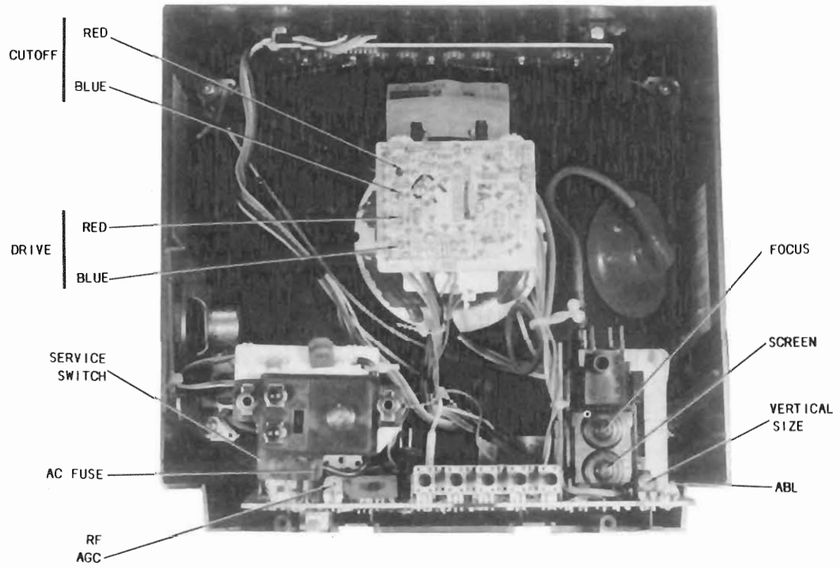


CABINET—REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove six screws holding cabinet back and remove back. Disconnect HV anode, CRT socket, Deflection Yoke connectors, Degaussing coil connectors, Speaker connectors, Ground leads, and all other required cabling. Remove one screw holding Remote Receiver assembly to cabinet front, and remove Remote Receiver assembly. Remove two screws holding Controls switch board assembly to cabinet top and remove from cabinet. Slide Main board assembly from cabinet.

CRT REMOVAL

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

Follow chassis removal procedure and lay set face down on a soft protective surface. Loosen and remove CRT neck assemblies. (See Caution). Remove four screws holding CRT to cabinet front and lift CRT out of cabinet. DO NOT LIFT CRT BY NECK.

SERVICING IN THE FIELD

CRT IMPLOSION PROTECTION AND CLEANING

Implosion protection is an integral part of the picture tube, cleaning accomplished without CRT removal.

FUSE DEVICES

A 3.0-amp fuse is used for AC line protection. (See photo, Chassis - Top View.)

VHF/UHF TUNER

See Miscellaneous Adjustments.

CHANNEL TUNING

Channel Up and Down buttons are provided for channel scanning. Fine tuning is automatic.

HORIZONTAL OSCILLATOR

Adjustment of the horizontal hold is accomplished by the proper setting of the Horizontal Hold Control.

HIGH VOLTAGE

For high voltage procedure, refer to Miscellaneous Adjustments.

FOCUS

The focus may be adjusted by the Focus Control. (See photo, Cabinet - Rear View.)

AGC

The AGC may be varied by an RF AGC Control. (See photo, Chassis - Top View.)

SAMS PHOTOFACT®

PANASONIC MODELS CTL-1030R/31R/32R. PC-11T30R/31R

For Supplier Address See PHOTOFACT Index

Model CTL-1032R

MODEL	CHASSIS
CTL-1030R	AGP159
CTL-1031R	AGP159
CTL-1032R	AGP159
PC-11T30R	YAGP159
PC-11T31R	YAGP159

SAFETY PRECAUTIONS

See Page 1A

INDEX

SAMS Howard W. Sams & Company
2647 Waterfront Parkway, East Drive, Suite 300, Indianapolis, Indiana 46214 U.S.A.

10 9 8 7 6 5 4 3 2 1

U.S.A. 90RF-01937 Printed in U.S. of America

DATE 6-90 SET 2749 FOLDER 1

SET 2749 FOLDER 1

SAFETY PRECAUTIONS

SERVICE WARNING

Service work should be performed only by qualified service technicians who are familiar with safety checks and guide lines.

1. For continued safety, no modification of any circuit should be attempted unless recommended by manufacturer.
2. Disconnect power source before replacing parts as some parts may be electrostatic sensitive.
3. Use an isolation transformer between the line cord and power receptacle, when servicing chassis.

SERVICING HIGH VOLTAGE AND PICTURE TUBE

When servicing the High Voltage circuits, extreme caution should be used.

1. Discharge static High Voltage by connecting a 10 kohms resistor in series with a test lead between chassis and anode lead of picture tube.
2. Wear shatter-proof eye protection (goggles) when handling the picture tube in case of implosion.
3. DO NOT lift picture tube by the neck.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Service personnel should be aware of the procedures and instructions covering x-ray radiation. The only potential source of x-ray in present day solid state receivers and monitors is the picture tube.

1. It is only when High Voltage is excessive that x-ray radiation is capable of being emitted from shell of picture tube. Be sure the High Voltage is set at specified level.
2. An accurate High Voltage meter should be available at all times. Meter calibration should be checked periodically.
3. High Voltage should be kept at rated value - NO HIGHER. Higher voltages may cause x-ray radiation or failure of other associated components. DO NOT depend on protection circuit to keep voltages at rated value.
4. Every time a chassis is serviced, High Voltage should be checked at various brightness levels to be sure it is regulating properly.
5. While troubleshooting a set with excessive High Voltage, avoid being close to picture tube. DO NOT operate longer than it is necessary to locate the cause of excessive High Voltage. Use a variable AC transformer to regulate voltage.
6. Many components, electrical and mechanical, in present chassis have safety related characteristics which are not evident with visual inspection. When these components are known, they are identified with a # on the schematic and in the parts list. When replacing these components, for SAFETY, use only an equivalent replacement part.

SAFETY CHECKS-FIRE AND SHOCK HAZARD

Cold Leakage Checks (Sets with isolated ground.)

1. Unplug the AC cord and connect a jumper across the two prongs on the plug.
2. Turn on power switch.
3. Measure the resistance, with an Ohm meter, between the jumpered AC plug and any exposed metal cabinet parts on the set such as: antenna screw heads, control shafts, handle brackets. Exposed metal parts that have a return path should measure between 200 kohms and 5 megohm. Parts without a return path must measure infinity.

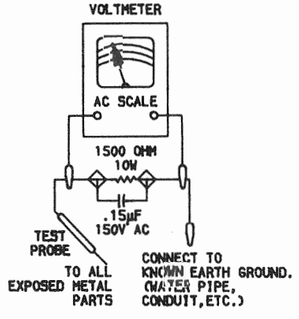
Leakage Current Hot Check

1. Plug the AC cord directly into AC outlet. DO NOT use an isolation transformer.
2. Connect a 1500 Ohm 10 watt resistor, in parallel with a .15μF 150V AC capacitor, between any exposed metal parts on the set and a good earth ground such as a water pipe. (See Figure below.)
3. Using an AC volt meter, with 1000 Ohms per volt or more sensitivity, measure the voltage across the resistor. Check each exposed part and measure voltage at each point.
4. Reverse the AC plug and repeat voltage measurement at each point.
5. The voltage at any point should not exceed .75 volts RMS. This corresponds to .5 milliamps AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected.

GENERAL GUIDE LINES

A final SAFETY check before returning the set to customer.

1. Check area repaired for poorly soldered or de-soldered connections. Check entire circuit board surface for solder splashes.
2. Check interboard 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.



TROUBLESHOOTING AID

Note: Waveforms taken with triggered scope, Keyed-Rainbow generator. Schematic voltages measured with digital meter, no signal. Controls adjusted for normal operation.

PICTURE or SOUND

NO PIC, NO SOUND, NO RASTER: Check AC power supply and sources generated from Horizontal Output Transformer (T502). Refer to "Troubleshooting" Power Supply and Horizontal circuits.

NO PIC, NO SOUND, HAS RASTER: Check IF-AGC and source voltages from Horizontal Output Transformer (T502). Refer to "Troubleshooting" IF-AGC and Horizontal circuits.

NO PIC, HAS SOUND, NO RASTER: Check Horizontal Output Transformer (T502) sources and Video circuit. Refer to "Troubleshooting" Horizontal and Video circuits.

NO PIC, HAS SOUND, HAS RASTER: Refer to "Troubleshooting" Video circuit.

HAS PIC, NO SOUND: Refer to "Troubleshooting" Audio circuit.

OVERLOADED PICTURE: Refer to "Troubleshooting" IF-AGC circuit.

LOW OR EXCESSIVE BRIGHTNESS: Check Video and Luminance circuits. Refer to "Troubleshooting" Video circuit.

SWEEP

NO RASTER, HAS SOUND: Check HV rectifier, Part of Horizontal Output Transformer (T502). Refer to "Troubleshooting" Horizontal circuit.

NO RASTER, NO SOUND: Refer to "Troubleshooting" Horizontal circuit.

NO VERT DEFLECTION: Refer to "Troubleshooting" Vertical circuit.

POOR VERT LIN OR FOLDOVER: Refer to "Troubleshooting" Vertical circuit.

POOR HORIZ LIN OR FOLDOVER: Refer to "Troubleshooting" Horizontal circuit.

NARROW PICTURE: Refer to "Troubleshooting" Horizontal circuit.

VERT OFF FREQUENCY: Refer to "Troubleshooting" Vertical circuit.

HORIZ OFF FREQUENCY: Refer to "Troubleshooting" Horizontal circuit.

SYNC

NO VERT/HORIZ SYNC: Refer to "Troubleshooting" Sync circuit.

RASTER

YELLOW (NO BLUE): Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

CYAN (NO RED): Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

MAGENTA (NO GREEN): Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

COLOR (B/W operating normally)

NO COLOR: Refer to "Troubleshooting" Chroma circuit.

WEAK COLOR: Refer to "Troubleshooting" Chroma circuit.

NO COLOR SYNC: Refer to "Troubleshooting" Chroma circuit.

NO GREEN: Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

NO BLUE: Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

NO RED: Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

INCORRECT HUE (TINT): Refer to "Troubleshooting" Chroma circuit.

TROUBLESHOOTING

POWER SUPPLY

Check AC Fuse (F801). If Fuse F801 is open, check Rectifier Diodes (D801 thru D804), Capacitors C801, C802, C803, C807, C808 and Electrolytic C805. Apply 120V AC and check for 157V at the cathode of Diode D801. If this voltage is missing, check Power Relay (RL831) and Thermistor D805. If 157V is present, check for 115V at TP93. If this voltage is missing, check the voltages and components associated with Regulator IC (IC801), Resistor R808. If the proper voltage is present at TP93, refer to the "Horizontal" section of this Troubleshooting guide.

AUDIO

Select an active TV channel and check for an audio waveform at pin 8 of the Audio IC (IC201). If there is no audio, check the voltages, waveforms and components associated with pin 23 of IC101 and IC201. Check the voltage at pin 4 of IC201. It should measure 0.46V at mute and 10.8V at Maximum volume.

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 12 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101). If video is missing at pin 12 of IC101, check the voltages, waveforms and components associated with the Video Amp Transistors (Q301, Q303). If video is present at pin 12 of IC101, check for a video waveform at pin 42 of IC101. If the waveform is missing, check the voltages, waveforms and components associated with pins 12, 30, 31, 32, 33, 42 of IC101. If the waveform is present at pin 42 of IC101, check the voltages, waveforms and components associated with the Video Output Transistor (Q302) and the Blue, Red, Green Output Transistors (Q451, Q452, Q453). If the brightness is inadequate or cannot be controlled, check the voltages, waveforms and components associated with pin 33 of IC101.

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 and 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 TP14. If video is now present at TP12, check the voltages, waveforms and components associated with pins 21, 24, 25 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101) and the Video Amp Transistor (Q101). If there is still no video at TP12, check the voltages, waveforms and components associated with pins 14, 15, 16, 18 thru 26 and 29 of IC101. 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
IC101

Pin	21	8.2V
Pin	24	5.0V
Pin	25	4.9V

CHROMA

Check for a chroma waveform at pin 13 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101). If the waveform is missing, check the components associated with pin 13 of IC101. If a chroma waveform is present at pin 13 of IC101, check for the proper waveforms at pins 39, 40, 41 of IC101. If these waveforms are missing, check the voltages, waveforms and components associated with pins 11, 13, 34, thru 41 of IC101. Check the 3.58MHz oscillator at pin 37 of IC101. Check the voltages and components associated with the color control and pin 34 of IC101. If there is inadequate tint range, check the voltages, waveforms and components associated with the tint control and pin 36 of IC101. If the proper waveforms are present at pins 39, 40 and 41 of IC101, refer to the "Raster" section of this Troubleshooting guide.

HORIZONTAL

Determine if TV is 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 (Q502). If horizontal deflection is now present, check the voltages, waveforms and components associated with pins 1 thru 7 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101) and the Horizontal Driver Transistor (Q501). If there is still no horizontal sweep, check the voltages, waveforms and components associated with the Horizontal Output Transformer (T502) and Q502. Check the voltages and components associated with Diodes D401, D506 and D507 for defects. The high voltage rectifier is part of Transformer T502, 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 6 and 7 of IC101. Horizontal linearity or foldover problems may be caused by Capacitors C507, C511, C518, C519 being defective.

