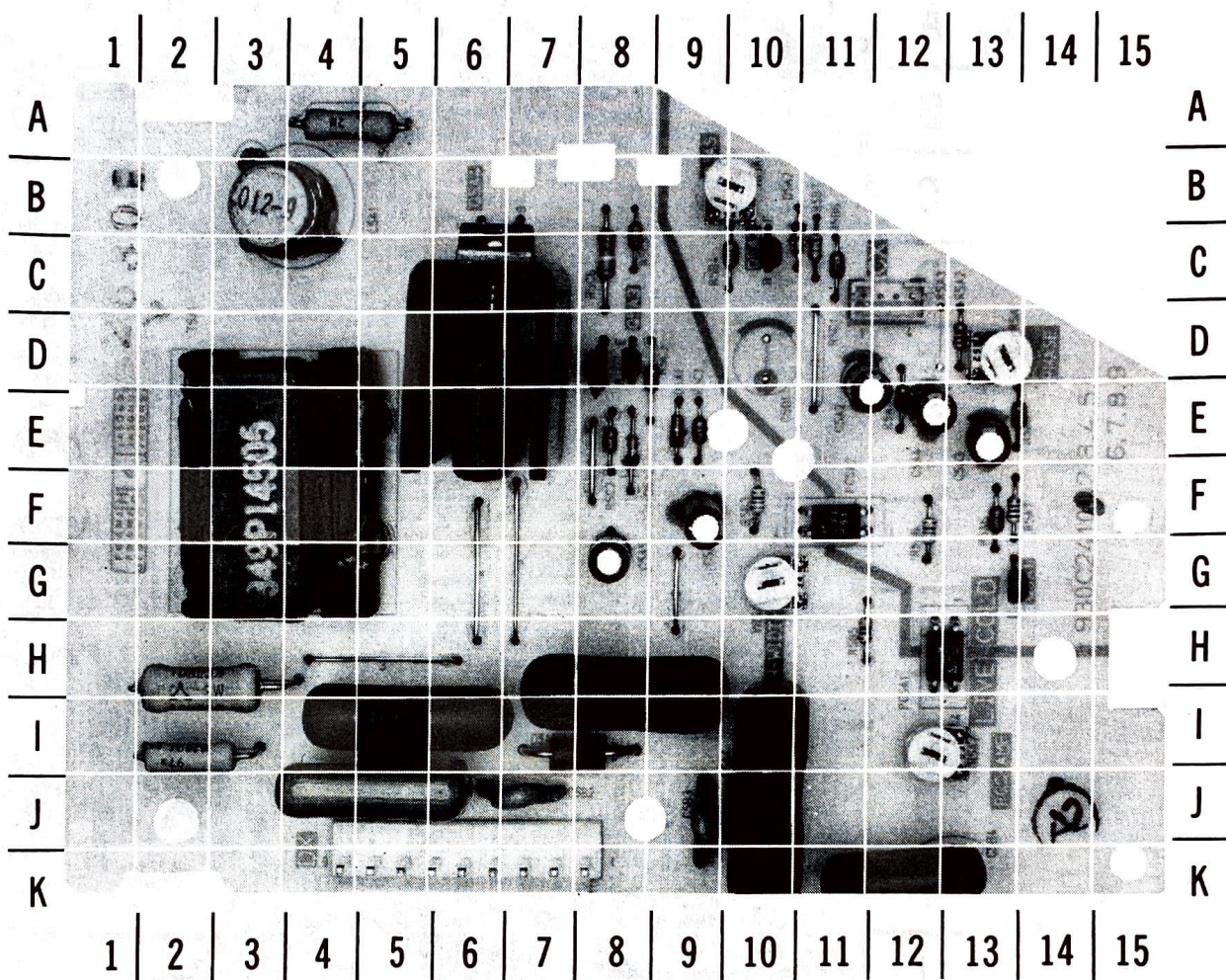


A HOWARD W. SAMS GRIDTRACE™ PHOTO

CRT BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE

B	C-11	DK	K-9	R651	G-8	R661	B-8	R684	B-2
C651	B-9	DM	G-2	R652	I-8	R662	B-3	SA	G-2
C652	E-11	G	J-11	R653	E-2	R664	E-3	VR651	B-10
C653	B-7	L651	E-1	R654	D-8	R670	B-3	VR652	B-8
C656	E-8	Q651	D-10	R655	F-9	R671	E-10	VR653	B-6
C680	H-7	Q652	H-10	R656	D-3	R672	H-10	VR654	B-5
C682	D-10	Q653	B-1	R657	C-10	R680	H-9	VR655	B-4
C683	G-11	Q680	F-10	R658	C-8	R681	I-7		
C684	C-3	Q681	I-10	R659	E-11	R682	G-9		
C685	I-10	Q682	B-2	R660	C-8	R683	I-11		

PINCUSHION BOARD

A HOWARD W. SAMS **GridTrace™** PHOTO**PINCUSHION BOARD - TOP VIEW, GridTrace LOCATION GUIDE**

C5A1	F9	C5B4	K-12	PC5A2	F-11	R5A8	F-12	R5C5	C-8
C5A2	E-11	C5B5	J-10	Q5A1	G-13	R5B3	F-10	R5C6	C-8
C5A3	E-13	C5B6	I-8	Q5A2	C-10	R5B4	C-10	R5C7	A-4
C5A4	E-12	CX	C-12	Q5A3	D-8	R5B5	H-11	RSD0	I-2
C5A5	G-8	D5A1	E-9	Q5A4	C-6	R5B6	F-13	T5A1	F-3
C5A6	D-8	D5A2	C-10	R5A2	D-13	R5B7	C-11	VR5A1	D-13
C5A8	E-7	D5A3	E-8	R5A4	E-12	R5B9	H-2	VR5A2	I-13
C5A9	I-5	D5A4	I-8	R5A5	E-13	R5C1	E-9	VR5A3	G-10
C5B1	J-5	DX	K-8	R5A6	F-13	R5C2	E-8	VR5A4	B-10
C5B2	J-7	L5A1	B-3	R5A7	F-13	R5C3	D-9		
C5B3	J-9	PC5A1	H-13	R5A8	F-12	R5C4	D-6		

Important Parts Information

- The parts listed here are those not usually available from a well-stocked supply cabinet or bin.
- Where items may be replaced with equivalent parts, several alternates are shown from participating vendors.
- On the parts lists, safety items are marked with a # to remind you that only exact replacements are recommended for these items.
- When ordering parts, state the model number, part number, and description.

Obtaining Parts

Many of these parts are available from your local Sams authorized distributor or the manufacturer of the equipment. Call Sams for the name of your nearest distributor:

800-428-7267

Or consult the Sams *Annual Index* for the address of the original equipment manufacturer.

Participating Vendors

Information on test equipment and replacement parts is listed in these pages for the following participating vendors. Consult the Sams *Annual Index* for their current address.

- B&K Precision
- Custom Components Corporation (Chek-A-Color)
- EVG / Russell Industries, Inc.
- NTE Electronics, Inc. (NTE)
- Philips ECG Company (ECG)
- PTS Electronics Corporation (PTS)
- Quam-Nichols Co. (Quam)
- Sencore, Inc.
- Thomson Consumer Electronics, Inc. (SK, TCE)

