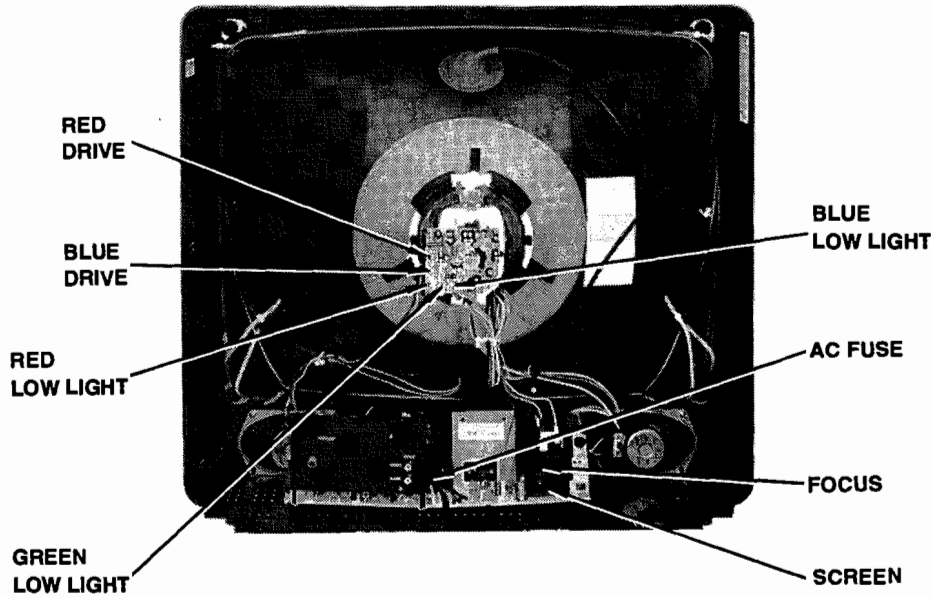


CABINET - REAR VIEW



TEST JIG HOOKUP

Function	Chek-A-Color Adapter No.	PC Board Plug No.	Pin	Color
CRT	B239	DY	1	Black
Yoke	D482		2	Yellow
Yoke Setting	YP1A		4	Blue
Comments	Focus Tap		6	Red

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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PHOTOFACT® Technical Service Data

SET 3220

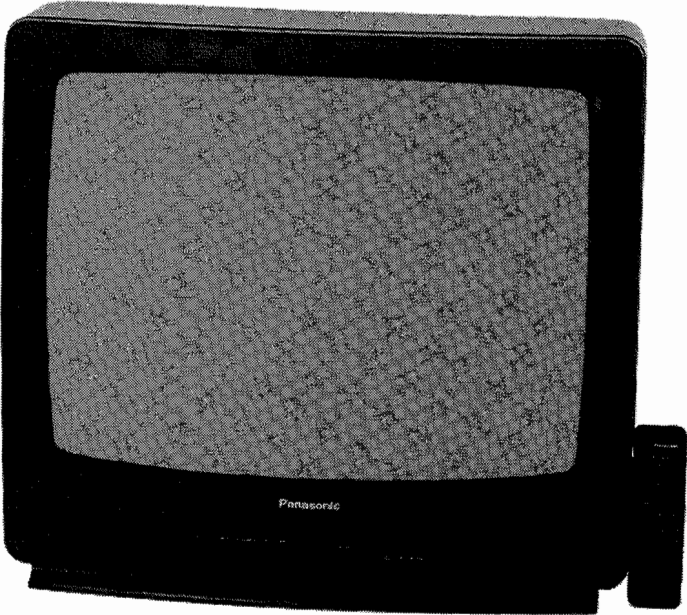
MODEL CT-25R10R (CHASSIS ADP208)

PANASONIC

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PANASONIC
Model CT-25R10R (Chassis ADP208)



Complete coverage
for servicing a television receiver...

- Schematics
- Component locations
- Parts lists
- Troubleshooting guide

Coverage includes this additional model and chassis:

MODEL	CHASSIS
PC-26A40C	YADP208



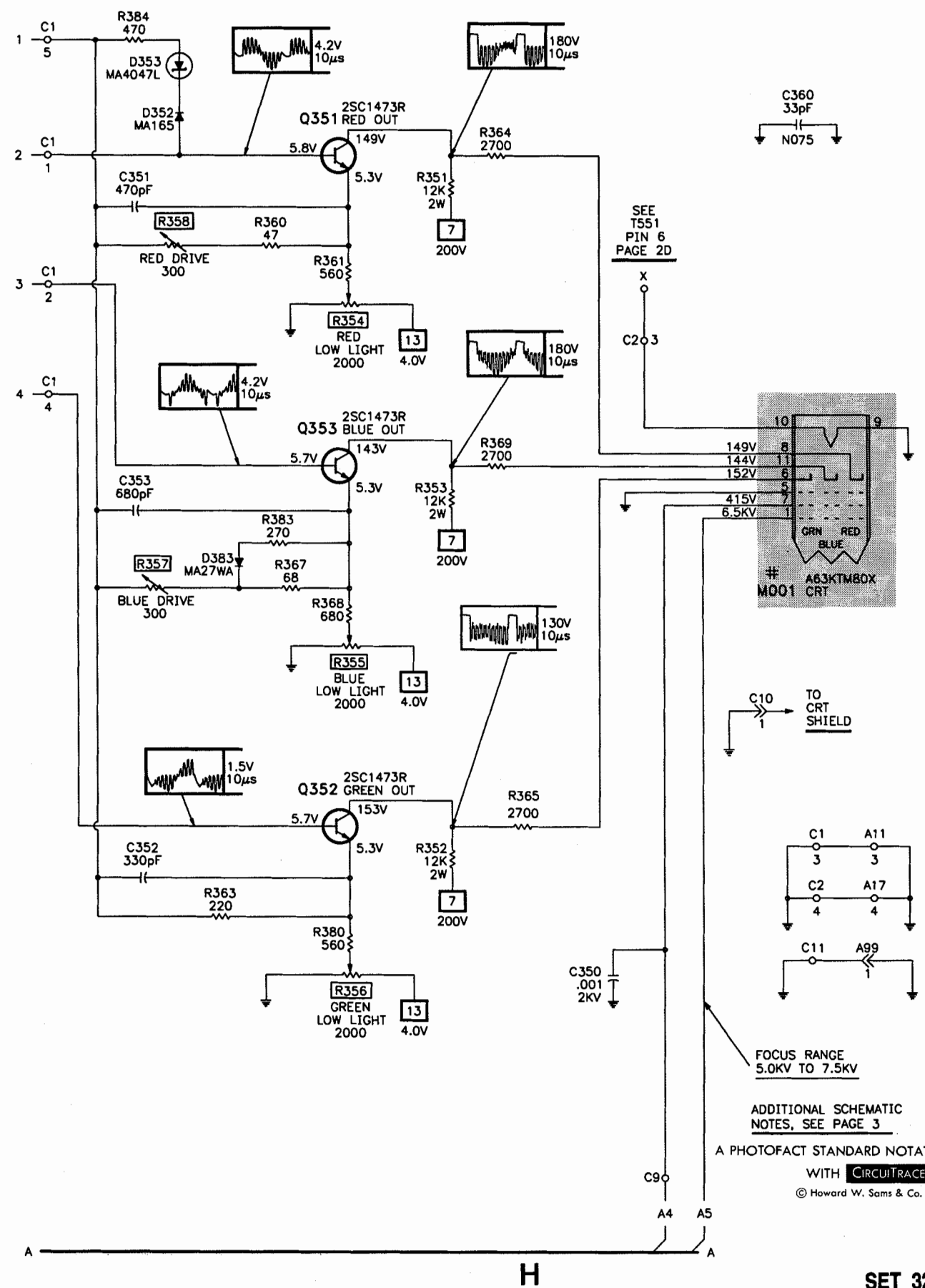
HOWARD W. SAMS & COMPANY

OCTOBER 1993 SET 3220

For Supplier Address,
See PHOTOFACT Annual Index

3220

CRT SCHEMATIC



MODEL CT-25R10R (CHASSIS ADP208)

MISCELLANEOUS ADJUSTMENTS

PRETUNING

Auto Memory

1. Press the set-up button until the arrow points at auto channel.
2. Press the + button. Available channels are scanned and stored in memory.

Add Channel

1. Select channel.
2. Press the set-up button until the arrow points at the channel display.
3. Press the + button.
4. Repeat steps one thru three to add other channels.

Delete Channel

1. Select channel
2. Press the set-up button until the arrow points at the channel display.
3. Press the - button.
4. Repeat step one thru three to erase other channels.

Normalize Settings

1. Press the video button.
2. Press the norm button.

NOTE: This set employs digital customer controls. All adjustments are at normalized position unless otherwise indicated.

B+ CHECK

Connect a digital DC voltmeter to TP91, low side to TP92. Set brightness, picture, and color to minimum. B+ should measure 130V with line voltage at 120VAC.

HIGH VOLTAGE CHECK

Connect a high voltage probe to CRT anode. High voltage must read 25.0KV +1.0KV -1.5KV.

RF AGC

Tune in a picture. Adjust RF AGC control R106 counterclockwise until snow appears in pictures, then clockwise to a point just past where snow disappears.

SUB BRIGHTNESS

Tune in a picture. Adjust brightness, picture, and color to minimum. Adjust sub brightness control R318 for just visible highlights. Set brightness, picture, and color controls to maximum. Check for blooming and readjust if required.

SUB CONTRAST

CAUTION: Do not adjust sub contrast control R304 unless CRT, CRT board, or associated components are replaced.

Tune in a colorbar pattern. Connect an oscilloscope to TP13, low side to ground. Adjust sub contrast control R304 for 2.6V p-p level of the video portion of the waveform.