HIGH VOLTAGE SHUTDOWN

The high voltage is monitored by Diode D504 rectifying pulses from the Horizontal Output Transformer (T502). Should the high voltage increase, the rectified voltage at the cathode of Diode D505 will also increase and trigger the shutdown circuit at pin 4 of IC101. To troubleshoot, remove D504 from the circuit and use a variac for AC power. Start at 90V AC and increase as necessary to locate and repair the defect. Return D504 to the circuit. NOTE: Care should be taken in defeating the high voltage shutdown circuit, as this may cause excessive X-radiation and damage to the CRT, Transformer (T502) and associated components. Monitor the high voltage and troubleshoot.

TROUBLESHOOTING (Continued)

Voltages Taken with TV in Shutdown

IC101	Pin 4	0.8V
TP93		163V

HIGH VOLTAGE SHUTDOWN TEST

Apply 120V AC, turn set On, set all customer controls for normal operation and connect a 10.0V Bias through an isolation diode to the cathode of D505. 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.

VERTICAL

Inject a vertical drive signal at pin 10 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101). If vertical deflection is now present, check voltages, waveforms and components associated with pins 8, 9, 10 of IC101. If there is still no vertical deflection, check the voltages, waveforms and components associated with the Vert Out IC (IC401). Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits. Check electrolytics C404, C407, C409, C411, C412, and C416 for defects.

SYNC

If there is no vertical or horizontal sync, check the voltages, waveforms and components associated with pin 17 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101). If there is no vertical sync, check the voltages, waveforms and components associated with pins 8, 10 and 17 of IC101. If there is no horizontal sync, check the voltages and components associated with pins 3, 6, 7 and 17 of IC101.

RASTER

Check the CRT and CRT voltages. If there is no red, check the voltages and components associated with pin 41 of the IF/SIF/VIDEO/CHROMA/VERT/HORIZ IC (IC101) and Red Output Transistor (Q352). If there is no green, check the voltages and components associated with pin 40 of IC101 and Green Output Transistor (Q353). If there is no blue, check the voltages and components associated with pin 39 of IC101 and Blue Output Transistor (Q351). If the raster has a keystone shape, check the Deflection Yoke (L503). If the raster has height or width problems, refer to the "Vertical", "Horizontal" and "Power Supply" sections of this Troubleshooting guide.

TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

Equipment	B&K Precision Equipment No.	Sencore Equipment No.	Notes
OSCILLOSCOPE	1541A, 2120, 2125, 2160	SC61	
GENERATORS			
RGB	1249, 1260	RG67	
MULTIBURST SIGNAL	1251, 1260	VA62A	
COLOR BAR	1211A, 1249, 1251, 1260	VA62A, CG25, NT64	
ANALOG VOM	114, 117, 177, 214		
DIGITAL VOM	388HD, 2900 SERIES	DVM37, DVM56A, SC61	
FREQUENCY METER	1803, 1804, 1805	FC71, SC61	
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44 PR-28(HV)	HP200 TP212	
ISOLATION TRANSFORMER	TR110, 1604, 1653, 1655	PR57	
CAPACITANCE ANALYZER	820, 810, 830	LC76, LC101, LC102	
CRT ANALYZER	467, 470, 480, 490	CR70	
TEMPERATURE PROBE	TP-28, TP-30		
AC LEAKAGE TESTER	1655	PR57	
LOGIC PROBE	DP51, DP21		
LOGIC PULSER	DP101, DP31		
INDUCTANCE ANALYZER	875A	LC76, LC101, LC102	
FLYBACK YOKE TESTER	875A	VA62A, LC76, LC101, LC102	
TV STEREO GENERATOR	2009	ST65, ST66	
TV STEREO POWER MONITOR		SR68	
FIELD STRENGTH METER		FS73, FS74	
TRANSISTOR TESTER		TF46	
VIDEO ANALYZER		VA62A	

TV ALIGNMENT INSTRUCTIONS

Use an isolation transformer and observe power supply polarity. Maintain line voltage at 120V AC. Allow a 20-minute warm-up period for receiver and test equipment.
Suggested Alignment Tools: **GC-THORSEN**
T101, T151 9440

PRELIMINARY INSTRUCTIONS

Set the channel selector to the highest unused channel. Set scope sweep to external. Connect scope vertical input to scope vertical input on sweep/marker generator. Connect scope external horizontal input to scope horizontal input on sweep/marker generator. Ground test equipment to TV chassis unless specified otherwise. Use only enough generator output to provide a usable indication.
Note: Response may vary slightly from that shown.
Connect a 4.5V Bias to TP14.

VIDEO IF ALIGNMENT (SWEEP MARKER GENERATOR)

DIRECT PROBE FROM SWEEP/MARKER GENERATOR	SWEEP GENERATOR OUTPUT	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	REMARKS
To TP12	IF Output on Tuner	44MHz (10MHz Sweep)	45.75MHz	Adjust T101 for Maximum gain and symmetry of response. See Figure 1.

TV ALIGNMENT INSTRUCTIONS (Continued)

VIDEO IF ALIGNMENT (BAR SWEEP GENERATOR)

BAR SWEEP GENERATOR	SCOPE INPUT	REMARKS
To TP1	To TP8	Perform Video IF Adjustments per SWEEP/MARKER GENERATOR Instructions. See Figure 2.

4.5MHz TRAP ALIGNMENT

Tune in a strong TV signal and set the contrast at maximum. Adjust the fine tuning until a beat pattern is visible on the screen. Adjust for MINIMUM beat interference.

SOUND IF ALIGNMENT

Tune in a station and adjust T202 for maximum sound. Reduce signal strength at the antenna terminals until distortion appears. Continue to reduce the signal while aligning for undistorted output by adjusting T202.

AUTOMATIC FINE TUNING ALIGNMENT

Connect as explained in preliminary instructions unless specified otherwise.

DIRECT PROBE FROM SWEEP/MARKER GENERATOR	SWEEP GENERATOR OUTPUT	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	REMARKS
To TP103	To IF Output on Tuner	44MHz (10MHz Sweep)	45.75MHz	Adjust T151 to place 45.75MHz marker at crossover as shown. See Figure 3.