PARTS LIST

SEMICONDUCTORS

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D201	EQA02-07CD	-	NTE5014A	ECG5014A	SK6A8
	RD7.5FB2	264P485060	NTE138A	ECG138A	SK7V5
D202	EQA02-08CD	-	NTE5016A	ECG5016A	SK8A2
	RD8.2FB3	264P486020	NTE5072A	ECG5072A	SK8V2
D203, 5, 6, 8	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D209	RD5.6FB1	264P484020	NTE136A	ECG136A	SK5V6
	EQA02-05F	-	NTE5010A	ECG5010A	SK5A1
D210 - D213	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D401	EQA02-05C	264P460060	NTE5010A	ECG5010A	SK5A1
D410	RD10EB1	-	NTE5018A	ECG5018A	SK9A1
	RD10FB1	264P486080	-	-	-
D451	S5500D	264P285010	NTE116	ECG116	SK3313
	EM1Z	264P285010	NTE552	ECG552	SK9000
	S5500	-	NTE116	ECG116	SK3313
D490	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D501, 2	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
# D503	EQA02-33A	264P471010	NTE5036A	ECG5036A	SK33A
	RD36EB1	264P471010	NTE5037A	ECG5037A	SK36A
D504	HZ11A1	264P341020	NTE5019A	ECG5019A	SK10A
D506	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D552, 3	TVR1G	264P295020	NTE552	ECG552	SK9000
	TVR1G	264P295020	NTE552	ECG552	SK9000
D561	RU-3B	264P102020	NTE552	ECG552	SK3318A
# D582	S5500D	264P285010	NTE116	ECG116	SK3313
	EM1Z	264P285010	NTE552	ECG552	SK9000
D593, 4	S5500D	264P285010	NTE116	ECG116	SK3313
	EM1Z	264P285010	NTE552	ECG552	SK9000
	S5500	-	NTE116	ECG116	SK3313
D599	1S2471	264P045040	NTE519	ECG519	SK3100
D601	RD7.5FB2	264P485060	NTE138A	ECG138A	SK7V5
	EQA02-07CD	-	NTE5014A	ECG5014A	SK6A8
D651	HZ3BLL	-	NTE5004A	ECG5004A	SK3A0
D703	1S2471	264P045040	NTE519	ECG519	SK3100
D710 - D713	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D715 - D717	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D719, 20	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D721	LN35GP	264P225020	-	-	-
D722	HZ5B2	264P341090	NTE5009A	ECG5009A	SK4A7
D723, 30	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D771, 72	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D773	EQA02-05C	264P460060	NTE5010A	ECG5010A	SK5A1
D901	S5500D	264P285010	NTE116	ECG116	SK3313
	EM1Z	264P285010	NTE552	ECG552	SK9000
	S5500	-	NTE116	ECG116	SK3313

For SAFETY use only equivalent replacement part.

SEMICONDUCTORS

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D2000	1S2471	264P045040	NTE519	ECG519	SK3100
# D953	RBV-40C	264P512010	NTE5311	ECG5311	SK5031
D3A0	RBV-401	264P512030	NTE5309	ECG5309	SK5028
D3A1	S5500D	264P285010	NTE116	ECG116	SK3313
	EM1Z	264P285010	NTE552	ECG552	SK9000
D3A2, 3	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
D5A1	RD22FB1	264P490040	-	-	-
	EQA02-20B	-	NTE5029A	ECG5029A	SK20A
D5A2, 3	1S2471	264P045040	NTE519	ECG519	SK3100
	1S2076A	-	NTE519	ECG519	SK3100
# D5A4	MB-1FS	264P157040	NTE558	ECG558	SK3998
	RH-2FS	264P157040	NTE558	ECG558	SK3998
	RH2D	-	NTE588	ECG588	SK9938
# D5A5	RU-3B	264P102020	NTE552	ECG552	SK3318A
# IC201	LA7655	-	-	ECG1863	-
	LA7655N	272P238020	-	ECG1863	-
IC202	LA7222	272P184010	-	-	-
IC330	LA7510	272P188010	-	-	-
IC350	C1870CA-001	-	-	-	-
	UPC1870CA-001-L	272P187010	-	-	-
IC401	LA7838	272P239040	-	-	-
IC701	M34350N6-567SP	263P228050	-	-	-
	M34350N6-566SP	-	-	-	-
IC702	T520E	-	-	-	-
	PST520E	266P130030	-	-	-
IC771	LA7911	266P197010	-	-	-
# IC951	STR-D3030	-	-	-	-
	STR-D3030	267P925010	-	-	-
IC2A0	LA7952	272P138010	-	-	-
IC3A0	7812(IC)	-	NTE966	ECG966	SK3592
	UPC7812H	266P934020	NTE966	ECG966	SK3592
IC3A1	LA7953	272P139010	-	-	-
IC3A2	LA4270	272P140010	NTE1798	ECG1798	SK9745
# PC5A1, 2	ON3161-R	268P033010	NTE3098	ECG3098	SK10178
Q101	2SC2058S	-	NTE85	ECG85	SK9229
	2SC2058S-P	260P654020	NTE85	ECG85	SK9229
Q130	2SC1906	260P356010	NTE107	ECG107	SK3293
Q201	2SA950Y	-	NTE290A	ECG290A	SK3841
	2SA950-Y	260P255040	NTE290A	ECG290A	SK3841
Q202, 3, 4	2SA1115	-	NTE290A	ECG290A	SK9138
	2SA1115-E	-	NTE290A	ECG290A	SK9138
	2SA1115-F	-	NTE290A	ECG290A	SK9138
	2SA933S-S	260P560040	NTE290A	ECG290A	SK9132
Q501	2SC2236Y	-	NTE382	ECG382	SK3849
	2SC2236-O	-	NTE382	ECG382	SK3849
	2SC2236-Y	260P387030	NTE382	ECG382	SK3849
Q502	2SA1320	-	NTE288*	ECG288*	SK3434*
	2SA1321	260P469010	NTE288*	ECG288*	SK3434*
	2SD1879	260P607010	NTE2331	ECG2331	SK10088
# Q551	2SC2655Y	-	NTE293	ECG293	SK3849
Q552	2SC2655-Y	260P325030	NTE293	ECG293	SK3849
	2SA933S	260P560040	NTE290A	ECG290A	SK9132
Q593	2SA1115-E	-	NTE290A	ECG290A	SK9138
	2SA1115-F	-	NTE290A	ECG290A	SK9138