HORIZONTAL CENTERING

Tune in a crosshatch pattern. Adjust horizontal centering control R524 for best horizontal centering.

VERTICAL SIZE

Tune in a crosshatch pattern. Adjust vertical size control R453 for a slight overscan at the top and bottom of the screen.

VIDEO LEVEL

CAUTION: Do not adjust unless video control R114 has been replaced or misadjusted.

Tune in a colorbar pattern. Connect an oscilloscope to emitter of Q3103. Adjust video control R114 for 1.0V p-p.

MPU REFERENCE OSCILLATOR

Tune in channel 13. Connect a frequency counter to pin 4 of connector A3. Set tuning system to TV/ANT. Connect a jumper from pin 7 of IC001 to ground. Adjust reference oscillator control C031 for 500kHz \pm 3.5Hz.

SUB TINT

Tune in an active channel. Adjust sub tint control R619 for normal skin tones.

COLOR TEMPERATURE

Tune in a crosshatch pattern. Set screen to minimum. Adjust low light and drive controls R354 thru R358 to midpoint. Adjust the screen control for a just visible pattern. Note the color of the pattern and adjust the two remaining low light controls for a white pattern. Adjust brightness and picture to maximum and adjust drive controls for best white pattern.

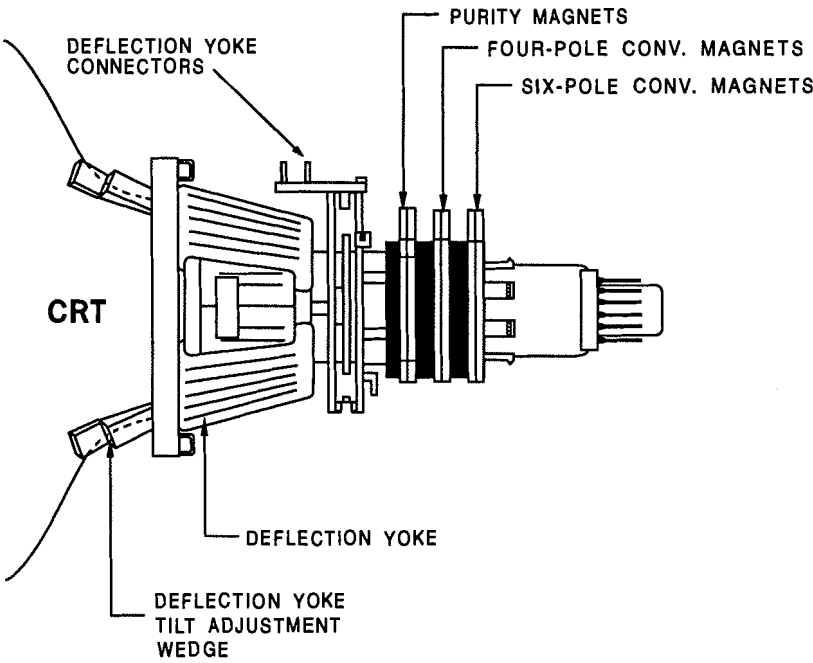
PURITY

Use a degaussing coil to demagnetize the CRT. Tune in a green raster. Loosen the deflection yoke and move it back as far as possible. Loosen locking ring and move the purity tabs to center the vertical green band. Slowly slide the deflection yoke forward until a uniform green screen is obtained.

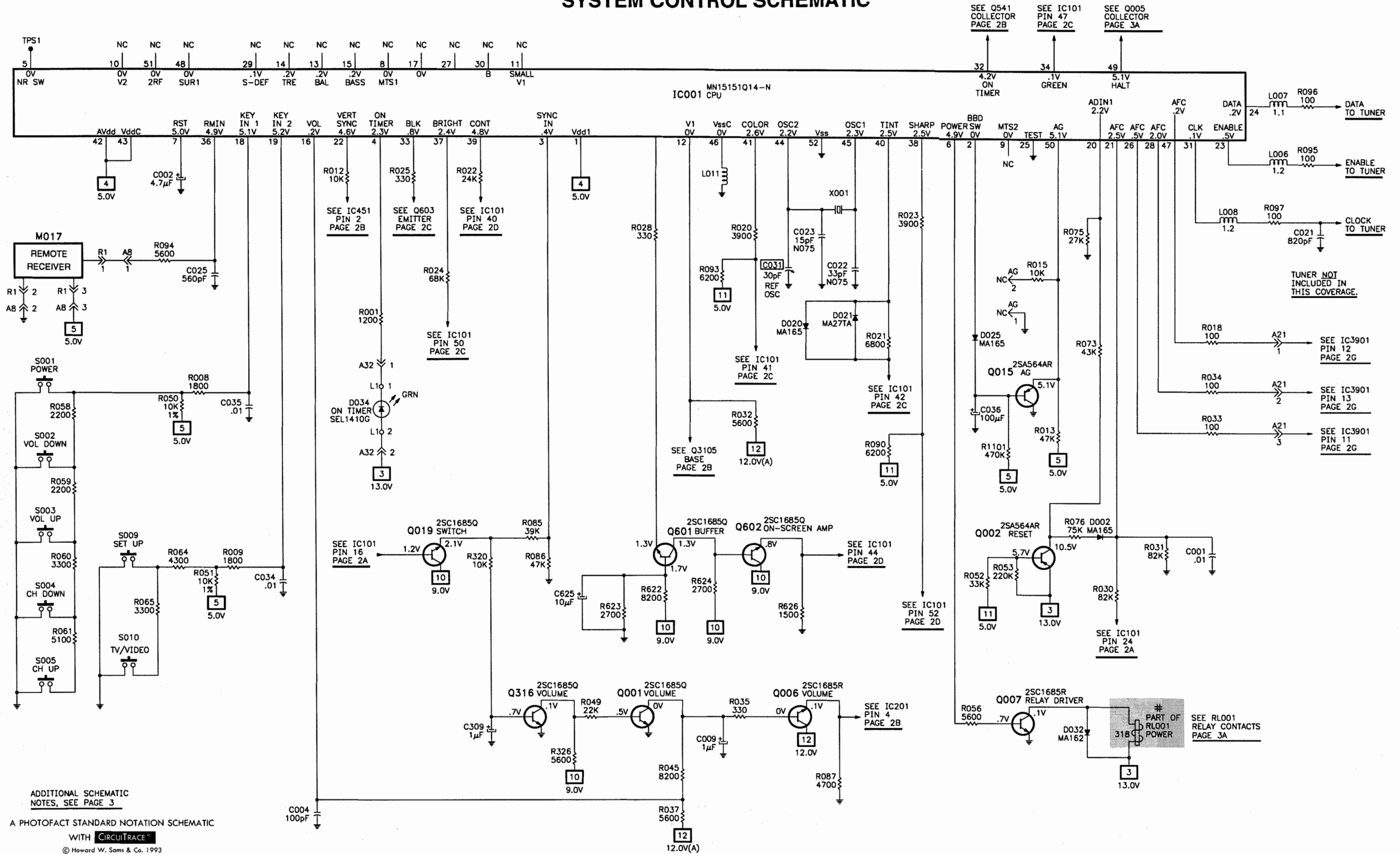
CONVERGENCE

Connect a signal generator to antenna terminals and tune in a dot pattern. Adjust the 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. Tune in a crosshatch pattern. Remove rubber wedges between the deflection yoke 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 left and right sides of the screen. Tilt the deflection yoke left or right to converge 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 rubber wedges.

CRT NECK ASSEMBLY



SYSTEM CONTROL SCHEMATIC



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.

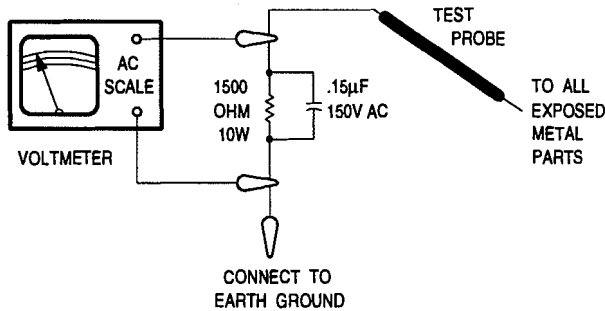
Hot Leakage Current Check

- 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 Volts 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.



NEW CIRCUITS

HORIZONTAL OSCILLATOR DISABLE CIRCUIT

This circuit protects against excessive high voltage. If for any reason the high voltage and or the beam current exceeds the normal level, the horizontal disable circuit operates to shift horizontal frequency and limit high voltage.

Horizontal pulses from pin 6 of T551 are rectified by D531. This DC voltage, directly proportional to the high voltage variations, is filtered and applied to the base of Q531 thru R532 and R533. The emitter voltage of Q531 is clamped by D533 to establish Q531's operating level. Under normal operating conditions, Q531 is cutoff, thus its collector is at 12.0V (source), which also keeps Q532 and Q533 nonconductive.

If high voltage increases, the horizontal pulse amplitude at pin 6 of T551 increases, causing the positive voltage at the cathode of D531 to increase. At a specified high voltage level, Q531 conducts and the voltage at its collector and at the base Q532 decreases. Q532 conducts and the voltage drop across its collector resistor causes Q533 to conduct. Q533 acts as a resistance in parallel with the horizontal AFC filter circuit of R502, C506, and C507. The conduction of Q533 lowers its resistance and dampens the AFC circuit, causing an increase in the horizontal oscillator frequency and reducing the high voltage.

Increased CRT beam current produces more ABL negative voltage at pin 3 of T551, which is coupled to the emitter of Q531's positive emitter voltage, which brings the transistor closer to conduction. Thus, excessive levels of high voltage and CRT beam current causes conduction of all three transistors to assure operation within safe limits.