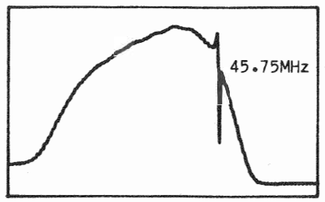


Figure 1

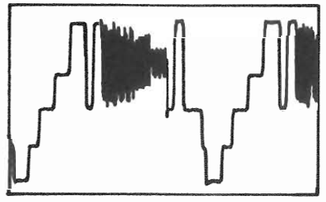


Figure 2

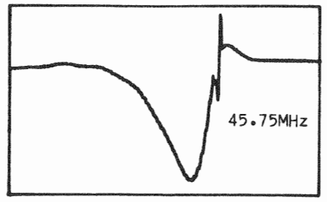


Figure 3

A

B

TUNER NOT INCLUDED IN THIS COVERAGE

SEE PIN 4, IC001 MPU PAGE 2F

SEE PINS 2,10 IC003 SWITCH PAGE 2F

SEE PIN 2, IC001 MPU PAGE 2F

SEE PIN 24, IC001 MPU PAGE 2F

SEE PIN 42, IC001 MPU PAGE 2F

SEE PIN 44, IC001 MPU PAGE 2F

SEE PIN 43, IC001 MPU PAGE 2F

SEE BASE Q006 VIDEO AMP PAGE 2G

SEE BASE Q010 VERT PULSE PAGE 2G

SEE BASE Q011 HORIZ PULSE PAGE 2G

SEE CRT FILAMENTS PAGE 2H

IF FROM TUNER

AGC TO TUNER

IF AGC RANGE 4.7V TO 5.6V

RF AGC RANGE 4.8V TO 7.9V

TAKEN WITH BAR SWEEP GENERATOR

TAKEN WITH CHROMA BAR SWEEP GENERATOR

IC101 IF/SIF/VIDEO/CHROMA/VERT/HORIZ

AN5265 IC201 AUDIO

AN5531 IC402 VERT OUT

2SC3315C Q101 VIDEO IF AMP

2SC1684R Q301 VIDEO AMP

2SC1684R Q303 VIDEO AMP

MN4066B PART OF IC003

2SC1473AH Q501 HORIZ DRIVER

2SD1439D Q502 HORIZ OUT

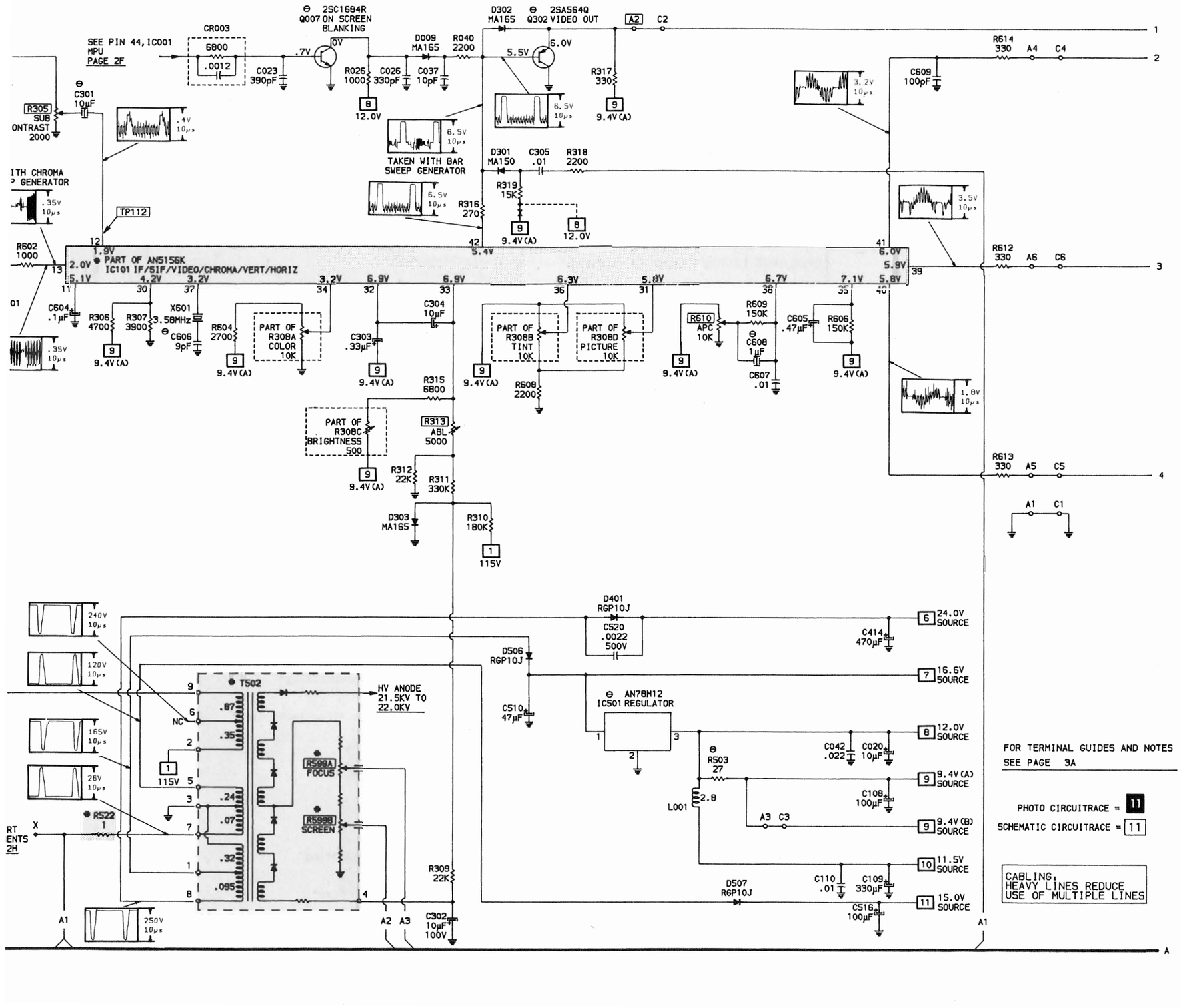
JK999 EARPHONE

SPARK GAP

HORIZ HOLD 10K

SUB CONTRAST 2000

VERT SIZE 200K

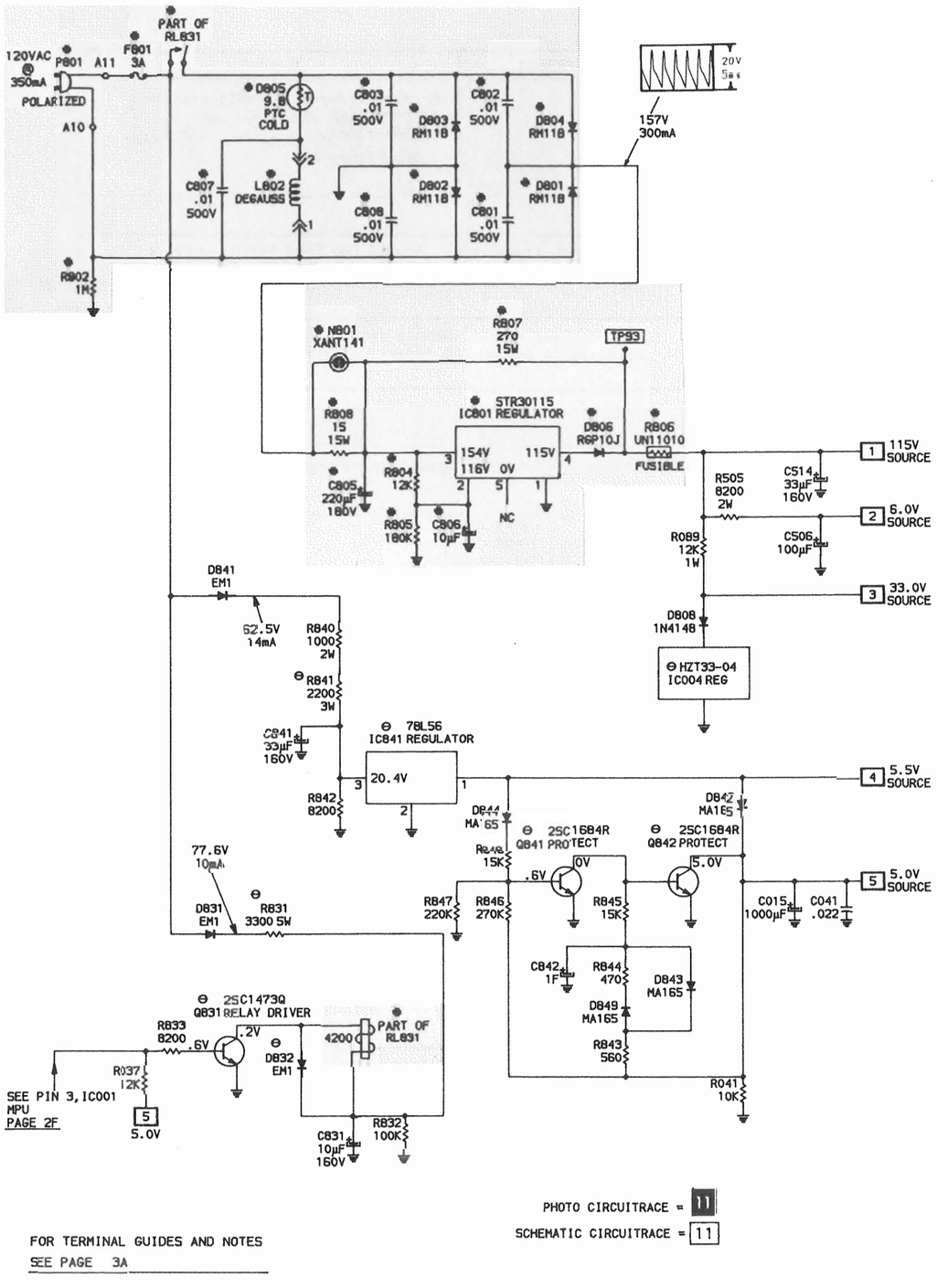


FOR TERMINAL GUIDES AND NOTES SEE PAGE 3A

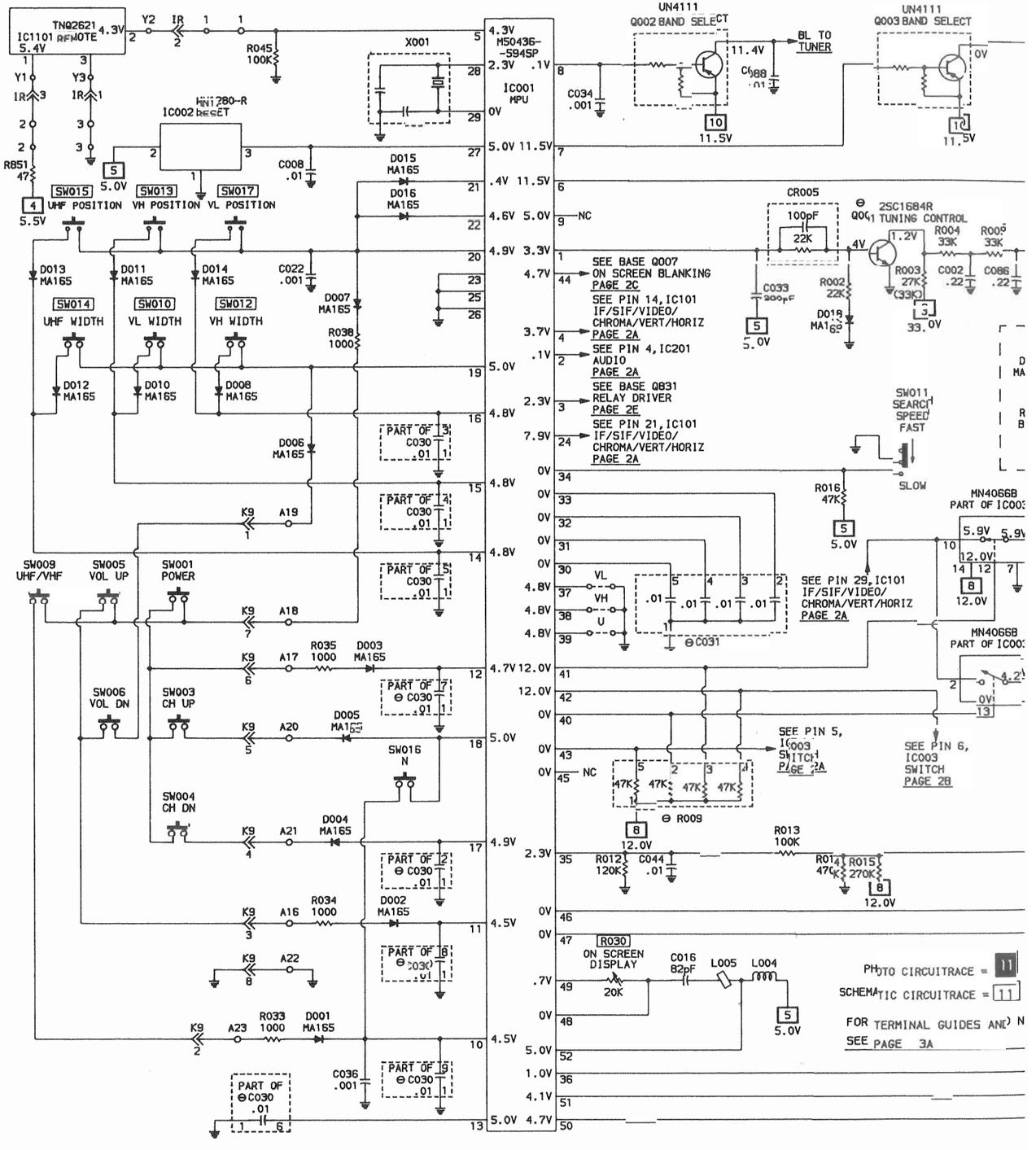
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

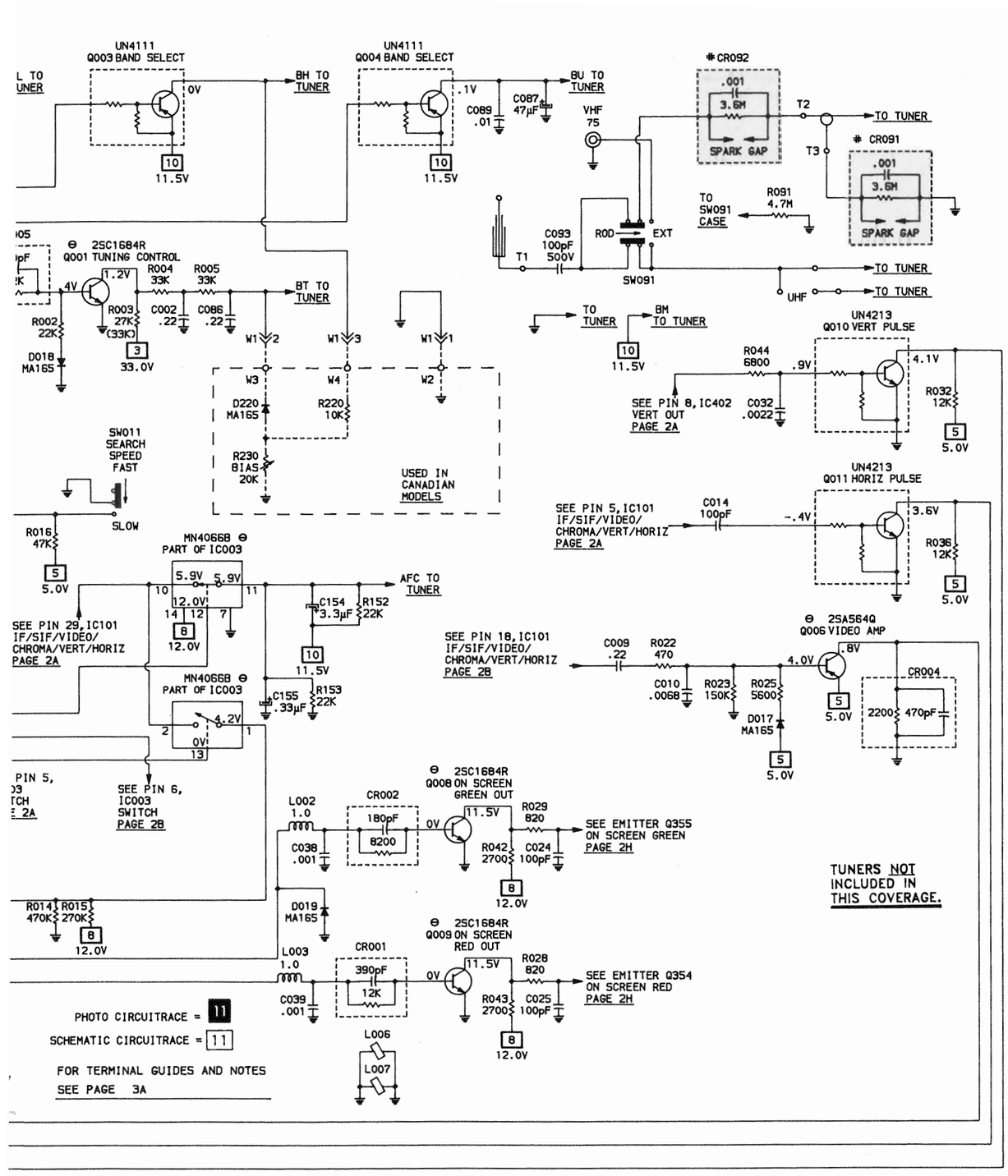
CABLING:
HEAVY LINES REDUCE USE OF MULTIPLE LINES

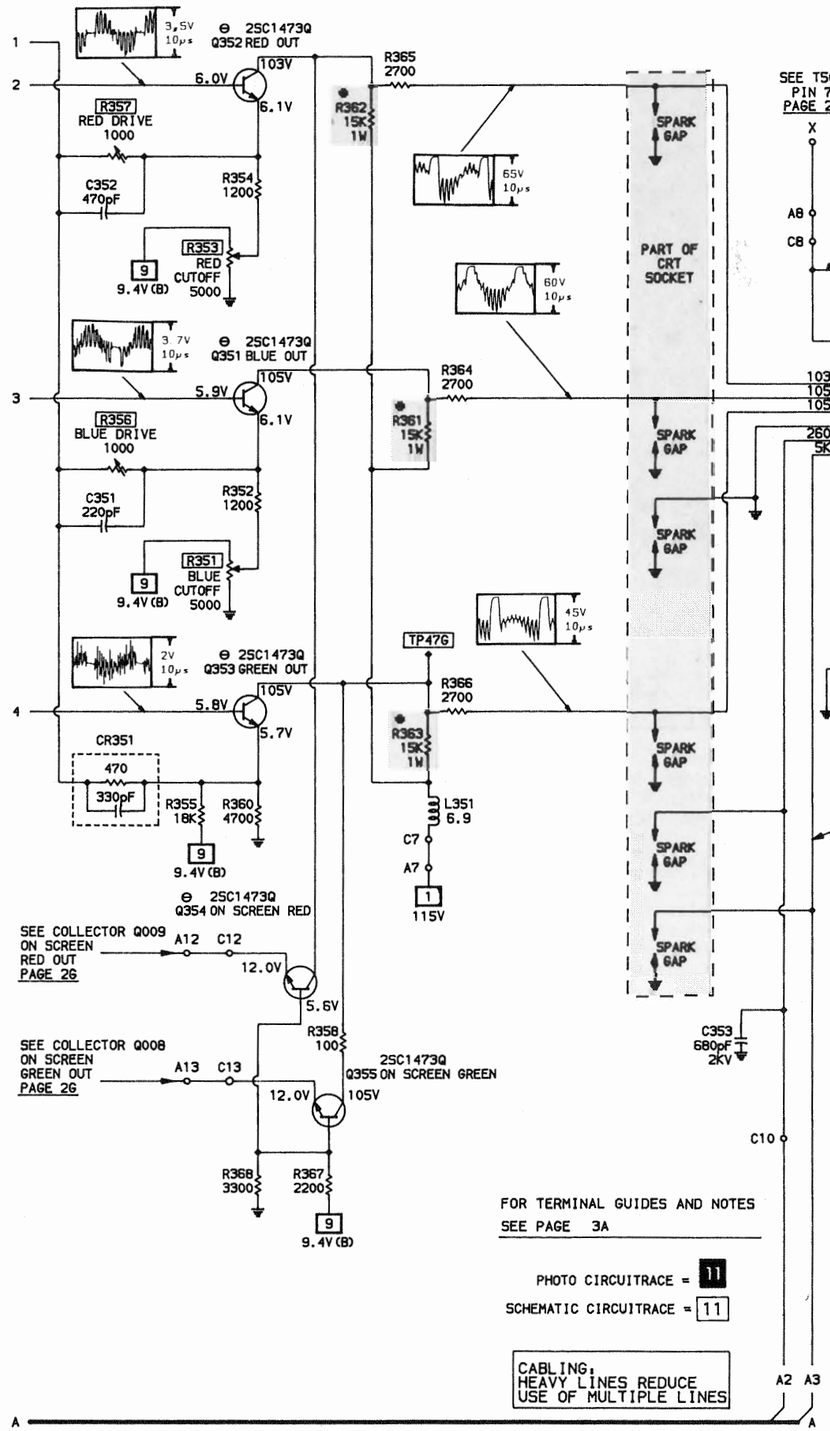


POWER SUPPLY



TUNER CONTROL



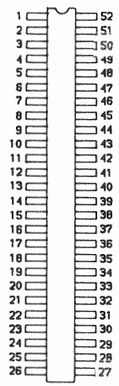


PANASONIC MODELS
CTL-1030R/31R/32R, PC-11T30R/31R

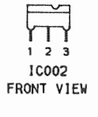
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE®