For SAFETY use only equivalent replacement part.

SEMICONDUCTORS

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
Q651, 2, 3	2SC3789E	-	NTE157	ECG157	SK3747
	2SC3789-D	260P571010	NTE157	ECG157	SK3747
	2SC3789-D	260P571010	NTE157	ECG157	SK3747
	2SC3789-E	-	NTE157	ECG157	SK3747
Q680, 81, 82	2SC1740S	-	NTE85	ECG85	SK3122
	2SC1740S-Q	260P559010	NTE85	ECG85	SK3122
	2SC2603-D	-	NTE289A	ECG289A	SK9137
	2SC1740S	260P559030	NTE85	ECG85	SK3122
Q702	2SC2603-E	-	NTE289A	ECG289A	SK9137
	2SC2603-F	-	NTE289A	ECG289A	SK9137
Q703	2SC1740S	-	NTE85	ECG85	SK3122
	2SC1740S-E	260P559050	NTE85	ECG85	SK3122
	2SC2603-E	-	NTE289A	ECG289A	SK9137
	2SC2603-F	-	NTE289A	ECG289A	SK9137
Q704, 5	2SC1740S	260P559030	NTE85	ECG85	SK3122
	2SC2603-E	-	NTE289A	ECG289A	SK9137
	2SC2603-F	-	NTE289A	ECG289A	SK9137
Q708, 9	2SA1115	-	NTE290A	ECG290A	SK9138
	2SA933-S	260P560040	NTE290A	ECG290A	SK9132
	2SA1115-F	-	NTE290A	ECG290A	SK9138
Q710	2SC2603	-	NTE289A	ECG289A	SK9137
	2SC2603-G	-	NTE289A	ECG289A	SK9137
Q711	2SC1740S-E	260P559050	NTE85	ECG85	SK3122
	2SA933S	-	NTE290A	ECG290A	SK9132
	2SA933S-Q	260P560050	NTE290A	ECG290A	SK9132
	2SA1115	-	NTE290A	ECG290A	SK9138
Q712 - Q714	2SC1740S	260P559030	NTE85	ECG85	SK3122
	2SC2603-E	-	NTE289A	ECG289A	SK9137
	2SC2603-F	-	NTE289A	ECG289A	SK9137
Q780	UN4212	-	NTE2357	ECG2357	SK9742
	DTC124ES	260P604010	NTE2357	ECG2357	SK9742
Q901	2SC2603	-	NTE289A	ECG289A	SK9137
	2SC2603-G	-	NTE289A	ECG289A	SK9137
	2SC1740S-E	260P559050	NTE85	ECG85	SK3122
Q3A2	DTC124ES	260P632010	NTE2357	ECG2357	SK9742
Q5A1	2SC2603	-	NTE289A	ECG289A	SK9137
	2SC2603-E	260P338040	NTE289A	ECG289A	SK9137
	2SC2603-F	260P338040	NTE289A	ECG289A	SK9137
Q5A2	2SC2603	-	NTE289A	ECG289A	SK9137
	2SC2603-G	260P338050	NTE289A	ECG289A	SK9137
	2SA1115	-	NTE290A	ECG290A	SK9138
Q5A3	2SA1115-E	260P254010	NTE290A	ECG290A	SK9138
	2SA1115-F	-	NTE290A	ECG290A	SK9138
	2SC2073	-	NTE375	ECG375	SK3929
Q5A4	2SC2168-O	260P428020	NTE375	ECG375	SK3929
	2SC2168-Y	260P428020	NTE375	ECG375	SK3929
	2SC2073-B	-	NTE375	ECG375	SK3929
	2SC2073-C	-	NTE375	ECG375	SK3929
	2SD386A-D	-	NTE375	ECG375	SK9118
	2SD386A-E	-	NTE375	ECG375	SK9118
	2SD401A-K	-	NTE375	ECG375	SK3929
	2SD401A-L	-	NTE375	ECG375	SK3929