As an added precaution against x-radiation, when Q532 conducts and its emitter voltage lowers, Q454 conducts to blank the CRT. The negative going voltage from the emitter of Q532 is coupled to the base of Q454 thru R540. This causes Q454 to conduct, and the voltage drop causes D454 to conduct and apply roughly 12.0V to the Y-output (video line). The 12.0V drives the video information into the black area and causes the picture screen to go black.

Servicing Procedure

If the horizontal is off frequency, determine if the cause is the horizontal circuit or the horizontal disable circuit. If the disable circuit does not operate during the horizontal disable test, the defect must be corrected to insure that the high voltage operates within safe limits.

Horizontal Oscillator Disable Test

Apply power and tune in a picture to verify horizontal is in sync. Connect a voltmeter to TPD2 and TPD1. Normalize video control menu, adjust brightness level to 0 and set picture level for .9V reading on the meter. Turn off receiver and place a jumper across R802. Reduce AC voltage to approximately 90.0VAC. Connect the high voltage meter to the high voltage anode of the CRT. Turn receiver on and slowly raise the AC supply voltage. Confirm the high voltage does not exceed 27.0KV when horizontal just begins to pull out of sync and sound mutes. If high voltage is not within the specified limit, the cause must be determined before the receiver is returned to the customer.

SYMPTOM - No change in frequency when Horizontal Oscillator Disable Test is performed.

Apply power and set all controls for normal operation. Turn receiver off to connect and remove the 33K ohm resistor in the following test.

Horizontal frequency should increase as each transistor is activated and cause receiver to lose horizontal sync. Check out the stage where this does not occur.

Connect a 33K ohm resistor from base of Q533 to TPD7 (12.0V), apply power, and check horizontal frequency.

Connect a 33K ohm resistor from base of Q532 to TPS9 (ground), apply power, and check horizontal frequency.

Connect a 33K ohm resistor from base of Q531 to TPD7 (12.0V), apply power, and check horizontal frequency.

If all transistors turn on, check voltage at base of Q531. If low or zero, check Q533, R531, R532, C531, D531, and the amplitude of the waveform at pin 6 of T551.

NOTE: Voltage at TP91 should measure between 153V and 162V when disable test is performed.

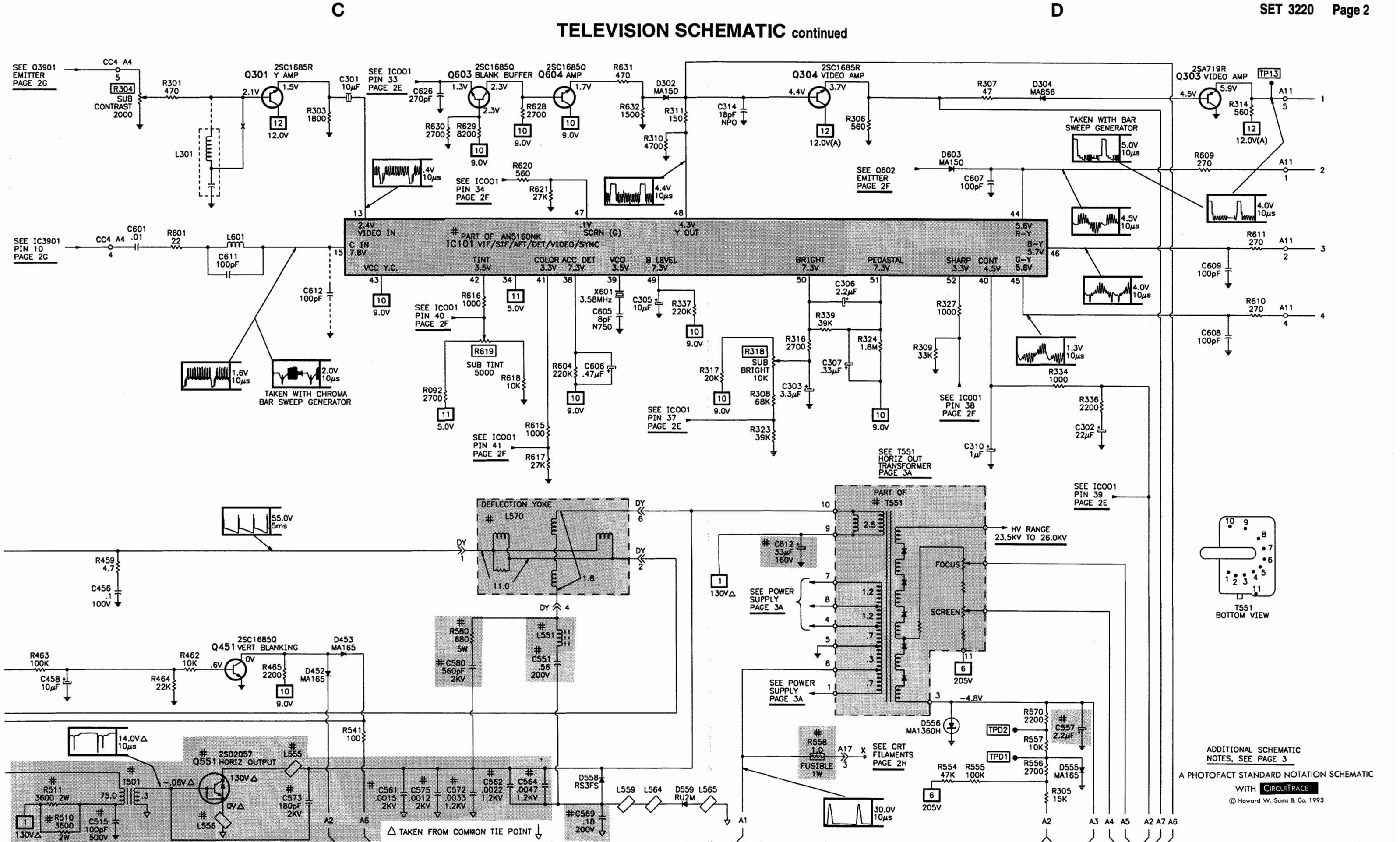
CRT Protection Circuit

This circuit blanks the CRT in the event of vertical sweep loss and also functions as a CRT spot killer when the receiver is turned off. During normal operation the vertical sweep waveform from IC451 supplies a positive voltage to the base of Q451. The conduction of Q451 grounds the anode of D453 and the D453 does not conduct, allowing normal video. Any failure mode causing loss of the vertical sweep waveform will allow C454 to discharge. Q451 will stop conducting as a result of the reduced base voltage. This allows D453 to conduct and supply roughly 9.0V to the video path going to the CRT. The increased DC voltage drives the video information into the black area and blanks the CRT. When the receiver is turned off, the vertical sweep waveform disappears but the 9.0V decays slowly. Thus the circuit operates to blank the CRT to provide spot burn protection. Note that any failure mode causing Q451 to be nonconductive will result in CRT blanking.

Servicing Procedure

The easiest way to confirm that the blanking circuit is active, causing a no raster symptom, is to measure the collector voltage of Q451. If the voltage is approximately 9.0V, D453 is conducting to cause CRT blanking.

TELEVISION SCHEMATIC continued



ADDITIONAL SCHEMATIC
NOTES, SEE PAGE 3
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE
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TROUBLESHOOTING

POWER SUPPLY

Check AC Fuse F001. If Fuse is open:

 Check T001, D801 thru D804, and C802 thru C806.

Apply 120VAC and check for 5.0V standby voltages at the cathode of D004 and at the emitter of Q004.

If standby voltages are missing:

 Check D004, D031, Q004, Q005, and T001.

If standby voltages are present check for 160V* at cathode of D802.

If 160V* is missing:

 Check L801, Q007, and RL001.

If 160V* is present, check for 130V* at TP91.

If 160V* is missing:

 Check IC801.

If the proper voltage is present at TP91, refer to the "Horizontal" section of this Troubleshooting guide.

* Taken from common tie point.

AUDIO

Select an active TV channel and check for an audio waveform at pin 28 of IC101. If waveform is missing:

 Check the voltages, waveforms, and components associated with pins 25 thru 30 of IC101.

If waveform is present at pin 28 of IC101:

 Check voltages, waveforms, and components associated with IC201.

VIDEO

Inject a video signal at TP121 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 13 of IC101. If the waveform is missing:

 Check the voltages, waveforms, and components associated with Q102 and Q301.

If the waveform is present at pin 13 of IC101:

 Check the voltages, waveforms, and components associated with pins 40 and 48 thru 50 of IC101, Q303, Q603, and Q604.

If the brightness is inadequate or cannot be controlled:

 Check the voltages, waveforms, and components associated with pin 50 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 AFT circuits.

If there is no video on the CRT:

 Check for a video waveform at TP121.

If video is present at TP121:

 Refer to the "Video" section of this Troubleshooting guide.

If there is no video at TP121 apply AGC bias to TP14. If video is now present at TP121:

 Check the voltages, waveforms, and components associated with pins 31, 32, and 33 of IC101.

If there is still no video at TP121:

 Check the voltages and waveforms associated with pins 17, 18, 19, 21 thru 24, 26, 27, and 31 thru 37 of IC101.

A defective AGC circuit can cause overloaded picture, excessive snow or loss of video.

 See the AGC Voltage Chart for AGC voltages with signal.

AGC VOLTAGE CHART		
IC101		
Pin 31	2.7V	
Pin 32	3.7V	
Pin 33	7.7V	

CHROMA

Check for a chroma waveform at pin 15 of IC101.

If the waveform is missing:

 Check Q102, Q3102, and Q3103.

If a chroma waveform is present at pin 15 of IC101, check for the proper waveforms at pins 44, 45, and 46 of IC101. If these waveforms are missing:

 Check the voltages, waveforms, and components associated with pins 38, 39, and 40 thru 47 of IC101. Check the 3.58MHz oscillator at pin 39 of IC101. Check the voltages and components associated with pin 40 of IC101.