3

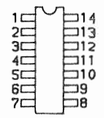
A



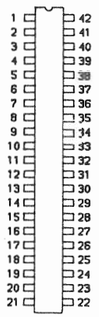
IC001
TOP VIEW



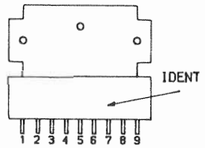
IC002
FRONT VIEW



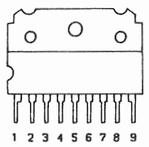
IC003
TOP VIEW



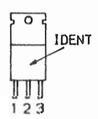
IC101
TOP VIEW



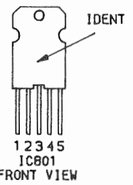
IC201
FRONT VIEW



IC402
FRONT VIEW

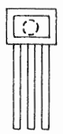


IC501
FRONT VIEW

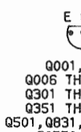


IC801
FRONT VIEW

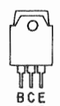
IC841
BOTTOM VIEW



Q002 THRU Q004
Q010,Q011,Q101
FRONT VIEW



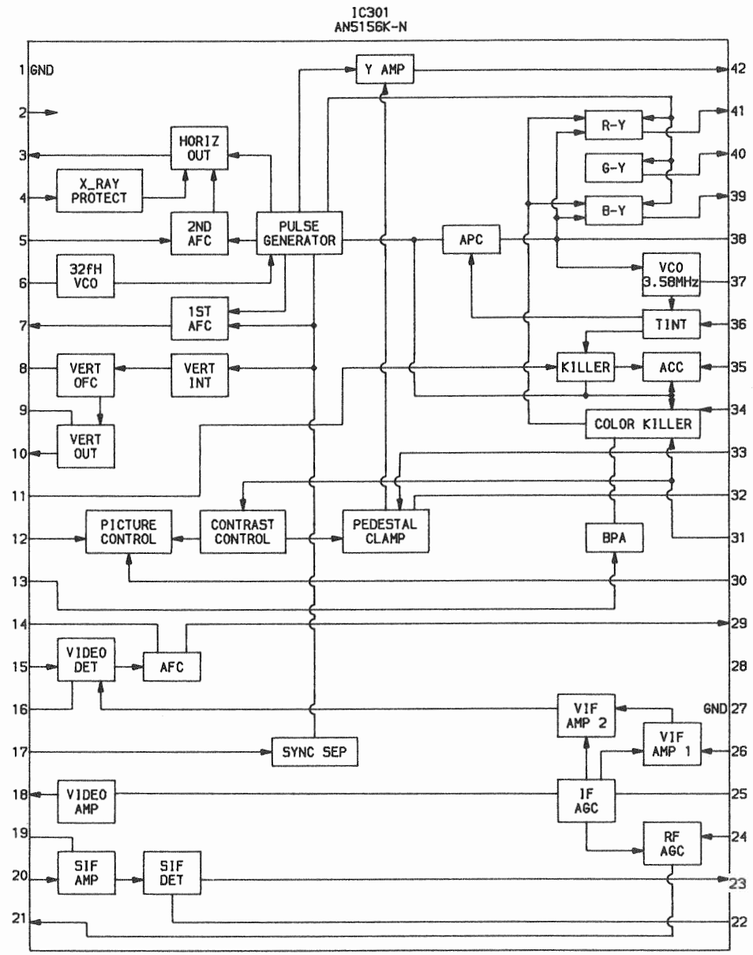
Q001,Q006
Q006 THRU Q009
Q301 THRU Q303
Q351 THRU Q355
Q501,Q831,Q841,Q842
BOTTOM VIEW

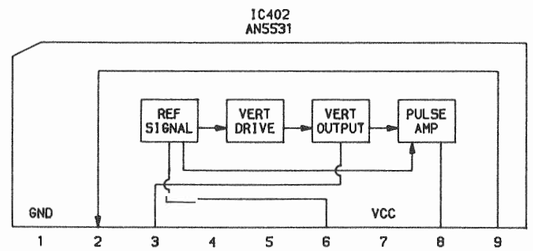


Q502
FRONT VIEW

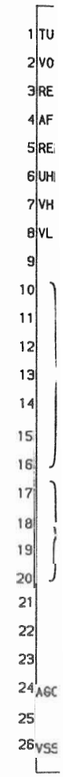
T502
BOTTOM VIEW

B





IC FUNCTIONS

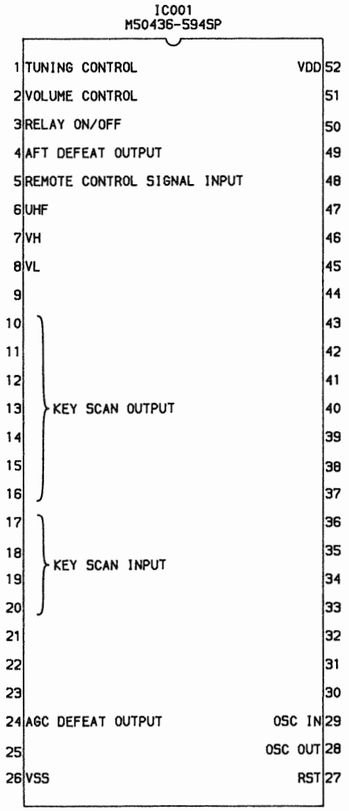


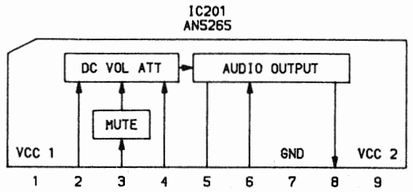
 # For SAFETY use only equivalent replacement part, see parts list.

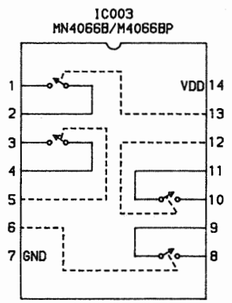
- Circuitry not used in some versions
- Circuitry used in some versions
- See Parts List
- Nominal value
- Ground
- Chassis
- Common tie point

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.