For SAFETY use only equivalent replacement part.

mitsubishi

MODEL CS-2722R

ELECTROLYTIC CAPACITORS

Item	Rating	Mfr. Part No.
C105	47 10V NP	-
C110	.47 35V	-
C200	10 25V NP	-
C206	10 25V NP	-
C214	33 16V NP	-
C217	47 16V NP	-
C219	47 10V NP	-
C366	10 25V NP	-
C367	10 25V NP	-
C452	1 35V	-
# C506	100 10V	181P201041
C559	1 50V NP	-
# C583	10 50V	181P118081
C5A5	4.7 25V NP	-
C723	1 50V NP	-
C725	4.7 25V NP	-
# C953	820 180V	185D063030
# C957	47 200V	181P188060
# C960	10 160V	181P188060

For SAFETY use only equivalent replacement part.

CAPACITORS

Item	Rating	Mfr. Part No.
C103	68 NPO 50V 5%	-
C104	180 NPO 50V 5%	-
# C552	.0015 1.6KV 5%	172P170030
# C570	.001 2KV 10%	154P251080
# C5A8	2.2 100V 10%	189D062030
# C5A9	.1 400V 5%	172P083000
# C5B1	.43 200V 5%	189P071060
# C5B2	220 2KV 10%	-
# C5B3	220 2KV 10%	-
# C5B4	.033 400V 5%	172P085060
# C5B5	.015 1.6KV 5%	172P171050
# C5B6	.015 800V 5%	1899P063090
C607	15 NPO 50V 5%	-
C714	CAP NETWORK	-
C715	22 NPO 50V 5%	-
C716	22 NPO 50V 5%	-
C717	20 N750 50V 5%	-
C718	10 N750 50V 5%	-
# C901	.1 125VAC 20%	189P033050
# C910	.01 250VAC 20%	189P133010
# C911	.01 250VAC 20%	189P133010
# C954	.0022 250VAC	142P014000
# C956	.0022 250VAC	189P060060

For SAFETY use only equivalent replacement part.

COILS (RF-IF)

Item No.	Rating	Mfr. Part No.
L100	VIF	323P172010
L101	VIF	323P171010
L102	10uH	325C106030
L130	Trap	320P026030
L134	1uH	325C110010
L137		325C110010
L200	8.2uH	325C101020
L201	8.2uH	325C107050
L202	8.2uH	325C107050
L300	SIF	317P073020
L331	1.5uH	325C110030
L333	18uH	325C106060
L340	1.2uH	325C100020
L501	33uH	321C031090
L502	1uH	321C030010
# L5A1	Horiz Linearity	333P012090
L651	120uH	325C107080
L700	10uH	325C111030
L710	10uH	325C121030

For SAFETY use only equivalent replacement part.