For inadequate tint range:

 Check sub tint control R619 and pin 42 of IC101.

If the proper waveforms are present at pins 44, 45, and 46 of IC101:

 Refer to the "Raster" section of this Troubleshooting guide.

HORIZONTAL

Determine if the TV is in shutdown:

 Refer to the "Horizontal Oscillator Disable" in New Circuits.

If the TV is not in shutdown, inject a horizontal signal at the base of Q551. If horizontal deflection is now present:

 Check Q501 and pins 4 thru 10 of IC101.

If there is still no horizontal deflection:

 Check Q551, T551, D541, and D551 thru D554.

Horizontal linearity or width problems may be caused by C551, C561, C572, C575, and L551 being defective.

VERTICAL

Inject a vertical signal at pin 2 of IC101. If deflection is present:

 Check pins 2, 12, and 14 of IC101.

If there is still no vertical deflection:

 Check IC451 and Q451.

Vertical linearity or height problems may be caused by vertical feedback and bias circuits:

 Check C451 thru C455 and C457.

SYNC

If horizontal and vertical sync are missing:

 Check Q3102, Q3103, and pin 11 of IC101.

If there is no vertical sync:

 Check pins 12 and 14 of IC101.

If there is no horizontal sync:

 Check pins 4, 6, 8, and 10 of IC101.

RASTER

Check the CRT and CRT voltages.

If there is no red:

 Check pin 44 of IC101 and Q351.

If there is no green:

 Check pin 45 of IC101 and Q352.

If there is no blue:

 Check pin 46 of IC101 and Q353.

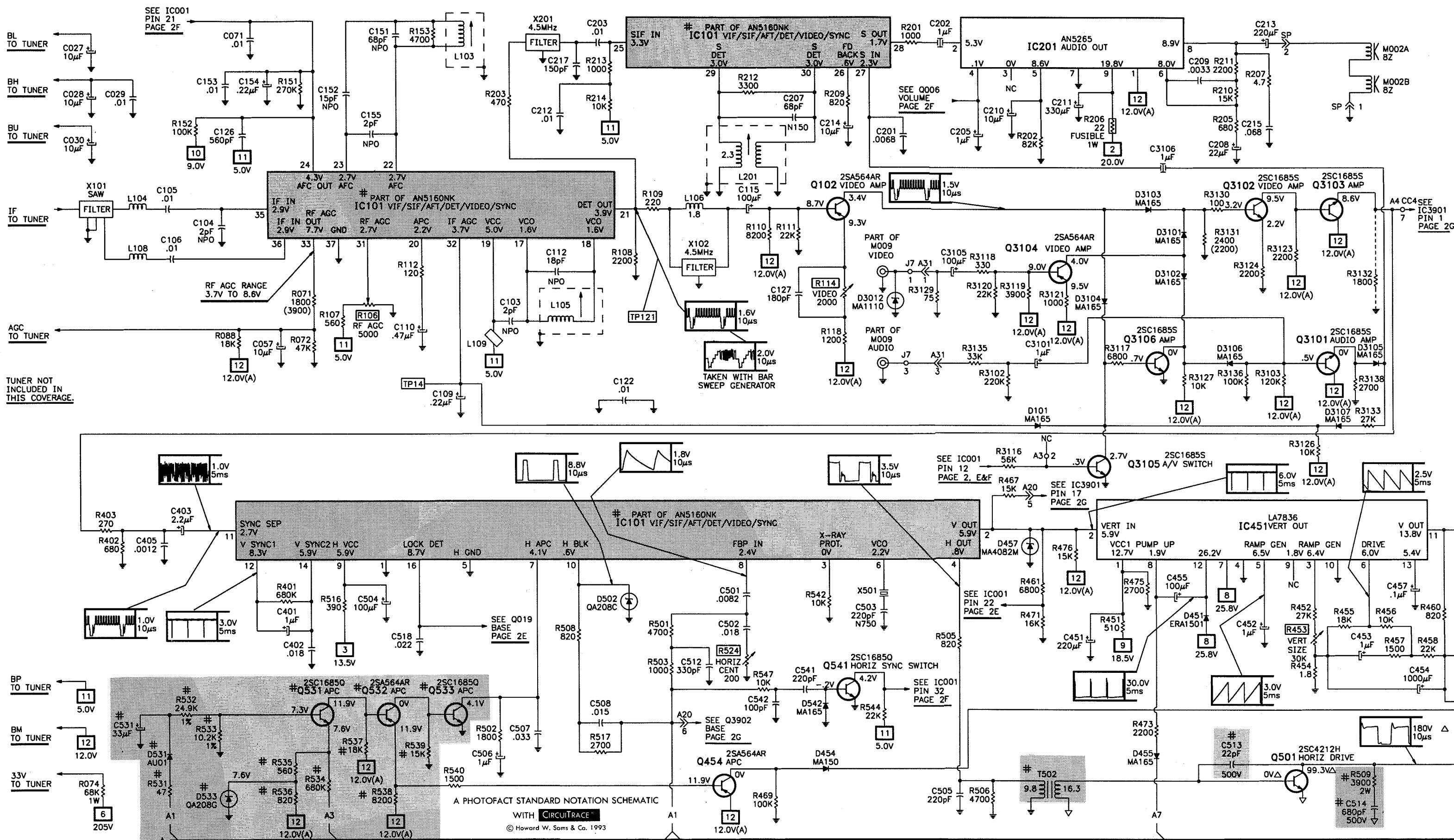
If raster has height or width problems:

 Refer to the "Vertical", "Horizontal", and "Power Supply" sections of this Troubleshooting guide.