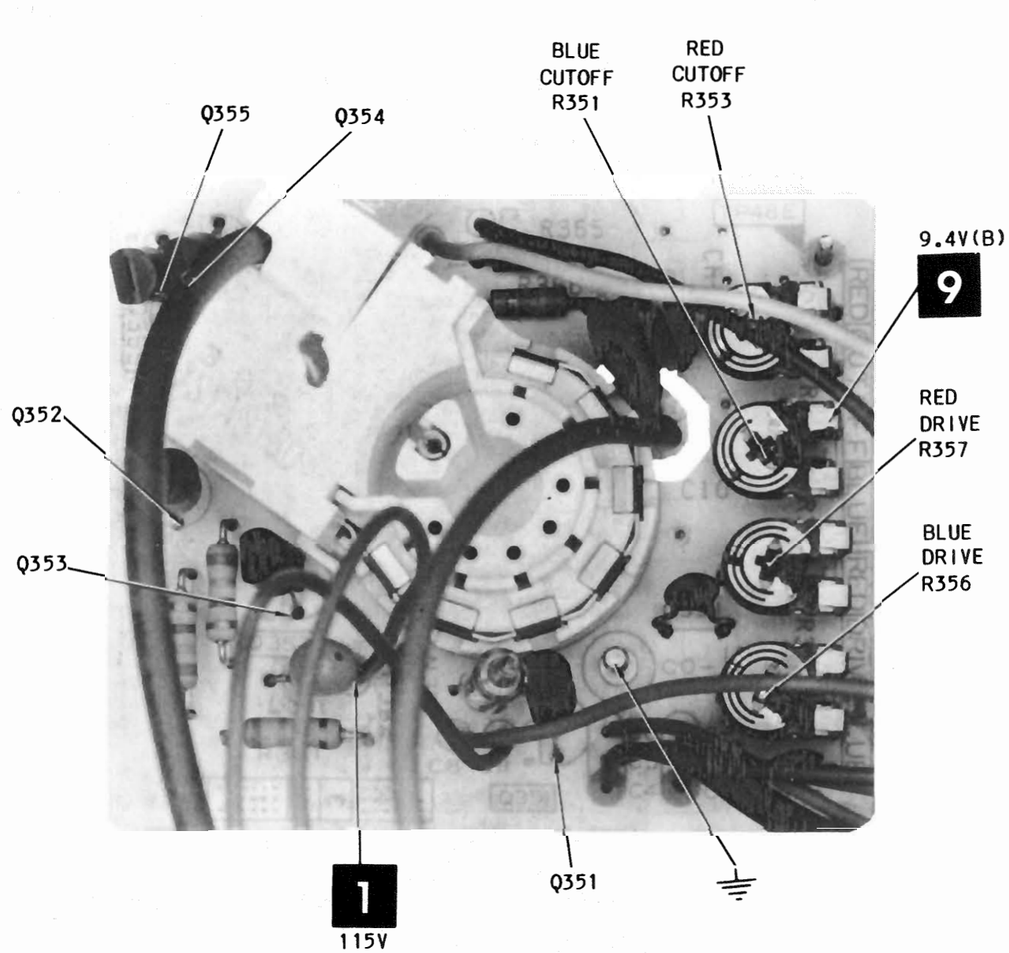
TERMINAL GUIDES AND NOTES



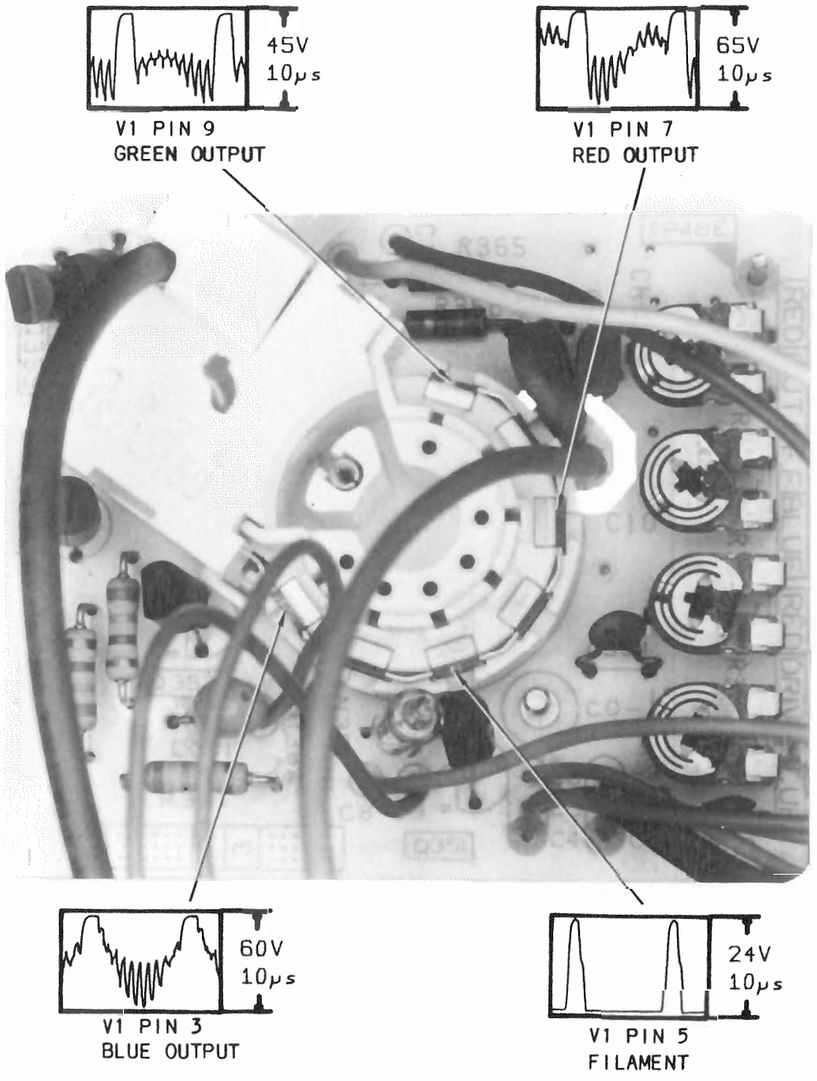




IC FUNCTIONS

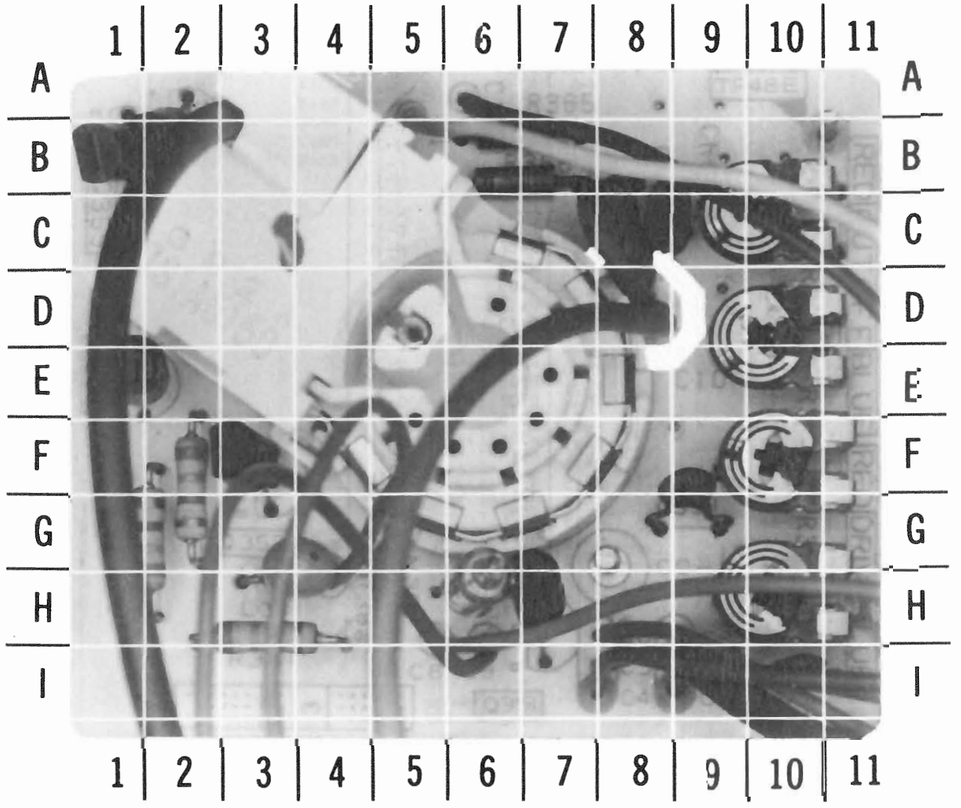


CRT BOARD



CRT BOARD

A Howard W. Sams QUICK-CHECKS™ Photo



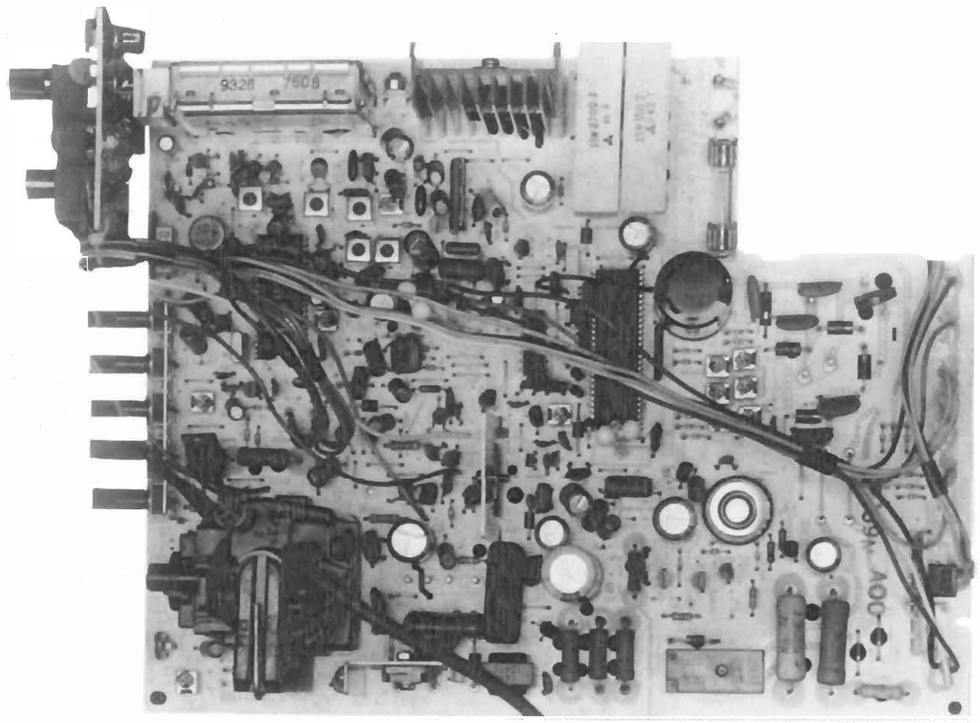
CRT BOARD

A Howard W. Sams GRIDTRACE™ Photo

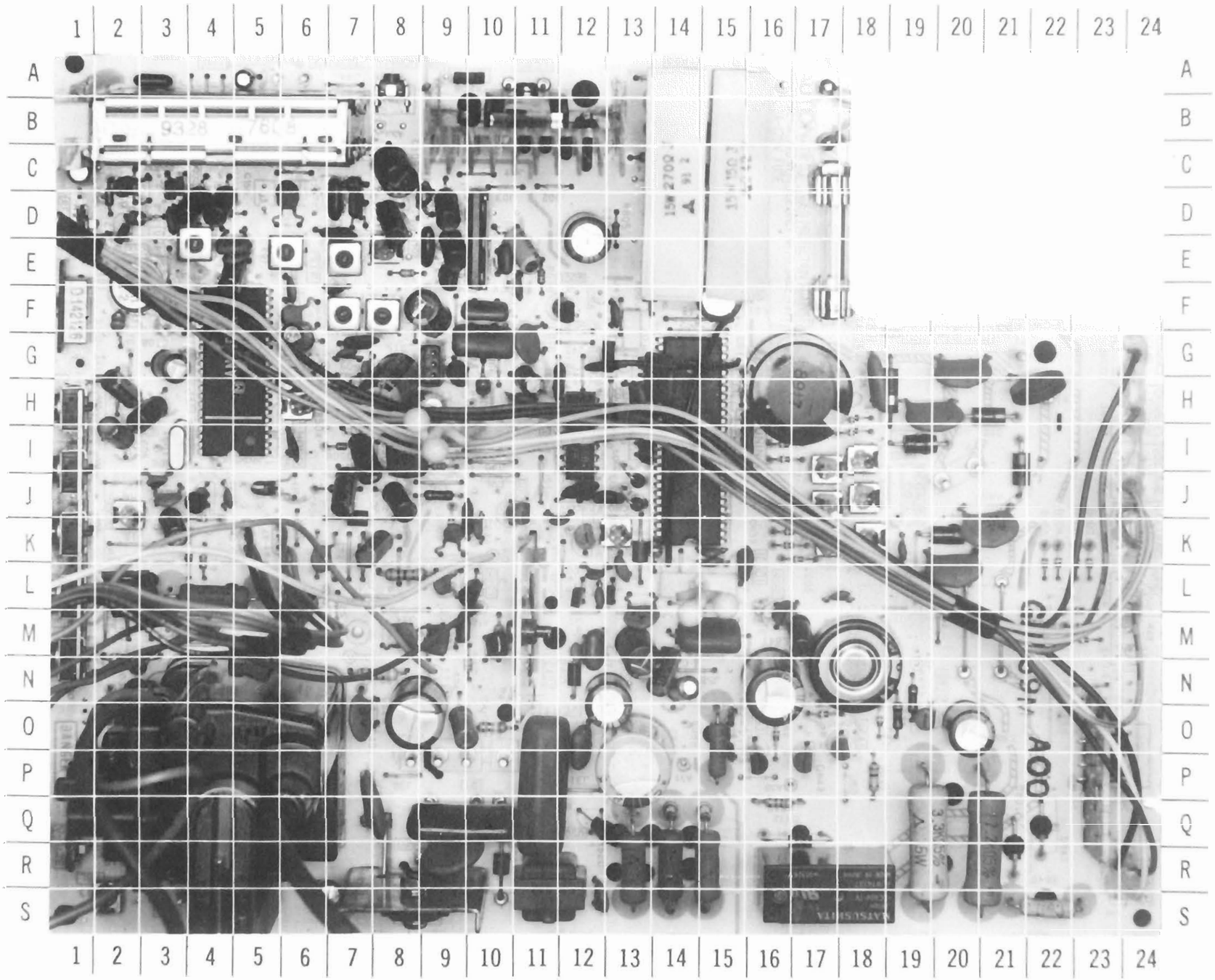
CRT BOARD-GridTrace
LOCATION GUIDE

CO-1C	G-8	R355*	A-9
C351	G-9	R356	H-10
C352	I-10	R357	F-10
C353	C-8	R358*	C-3
CR351	C-9	R360*	B-10
L351	G-4	R361	H-3
N351	H-6	R362	G-2
Q351	H-7	R363	F-2
Q352	E-1	R364	H-5
Q353	F-3	R365	B-7
Q354	B-2	R366	B-7
Q355	B-1	R367*	C-2
R351	D-10	R368*	D-1
R352*	F-9		
R353	C-10		
R354*	D-10		

*Located on bottom of board.



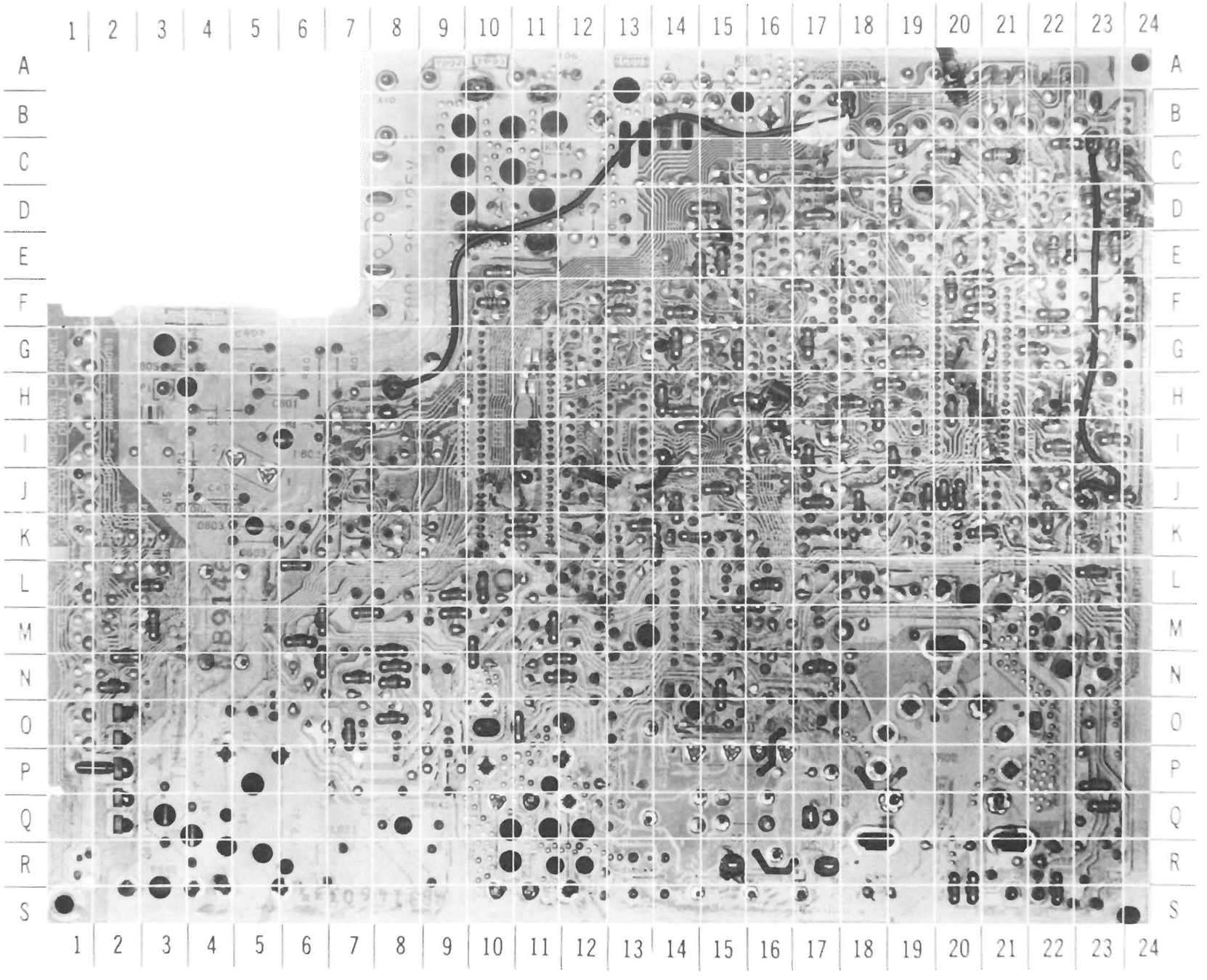
MAIN BOARD-SHIELD LOCATION



MAIN BOARD–TOP VIEW

MAIN BOARD-TOP VIEW-GridTrace LOCATION GUIDE

C002	M-15	C154	D-4	C502	I-6	CR004	G-12	D804	I-21	L502	R-10	R305	E-8	SW013	J-18
C005	M-17	C155	D-4	C503	I-7	CR005	L-16	D805	H-22	L601	H-7	R308	H-1	SW014	K-17
C008	F-13	C207	E-5	C504	K-8	CR201	D-7	D806	A-14	N801	C-15	R313	S-2	SW015	K-18
C009	G-10	C208	D-5	C505	J-8	CR601	G-7	D808	O-15	Q001	L-16	R319	K-4	SW016	A-8
C010	G-11	C209	D-9	C506	J-7	D001	M-23	D831	R-21	Q002	C-3	R403	K-6	SW017	I-18
C014	L-12	C210	E-9	C507	Q-10	D002	M-23	D832	Q-17	Q003	C-3	R407	R-1	T101	E-7
C015	F-15	C211	D-10	C508	S-12	D003	L-23	D841	Q-22	Q004	B-1	R410	N-10	T151	F-7
C016	K-13	C212	E-10	C510	R-2	D004	K-22	D842	O-16	Q006	F-12	R411	O-10	T201	E-6
C020	O-11	C213	F-10	C511	P-11	D005	K-22	D843	N-17	Q007	L-10	R503	N-2	T202	E-4
C022	K-19	C214	F-9	C514	O-13	D006	K-23	D844	O-18	Q008	J-11	R504	H-6	T501	R-11
C023	R-10	C215	G-8	C516	L-6	D007	K-23	D849	O-17	Q009	K-12	R505	L-4	T502	P-4
C026	L-9	C216	E-5	C518	R-9	D008	I-16	DY	P-8	Q010	L-12	R507	I-9	TP1	D-2
C027	K-15	C221	D-6	C519	Q-8	D009	I-9	F801	D-17	Q011	L-13	R511	I-9	TP12	C-8
C030	I-16	C222	F-6	C520	O-7	D010	K-16	IC001	K-15	Q101	D-2	R518	R-15	TP14	F-4
C031	G-14	C301	G-6	C521	K-7	D012	K-16	IC002	G-13	Q301	E-9	R520	R-13	TP93	A-14
C032	M-9	C302	S-7	C601	G-7	D013	J-16	IC003	H-12	Q302	J-4	R522	N-8	TP103	I-9
C033	K-15	C303	H-2	C603	G-7	D014	I-16	IC004	O-15	Q303	G-9	R610	J-2	TP302	K-4
C037	K-9	C304	H-3	C604	H-6	D015	I-18	IC101	I-5	Q501	Q-12	R802	H-19	TUNER	B-4
C038	J-11	C305	M-8	C605	I-2	D016	H-18	IC201	D-10	Q502	S-8	R804	C-13	X001	F-13
C039	L-12	C401	D-8	C606	J-3	D017	G-10	IC402	M-11	Q831	O-19	R805	D-13	X101	E-2
C040	L-18	C402	D-7	C607	J-3	D018	M-15	IC501	L-2	Q841	O-18	R806	A-9	X102	E-9
C041	L-13	C403	H-9	C608	K-3	D101	D-2	IC801	A-11	Q842	P-17	R807	C-14	X201	D-7
C042	H-13	C404	J-6	C609	J-4	D301	K-4	IC841	P-16	R009	I-13	R808	C-15	X601	I-3
C044	H-11	C405	M-9	C801	H-19	D302	K-4	L001	H-10	R010	I-9	R831	Q-20		
C086	A-3	C406	M-12	C802	K-21	D303	N-2	L002	J-13	R012	H-11	R832	P-18		
C087	C-1	C407	M-13	C803	L-20	D401	O-7	L003	J-13	R030	K-13	R833	N-19		
C101	E-2	C408	O-12	C805	G-17	D403	N-12	L004	K-14	R039	E-11	R840	S-22		
C104	F-3	C409	N-8	C806	D-12	D501	I-8	L005	K-13	R040	J-9	R841	Q-21		
C105	C-2	C410	O-9	C807	G-20	D504	K-7	L006	F-13	R044	M-10	R842	Q-16		
C106	F-7	C411	H-8	C808	G-18	D505	J-7	L007	M-14	R089	O-15	R851	O-19		
C107	A-5	C412	N-14	C831	O-20	D506	R-3	L101	D-2	R103	C-2	R599A	P-1		
C108	G-3	C414	N-13	C841	N-16	D507	L-6	L102	F-2	R107	D-8	R599B	P-1		
C109	C-8	C416	N-14	C842	M-18	D508	I-7	L103	D-9	R110	D-1	RL831	R-18		
C110	D-3	C417	M-12	CR001	J-12	D801	H-21	L201	C-7	R112	D-4	SW010	J-17		
C151	F-6	C418	M-10	CR002	J-12	D802	I-19	L301	F-8	R151	E-8	SW011	F-1		
C153	E-11	C501	I-8	CR003	K-10	D803	K-20	L501	K-7	R210	L-8	SW012	J-17		



MAIN

C02
C02
C03
C03
C03
C08
C08
C10
C10
C20
C20
C41
D01
L50
R00
R00
R00
R00
R00
R00
R01
R01
R01
R01
R02
R02
R02
R02
R02
R03

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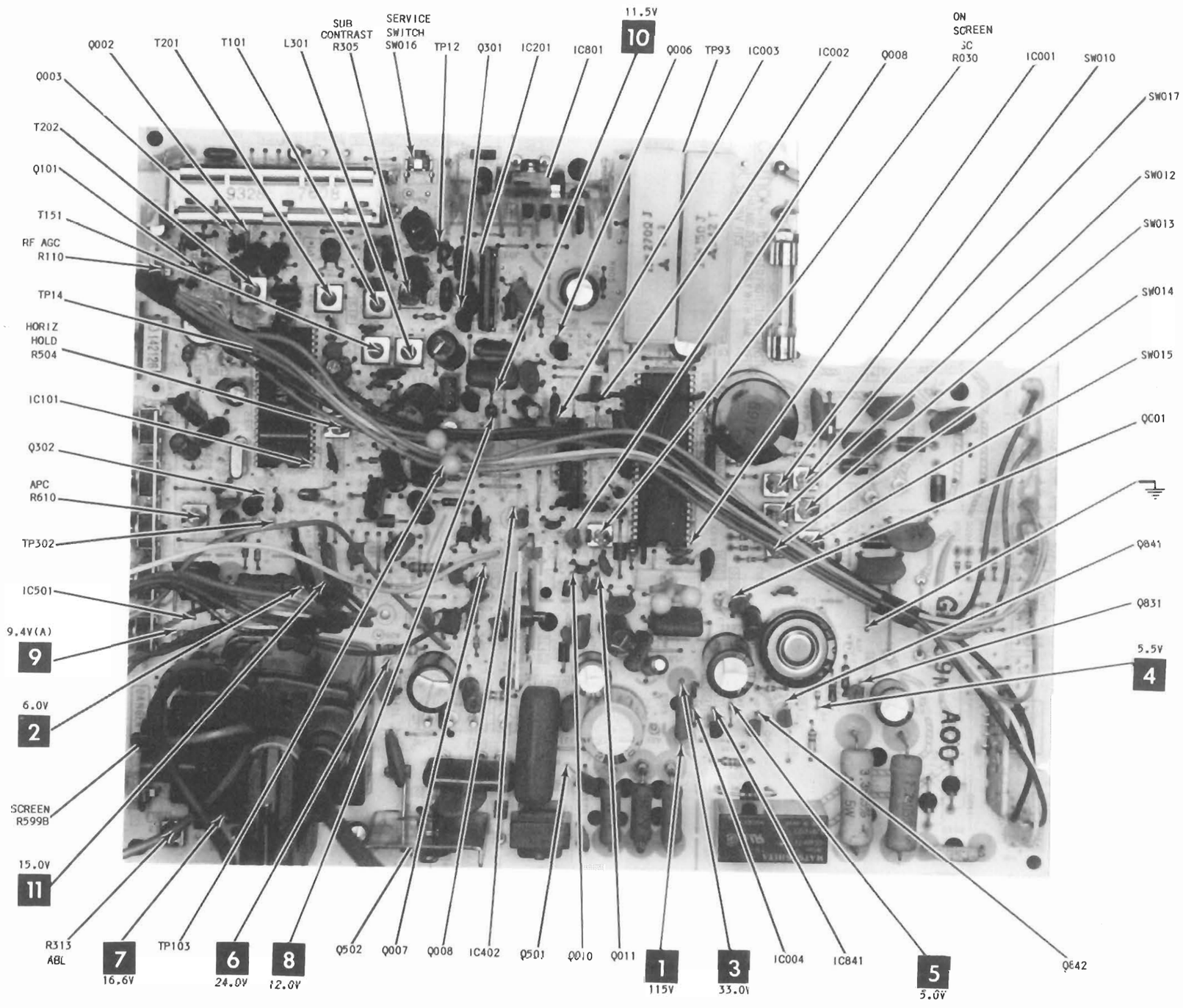
MAIN BOARD-BOTTOM VIEW

MAIN BOARD-BOTTOM VIEW-GridTrace LOCATION GUIDE

C024	K-14	R033	N-2	R306	G-22	R612	J-20
C025	K-14	R034	M-3	R307	G-21	R613	J-20
C034	J-10	R035	L-3	R309	S-20	R614	J-19
C035	J-10	R036	K-11	R310	S-20	R843	N-8
C036	F-10	R037	M-6	R311	S-22	R844	N-7
C088	C-21	R038	L-6	R312	P-23	R845	N-8
C089	C-23	R041	N-6	R315	L-23	R846	N-8
C102	E-22	R042	J-15	R316	J-21	R847	O-7
C103	G-22	R043	M-16	R317	K-21	R848	O-8
C204	D-19	R045	N-2	R318	N-17		
C206	F-21	R101	C-22	R320	H-16		
C415	H-20	R102	D-23	R401	C-17		
D019	J-13	R104	E-22	R402	D-17		
L504	H-16	R105	F-22	R406	H-19		
R002	L-9	R106	G-20	R408	N-12		
R003	N-10	R108	G-20	R409	N-12		
R004	M-9	R109	D-24	R412	O-15		
R005	L-10	R111	E-23	R413	M-11		
R007	M-6	R152	B-19	R414	O-23		
R008	M-7	R153	C-20	R501	H-20		
R013	H-14	R202	E-21	R502	H-18		
R014	H-14	R203	E-21	R508	O-11		
R015	I-14	R204	F-20	R510	J-17		
R016	F-13	R205	F-21	R512	J-19		
R018	E-10	R206	D-15	R513	J-18		
R022	F-14	R207	E-15	R514	I-18		
R023	F-13	R208	E-15	R515	I-17		
R025	G-14	R209	E-15	R602	G-19		
R026	L-16	R301	G-15	R604	I-23		
R028	K-13	R302	F-15	R606	I-22		
R029	J-14	R303	G-17	R608	J-24		
R032	K-11	R304	E-18	R609	K-22		

A

B



A Howard W. Sams CIRCUITRACE® Photo

MAIN BOARD

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AGC

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SUB

Tune R308 of Brig high Cont If r

MISCELLANEOUS ADJUSTMENTS

PRETUNING

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

Mode Select
1. Press the "A" button on remote transmitter for 2 seconds.
2. Display will blink and dots will vanish for Memory mode.
3. Press the "A" button on remote transmitter for 2 seconds.
4. Display will blink and dots will re-appear for Scan mode.

Add Channel
1. Select Scan Mode (See Mode Select).
2. Select channel.
3. Press the "B" button on remote transmitter. Tuning dots and bar display will turn yellow to indicate that the channel is in memory.
4. Repeat steps two and three to add other channels.
5. Select Memory mode tuning (See Mode Select).

Delete Channel
1. Select Scan Mode (See Mode Select).
2. Select channel.
3. Press the "B" button on remote transmitter. Tuning dots and bar display will turn red to indicate that the channel has been erased from memory.
4. Repeat steps two and three to erase other channels.

The following Control settings were used for all adjustments unless otherwise indicated: Brightness (part of R308), Picture (Part of R308), Color (Part of R308), and Tint (Part of R308) to Normal Viewing Levels.

B+ CHECK

Tune in a picture. Set Brightness (Part of R308), Contrast (Part of R308), and Color (Part of R308) Controls to MINIMUM. Connect a High Voltage Probe to CRT anode. High Voltage should be 21.5KV to 22.0KV. High Voltage must never exceed 22.5KV.

AGC ADJUSTMENT

Tune in a picture. Adjust RF AGC Control (R110) Counterclockwise until snow appears in picture, then Clockwise to a point just beyond where snow disappears.

SUB BRIGHTNESS ADJUSTMENT

Tune in a picture. Set Brightness (Part of R308), Color (Part of R308), and Picture (Part of R308) Controls to MINIMUM. Adjust Sub Brightness Control (R313) for just visible highlights. Set Brightness and Picture Controls to Maximum. Readjust Sub Brightness if required.

SUB CONTRAST ADJUSTMENT

Tune in a picture. Set Picture (Part of R308), and Brightness (Part of R308) to Maximum. Connect a Digital DC Voltmeter to TP112 (IC101 Pin 12), low side to Ground. Adjust Sub Contrast Control (R305) for 2.0 VDC.

HORIZONTAL HOLD ADJUSTMENT

Tune in a picture. Adjust Horizontal Hold Control (R504) until picture stands straight.

CW ADJUSTMENT

Tune in a Color Bar pattern. Set APC Control (R610) fully Clockwise. Adjust APC Control Counterclockwise until color just locks in. Tune from channel to channel and check color sync, readjust if required.

CHANNEL NUMBER DISPLAY LOCATION ADJUSTMENT

Tune in a picture. Press the hold recall button on remote transmitter. Adjust On Screen Display Control (R030) to center the channel number display on the screen.

TUNING DISPLAY INDICATOR ADJUSTMENT

Press and hold recall button on remote transmitter throughout this adjustment.
VHF low channels 2 - 6
Tune in channel 2 or closest station. Set SW017 to center the tuning indicator under the channel number selected.
Tune in channel 6 or closest station. Set SW010 to center the tuning indicator under the channel number selected.
VHF high band channels 7 - 13.
Tune in channel 7 or closest station. Set SW013 to center the tuning indicator under the channel number selected.
Tune in channel 13 or closest station. Set SW012 to center the tuning indicator under the channel number selected.
UHF channels 14 - 69.
Tune in channel 14 or closest station. Set SW015 to center the tuning indicator under the channel number selected.
Tune in channel 69 or closest station. Set SW014 to center the tuning indicator under the channel number selected.