ST continued

CONTROLS

(All wattages 1/2 watt or less, unless otherwise listed.)

Item No.	Function	Resistance	Mfr. Part No.
VR100	RF AGC	50K	127C081010
VR201	Sub Contrast	50K	127C081010
VR350	Comp Level	5000	127C080070
VR351	St Filter	10K	127C080080
VR352	DBX Filter	50K	127C081010
VR353	Separation	100K	127C081020
VR354	Spectral	100K	127C091020
VR355	ST VCO	50K	127C091010
VR401	Vertical Size	10K	127C091010
VR402	Vertical Linearity	10K	127C080080
VR5A1	PCC Phase	500	127C080030
VR5A2	PCC Amp	5000	127C080070
VR5A3	Horiz Width	30K	127C081000
VR5A4	Bias	10K	127C080080
VR651	Red Drive	200	127C020010
VR652	Blue Drive	200	127C020010
VR653	Red Cut Off	5000	127C020070
VR654	Green Cut Off	5000	127C020070
VR655	Blue Cut Off	5000	127C020070
VR701	OSC	5000	127C020070

SPEAKERS

Item No.	Description	Mfr. Part No.	QUAM Part No.
SP391	4 inch, 8 Ohm	480P400010	-
SP392	4 inch, 8 Ohm	480P400010	-

RESISTORS

Item No.	Rating	Mfr. Part No.	NTE Replacement
R102	130K 1% 1/4W Carbon Film	-	-
R106	750 1% 1/4W Carbon Film	-	-
# R111	10 5% 1/4W Carbon Film	103P330010	QW010
R214	39k 1% 1/4w Carbon Film	-	-
R217	13K 1% 1/4W Carbon Film	-	-
R228	160k 1% 1/4W Carbon Film	-	-
R233	180K 1% 1/4W Carbon Film	-	-
R353	180K 1% 1/4W Carbon Film	-	-
R358	30K 1% 1/4W Carbon Film	-	-
R3A0	100 5% 3W Metal Film	-	3W110
# R3C4	2.2 5% 1/4W Carbon Film	103P338040	QW2D2
# R3C5	2.2 5% 1/4W Carbon Film	103P338040	QW2D2
# R455	2.2 5% 1/4W Carbon Film	103P418040	QW2D2
R492	3000 1% 1/4W Metal Film	-	-
R504	16K 1% 1/4W Carbon Film	-	-
R506	10K 1% 1/4W Carbon Film	-	-
# R507	10K 1% 1/4W Metal Film	103P464090	-
# R508	39K 1% 1/4W Metal Film	103P466030	-
# R510	3300 1% 1/4W Metal Film	103P463070	-
# R515	5.6 5% 1/2W Fusible	103P398090	-
# R516	10 5% 1/4W Carbon Film	103P410010	QW010
# R517	10 5% 1/4W Carbon Film	103P410010	QW010
# R520	1300 1% 1/4W Metal Film	103P462080	-
R552	150 5% 3W Metal Film	-	3W115
# R555	3.9 10% 5W WW	109D055070	5W3D9
# R556	27K 5% 1/4W Carbon Film	103P414020	QW327
# R557	33K 5% 1/4W Carbon Film	103P414030	QW333
# R558	1.2 5% 1/4W Carbon Film	103P338010	QW1D2
# R560	1.2 5% 1/4W Carbon Film	103P338010	QW1D2
# R561	1.2 5% 1/4W Carbon Film	103P338010	QW1D2
# R585	1.2 5% 1/4W Carbon Film	103P338010	QW1D2
R5B9	10K 5% 3W Metal Film	-	3W310
# R5C5	3300 5% 1/4W Carbon Film	-	QW233
# R5C6	3900 5% 1/2W Carbon Film	-	QW239
# R5C7	270 5% 2W Metal Film	-	QW127
# R5D0	820 5% 2W Metal Film	-	QW182
R607	39K 1% 1/4W Carbon Film	-	-
R613	20K 1% 1/4W Carbon Film	-	-
R651	10k 5% 3W Metal Film	-	3W310
R652	10K 5% 3W Metal Film	-	3W310
R653	10K 5% 3W Metal Film	-	3W310
R664	1.2 5% 2W Fusible	103P438010	F2W1D2
R702	2200 1% 1/4W Carbon Film	-	-
R703	2200 1% 1/4W Carbon Film	-	-

For SAFETY use only equivalent replacement part.