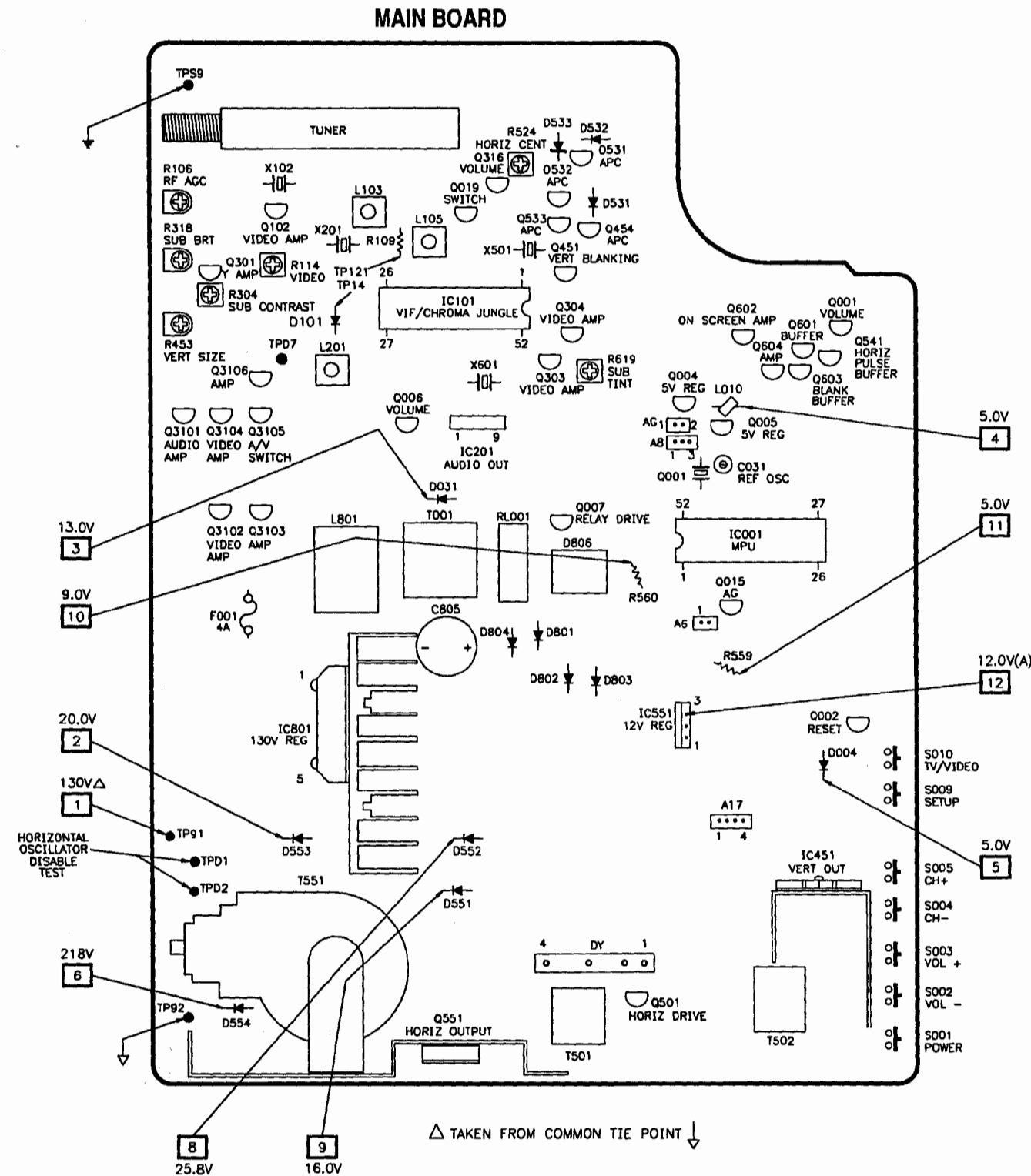
A

B

TELEVISION SCHEMATIC



PLACEMENT CHART



PARTS LIST continued

CAPACITORS & ELECTROLYTICS

Item No.	Rating	Mfr. Part No.
C022	33pF N075 50V 5%	ECCF1H330JP
C023	15pF N075 50V 5%	ECCF1H150JP
C028	10μF 16V Tantalum	ECSF16E10VB
C031	30pF Trimmer	ECRHA030E81
C103	2pF NPO 50V ±.25pF	ECCF1H020CC
C104	2pF NPO 50V ±.25pF	ECCF1H020CC
C112	18pF NPO 50V 5%	ECCF1H180JC
C151	68pF NPO 50V 5%	ECCF1H680JC
C152	15pF NPO 50V 5%	ECCF1H150JC
C155	2pF NPO 50V 5%	ECCF1H020CC
C202	1μF 50V NP	ECEA1HN010S
C207	68pF N150 50V 10%	ECCF1H680KP
C301	10μF 16V NP	ECEA1CN100S
C314	18pF NPO 50V 5%	ECCF1H180JC
C350	.001 2KV 10%	ECKD3D102KB
C360	33pF N075 50V	ECCF1H330JP
C452	1μF 25V Tantalum	ECSF1EE105
C503	220pF N750 50V 5%	ECCF1H221JU
# C513	22pF 500V 10%	ECCD2H220K
# C514	680pF 500V 10%	ECKD2H681KB
# C515	100pF 500V 10%	ECKD2H101KB
# C531	33μF 25V	ECEA1EU330
# C551	.56 200V 5%	ECQF2H564JS
# C553	22μF 250V	ECEA2EU220
# C554	560pF 500V 10%	ECKD2H561KB
# C555	560pF 500V 10%	ECKD2H561KB
# C557	2.2μF 50V	ECEA1HU2R2
# C559	220μF 25V	ECEA1EU221
# C561	.0015 2KV 5%	ECKD3D152JB
# C562	.0022 2KV 5%	ECKD3D222JB
# C564	.0047 1.2KV 5%	ECWH12H472JR
# C566	470μF 35V	ECEA1VU471
# C568	560pF 500V 10%	ECKD2H561KB
# C569	.18 200V 5%	ECQM2184JZ
# C572	.0033 1.2K 5%	ECWH12H332JS
# C573	180pF 2KV 5%	ECKD3D181JB
# C575	.0012 2KV 5%	ECKD3D122JB
# C580	560pF 2KV 10%	ECKD3D561KB
C605	8pF N750 50V ±.25pF	ECCF1H080DU
# C802	.0047 500V	ECKD2H472PU
# C803	.0047 500V	ECKD2H472PU
# C804	.0047 500V	ECKD2H472PU
# C805	470μF 200V	ECES2DU471M4
# C806	22μF 160V	ECEA2CU220
# C812	33μF 160V	ECEA160V33Z
# C817	.015 125VAC 10%	ECQU1A153KH
# C818	.015 125VAC 10%	ECQU1A153KH
# C819	.0022 125VAC 10%	ECKCFL222ZE
C3106	1μF 50V NP	ECEA1HN010S
C3909	27pF NPO 50V 5%	ECCF1H270JC
C3910	27pF NPO 50V 5%	ECCF1H270JC
C3914	27pF NPO 50V 5%	ECCF1H270JC
C3915	22pF NPO 50V 5%	ECCF1H220JC
C3918	27pF NPO 50V 5%	ECCF1H270JC
C3919	27pF NPO 50V 5%	ECCF1H270JC
C3921	12pF NPO 50V 5%	ECCF1H120JC

For SAFETY use only equivalent replacement part.

CONTROLS & RESISTORS

Item No.	Function/Rating	Mfr. Part No.	NTE Part No.
# D806	7.2 Cold PTC	TRPW5B0M050D	-
R050	10K 1% 1/4W	ER0S2CKF1002	-
R051	10K 1% 1/4W	ER0S2CKF1002	-
R106	5000 RF AGC	EVN60AA00B53	-
R114	2000 Video	EVND4AA00B23	-
R206	22 5% 1W Fusible	ERQ1CJP220	F1W022
R304	2000 Sub Contrast	EVND4AA00B23	-
R318	10K Sub Brightness	EVN60AA00B14	-
R354	2000 Red Low Light	EVN49AA00B23	-
R355	2000 Blue Low Light	EVN49AA00B23	-
R356	2000 Green Low Light	EVN49AA00B23	-
R357	300 Blue Drive	EVN49AA00B32	-
R358	300 Red Drive	EVN49AA00B32	-
R453	30K Vertical Size	EVN60AA00B34	-
# R509	3900 5% 2W	ERG2ANJ392	2W239
# R510	3600 5% 2W	ERG2ANJ362	2W236
# R511	3600 5% 2W	ERG2ANJ362	2W236
R524	200 Horizontal Centering	EVND4AA00B22	-
# R531	47 5% 1/4W	ERD25FJ470	QW047
# R532	24.9K 1% 1/4W	ER0S2CKF2492	-
# R533	10.2K 1% 1/4W	ER0S2CKF1022	-
# R534	680K 5% 1/4W	ERDS2TJ684	QW468
# R535	560 5% 1/4W	ERDS2TJ561	QW156
# R536	820 5% 1/4W	ERDS2TJ821	QW182
# R537	18K 5% 1/4W	ERDS2TJ183	QW318
# R538	8200 5% 1/4W	ERDS2TJ822	QW282
# R539	15K 5% 1/4W	ERDS2TJ153	QW315
# R551	1 5% 1W Fusible	ERQ1CJP1R0	F1W1D0
# R552	1.8 5% 1/2W Fusible	ERQ12HJ1R8	-
# R558	1 5% 1W Fusible	ERQ1CJP1R0	F1W1D0
R559	68 5% 3W	ERG3ANJ680	3W068
R560	62 2% 2W	ERG2SG620	2W062
# R569	27 5% 2W	ERG2ANJ270	HW027
# R580	680 5% 5W	ERG5ZJ681	5W168
R619	5000 Sub Tint	EVND4AA00B53	-
# R801	.82 10% 5W Wirewound	ERF5ZKR82	5WD82
# R802	130 5% 20W Wirewound	ERF20ZJ131	-
# R804	220K 5% 1/4W	ERDS2TJ224	QW422
# R805	10K 5% 1/2W	ERDS1TJ103	HW310
# R807	47 5% 1/4W	ERD25FJ470	QW047
# R809	33 5% 1/4W	ERD25FJ330	QW033
# R810	4.7 10% 5W Wirewound	ERF5ZK4R7	5W4D7
# R815	8.2M 20% 1/2W	ERC12ZGM825	HW582
# R816	1 10% 1/2W Wirewound	ERW12PK1R0	-

For SAFETY use only equivalent replacement part.

MISCELLANEOUS

Item No.	Description	Mfr. Part No.	Notes
# CRA801	Component Combination	EXNG131P155	130pF, 1.5M
# F001	Fuse	0BA1F40NU100	4.0A 125VAC
# M001	CRT	-	A63KTM80X
M002A, B	Speaker	EAS12D537KG	3" X 5", 8 Ohm, 3W
M009	Jack	TJB17655-1	Audio / Video
M017	Remote Receiver	TNQ2683B	Remote Control
# M022	Line Cord	TSX5140X	AC, Polarized
# RL001	Relay	TSE1864	Power
S001	Switch	EVQQBH12T	Power
S002	Switch	EVQQBH12T	Volume Down
S003	Switch	EVQQBH12T	Volume Up
S004	Switch	EVQQBH12T	Channel Down
S005	Switch	EVQQBH12T	Channel Up
S009	Switch	EVQQBH12T	Set Up
S010	Switch	EVQQBH12T	TV / Video
X001	Crystal	TSS2077MX	Oscillator
X101	Filter	EFCH45MVK12N	45MHz SAW
X102	Trap	EFCS4R5MW3BA	4.5MHz
X201	Filter	EFCS4R5MS4	4.5MHz Bandpass
X501	Crystal	EF0A503KS41	503kHz
X601	Crystal	TSS816MX	3.58MHz
X3901	Crystal	CSA120MT	Oscillator
	CRT Socket	TJS1A5050	-
	Fuse Holder	TJC6319	(2 used)
	Magnet	0FMK014ZZ	Convergence Corrector
	Magnet	TLC2047-2	Purity Rings
	PC Board (1)	TNP190131JA	Main (A)
	PC Board (1)	TNP110622CB	CRT (C)
	PC Board (1)	TNP110385ZA	LED (L)
	PC Board (1)	ONP19027GC	Closed Caption (CC)
	Remote Transmitter	EUR641239	-
	Tuner (1)	ENV568C4G3	UHF / VHF (CT-25R10R)
	Tuner (1)	ENV568C5G3	UHF / VHF (PC-26A40C)
	Wedge	TMM2A30202	Yoke Positioning (3 used)

For SAFETY use only equivalent replacement part.

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

PANASONIC

MODEL CT-25R10R (CHASSIS ADP208)

TEST EQUIPMENT



C3900	F-2	C3912	C-3	CC4	H-14	R3902	C-13	R3913	D-10
C3901	B-12	C3913	F-5	D3900	F-10	R3903	C-13	R3914	C-10
C3902	E-5	C3914	B-13	D3903	D-3	R3904	G-9	R3915	B-9
C3903	E-7	C3915	E-13	IC3901	E-5	R3905	G-6	R3916	D-10
C3905	G-7	C3916	C-4	L3902	G-12	R3906	B-13	R3917	C-10
C3906	E-11	C3919	G-12	Q3901	D-13	R3907	D-4	R3918	A-12
C3907	F-7	C3921	B-14	Q3902	D-3	R3908	D-4	R3920	E-13
C3909	E-8	CC1	A-11	Q3903	A-13	R3910	B-3	X3901	E-9
C3910	E-10	CC2	A-5	R3900	F-12	R3911	E-3		
C3911	C-3	CC3	H-4	R3901	G-13	R3912	B-10		

Equipment	Sencore No.	Equipment	Sencore No.
Oscilloscope	SC3100	Isolation Transformer	PR57
Generators		Capacitance Analyzer	LC101, LC102
RGB	CM2000	CRT Analyzer	CR70
Multiburst Signal	VG91	AC Leakage Tester	PR57
Color Bar	VG91	Inductance Analyzer	LC101, LC102
TV Stereo	VG91	Flyback Yoke Tester	TVA92
Digital VOM	SC3100	TV Stereo Power Monitor	SR68, PA81
Frequency Meter	SC3100	Field Strength Meter	SL750
Hi-Voltage Probe	HP200	Transistor Tester	TF46
Accessory Probes	TP212	Video Analyzer	VG91, TVA92

- 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.

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.

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.

- Custom Components Corporation (Chek-A-Color)
- NTE Electronics, Inc. (NTE)
- Philips ECG Company (ECG)
- PTS Electronics Corporation (PTS)
- Sencore, Inc.
- Thomson Consumer Electronics, Inc. (SK, TCE)

PARTS LIST continued

SEMICONDUCTORS continued

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
# D801 Thru					
# D804	RM11B	-	NTE125	ECG125	SK3081
	ERC12-08	-	NTE125	ECG125	SK3081
D3012	MA1110	-	NTE5020A	ECG5020A	SK11A
D3101 Thru					
D3107	MA165	-	NTE519	ECG519	SK3100
D3900	MA1051L	-	-	-	-
D3903	MA165	-	-	-	-
IC001	MN152810Q16-1	-	-	-	-
	MN152810Q16N	-	-	-	-
# IC101	AN5160NK	-	NTE7060	ECG7060	-
	AN5160NK-N	-	NTE7060	ECG7060	-
IC201	AN5265	-	NTE1789	ECG1789	SK9876
IC451	LA7836	-	-	-	-
	LA7836-TV	-	-	-	-
# IC551	AN78M12	-	NTE966	ECG966	SK3592
	AN78M12LB	-	NTE966	ECG966	SK3592
# IC801	STR3230	-	NTE1742	ECG1742	SK9995
	TVSSTR3230	-	NTE1742	ECG1742	SK9995
IC3901	CCD3000	-	-	-	-
Q001	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q002	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q004	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q005	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q006, 07	2SC1685R	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q015	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q019	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q102	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q301	2SC1685R	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q303	2SA719R	-	NTE290A	ECG290A	SK3114A
	2SA719QR	-	NTE290A	ECG290A	SK3114A
Q304	2SC1685R	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q316	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q351 Thru					
Q353	2SC3063	-	NTE157	ECG157	SK3747
Q451	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q454	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932

For SAFETY use only equivalent replacement part.

SEMICONDUCTORS continued

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
Q501	2SC4212H	-	-	-	-
	2SC4212HLBS	-	-	-	-
# Q531	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
# Q532	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
	2SA564A	-	NTE290A	ECG290A	SK3932
# Q533	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q541	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
# Q551	2SD2057	-	NTE2302	ECG2302	SK9422
	2SD2057LB	-	NTE2302	ECG2302	SK9422
Q601 Thru					
Q604	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q3101 Thru					
Q3103	2SC1685S	-	NTE85	ECG85	SK9229
	2SC1685QRS	-	NTE85	ECG85	SK9229
Q3104	2SA564AR	-	NTE290A	ECG290A	SK3932
	2SA564AQRS	-	NTE290A	ECG290A	SK3932
Q3105, 06	2SC1685S	-	NTE85	ECG85	SK9229
	2SC1685QRS	-	NTE85	ECG85	SK9229
Q3901	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q3902, 03	2SC1685R	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229

For SAFETY use only equivalent replacement part.

CABINET PARTS

Item	Part No.
MODEL CT25R10R	
Cabinet Back	TKU2A25101
Cabinet Front	TXFKY232SER
Pushbutton Assembly	TBX2885000G
Speaker Grille	TKP2A13014
Overlay - Channel, Power, Volume	TKP2A12002
MODEL PC-26A40C	
Cabinet Back	TXFKU092SER
Cabinet Front	TXFKY242SER
Pushbutton Assembly	TBX2885000G
Speaker Grille	TKP2A13014
Overlay - Channel, Power, Volume	TKP2A12002

COILS & TRANSFORMERS

Item No.	Function/Rating	Mfr. Part No.	On-Unit No.
L006	5.6μH	TLUABTA5R6K	-
L007	5.6μH	TLUABTA5R6K	-
L008	5.6μH	TLUABTA5R6K	-
L010	Ferrite Bead	EXCELSA24	-
L011	1.0μH	TLUABTA1R0K	-
L012	Ferrite Bead	EXCELSA24	-
L103	AFT	TLI67394-1	-
L104	1.2μH	TLQ012K205C	-
L105	VCO	TLI158755	-
L106	15μH	TLUABTA150K	-
L108	1.2μH	TLQ012K205C	-
L109	Ferrite Bead	EXCELSA35	-
L201	Quadrature	TLS63318-2	-
L301	3.58MHz Trap	ELB5A082	-
L354	150μH	TLUABTA151K	-
# L551	Horizontal Linearity	TLH6663P	-
# L555	Ferrite Bead	EXCELSA24	-
# L556	Ferrite Bead	EXCELSA24	-
# L559	Ferrite Bead	EXCELSA24	-
# L564	Ferrite Bead	TSC910	-
# L565	Ferrite Bead	TSC910	-
# L570	Yoke 90°	OLY15507F	-
	Horiz 1.27mH		
	Vert 24.9mH		
L601	10μH	ELEPR100JA	-
# L801	AC Line Choke	ELF18D656K	ELF656K
# L804	Degaussing	OLK19003C	-
L3901	5.6μH	ELEPH5R6JA	-
L3902	5.6μH	ELEPH5R6JA	-
# T001	Power Supply	TLP16297	-
# T501	Horizontal Driver	TLH15452	-
# T502	Horizontal Coupling	ETE19Z30AY	E1930
# T551 (1)	Horizontal Output	TLF15544F	-

For SAFETY use only equivalent replacement part.

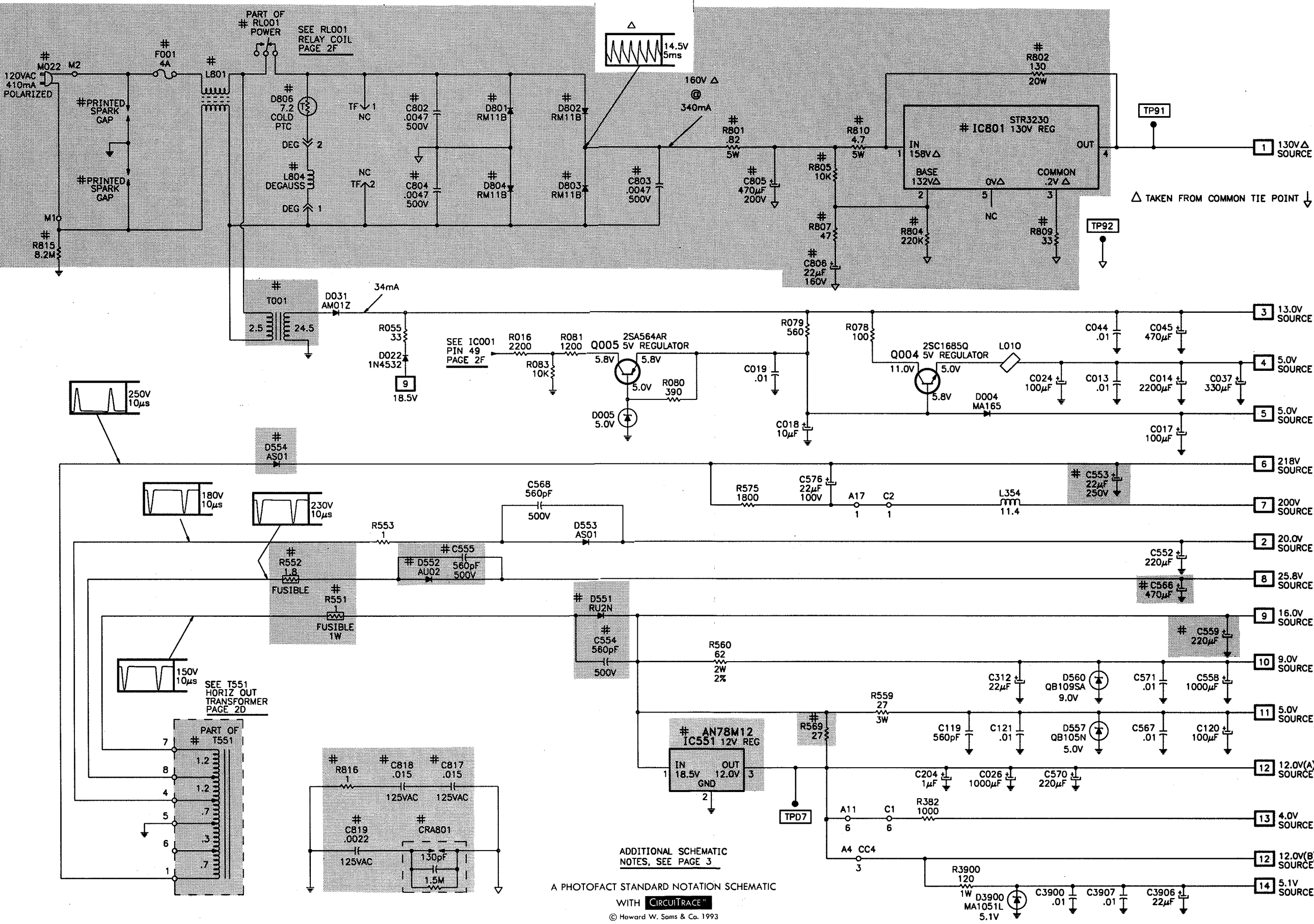
(1) Focus and screen controls are part of T551.



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POWER SUPPLY SCHEMATIC



PARTS LIST

MAIN BOARD, GRIDTRACE LOCATION GUIDE continued

Q501	Q-9	R081	G-11	R402	F-3	R575	M-10	T001	I-5
Q531	C-8	R083	H-11	R403	G-3	R580	P-8	T501	R-8
Q532	C-8	R085	C-6	R451	O-12	R601	F-3	T502	R-12
Q533	D-7	R086	C-6	R452	N-13	R604	F-6	T551	Q-3
Q541	F-13	R087	G-4	R453	E-1	R609	F-7	TF	K-8
Q551	R-6	R088	B-4	R454	R-12	R610	F-7	TP13	F-8
Q601	F-12	R090	F-10	R455	Q-13	R611	F-7	TP14	E-4
Q602	F-11	R092	F-9	R456	Q-13	R615	F-10	TP91	M-1
Q603	F-12	R093	G-12	R457	Q-13	R616	E-8	TP92	R-1
Q604	F-11	R094	H-11	R458	Q-13	R617	G-12	TP121	D-5
Q3101	G-1	R095	B-5	R459	S-13	R618	G-8	TPD1	N-1
Q3102	I-2	R096	B-5	R460	R-13	R619	F-8	TPD2	N-1
Q3103	I-3	R097	B-5	R461	K-13	R620	E-12	TPD7	F-2
Q3104	G-2	R106	C-1	R462	G-8	R621	E-12	TPS9	B-1
Q3105	G-2	R107	D-2	R463	Q-12	R622	F-11	X001	H-10
Q3106	G-2	R108	D-5	R464	Q-12	R623	F-12	X101	G-4
R001	J-10	R109	D-5	R465	E-7	R624	F-11	X102	C-3
R008	K-13	R110	C-2	R467	G-13	R626	F-11	X201	D-4
R009	J-13	R111	C-2	R469	D-8	R628	F-11	X501	D-7
R012	K-13	R112	C-5	R471	K-13	R629	G-11	X601	F-6
R013	H-10	R114	D-3	R473	O-12	R630	F-12		
R015	H-10	R118	D-2	R475	P-13	R631	F-11		
R016	H-10	R151	D-3	R476	D-9	R632	G-11		
R018	I-13	R152	C-3	R501	C-7	R801	L-8		
R020	G-12	R153	D-4	R502	D-7	R802	M-7		
R021	G-11	R201	D-2	R503	C-7	R804	M-3		
R022	I-11	R202	G-5	R505	D-7	R805	L-6		
R023	H-12	R203	D-4	R506	D-8	R807	M-3		
R024	H-11	R205	G-5	R508	C-6	R809	L-3		
R025	H-12	R206	K-9	R509	S-8	R810	L-6		
R028	H-12	R207	G-6	R510	N-9	R815	K-1		
R030	J-13	R209	F-4	R511	N-9	R816	L-2		
R031	L-12	R210	G-6	R516	E-10	R1101	L-10		
R032	K-10	R211	G-6	R517	B-7	R3102	H-1		
R033	H-13	R212	F-4	R524	C-7	R3103	G-1		
R034	H-13	R213	D-4	R531	D-9	R3116	H-9		
R035	H-9	R214	D-4	R532	C-8	R3117	G-2		
R037	K-12	R301	E-2	R533	C-8	R3118	H-2		
R045	J-12	R303	D-2	R534	C-8	R3119	G-1		
R049	E-11	R304	E-2	R535	B-8	R3120	G-1		
R050	N-13	R305	E-10	R536	B-8	R3121	G-2		
R051	N-13	R306	F-8	R537	C-8	R3123	I-3		
R052	M-13	R307	F-8	R538	C-8	R3124	I-2		
R053	M-13	R308	D-1	R539	C-7	R3126	G-3		
R055	N-12	R309	G-12	R540	D-8	R3127	F-2		
R056	I-8	R310	F-7	R541	E-8	R3129	I-2		
R058	R-14	R311	E-8	R542	D-7	R3130	F-2		
R059	Q-14	R314	F-8	R544	G-12	R3131	G-2		
R060	P-14	R316	F-10	R547	E-12	R3133	F-1		
R061	P-14	R317	C-1	R551	O-5	R3135	H-1		
R064	N-13	R318	D-1	R552	O-6	R3136	G-2		
R065	N-13	R320	C-6	R553	N-3	R3138	G-1		
R071	E-4	R323	D-1	R554	N-2	RL001	I-7		
R072	A-5	R324	F-9	R555	N-2	S001	R-14		
R073	M-13	R326	C-6	R556	N-2	S002	Q-14		
R074	M-10	R327	F-9	R557	N-1	S003	Q-14		
R075	L-13	R334	E-10	R558	M-10	S004	P-14		
R076	M-13	R336	G-12	R559	K-10	S005	O-14		
R078	G-9	R337	E-7	R560	J-9	S009	N-14		
R079	M-12	R339	F-8	R569	L-10	S010	M-14		
R080	G-10	R401	E-6	R570	N-2	SP	G-7		

SEMICONDUCTORS

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D002	MA165	-	NTE519	ECG519	SK3100
D004	MA165	-	NTE519	ECG519	SK3100
D005	QA205D	TVSQA205D	NTE5010A	ECG5010A	SK5A1
D020	MA165	-	NTE519	ECG519	SK3100
D021	MA27TA	-	NTE605A	ECG605A	SK7952
D022	1N4532	-	NTE177	ECG177	SK9091
	MA161	-	NTE177	ECG177	SK9091
D025	MA165	-	NTE519	ECG519	SK3100
D031	AM01Z	-	NTE116	ECG116	SK3313
	ERA15-01	-	NTE552	ECG552	SK9000
D032	MA162	-	NTE519	ECG519	SK3100
	1N4532	-	NTE177	ECG177	SK9091
D034	SEL1410G	-	-	-	-
D101	MA165	-	NTE519	ECG519	SK3100
D302	MA150	-	NTE177	ECG177	SK9091
	1N4532	-	NTE177	ECG177	SK9091
D304	MA856TV	-	NTE519	ECG519	SK3100
D352	MA165	-	NTE519	ECG519	SK3100
D353	MA4047L	-	NTE5009A	ECG5009A	SK4A7
D383	MA27WA	-	NTE605A	ECG605A	SK7952
D451	ERA15-01	-	NTE552	ECG552	SK9000
	AM01Z	-	NTE116	ECG116	SK3313
D452, 53	MA165	-	NTE519	ECG519	SK3100
D454	MA150	-	NTE177	ECG177	SK9091
	1N4532	-	NTE177	ECG177	SK9091
D455	MA165	-	NTE519	ECG519	SK3100
D457	MA4082M	-	-	-	-
D502	QA208C	TVSQA208C	NTE5016A	ECG5016A	SK8A2
# D531	AU01	-	NTE552	ECG552	SK9000
	AS01	-	NTE552	ECG552	SK9000
	ERA2204	-	NTE552	ECG552	SK9000
# D533	QA208G	TVSQA208M	NTE5016A	ECG5016A	SK8A2
D542	MA165	-	NTE519	ECG519	SK3100
# D551	RU2N	-	NTE552	ECG552	SK9000
# D552	AU02	-	-	-	-
D553	AS01	-	NTE552	ECG552	SK9000-
	AU01	-	NTE552	ECG552	SK9000
	ERA2204	-	NTE552	ECG552	SK9000
# D554	AS01	-	NTE552	ECG552	SK9000
	AU01	-	NTE552	ECG552	SK9000
	ERA2204	-	NTE552	ECG552	SK9000
D555	MA165	-	NTE519	ECG519	SK3100
D556	MA1360H	-	NTE5037A	ECG5037A	-
D557	QB105N	TVSQB105N	NTE135A	ECG135A	SK5V1
# D558	RS3FS	-	-	-	-
# D559	RU2M	TVSRU2M	-	-	-
D560	QB109SA	TVSQB109SA	NTE5073A	ECG5073A	SK8V7
D603	MA150	-	NTE177	ECG177	SK9091
	1N4532	-	NTE177	ECG177	SK9091

For SAFETY use only equivalent replacement part.

SCHEMATIC NOTES

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

✖ Circuitry not used in some sets.

--- Circuitry used in some versions.

⏏ Ground

≡ Chassis ground

▽ Common tie point

△ Taken from common tie point

11 Schematic Circuittrace

A— Cabling: Heavy lines reduce use of mutiple lines.

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

Waveforms taken with triggered scope and keyed rainbow generator. Waveform voltage is peak to peak. Timebase is per division. Waveforms shown at 10 divisions.

Item numbers in rectangle appear in adjustment instructions.

Supply voltages maintained as seen at input.

Voltages measured with digital meter and no signal.

Controls adjusted for normal operation.

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.

Rated voltage shown on Zener Diodes.

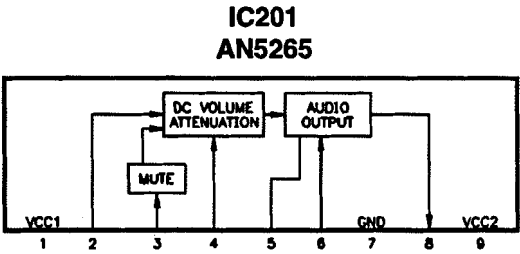
TUNER INFORMATION

TUNER VOLTAGE CHART

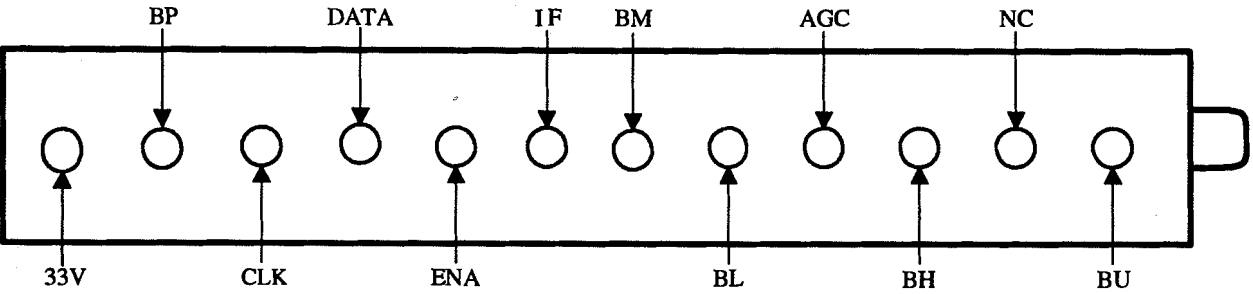
Pin	VHF Low Band	VHF High Band	UHF Band
33V	3.7V	7.0V	8.0V
BP	5.0V	5.0V	5.0V
CLK	.1V	.1V	.1V
DATA	.1V	.2V	.2V
ENA	.6V	.6V	.6V
BM	12.0V	12.0V	12.0V
BL	11.7V	.3V	.1V
AGC	7.7V	7.7V	8.6V
BH	0V	11.7V	0V
NC	.9V	4.0V	4.8V
BU	.1V	.1V	11.6V

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

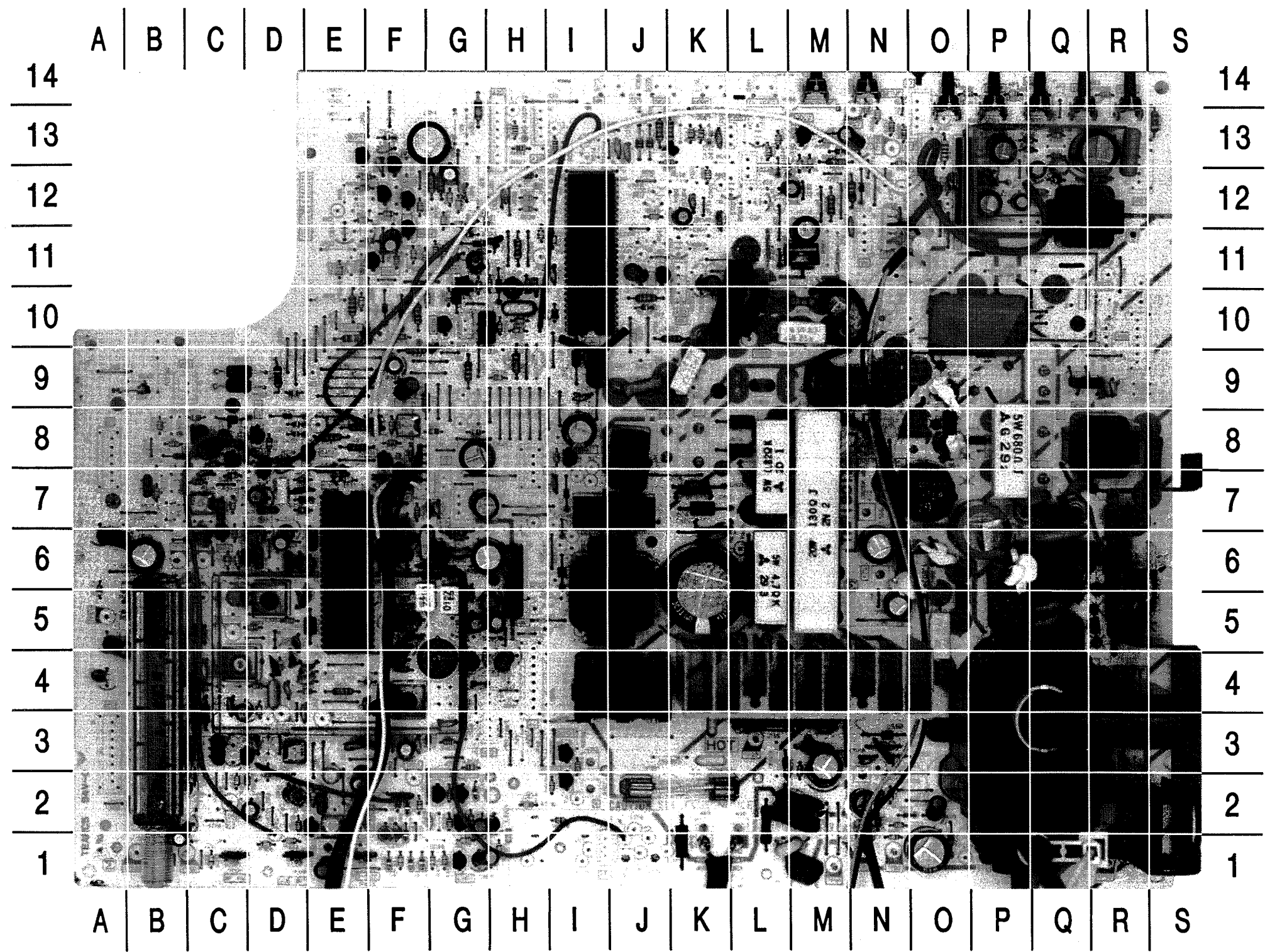
IC FUNCTION



TUNER TERMINAL GUIDE



MAIN BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

MAIN BOARD, GRIDTRACE LOCATION GUIDE

A3	H-7	C205	H-5	C567	N-11	D558	Q-7
A4	H-4	C207	F-4	C568	N-3	D559	O-8
A11	F-8	C208	H-5	C569	P-5	D560	C-9
A17	N-11	C209	G-6	C570	M-11	D603	F-10
A20	H-13	C210	G-5	C571	I-9	D801	K-7
A21	H-13	C211	H-6	C572	Q-6	D802	L-8
A31	I-1	C212	D-3	C573	Q-7	D803	L-8
A32	K-10	C213	G-7	C575	Q-5	D804	K-7
A99	N-2	C214	F-4	C576	M-10	D806	J-8
AG	G-10	C215	G-6	C580	Q-7	D3101	F-2
C001	K-13	C217	D-4	C601	G-3	D3102	F-2
C002	J-11	C301	D-2	C605	F-7	D3103	F-2
C004	K-12	C302	G-12	C606	F-6	D3104	G-2
C009	K-12	C303	E-1	C607	G-7	D3105	F-1
C013	I-11	C305	E-2	C608	F-7	D3106	F-1
C014	G-13	C306	E-9	C609	F-7	D3107	F-1
C017	N-13	C307	F-9	C611	F-3	DEG	J-8
C018	M-12	C309	D-6	C625	F-11	DY	Q-9
C019	K-12	C310	F-6	C626	H-12	F001	J-2
C021	C-5	C312	F-6	C802	K-7	IC001	J-10
C022	H-11	C314	F-7	C803	L-8	IC101	E-7
C023	H-11	C401	D-6	C804	K-6	IC201	H-5
C024	G-11	C402	D-6	C805	K-5	IC451	O-13
C025	G-12	C403	F-3	C806	M-3	IC551	M-11
C026	B-6	C405	F-3	C812	P-7	IC801	L-3
C027	A-6	C451	P-13	C817	M-2	L006	J-13
C028	A-4	C452	P-12	C818	M-2	L007	J-13
C029	B-2	C453	Q-13	C819	M-1	L008	H-12
C030	B-1	C454	R-13	C3101	G-1	L010	G-10
C031	H-10	C455	P-12	C3105	H-2	L011	I-10
C034	J-13	C456	R-13	C3106	F-1	L103	C-4
C035	J-13	C457	P-12	CRA801	M-1	L104	G-5
C036	K-11	C458	Q-12	D002	M-12	L105	D-5
C037	I-9	C501	D-7	D004	M-13	L106	C-3
C044	I-7	C502	C-7	D005	H-11	L108	F-5
C045	G-8	C503	D-7	D020	G-11	L109	E-5
C057	A-5	C504	D-6	D021	G-11	L201	F-4
C071	C-4	C505	D-8	D022	N-12	L301	E-1
C103	E-5	C506	D-7	D025	J-10	L551	O-7
C104	F-5	C507	E-6	D031	I-6	L555	R-5
C105	F-5	C508	B-7	D032	I-7	L556	S-5
C106	F-5	C512	C-7	D101	F-4	L559	P-8
C109	F-4	C513	R-9	D302	F-10	L564	O-8
C110	C-5	C514	R-8	D304	F-7	L565	O-9
C112	D-5	C515	R-9	D451	P-12	L601	E-3
C115	D-2	C518	D-6	D452	D-8	L801	J-4
C119	E-4	C531	C-8	D453	D-8	Q001	E-13
C120	F-5	C541	F-13	D454	D-8	Q002	M-13
C121	F-5	C542	F-13	D455	O-12	Q004	G-10
C122	G-4	C551	P-10	D457	D-7	Q005	G-11
C126	D-4	C552	N-2	D502	C-6	Q006	G-4
C127	D-3	C553	O-1	D531	C-8	Q007	I-8
C151	D-4	C554	O-6	D533	B-8	Q015	J-11
C152	D-4	C555	O-6	D542	F-13	Q019	D-6
C153	C-4	C557	O-2	D551	O-5	Q102	C-3
C154	C-3	C558	I-8	D552	N-6	Q301	E-2
C155	D-5	C559	N-5	D553	N-3	Q303	F-7
C201	E-2	C561	Q-5	D554	R-3	Q304	F-8
C202	E-2	C562	Q-6	D555	N-2	Q316	C-6
C203	D-4	C564	Q-6	D556	O-1	Q451	D-8
C204	H-4	C566	N-6	D557	C-9	Q454	D-8