COLOR PURITY ADJUSTMENT

Operate the receiver for 15 minutes with Brightness control at Maximum. Connect a 50 ohm resistor to TP12 and Ground. Use a Degaussing coil to demagnetize the CRT and mounting hardware. Set Picture (Part of R308), Color (Part of R308), Red (R353), and Blue (R351) Cut Off Controls to MINIMUM. Set Brightness (Part of R308) to produce a visible (green) raster. Loosen the Deflection Yoke clamp screw and slide the Deflection Yoke backward to obtain a Vertical green band. Rotate and spread the tabs of the Purity magnets until the green band is centered on the screen. Move the Deflection Yoke forward

MISCELLANEOUS ADJUSTMENTS (Continued)

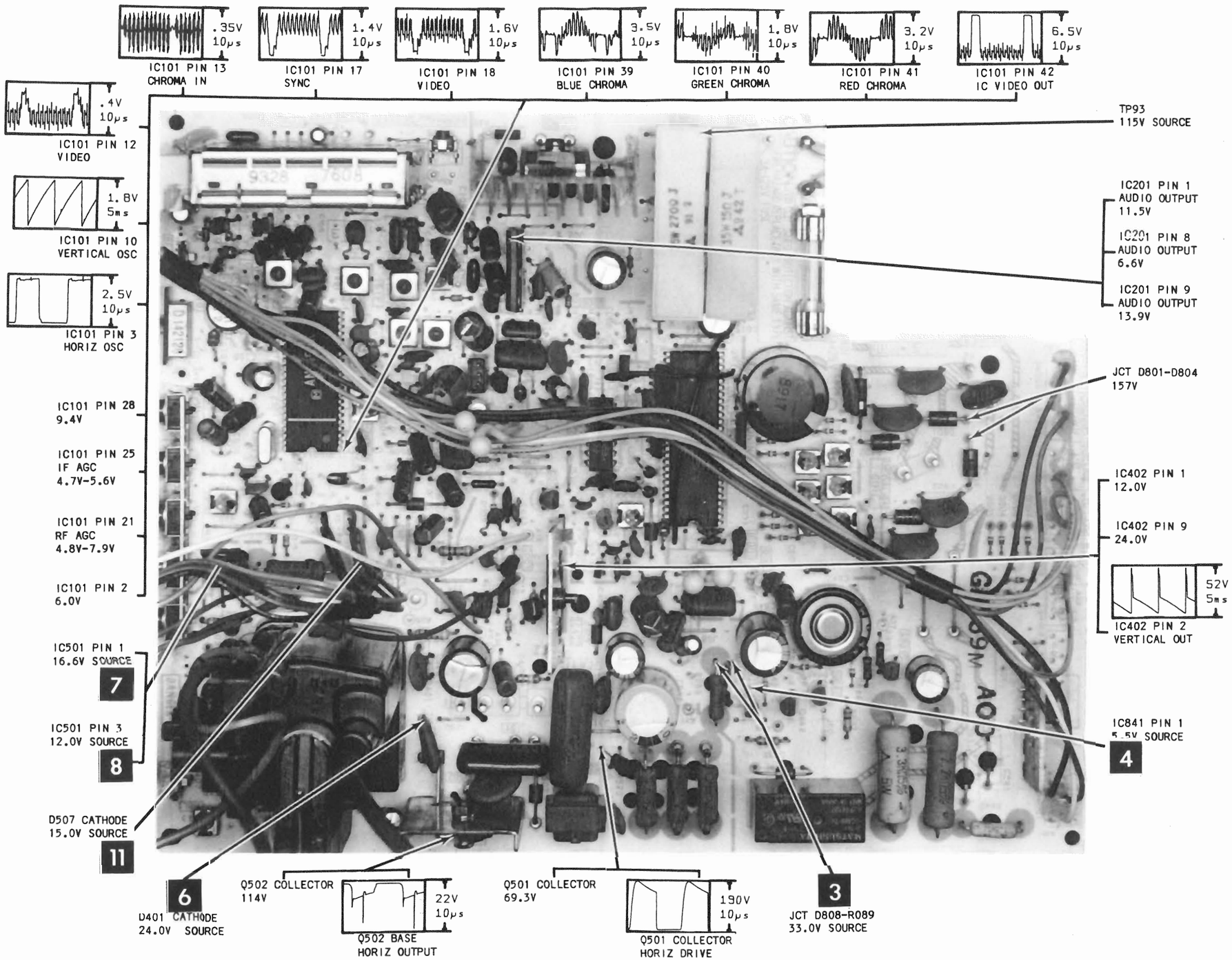
until a uniform green screen is obtained. Check red and blue purity by adjusting Cut Off Controls.

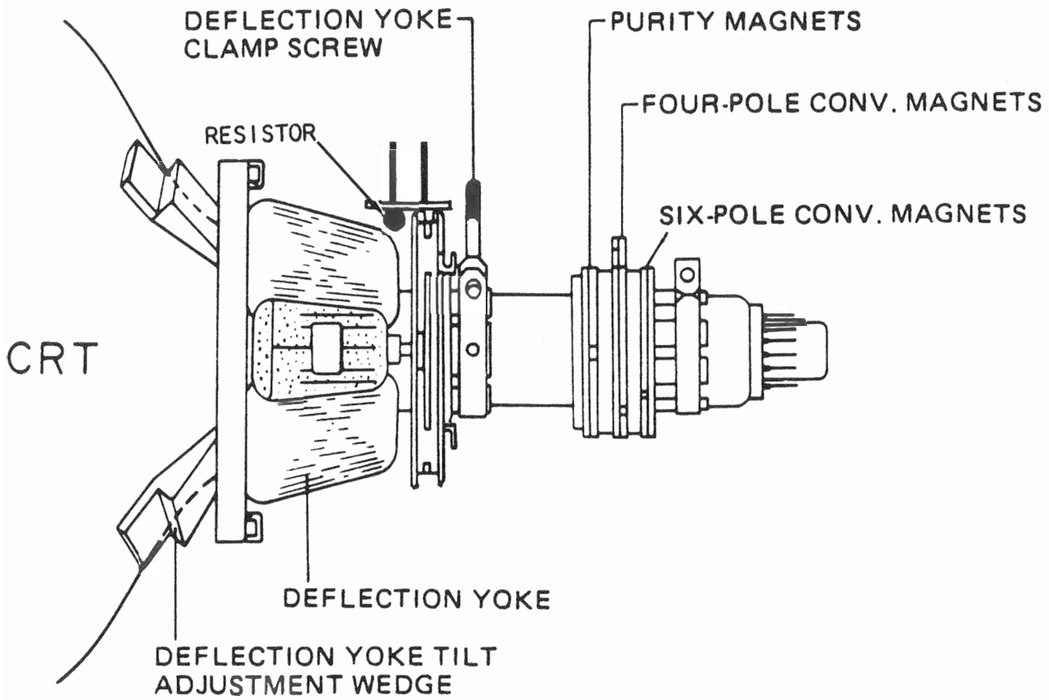
COLOR TEMPERATURE ADJUSTMENT (B/W TRACKING)

Tune in a picture. Set Color (Part of R308), Brightness (Part of R308), Picture (Part of R308), Red (R353), Blue (R351), Cut Off Controls, and Screen Control (R599B) to MINIMUM. Set Red (R357), and Blue (R356) Drive Controls to Midrange. Set Service Switch (SW016) to Service Position. Slowly advance Screen Control to obtain a dim Horizontal line of one color. Advance Brightness Control (Part of R308) to produce a green line. Adjust Cut Off Controls to obtain a white line. Place Service Switch to Normal. Set Brightness and Picture Control to Maximum. Adjust the Blue and Red Drive Controls for best Black and White picture. Check tracking at low and high brightness. If necessary, re-adjust Controls slightly.

CONVERGENCE ADJUSTMENTS

Operate the receiver for 15 minutes. Connect a Color Bar Generator to the antenna terminals and tune in a dot pattern. Adjust the 4-pole magnet tabs to converge the red and blue dots at the center of the screen. Adjust the 6-pole magnet tabs 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, therefore it is necessary to repeat adjustment until center convergence is correct. Tune in a Crosshatch pattern and remove the rubber wedges between the Deflection Yoke and the CRT. Tilt the Deflection Yoke up or down to converge the Vertical Lines at top and bottom of screen and the Horizontal lines at the right and left sides of the screen. Tilt the Deflection Yoke right or left to converge Horizontal lines at top and bottom of screen and the Vertical lines at the right and left sides of the screen. Repeat convergence procedure if necessary to obtain best overall convergence. Apply adhesive to wedges and carefully replace on CRT.


.35V 10µs
IC101 PIN 13 CHROMA IN
1.4V 10µs
IC101 PIN 17 SYNC
1.6V 10µs
IC101 PIN 18 VIDEO
3.5V 10µs
IC101 PIN 39 BLUE CHROMA
1.8V 10µs
IC101 PIN 40 GREEN CHROMA
3.2V 10µs
IC101 PIN 41 RED CHROMA
6.5V 10µs
IC101 PIN 42 IC VIDEO OUT
.4V 10µs
IC101 PIN 12 VIDEO
1.8V 5ms
IC101 PIN 10 VERTICAL OSC
2.5V 10µs
IC101 PIN 3 HORIZ OSC
IC101 PIN 28 9.4V
IC101 PIN 25 IF AGC 4.7V-5.6V
IC101 PIN 21 RF AGC 4.8V-7.9V
IC101 PIN 2 6.0V
IC501 PIN 1 16.6V SOURCE
7
IC501 PIN 3 12.0V SOURCE
8
D507 CATHODE 15.0V SOURCE
11
6
D401 CATHODE 24.0V SOURCE
Q502 COLLECTOR 114V
22V 10µs
Q502 BASE HORIZ OUTPUT
Q501 COLLECTOR 69.3V
190V 10µs
Q501 COLLECTOR HORIZ DRIVE
3
JCT D808-R089 33.0V SOURCE
TP93 115V SOURCE
IC201 PIN 1 AUDIO OUTPUT 11.5V
IC201 PIN 8 AUDIO OUTPUT 6.6V
IC201 PIN 9 AUDIO OUTPUT 13.9V
JCT D801-D804 157V
IC402 PIN 1 12.0V
IC402 PIN 9 24.0V
52V 5ms
IC402 PIN 2 VERTICAL OUT
IC841 PIN 1 5.5V SOURCE
4



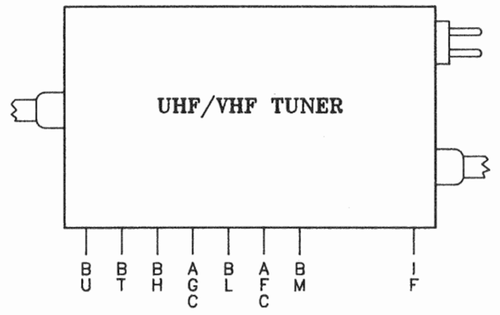
CRT NECK ASSEMBLY

TUNER VOLTAGE CHART

	BU	BT	BH	AGC	BL	AFT	BM
VHF Low Band	.1V	1.7V	0V	7.9V	11.4V	5.9V	11.5V
VHF High Band	.1V	7.0V	11.4V	7.9V	.1V	5.8V	11.5V
UHF Band	11.4V	2.3V	0V	7.9V	0V	5.6V	11.5V

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

TUNER TERMINAL GUIDE



PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NTE PART No.	ECG PART No.	TCE PART No.	NOTES
D001 THRU D009	MA165	NTE519	ECG519	SK3100/519	
D010 THRU D019	MA165	NTE519	ECG519	SK3100/519	
D101	MA27T-A	NTE605A	ECG605A	SK7952/605A	
	MA27TA	NTE605A	ECG605A	SK7952/605A	
D220					SOME VERSIONS
D301	MA150	NTE519	ECG519	SK3100/519	
D302,3	MA165	NTE519	ECG519	SK3100/519	
D401	RGP10J	NTE552	ECG552	SK9000/552	
	TVSRGP10J	NTE552	ECG552	SK9000/552	
D403	ERB12-02	NTE116	ECG116	SK3311	
	TVSB1202	NTE116	ECG116	SK3311	
D501	MA4047M	NTE5009A	ECG5009A	SK4A7/5009A	
D504	RGP-10J	NTE552	ECG552	SK9000/552	
	TVSRGP10J	NTE552	ECG552	SK9000/552	
D505	TVSRD12EB1Z	NTE5021A	ECG5021A	SK12A/5021A	#
	TVSRD12EB1	NTE5021A	ECG5021A	SK12A/5021A	
D506,7	RGP10J	NTE552	ECG552	SK9000/552	
	TVSRGP10J	NTE552	ECG552	SK9000/552	
D508	MA4030M	NTE5004A	ECG5004A	SK3A0/5004A	
D801 THRU D804	RM11B	NTE125	ECG125	SK3081/125	#
D806	RGP10J	NTE552	ECG552	SK9000/552	#
	TVSRGP10J	NTE552	ECG552	SK9000/552	
D808	1N4148	NTE519	ECG519	SK3100/519	
	TVS1N4148	NTE519	ECG519	SK3100/519	
D831,2	EM1	NTE116	ECG116	SK3313/116	
	TVSEM1	NTE116	ECG116	SK3313/116	
D841	EM1	NTE116	ECG116	SK3313/116	
	TVSEM1	NTE116	ECG116	SK3313/116	
D842,3,4,9	MA165	NTE519	ECG519	SK3100/519	
IC001	M50436-594SP				
IC002	MN1280-R	NTE15044		SK9854	
	MN1280R	NTE15044		SK9854	
IC003	MN4066B	NTE4066B	ECG4066B	SK4066B	
	MN4066BP	NTE4066B	ECG4066B	SK4066B	
IC004	HZT33-04	NTE615P	ECG615A		
IC101	AN5156K				#
	AN5156K-N				
	AN5156KN				
IC201	AN5265	NTE1789	ECG1789		
IC402	AN5531				#
IC501	AN78M12	NTE966	ECG966	SK3592/966	
	AN78M12LB	NTE966	ECG966	SK3592/966	
IC801	STR30115				#
IC841	78L56				
	M5278L56				

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NTE PART No.	ECG PART No.	TCE PART No.	NOTES
Q001	C1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684QR	NTE289A	ECG289A	SK3124A/289A	
Q002,3,4	N4111	NTE2356	ECG2356		
	UN4111	NTE2356	ECG2356		
Q006	A564Q	NTE290A	ECG290A	SK3932/91	
	2SA564Q	NTE290A	ECG290A	SK3932/91	
	2SA564QR	NTE290A	ECG290A	SK3932/91	
Q007,8,9	C1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684QR	NTE289A	ECG289A	SK3124A/289A	
Q010,11	N4213	NTE2359	ECG2359		
	UN4213	NTE2359	ECG2359		
Q101	C3315C				
	2SC3315C				
Q301	C1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684QR	NTE289A	ECG289A	SK3124A/289A	
Q302	A564Q	NTE290A	ECG290A	SK3932/91	
	2SA564Q	NTE290A	ECG290A	SK3932/91	
	2SA564QR	NTE290A	ECG290A	SK3932/91	
	2SB641QR	NTE19	ECG19	SK3912	
Q303	C1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684QR	NTE289A	ECG289A	SK3124A/289A	
Q351 THRU Q355	C1473Q	NTE399	ECG399	SK9352/399	
	2SC1473Q	NTE399	ECG399	SK9352/399	
	2SC1473NCQR	NTE399	ECG399	SK9352/399	
Q501	C1473AH	NTE399	ECG399	SK9352/399	
	2SC1473AH	NTE399	ECG399	SK9352/399	
Q502	D1439Q	NTE2302	ECG2302	SK9422	#
	2SD1439Q	NTE2302	ECG2302	SK9422	
	2SD1439-QLB	NTE2302	ECG2302	SK9422	
Q831	C1473Q	NTE399	ECG399	SK9352/399	
	2SC1473Q	NTE399	ECG399	SK9352/399	
	2SC1473NCQR	NTE399	ECG399	SK9352/399	
Q841,2	C1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684R	NTE289A	ECG289A	SK3124A/289A	
	2SC1684QR	NTE289A	ECG289A	SK3124A/289A	

For SAFETY use only equivalent replacement part.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

ELECTROLYTIC CAPACITORS

Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR. PART No.
C301	10 NP 16V	ECEA1CN100S
C403	22 NP 16V	ECEA1CN220S
C404	1 35V	ECSF1VE105K
C608	1 NP 50V	ECEA1HN010S

	ITEM No.	RATING	MFGR. PART No.
#	C805	220 180V	ECES2PV221
#	C806	10 160V	ECEA2CS100
	C842	1 Farad 5.5V	EECF5R5U105

For SAFETY use only equivalent replacement part.

CAPACITORS

Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR. PART No.
C030	Capacitor Array (.01 X 7) 50V	EXFP8102ZF
C031	Capacitor Array (.01 X 4)	EXFP4102ZF
C037	10pF 50V ±.5pF	ECCF1H100D
C106	1pF NPO 50V ±.25pF	ECCF1H010CC
C151	3pF NPO 50V ±.25pF	ECCF1H030CC
C221	3pF NPO 50V ±.25pF	ECCF1H030CC
C502	100pF NPO 50V 5%	ECCF1H101JC
# C507	.0039 1.2KV 5%	ECWH12H392JS

	ITEM No.	RATING	MFGR. PART No.
#	C511	.3 200V 5%	ECQF2H304JZ
#	C518	.0015 2KV 5%	ECKD3D152JB
#	C519	.0015 2KV 5%	ECKD3D152JB
	C606	9pF NPO 50V ±.5pF	ECCF1H090DC
#	C801	.01 125VAC .01 500V	ECKD2H103PU
#	C802	.01 125VAC .01 500V	ECKD2H103PU
#	C807	.01 125VAC .01 500V	ECKD2H103PU
#	C808	.01 125VAC .01 500V	ECKD2H103PU

For SAFETY use only equivalent replacement part.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
R030	On Screen Display	20K	EVND4AA00B24	
R110	RF AGC	2000	EVN59UA00B23	
R305	Sub Contrast	2000	EVND4AA00823	
R308A	Color	10K	(1)	
R308B	TInt	10K	(1)	
R308C	Brightness	500	(1)	
R308D	Picture	10K	(1)	
R308E	Vertical Hold	30K	(1)	
R313	ABL	5000	EVND4AA00B53	
R351	Blue Cutoff	5000	EVN49AA00B53	
R353	Red Cutoff	5000	EVN49AA00B53	
R356	Blue Drive	1000	EVN49AA00B13	
R357	Red Drive	1000	EVN49AA00B13	
R407	Vertical Size	200K	EVN59UA00B25	
R504	Horizontal Hold	10K	EVND4AA00B14	
# R599A	Focus		(2)	
# R599B	Screen		(2)	
R610	APC	10K	EVND4AA00B14	

For SAFETY use only equivalent replacement part.
(1) Part of Control Assembly Part No. EVUG5ACA0007
(2) Part of Horizontal Output Transformer # T502 Part No. TLF14743F

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

RESISTORS (Power and Special)

	ITEM No.	RATING	REPLACEMENT DATA MFGR. PART No.	NTE PART No.	
#	D805	9.8 PTC Cold	ERPZ4B0M080B		
	R009	Resistor Array (47K X4)	EXBP84473J		
#	R512	3.92K 1% 1/4W Metal Oxide Leadless	ER025LKF3941		
#	R513	2.94K 1% 1/4W Metal Oxide Leadless	ER025LKF2941		
#	R518	3300 5% 2W Metal Oxide	ERG2ANJ332	2W233	
#	R519	3300 5% 2W Metal Oxide	ERG2ANJ332	2W233	
#	R520	470 5% 2W Metal Oxide	ERG2ANJ471	2W147	
#	R522	1 5% 1/2W Fusible	ERQ12AJ1R0		
#	R802	1M 10% 1/2W Carbon Comp	ERC12ZGK105	HW510	
#	R804	12K 5% 1/2W Carbon	ERDS1TJ123	HW312	
#	R805	180K 5% 1/4W Carbon	ERDS2TJ184	QW418	
#	R806	Fusible	UN11010		
#	R807	270 5% 15W Wirewound	ERF15ZYJ271		
#	R808	15 5% 15W Wirewound	ERF15ZYJ150		
	R831	3300 5% 5W Metal Oxide	ERG5SJ332		
	R841	2200 5% 3W Metal Oxide	ERG3ANJ222	3W222	

For SAFETY use only equivalent replacement part.

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
L001	RF Choke (100uH)	ELEPE101KA
L002	Peaking (15uH)	TLT150K126R
L003	Peaking (15uH)	TLT150K126R
L004	RF Choke (.27uH)	ELEPER27KA
L101	RF Choke (.56uH)	ELEQER56JA

ITEM No.	FUNCTION	MFGR. PART No.
L102	RF Choke (.68uH)	ELEQER68KA
L103	Peaking (15uH)	ELEPE150KA
L201	Peaking (15uH)	ELEPE150KA
L351	RF Choke (470uH)	TLT471K991R
L601	RF Choke (18uH)	ELEPE180KA

COILS & TRANSFORMERS

	ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
#	L503	Yoke 90° Horiz 3.75mh Vert 21.9mh	TLY15395F1M	TLY153951L(1)	
#	T203	Earphone	ETA16Z17AY	A1617(1)	
#	T501	Horizontal Drive	TLH15412	TLH15412(1)	
#	T502	Horizontal Output	TLF14743F	TLF14743F(1)	

For SAFETY use only equivalent replacement part.
(1) Number on unit.

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA MFGR. PART No.	QUAM PART No.	NOTES
SP1	16 Ohms 3" round with mounting ears	EAS65P34DG		

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

MISCELLANEOUS

	ITEM No.	PART NAME	MFGR. PART No.	NOTES
	CR001	Capristor	EXRP391K123S	390pF, 12K
	CR002	Capristor	EXRP181K822S	180pF, 8200
	CR003	Capristor	EXRP122K682S	1200pF, 6800
	CR004	Capristor	EXRP471K222S	470pF, 2200
	CR005	Capristor	EXRP101K223S	100pF, 22K
#	CR091	Capristor	EXNG102Z365D	.001, 3.6M
#	CR092	Capristor	EXNG102Z356D	.001, 3.6M
	CR201	Capristor	EXPP820K333S	82pF, 33K
	CR351	Capristor	EXRP331K471T	330pF, 470
	CR601	Capristor	EXRP180K332S	18pF, 3300
#	F801	Fuse 3 Amp @ 125V	XBA1F30NU100	
	L005	Ferrite Bead	TSK1008	
	L006	Ferrite Bead	TSK1008	
	L007	Ferrite Bead	TSK1008	
	L301	Delay Line	EIK7EN002Q	
	L501	Ferrite Bead	TSK1008	
	L502	Ferrite Bead	TSK1008	
	L504	Ferrite Bead	TSK1008	
#	L802	Deguassing Coil	TLK159025M	
	N351	Neon Lamp	XANT137	
#	N801	Neon Lamp	XANT141	
#	P801	AC Cord	TSX3136	Polarized
#	RL831	Power Relay	TSE1838	
	SW001	Switch	EVQQS607T	Power
	SW003	Switch	EVQQS607T	Channel Up
	SW004	Switch	EVQQS607T	Channel Down
	SW005	Switch	EVQQS607T	Volume Up
	SW006	Switch	EVQQS607T	Volume Down
	SW009	Switch	EVQQS607T	UHF/VHF
	SW010	Switch	EVND48A00	VL Width
	SW011	Switch	ESD142126	Fast/Slow
	SW012	Switch	EVND48A00	VH Width
	SW013	Switch	EVND48A00	VH Position
	SW014	Switch	EVND48A00	UHF Width
	SW015	Switch	EVND48A00	UHF Position
	SW016	Switch	EVQQSN04T	Service/Normal
	SW017	Switch	EVND48A00	VL Position
	SW091	Switch	ESD1512217	INT/External Antenna
#	V1	CRT	A26JGZ91X	10"
	X001	Crystal	EFOFC4194A4	
	X101	SAW Filter	EFCH45MVK11T	
	X102	Filter	EFCS4R5MW3	4.5MHz Trap
	X201	Filter	EFCS4R5MS4E	4.5MHz Bandpass
	X601	Crystal Oscillator	TSS816MX	3.59MHz
		Antenna Terminal Assembly	TJB1723300M	
		Control Assembly	EVUG5ACA0007	Includes Five Controls Color, Tint, Brightness Picture, Vertical Hold
		CRT Socket	TJS1A5150	
		Fuse Holder	TJC6319	Two Used
		Purity/Static Convergence Rings	TLC2042	
		RC Receiver	EUR50514	CTL-1031R/32R PC-11T31R
		RC Receiver RC Transmitter	EUR50513	CTL-1030R/PC-11T30R
		VHF Antenna	TSA120022	
#		UHF/VHF Tuner	ENV76808F2	

For SAFETY use only equivalent replacement part.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.	PART No.	PART No.	PART No.
Bottom Case Transmitter	UR50VCS683	(2)(3)(5)		
Bottom Case Transmitter	UR50VCS682	(1)(4)		
Upper Case Transmitter	UR50VSC672	(2)(3)(5)		
Upper Case Transmitter	UR50VSC670	(1)(4)		
Battery Cover Transmitter	UR50EC782A	(1)(4)		
Battery Cover Transmitter	UR50EC782	(2)(3)(5)		
Cabinet Front Assembly	TXFKY218SER	(3)		
Cabinet Front Assembly	TXFKY208SER	(2)(5)		
Cabinet Front Assembly	TXFKY198SER	(1)(4)		
Cabinet Back Assembly	TXFKU308SER	(4)		
Cabinet Back Assembly	TXFKU318SER	(5)		
Cabinet Back Assembly	TKU2A21903	(1)		
Cabinet Back Assembly	TKU2A21902	(2)		
Cabinet Back Assembly	TKU2A21901	(3)		
Overlay Trim Cabinet Top	TKP2A91261	All		
Lens Infra-Red	TKP2A91251-1	All		
6 Push Button Assembly	TBX2A51201	(2)(3)(5)		
6 Push Button Assembly	TBX2A51202	(1)(4)		

(1) Used In model CTL-1030R.
(2) Used In model CTL-1031R.
(3) Used In model CTL-1032R.
(4) Used In model PC-11T30R.
(5) Used In model PC-11T31R.

PANASONIC MODELS
CTL-1030R/31R/32R, PC-11T30R/31R

G

H SET 2749 FOLDER 1 6