RESISTORS

Item No.	Rating	Mfr. Part No.	NTE Replacement
R708	12K 1% 1/4W Carbon Film	-	-
R709	8200 1% 1/4W Carbon Film	-	-
R710	6800 1% 1/4W Carbon Film	-	-
R719	Resistor Network	103P543090	-
R724	Resistor Network	103P054060	-
R733	220 5% 3W Metal Film	-	3W322
R739	56K 1% 1/4W Carbon Film	-	-
R741	39K 1% 1/4W Carbon Film	-	-
R786	39K 1% 1/4W Carbon Film	-	-
R787	39K 1% 1/4W Carbon Film	-	-
# R910	4.7M 10% 1/2W Carbon Film	109D036020	HW547
# R954	120 10% 30W WW	109D101010	-
# R956	820K 10% 1/2W Carbon Comp	101P824030	HW482
# R960	330K 5% 1/4W Carbon Film	103P415050	QW433
# R961	12K 5% 1W Metal Film	103C173080	1W312
# R962	470 5% 1/4W Carbon Film	103P412010	QW147
# RP901	164.6 Tap 5.2 Cold PTC	265P071040	-

For SAFETY use only equivalent replacement part.

MITSUBISHI

COILS & TRANSFORMERS

Item No.	Function	Mfr. Part No.	On-Unit No.	Russell Part No.
# L491	Yoke 90° Horiz 1.98uH Vert 31.5uH	33P132020	-	-
# T551	Horizontal Output	334P160030	-	-
# T552	Horizontal Drive	336P102040	-	-
# T5A1	Side Pincushion	336P102040	-	-
# T991	Power	350P439020	-	-

For SAFETY use only equivalent replacement part.

MODEL CS-2722R

PARTS LIST continued

MISCELLANEOUS

Item No.	Description	Mfr. Part No.	Notes
BP330	Ceramic Filter	296P067010	4.5MHz
CF100	Ceramic Filter	296P024020	4.5MHz
CF501	Ceramic Resonator	299P051030	-
DL201	Delay Line	337P096060	-
DL202	Delay Line	337P110020	-
# F901	Fuse	-	6.3A 125V
# F951	Fuse	-	1.25A 125V
J201	Socket	449C090010	-
# K901	Power Relay	287P049020	-
# L554	Ferrite Bead	411P001010	-
# L555	Ferrite Core Filter	411D009020	-
# L901	Line Filter	351P017010	-
# L991	Degaussing	409B053090	-
# P901	AC Cord	242C957030	-
PJ3A1	Pin Jack Board	440C164020	-
S701	Switch	432P085020	Power
S702	Switch	432P085020	Volume Up
S703	Switch	432P085020	Volume Down
S704	Switch	432P085020	Channel Up
S705	Switch	432P085020	Channel Down
S706	Switch	432P085020	Input
S707	Switch	432P085020	Adjust Up
S709	Switch	432P085020	Adjust Down
S710	Switch	432P085020	Video Function
SF131	Switch	296P065020	-
SF330	Switch	296P066010	-
# V271	CRT	251P274020	A66TPP11XF
X601	Crystal Resonator	285P015010	3.579545MHz
X701	Crystal Resonator	285P029030	-
Z701	Remote Control	939P296040	-
	Preamp		
	Antenna Terminal	440A003040	-
	Board(1)		
	CRT Board(1)	930C294030	-
	CRT Socket(1)	449C081090	-
	Main Board(1)	920A367010	-
	PCC Board(1)	930C241010	-
	Remote Control	939P245030	-
	Transmitter		

For SAFETY use only equivalent replacement part.

(1) Contact PTS Electronics Corporation for replacement; order by manufacturer's part number.

CABINET PARTS

MODEL CS-2722R

Item	Part No.
Cabinet Front	701A436010
Cabinet Rear	700C113080
Door Latch	761C352010
Door	702C822090

TEST EQUIPMENT

Test equipment listed by participating manufacturers illustrates typical or equivalent equipment used by Sams engineers to obtain measurements. This equipment is compatible with most types used by field service technicians.

Equipment	B&K Precision No.	SENCORE No.
Oscilloscope	1541A, 2120, 2125, 2160, 2190, 2522	SC61
Generators		
RGB	1249A, 1260	RG67
Multiburst Signal	1251, 1260	VA62A
Color Bar	1211A, 1249A, 1251, 1260	VA62A, CG25, NT64
TV Stereo	2009	ST65, ST66
Analog VOM	114, 117, 177, 214	-
Digital VOM	377, 388HD, 2700 Series, 2831A, 2860, 2900 Series	DVM37, DVM56A, SC61
Frequency Meter	1803A, 1804A, 1805, 1822, 1851, 1855	FC71, SC61
Hi-Voltage Probe	HV-44	HP200
VOM/DMM	-	TP212
Accessory Probes	PR-28(HV)	-
Isolation Transformer	TR110, 1604, 1653, 1655	PR57
Capacitance Analyzer	810A, 815, 820, 830	LC76, LC101, LC102
CRT Analyzer	480, 490	CR70
Temperature Probe	TP-28, TP-30	-
AC Leakage Tester	1655	PR57
Logic Probe	DP21, DP51	-
Logic Pulser	DP31, DP101	-
Inductance Analyzer	875A	LC76, LC101, LC102
Flyback Yoke Tester	875A	VA62A, LC76, LC101, LC102
TV Stereo Power Monitor	-	SR68
Field Strength Meter	-	FS73, FS74
Transistor Tester	510, 520B, 530	TF46
Video Analyzer	-	VA62A
Modulator/Converter	1201	-

SAMS PHOTOFACT POINTERS

Do you think PHOTOFACT is simply a rehash of manufacturer's data? Then this column is especially for you. We want you to know...

How We Make PHOTOFACT®

We start by procuring a run-line television set. And we obtain whatever documentation is available. We analyze the unit using test equipment normally available to the technician. Then we write up our findings for you in PHOTOFACT.

What's Involved

For every basic coverage, a draftsman draws a schematic to our exacting standards, so that every PHOTOFACT schematic follows an easy to use service format.

A technician takes live measurements against a working unit, comparing it to the schematic.

Another technician verifies the schematic against the unit, painstakingly checking the values of all components. This is a time-consuming process that saves you time and money later on.

Another draftsman prepares a placement chart to help you locate major servicing components. When needed, the

printed circuit boards are photographed and labelled for added clarity.

Next we develop a list of the key parts you would need for most service tasks, and we research their recommended replacements.

To do all this, obviously we take the television set apart, so someone has to put it back

together--a chance to confirm our information.

Our editors then compile all the service data we've generated and arrange it in a consistent, easy to follow format.

Throughout this process, we often discover additional information critical to your service tasks, which we add to our write-up.

To order PHOTOFACT, see your authorized Sams distributor. Call our customer service line for the name of your nearest distributor:

800-428-7267

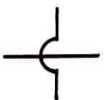
When Schematic Lines Cross...

Can you tell whether crossed lines are tie points or jumps?

Many manufacturers assume you'll know that crossed lines represent tie points. At Sams we leave no room for confusion. We show you with our standard notation, so instead of puzzling, you can get your repair done. Here's how.



A dot means that the circuitry is electrically tied together (a tie point):



A jump over a line means that components are isolated from each other (a jump):

Remember this when you're troubleshooting with your next Sams schematic. Helping you make repairs quickly is our business.

Fighting With a Large Schematic?

We put our schematics on large foldout pages so that you can get the kind of system overview that helps with troubleshooting a set. But the way we draw our schematics, you can fold the page in half on the longest dimension and still conveniently read the schematic, like this:

