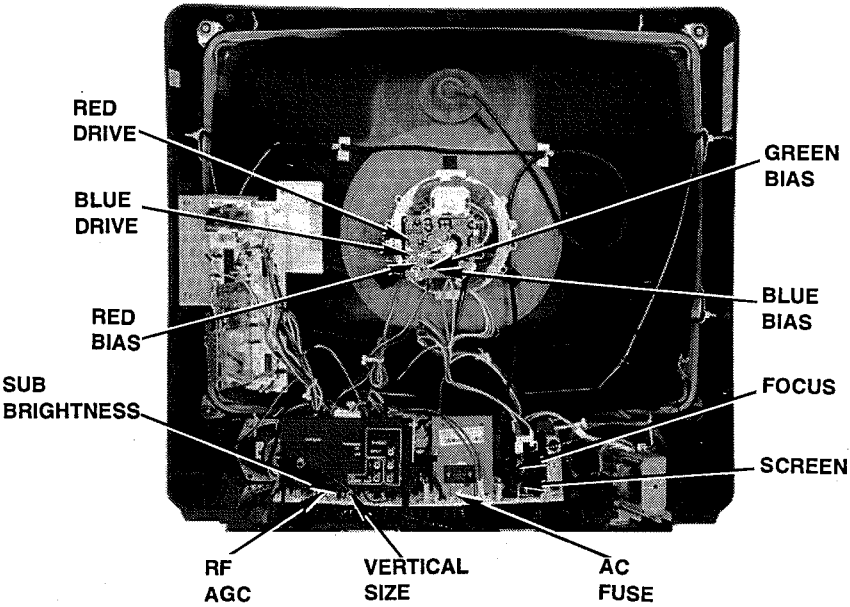


CABINET - REAR VIEW



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.

Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein.

©1993 by Howard W. Sams & Company
2647 Waterfront Parkway East Drive, Suite 300
Indianapolis, IN 46214-2012

Printed in the United States of America 5 4 3 2 1



93IE02475



PHOTOFACT® Technical Service Data

SET 3172

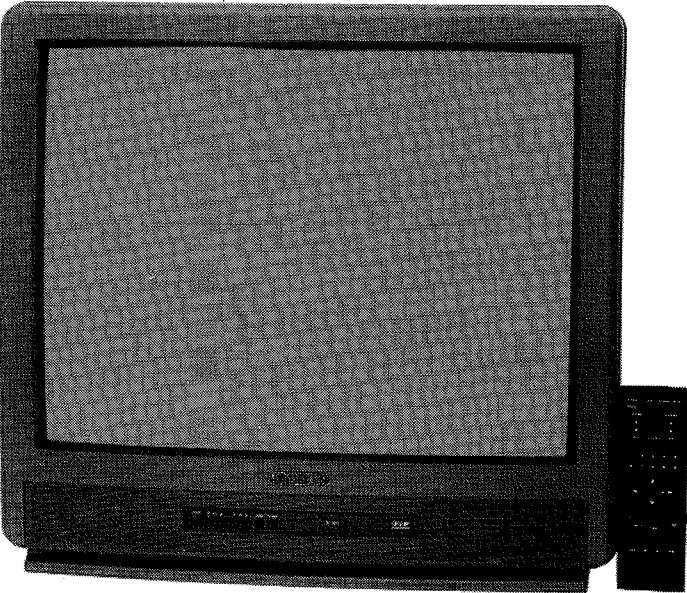
MODELS CTN-2768S, CTP-2768S (CHASSIS ANEDP206)

PANASONIC

INDEX	
Convergence Adjustments	1
GridTrace Location Guide	
A Board	6
C Board	7
E Board	6
F Board	7
W Board	6
X Board	7
Y Board - Bottom View	7
Y Board - Top View	7
Z Board	6
IC Functions	3
Important Parts Information	9
Miscellaneous Adjustments	1
New Circuits	7
Parts List	8, 9
Photos	
A Board	6
C Board	7
Cabinet - Rear View	1
CRT Neck Assembly	1
E Board	6
F Board	7
W Board	6
X Board	7
Y Board - Bottom View	7
Y Board - Top View	7
Z Board	6
PIP Adjustments	5
Placement Chart	5
Safety Precautions	1
Schematics	
CRT	3
MPU	4
Multi Sound Decoder	3
Multi Sound Decoder/ Audio	3
PIP	3, 4
Power Supply	5
Television	2
Schematic Notes	3
Stereo/SAP Adjustments	5
Test Equipment	5
Test Jig Hookup	1
Troubleshooting	1
Tuner Information	4

For Supplier Address,
See PHOTOFACT Annual Index

PANASONIC
Models CTN-2768S, CTP-2768S (Chassis ANEDP206)



Representative Model

Complete coverage
for servicing a television receiver...

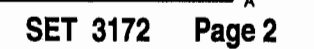
- Schematics
- Component locations
- Parts lists
- Troubleshooting guide



HOWARD W. SAMS & COMPANY

JUNE 1993 SET 3172

PANASONIC **MODELS CTN-2768S, CTP-2768S (CHASSIS ANEDP206)**



MISCELLANEOUS ADJUSTMENTS

PRETUNING

NOTE: All procedures require an antenna connected and power applied to the set. Select TV/ANT tuning mode.

Auto Memory

1. Press the set-up button until the arrow points at auto ch.
2. Press the plus 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 plus button.
4. Repeat step 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 minus 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. Set in TV/ANT mode.

B+ CHECK

Connect a digital DC voltmeter to TP91, low side to TP92. Set brightness, picture, and color to minimum. With AC line voltage set to 120VAC, B+ should read 130.5VDC \pm 1VDC.

HIGH VOLTAGE CHECK

Tune in a picture. Connect a high voltage probe to CRT anode. High voltage must read 29.5KV (+1.0KV -1.5KV).

RF AGC DELAY

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

SUB BRIGHTNESS

Tune in a crosshatch pattern. Set brightness to a level of 15, set picture and color to minimum. Adjust sub brightness control R318 for just visible highlights. Set brightness, picture, and color to maximum. Check for blooming and readjust if required.

SUB CONTRAST

NOTE: Do not make adjustments unless CRT, C board, or associated components are replaced.

Tune in a color bar pattern. Connect a 4700 ohm resistor across TPD7 to TPD1. Connect an oscilloscope to TP13, low side to ground. Adjust sub contrast control R304 for 1.2V p-p level of the video portion of the waveform. Do not include any overshoot spikes or edges.

PINCUSHION AND HORIZONTAL CENTERING

Tune in a crosshatch pattern. Normalize video settings. Set horizontal width control R760 and horizontal center control R524 for midrange. Adjust parabola control R761 for straightest vertical lines on the left and right sides of the screen. Adjust R760 for slight overscan. Adjust R524 so center square of pattern is centered on the screen.

MPU REFERENCE OSCILLATOR

Tune in channel 13. Connect a frequency counter to pin 4 of connector A3. Short TPS2 to ground. Adjust MPU reference oscillator C031 for exactly 500kHz \pm 3.5Hz.

SUB TINT

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

VIDEO LEVEL

NOTE: Do not make adjustment unless video level control R114 is replaced.
Tune in a colorbar pattern. Connect an oscilloscope to pin 7 of connector A4. Adjust video level control R114 for 1.0V p-p.

COMB FILTER

Tune in a colorbar pattern. Connect an oscilloscope to TP13. Adjust phase coil L304 and balance control R335 for minimum burst amplitude.

COLOR TEMPERATURE

Set the brightness and contrast to mid-range. Set the color and screen control to minimum. Set the red R358 and blue R357 drive controls,

MISCELLANEOUS ADJUSTMENTS continued

and red R354, green R356, and blue R355 bias controls to midpoint. Connect a jumper between TPS8 and TPS9 to collapse the vertical. Adjust the screen control to obtain a faintly visible line of one predominant color. Adjust two remaining bias controls for best white balance of line. Remove the jumper. Adjust the red and blue drive controls R358 and R357 for best black and white picture.

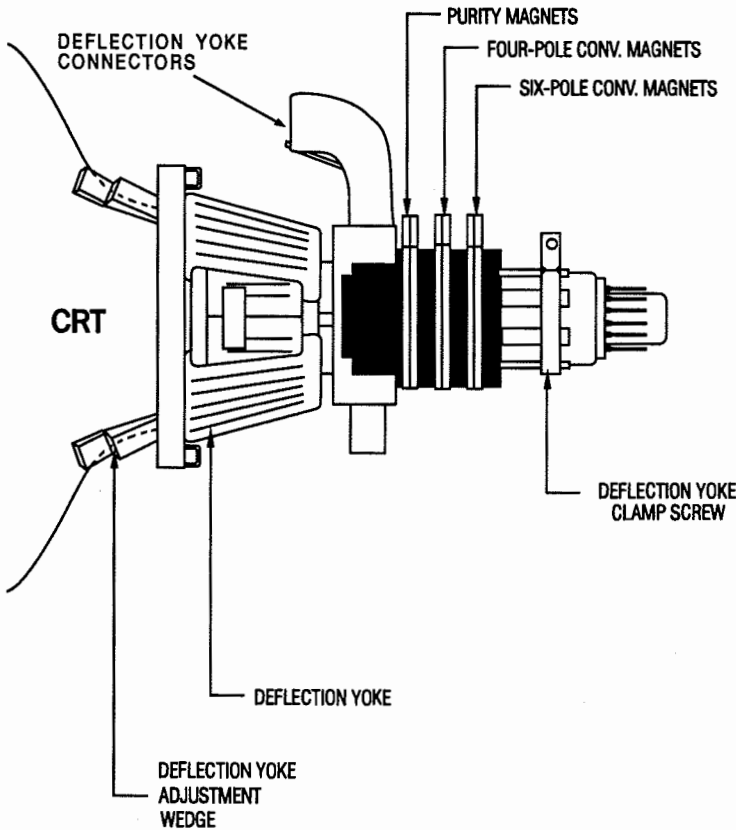
PURITY

Tune in a green raster. Loosen deflection yoke L570 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.

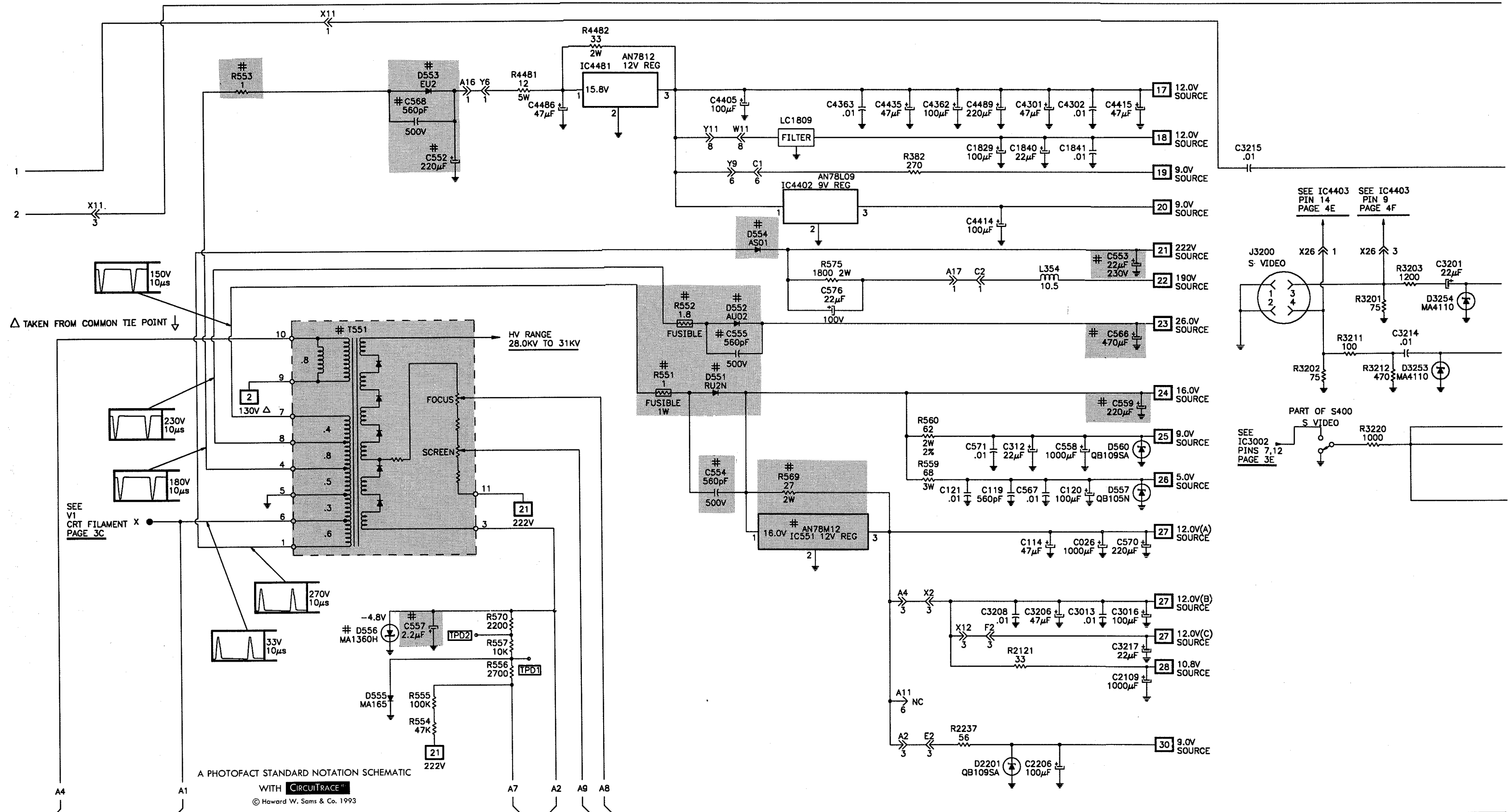
CONVERGENCE

Connect a signal generator to antenna terminals and tune in a dot pattern. Adjust 4-pole magnets to converge the red and blue dots at the center of the screen. Adjust 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 L570 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



TELEVISION SCHEMATIC continued



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.

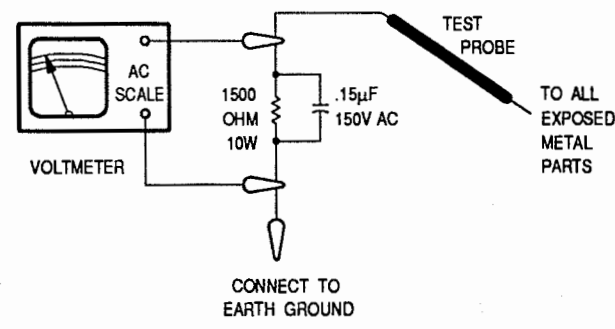
Hot Leakage Current Check

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.



TROUBLESHOOTING

POWER SUPPLY

Check the AC fuse F001. If fuse is open:
 Check T001, T2401, D801 thru D804, and C802 thru C806.

Apply 120V AC and check for 5V at the emitter of Q004. If 5V is missing:
 Check the voltages and components associated with D004, D031, Q004, Q005, and T001.

If 5V is present, turn set on and check for 156V* at the cathode of D802. If 156V* is missing:
 Check the voltages and components associated with line filter L801, Q007, and RL001.

If 156V* is present at the cathode of D802 check for 131V* at TP91. If 156V* is missing:
 Check the voltages and components associated with the IC801.

If 131V* is present, refer to the "Horizontal" section of this Troubleshooting guide.

* With respect to isolated ground.

AUDIO

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

If the waveform is missing or improper check the voltages, and components associated with pins 25, 28, 29, and 30, of IC101.

If waveform is present, select a station transmitting a signal in stereo and check for an audio waveform at pins 17 and 18 of IC2200. If waveforms are missing check the voltages, and components associated with IC2200.

If waveforms are present at pins 17 and 18 of IC2200, check for audio waveforms at pins 4 and 9 of IC2301.

If waveforms are missing:
 Check the voltages, waveforms, and components associated with IC2101, IC3002, IC2102, and IC2411.

If waveforms are present:
 Check the voltages, waveforms, and components associated with IC2301.

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, waveform, and components associated with Q102, Q301, Q321, Q322, Q323, Q325, Q3216, Q3255, IC3002, and pins 1, 2, 3, 5, 11, 12, 14, 16 of IC3201.

If the waveform is present at pin 13 of IC101:
 Check the voltages, waveforms, and components associated with pins 40, 48 thru 50 of IC101, Q303, Q4344, and pins 3, 8, 9, 10, 11, 12 of IC4351.

If the brightness is inadequate or cannot be controlled:
 Check the voltages, waveforms, and components associated with pin 50 of IC101, and pin 7 of V1.

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 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, waveforms, and components 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	4.7V	
Pin 33	3.9V	

RASTER

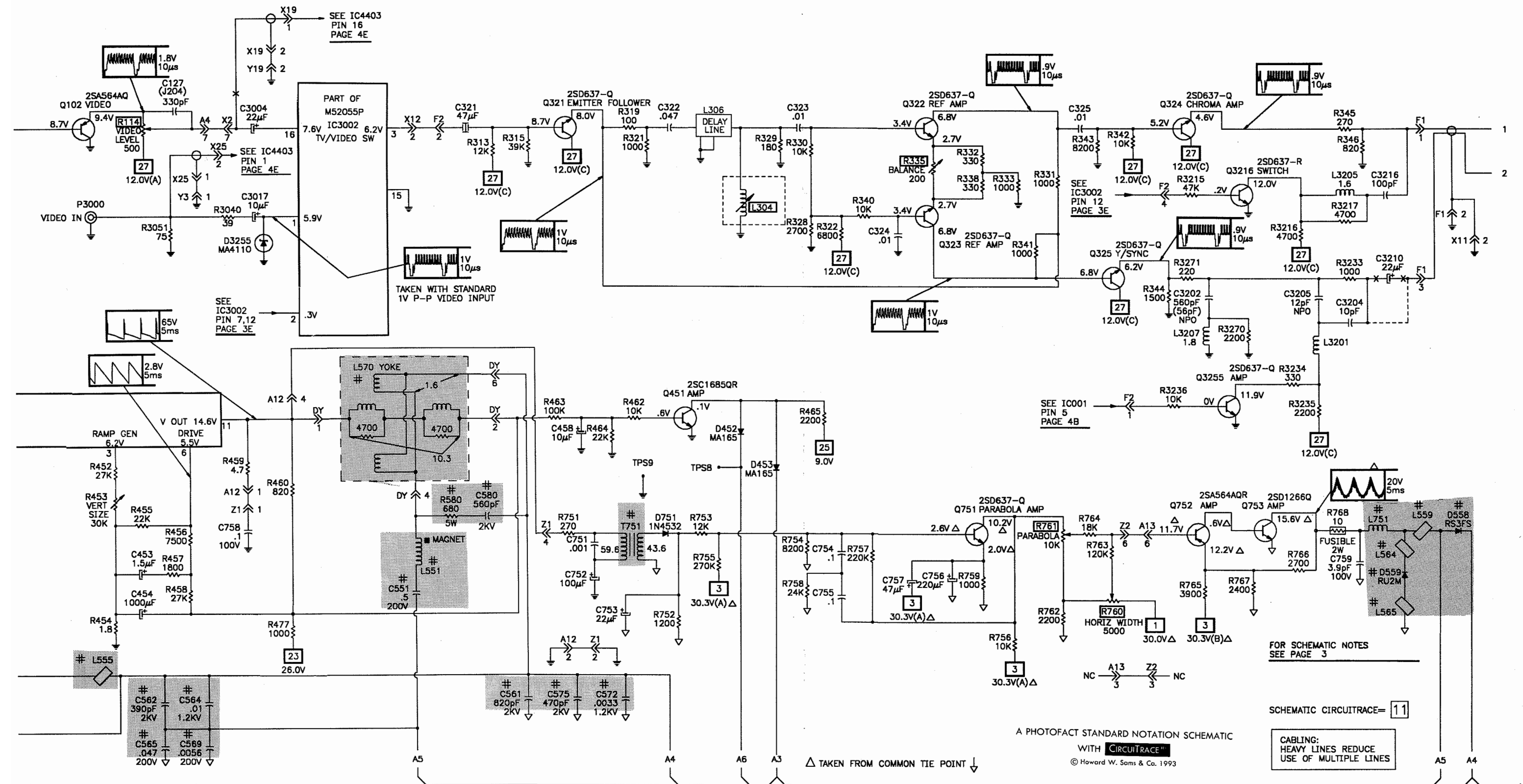
Check the CRT and CRT voltages. If there is no Red:
 Check the voltages and components associated with pin 20 of IC4351, Q4351 and Q351.

If there is no Green:
 Check the voltages and components associated with pin 17 of IC4351, Q4352 and Q352.

If there is no Blue:
 Check the voltages and components associated with pin 14 of IC4351, Q4353 and the Q353.

If raster has height or width problems:
 Refer to the "Vertical", "Horizontal", and "Power Supply" sections of this Troubleshooting guide.

TELEVISION SCHEMATIC continued



TROUBLESHOOTING continued**CHROMA**

Check for a chroma waveform at pin 15 of the IC101. If the waveform is missing:

Check the voltages, waveforms, and components associated with Q324, and pins 6 thru 9 of IC3201.

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

Check the voltages, waveforms, and components associated with pins 38, 39 and 41 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.

If waveforms are present at pins 44, 45, 46 of IC101, check for the proper waveforms at pins 14, 17, 20 of IC4351. If waveforms are missing:

Check the voltages, waveforms, and components associated with pins 14 thru 22 of IC4341, Q4342, Q4343, Q4351, Q4352, and Q4353.

If there is inadequate tint range:

Check the voltages and components associated with the sub-tint control 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.

SYNC

If horizontal and vertical sync are missing:

Check the voltages, waveforms, and components associated with Q3102, Q3103, Q3104, and pin 11 of IC101.

If there is no vertical sync:

Check the voltages, waveforms, and components associated with pins 12 and 14 of IC101.

If there is no horizontal sync:

Check the voltages, waveforms, and components associated with pins 4, 6, 8 and 10 of IC101.

HORIZONTAL

Determine if the TV is in shutdown:

Refer to the "New Circuits" section of this Troubleshooting guide.

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

Check the voltages, waveforms, and components associated with Q501 and pins 4 thru 10 of IC101.

If there is still no horizontal deflection:

Check the voltages, waveforms, and components associated with Q551 and T551. Check D541, D552, D554, and associated components for defects.

The high voltage rectifier is part of T551 and if defective will affect the performance of the horizontal circuits.

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 the IC101. If vertical deflection is present:

Check the voltages, waveforms, and components associated with pins 2, 12, 14 of IC101.

If there is still no vertical deflection:

Check the voltages, waveforms, and components associated with the IC451 and Q451.

Vertical linearity or height problems may be caused by vertical feedback and bias circuits, check C451 thru C455 and C457 for defects.

PIP VIDEO

Check for the proper waveform at pin 23 of IC4401. If the waveform is missing:

Check the voltages, waveforms, and components associated with pins 44, 46, 49, 51 of IC4401, Q4407, IC4403, and pins 1, 2, 3, 5, 11 thru 16 of IC4403.

If the waveform is present at pin 23 of IC4401, check for the proper waveform at pin 14 of IC1801. If the waveform is missing at pin 14 of IC1801:

Check the voltages, waveforms, and components associated with Q1811, Q1812, IC1801, and IC1802.

If the waveform is present at pin 14 of IC1801:

Check the voltages, waveforms, and components associated with Q1825, Q1826, and IC4352.

PIP CHROMA

Check for the proper waveforms at pins 24 and 26 of IC4401. If the waveforms are missing:

Check the voltages, waveforms, and components associated with pins 34, 37, 40, 41, 42, 43 of IC4401, and pins 6 thru 9 of IC4403.

If the waveforms are present at pins 24, and 26 of IC4401, check for the proper voltages at pins 17 and 18 of IC1801. If the waveforms are missing at pins 17 and 18 of IC1801:

Check the voltages, waveforms, and components associated with IC1801, IC1802, Q1813, Q1814, Q1815, Q1816, Q1817, Q1818.

If the waveforms are present at pins 17 and 18 of IC1801, check for the proper waveforms at pins 16, 19, and 22 of IC4351. If the waveforms are missing:

Check the voltages, waveforms, and components associated with pins 7, 8, 9, 12 thru 16 of IC4352, Q4345, Q4360, Q1822, Q1824.

If the waveforms are present at pins 16, 19, 22 of IC4351:

Check the voltages, waveforms, and components associated with IC4351.

PIP VERTICAL

Check for the proper waveform at pin 23 of IC1801. If the waveform is missing at pin 23 of IC1801:

Check the voltages, waveforms, and components associated with Q1805 and Q4369.

If the waveform is present at pin 23 of IC1801, check for the proper waveform at pin 24 of IC1801. If the waveform is missing at pin 24 of IC1801:

Check the voltages, waveforms, and components associated with pins 5, 9, 10, 11, and 46 of IC4401, Q4401, and Q1806.

PIP HORIZONTAL

Check for the proper waveforms at pin 4 of IC1805 and pin 4 of IC1806.

If the waveform is missing at pin 4 of IC1806:

Check the voltages, waveforms, and components associated with Q1808, Q4366, Q4365, Q4357, and Q4346.

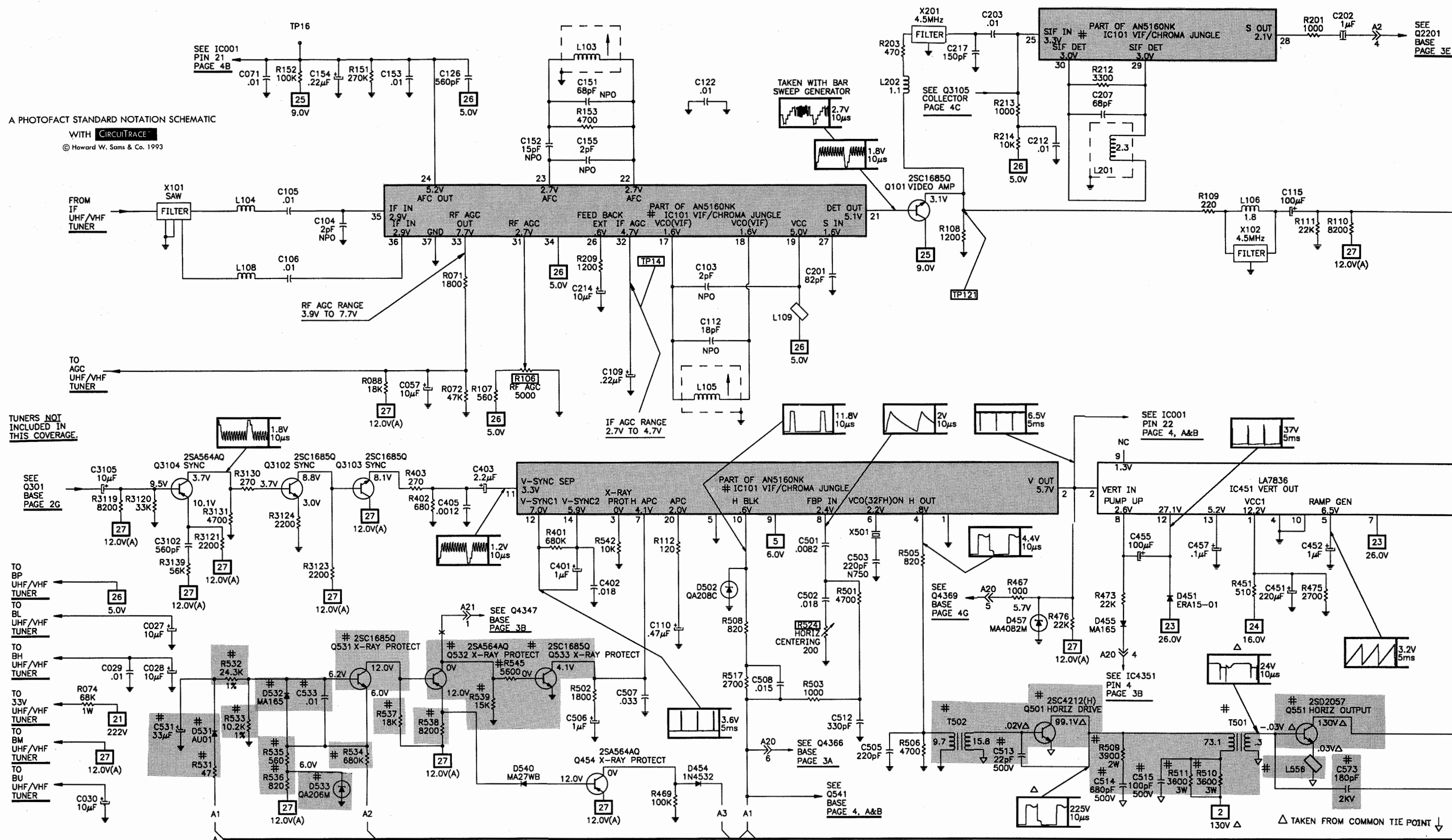
If the waveform is missing at pin 4 of IC1805:

Check the voltages, waveforms, and components associated with pins 4, 15, 17, 18, and 21 of IC4401, Q4402, Q4405, Q4406, Q4409, Q4416, and Q1807.

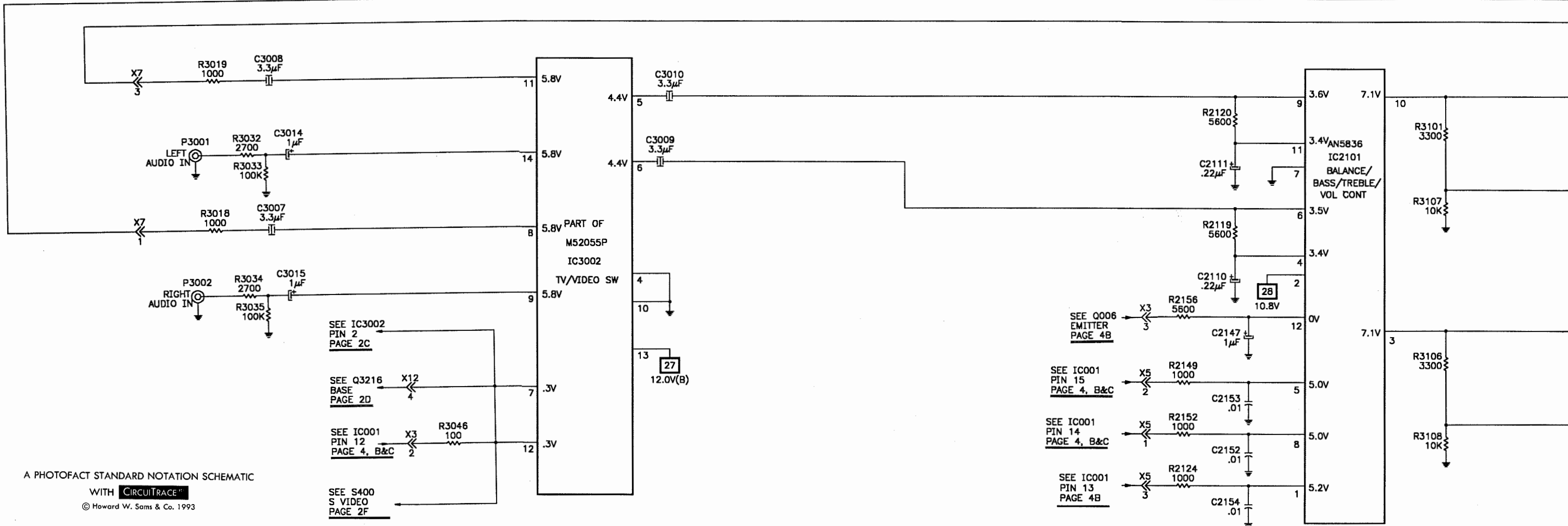
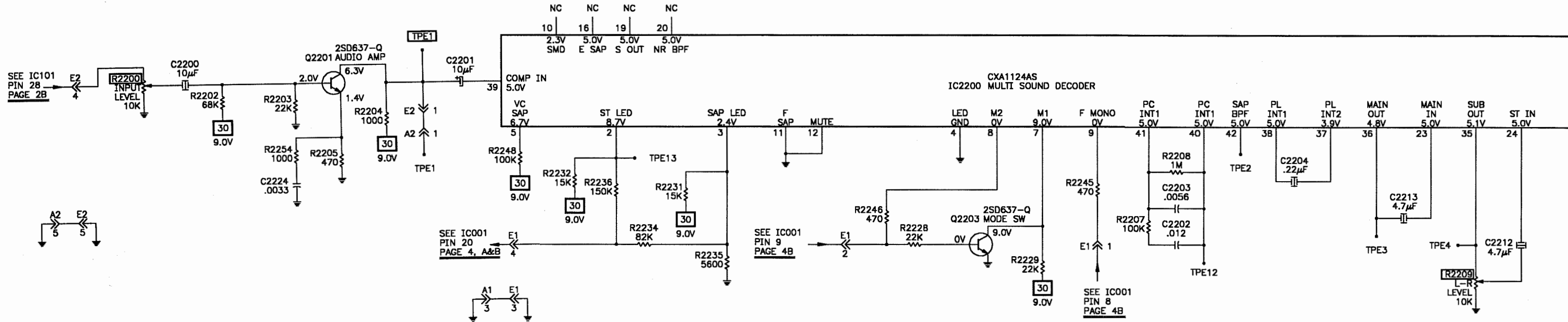
If the waveforms are present at pin 4 of IC1805, and pin 4 of IC1806:

Check the voltages, waveforms, and components associated with IC1805, IC1806, and pins 26, 27, 35, and 36 of IC1801.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE™
© Howard W. Sams & Co. 1993

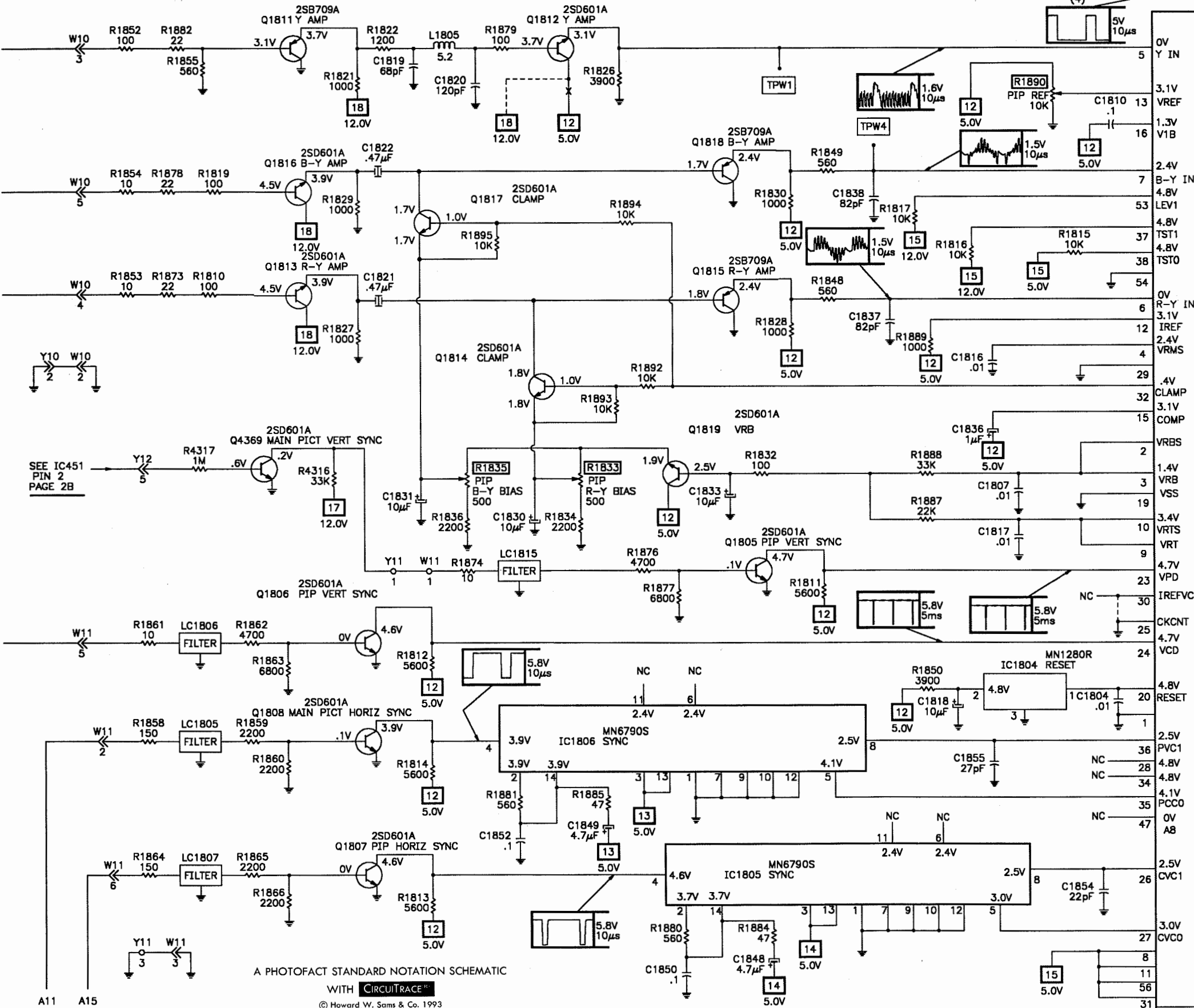


MULTI SOUND DECODER SCHEMATIC

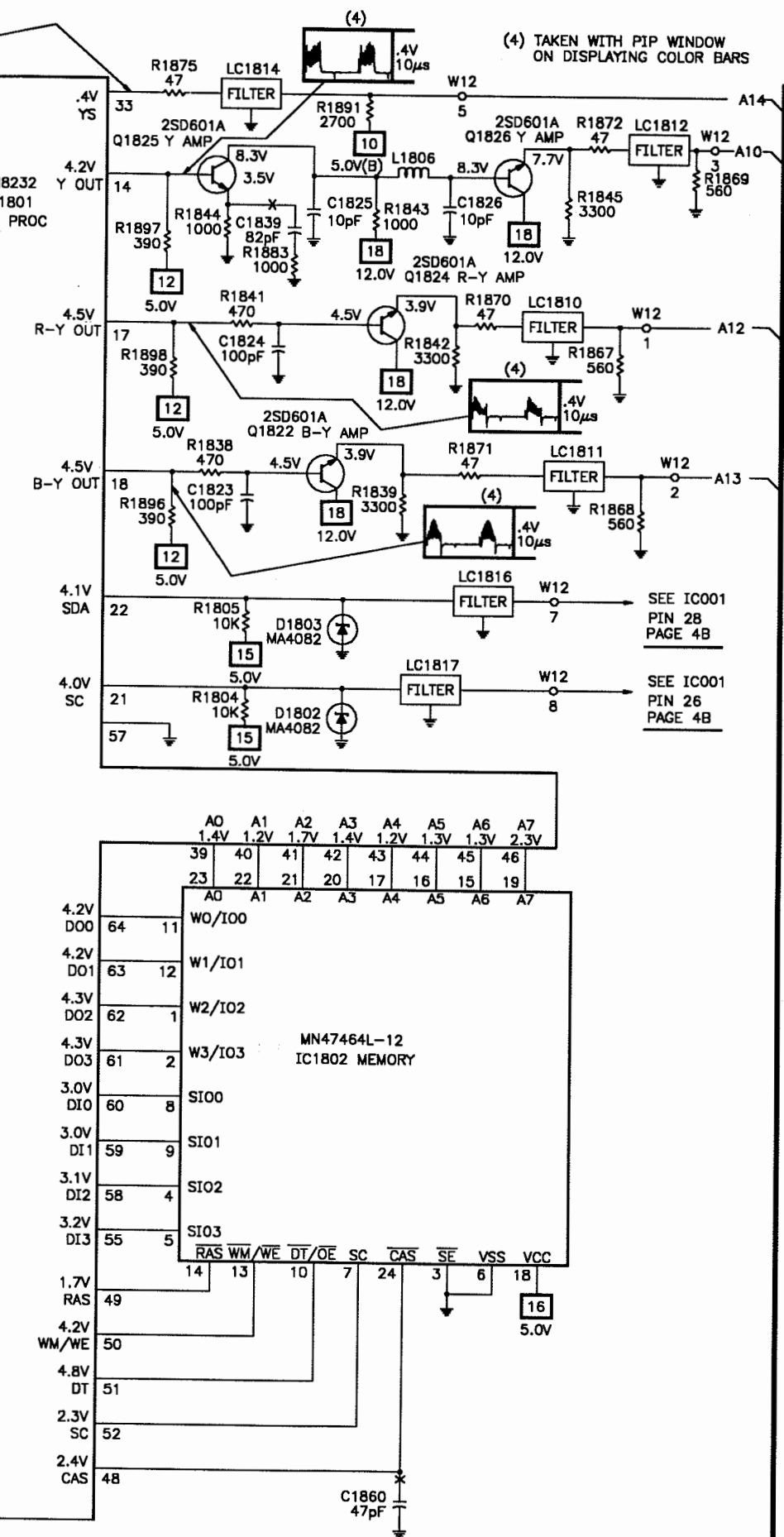


A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH **CIRCUITRACE™**
© Howard W. Sams & Co. 1993

PIP SCHEMATIC continued

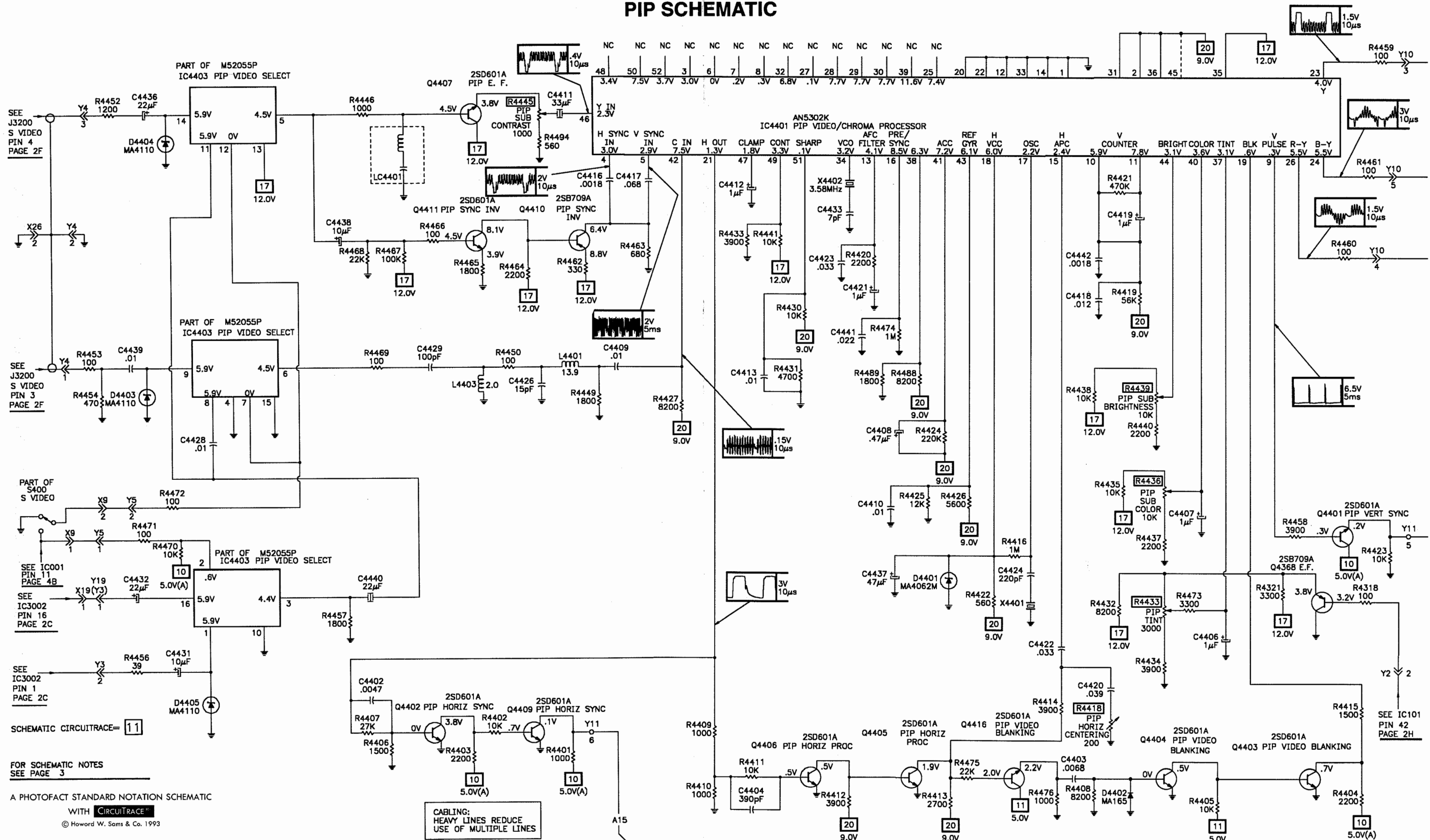


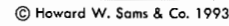
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITTRACE[®]
© Howard W. Sams & Co. 1993



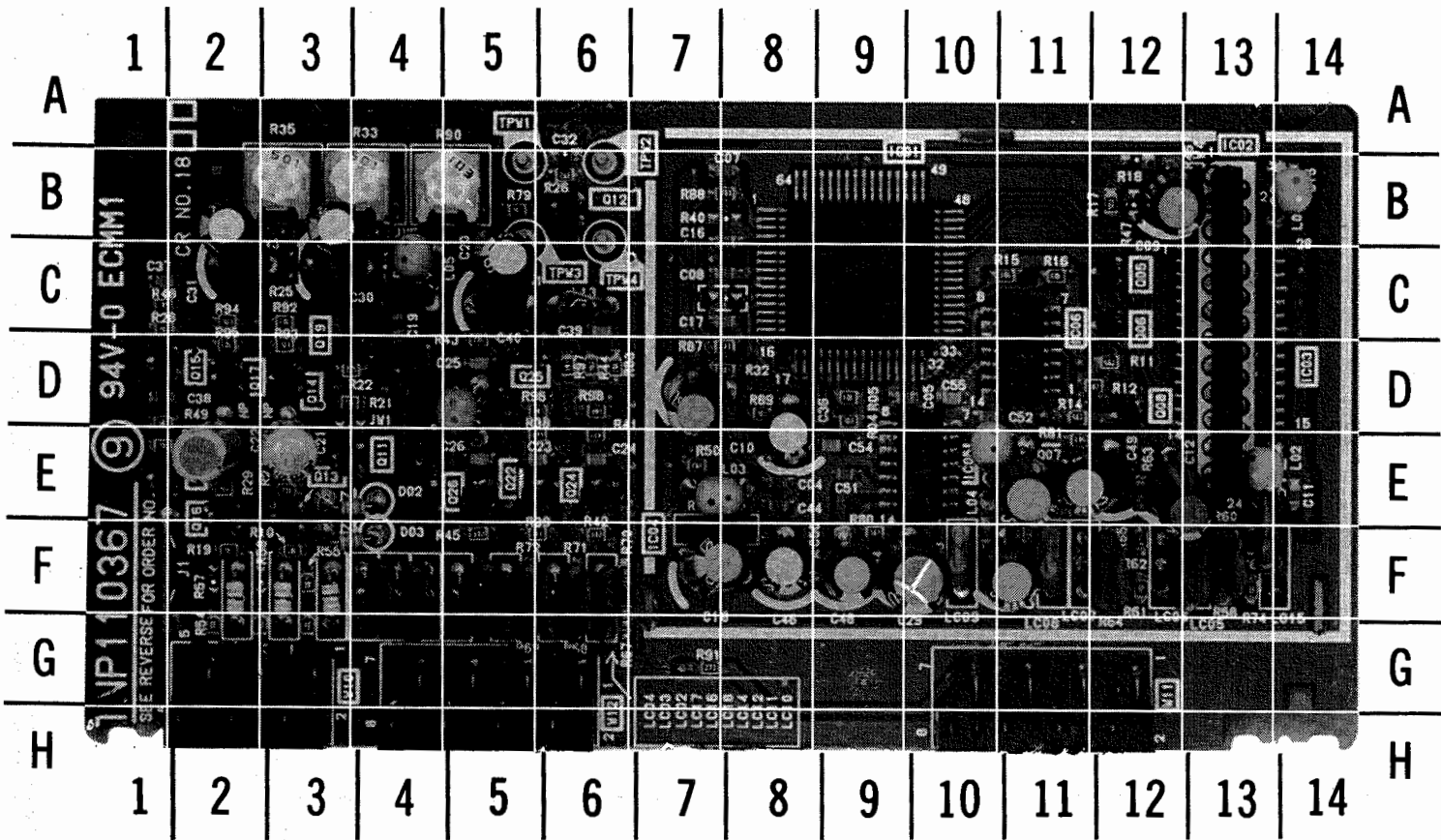
PANASONIC
MODELS CTN-2768S, CTP-2768S (CHASSIS ANEDP206)

PIP SCHEMATIC





W BOARD



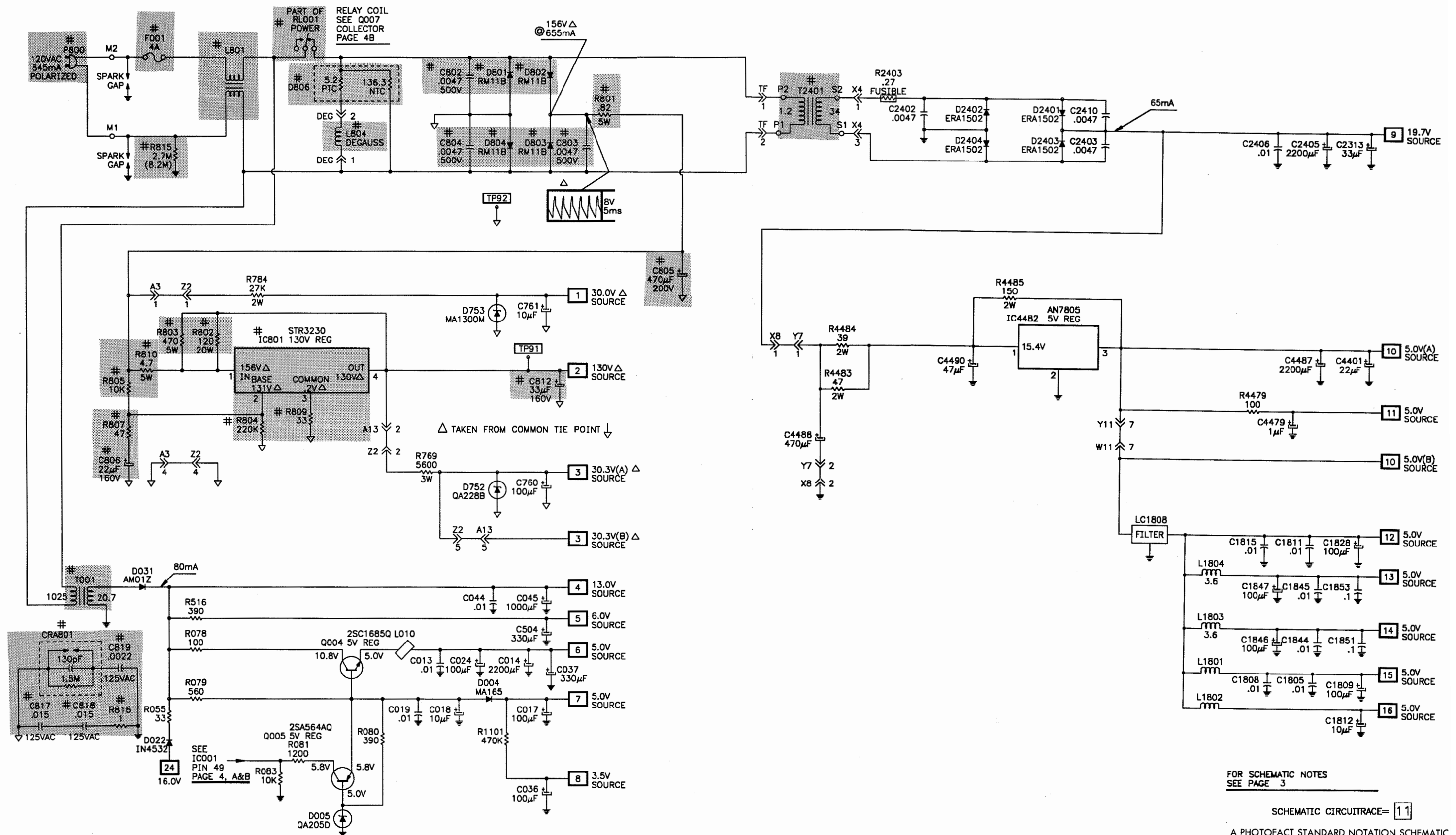
A HOWARD W. SAMS GRIDTRACE™ PHOTO

W BOARD, GRIDTRACE LOCATION GUIDE

C1804	E-8	C1847	E-11	LC1817	F-4	R1829	E-2	R1871	F-6
C1805	D-10	C1848	F-9	Q1805	C-12	R1830	E-1	R1872	F-5
C1807	B-8	C1849	E-12	Q1806	C-12	R1832	D-8	R1873	F-3
C1808	C-8	C1850	F-9	Q1807	E-11	R1833	B-4	R1874	F-13
C1809	B-12	C1851	E-9	Q1808	D-12	R1834	B-3	R1875	F-5
C1810	E-8	C1852	D-10	Q1811	E-4	R1835	B-3	R1876	F-13
C1811	E-14	C1853	F-10	Q1812	B-6	R1836	B-2	R1877	E-13
C1812	E-12	C1854	E-9	Q1813	F-3	R1838	E-6	R1878	F-2
C1815	B-14	C1855	D-10	Q1814	D-3	R1839	F-5	R1879	B-5
C1816	B-8	C1899	G-13*	Q1815	D-2	R1841	E-6	R1880	F-9
C1817	C-8	D1802	E-4	Q1816	F-2	R1842	F-6	R1881	E-11
C1818	F-7	D1803	F-4	Q1817	D-2	R1843	D-5	R1882	F-3
C1819	C-4	IC1801	B-8	Q1818	E-2	R1844	D-6	R1883	D-6
C1820	C-5	IC1802	B-13	Q1819	C-4	R1845	F-5	R1884	F-9
C1821	E-3	IC1804	F-8	Q1822	E-5	R1848	C-1	R1885	E-12
C1822	E-2	IC1805	E-10	Q1824	E-6	R1849	D-1	R1887	D-8
C1823	E-6	IC1806	D-11	Q1825	D-6	R1850	E-7	R1888	B-8
C1824	E-6	L1801	B-14	Q1826	E-5	R1852	G-3	R1889	D-8
C1825	D-5	L1802	E-13	R1804	D-9	R1853	G-3	R1890	B-5
C1826	E-5	L1803	E-7	R1805	D-9	R1854	G-2	R1891	G-7
C1828	F-11	L1804	E-10	R1810	F-3	R1855	F-3	R1892	C-3
C1829	F-10	L1805	C-4	R1811	D-12	R1858	F-13	R1892	D-3
C1830	B-3	L1806	D-5	R1812	D-12	R1859	F-13	R1894	C-2
C1831	C-2	LC1805	F-13	R1813	F-11	R1860	E-13	R1895	D-2
C1833	D-7	LC1806	F-12	R1814	D-11	R1861	F-12	R1896	D-6
C1836	D-8	LC1807	F-12	R1815	C-11	R1862	F-12	R1897	D-6
C1837	C-1	LC1808	F-11	R1816	C-11	R1863	E-12	R1898	D-6
C1838	D-1	LC1809	F-10	R1817	B-12	R1864	F-12	W10	G-3
C1839	C-6	LC1810	F-6	R1819	F-2	R1865	F-12	W11	G-12
C1840	C-5	LC1811	F-6	R1821	D-3	R1866	E-11	W12	G-6
C1841	C-5	LC1812	F-5	R1822	D-3	R1867	G-6		
C1844	E-8	LC1814	F-5	R1826	B-6	R1868	G-6		
C1845	F-10	LC1815	F-13	R1827	E-3	R1869	G-5		
C1846	F-8	LC1816	F-4	R1828	C-1	R1870	F-6		

* LOCATED ON BOTTOM OF BOARD

POWER SUPPLY SCHEMATIC



FOR SCHEMATIC NOTES
SEE PAGE 3

SCHEMATIC CIRCUITRACE= 11

A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE™**

© Howard W. Sams & Co. 1993

A BOARD, GRIDTRACE LOCATION GUIDE

A1	G-1	C112	I-4	C533	G-2	D031	I-8	L555	J-17	R030	B-9	R114	L-4	R501	H-3	R626	D-6	X601	H-6.
A2	L-1	C0114	L-13	C541	B-6	D032	H-8	L556	H-18	R031	B-12	R120	L-8	R502	H-4	R628	D-6		
A3	G-8	C115	M-3	C542	B-6	D201	K-5	L559	G-15	R032	E-10	R151	K-4	R503	H-3	R629	D-7		
A4	K-8	C119	K-5	C551	F-15	D302	E-6	L564	G-15	R033	B-8	R152	K-3	R505	H-4	R630	C-6		
A5	C-11	C120	J-6	C552	M-13	D451	C-15	L565	F-15	R034	B-8	R153	J-4	R506	G-4	R631	D-6		
A8	E-7	C121	J-6	C553	M-14	D452	G-4	L751	F-14	R035	F-8	R201	L-4	R508	H-3	R632	D-6		
A11	H-6	C122	K-7	C554	I-14	D453	G-4	L801	K-9	R037	C-11	R203	K-4	R509	G-18	R765	F-18		
A12	B-18	C126	J-4	C555	I-14	D454	F-4	Q001	B-5	R038	C-10	R209	K-6	R510	F-13	R766	E-17		
A13	E-18	C127	L-4	C557	M-14	D455	C-14	Q002	B-12	R039	C-11	R212	J-6	R511	F-13	R767	F-18		
A16	L-13	C151	J-4	C558	G-9	D457	H-4	Q004	E-7	R040	C-11	R213	K-4	R513	I-4	R768	D-16		
A17	D-14	C152	J-4	C559	I-14	D502	H-2	Q005	D-7	R042	D-10	R214	K-4	R516	E-5	R801	G-12		
A20	B-7	C153	K-3	C561	J-16	D531	F-3	Q006	J-7	R043	C-11	R303	M-4	R517	H-2	R802	H-12		
A21	B-8	C154	K-3	C562	H-16	D532	G-2	Q007	G-9	R044	B-11	R304	M-5	R524	H-3	R803	F-12		
A32	D-10	C155	J-4	C564	H-16	D533	G-2	Q015	D-10	R045	C-10	R305	E-5	R531	F-4	R804	L-12		
A99	M-13	C201	M-5	C565	G-15	D540	G-3	Q019	I-3	R047	B-10	R308	M-4	R532	G-3	R805	I-11		
AG	E-7	C202	L-5	C566	H-13	D542	B-6	Q101	J-4	R049	D-5	R309	C-7	R533	G-3	R807	L-12		
C001	B-11	C203	K-4	C567	C-13	D551	I-15	Q102	L-3	R050	B-14	R310	H-6	R534	F-3	R809	L-12		
C002	D-10	C207	J-6	C568	L-13	D552	I-14	Q301	M-4	R051	B-14	R311	G-5	R535	G-2	R810	I-12		
C004	C-10	C212	H-4	C569	I-15	D553	K-14	Q303	G-6	R052	B-13	R314	G-6	R536	G-2	R815	M-10		
C005	C-11	C214	K-6	C570	C-12	D554	L-17	Q316	H-3	R053	B-13	R316	E-6	R537	G-3	R816	M-12		
C006	C-12	C217	K-4	C571	F-9	D555	M-14	Q451	G-4	R055	C-13	R317	M-3	R538	G-3	R1101	E-11		
C007	D-11	C301	L-4	C572	I-16	D556	M-15	Q454	G-4	R056	G-8	R318	M-4	R539	G-3	R3116	F-7		
C009	C-10	C302	C-7	C573	H-17	D557	F-3	Q501	F-17	R058	A-17	R320	H-3	R541	G-5	R3119	M-7		
C010	C-11	C303	M-5	C575	I-16	D558	H-16	Q531	G-3	R059	A-16	R323	M-4	R542	H-4	R3120	M-7		
C011	C-11	C305	L-5	C576	E-13	D559	F-15	Q532	G-3	R060	A-15	R324	F-6	R544	C-6	R3121	M-7		
C012	D-10	C306	F-6	C580	H-16	D560	F-3	Q533	G-4	R061	A-15	R326	H-3	R545	H-3	R3123	L-9		
C013	D-8	C307	F-6	C601	K-7	D603	E-6	Q541	B-6	R064	B-13	R327	E-6	R547	C-5	R3124	L-8		
C014	B-6	C309	H-4	C602	C-5	D606	B-8	Q551	H-17	R065	B-13	R334	E-5	R551	J-14	R3130	M-6		
C017	B-13	C310	I-6	C605	H-6	D801	H-11	Q601	C-6	R071	K-5	R336	C-6	R552	I-14	R3131	M-6		
C018	C-12	C312	H-6	C606	I-6	D802	G-11	Q602	D-5	R072	I-1	R337	G-5	R553	L-14	R3139	M-6		
C019	C-11	C314	G-6	C607	H-6	D803	G-11	Q603	C-6	R073	B-12	R339	F-5	R554	L-14	RL001	H-9		
C021	J-3	C401	I-4	C608	H-6	D804	H-11	Q604	C-6	R074	E-12	R401	I-4	R555	L-13	S001	B-17		
C022	D-8	C402	I-4	C609	H-6	D806	G-9	Q752	E-17	R076	B-12	R402	L-6	R556	M-13	S002	B-17		
C023	D-8	C403	L-6	C610	D-5	DEG	G-10	Q753	E-17	R078	F-7	R403	L-7	R557	M-14	S003	B-16		
C024	D-7	C405	L-6	C625	C-6	DY	F-16	Q3102	L-8	R079	C-13	R451	B-14	R558	E-12	S004	B-15		
C025	C-7	C451	B-15	C626	C-7	F001	L-10	Q3103	L-8	R080	E-7	R452	B-14	R559	D-11	S005	B-14		
C026	I-2	C452	C-15	C802	H-11	IC001	E-9	Q3104	M-7	R081	D-7	R453	M-5	R560	F-10	S009	A-13		
C027	H-1	C453	B-16	C803	G-11	IC101	H-5	Q3105	L-7	R083	D-7	R454	C-17	R569	E-11	S010	A-12		
C028	J-1	C454	B-17	C804	H-11	IC451	B-15	R001	E-10	R085	I-3	R455	B-16	R570	M-14	T001	I-9		
C029	L-2	C455	C-15	C805	I-11	IC551	D-12	R002	F-8	R086	I-3	R456	B-16	R575	E-13	T501	G-17		
C030	M-2	C457	C-16	C806	L-13	IC801	K-11	R004	A-5	R087	J-7	R457	B-16	R580	G-15	T502	C-17		
C031	D-8	C458	B-16	C812	H-15	L006	B-10	R005	B-5	R088	K-2	R458	B-16	R604	I-6	T551	K-16		
C034	B-9	C501	H-4	C817	M-12	L007	B-10	R006	D-10	R090	E-6	R459	B-18	R609	H-6	TF	G-11		
C035	B-9	C502	H-3	C818	M-12	L008	C-8	R008	B-10	R092	F-6	R460	B-17	R610	H-6	TP13	G-6		
C036	D-11	C503	H-4	C819	M-12	L010	E-7	R009	B-10	R093	C-7	R461	B-10	R611	H-6	TP14	J-6		
C037	E-9	C504	H-4	C3102	M-6	L011	E-8	R012	B-10	R094	D-8	R462	G-7	R614	D-5	TP91	N-13		
C044	H-8	C505	G-4	C3105	L-7	L012	F-9	R013	E-8	R095	J-2	R463	C-16	R615	E-6	TP92	M-17		
C045	G-7	C506	H-4	CRA801	M-12	L103	J-3	R015	E-7	R096	I-2	R464	C-16	R616	G-5	TP121	J-4		
C057	J-1	C507	H-4	D001	B-12	L104	I-7	R016	E-8	R097	I-2	R465	G-5	R617	C-7	TPD1	M-13		
C071	J-3	C508	H-2	D002	B-12	L105	I-4	R020	C-7	R106	M-3	R467	B-7	R618	G-6	TPD2	M-14		
C103	I-4	C512	G-3	D004	B-13	L106	L-3	R021	D-7	R107	L-4	R469	G-4	R619	G-6	TPS2	E-10		
C104	I-6	C513	F-17	D005	D-7	L108	I-6	R022	D-8	R108	J-4	R471	B-11	R620	C-5	X001	E-8		
C105	I-6	C514	G-18	D020	D-7	L109	J-4	R023	C-7	R109	J-3	R473	C-15	R621	C-5	X101	J-6		
C106	I-6	C515	F-17	D021	D-7	L201	K-6	R024	D-8	R110	L-3	R475	B-15	R622	D-6	X102	L-3		
C109	J-6	C518	I-4	D022	C-13	L202	J-3	R025	C-8	R111	L-3	R476	F-4	R623	C-6	X201	K-4		
C110	I-3	C531	G-3	D025	E-10	L551	H-14	R028	C-8	R112	I-3	R477	C-16	R624	D-5	X501	H-4		

PIP ADJUSTMENTS

All adjustments are made with PIP window on and displaying a colorbar pattern unless noted.

ANALOG

R-Y BIAS

Connect an oscilloscope to pin 15 of IC4352. Tune in a black raster. Adjust R-Y bias control R1833 for minimum positive and negative overshoot.

B-Y BIAS

Connect an oscilloscope to pin 12 of IC4352. Tune in a black raster. Adjust B-Y bias control R1835 for minimum positive and negative overshoot.

REFERENCE

Connect an oscilloscope to pin 22 of IC4351. Adjust PIP reference control R1890 for .8V p-p \pm .1V. Do not measure from base line or include any overshoots while measuring.

BRIGHTNESS AND CONTRAST

Adjust PIP brightness control R4356 and PIP contrast control R4379 so that PIP brightness and contrast matches main brightness and contrast.

COLOR

Connect an oscilloscope to pin 22 of IC4351. Adjust PIP color control R4306 so that the color portion of the waveform is .6V p-p. Do not include any overshoots while measuring.

TRACKING

Adjust pattern generator color level so that the colorbar pattern is black and white. Set PIP color control R4306 to minimum. Set red and blue low tracking controls R4351 and R4354 to minimum. Set red and blue high tracking controls R4393 and R4394 to minimum. Adjust each tracking control so that the PIP background matches the main background. Perform analog color adjustment.

HORIZONTAL CENTERING

Tune in a crosshatch pattern. Adjust PIP horizontal centering control R4418 until crosshatch pattern is centered in PIP window.

DIGITAL

CONTRAST

Tune in a monochrome pattern. Connect an oscilloscope to TPW1. Adjust PIP sub contrast control R4445 so that the waveform is 2.5V p-p \pm .1V.

BRIGHTNESS

Connect an oscilloscope to TPW1. Set oscilloscope for dual trace. Set trace for zero DC reference. Adjust the PIP sub brightness control R4439 so that the bottom of waveform is 2.5V p-p \pm .1V above zero reference.

TINT

Connect an oscilloscope to TPW4. Adjust PIP tint control R4433 so that the 5th and 7th peaks are balanced in amplitude.

COLOR

Connect an oscilloscope to TPW4. Adjust PIP color control R4436 for 1.6V p-p \pm .1V.

STEREO/SAP ADJUSTMENTS

All adjustments were made using a MTS TV/STEREO generator connected to the antenna terminals, with the customer controls set to normal listening levels. Select STEREO mode.

INPUT LEVEL

On generator select pilot, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to TPE1, low side to ground. Adjust input level control R2200 for .9V p-p.

L-R LEVEL

On generator select pilot, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to TPE11, low side to ground. Adjust L-R level control R2209 for 600mVp-p.

VCO

On generator select pilot, 1kHz audio frequency, and L-R modulating signal. Set volume for an audible signal (about 15). Set VCO control R2220 fully counterclockwise. Adjust VCO control clockwise until a clear signal is heard.

FILTER

Select SAP mode on the receiver. On generator select SAP, 1kHz audio frequency and L-R modulating signal. Connect an oscilloscope to TPE21, low side to ground. Adjust filter control R2221 for minimum.

SEPARATION

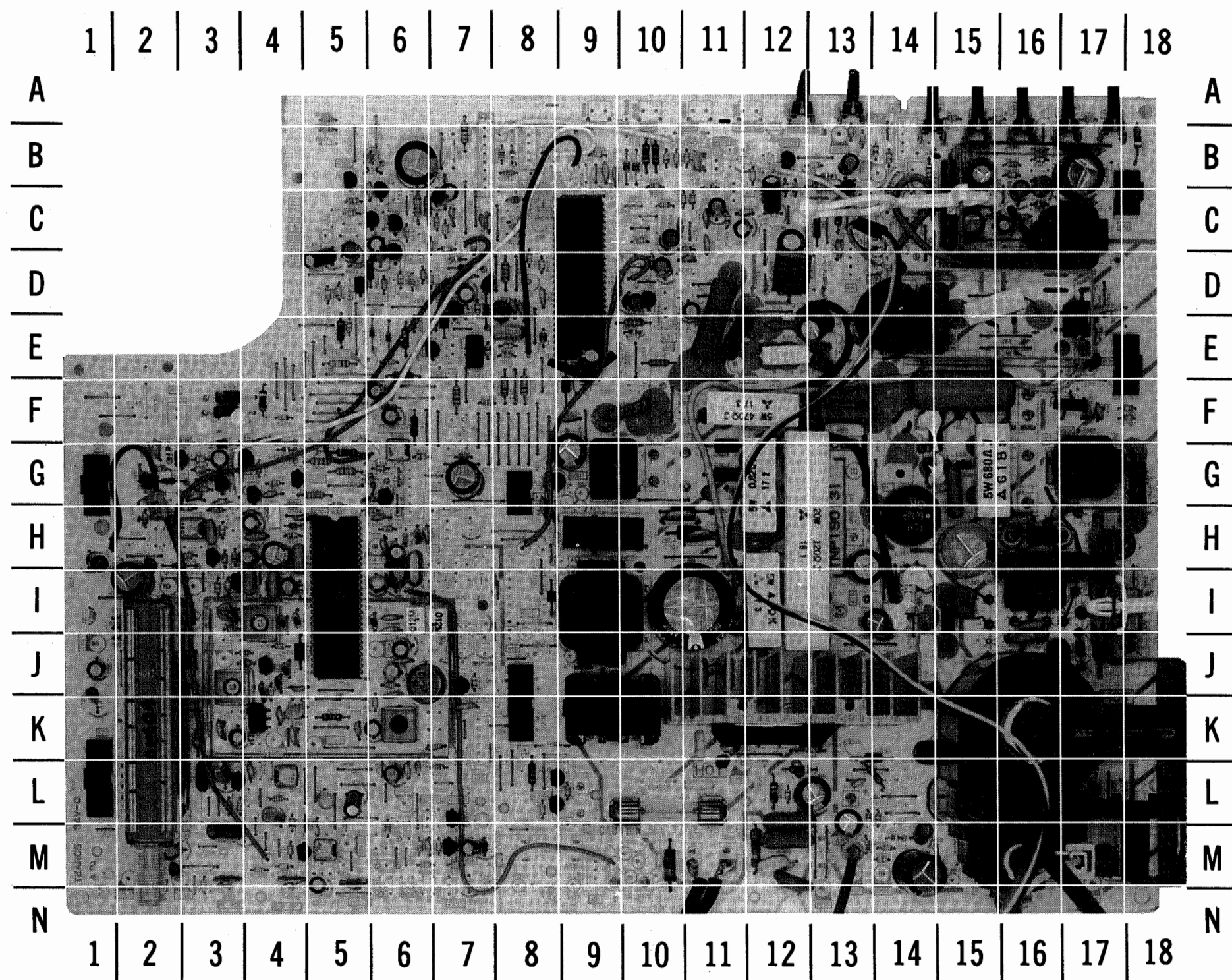
On generator select pilot, 8kHz audio frequency, and left modulating signal. Connect an oscilloscope to TPE10, low side to ground. Adjust separation control R2213 for minimum amplitude of waveform.

TEST EQUIPMENT

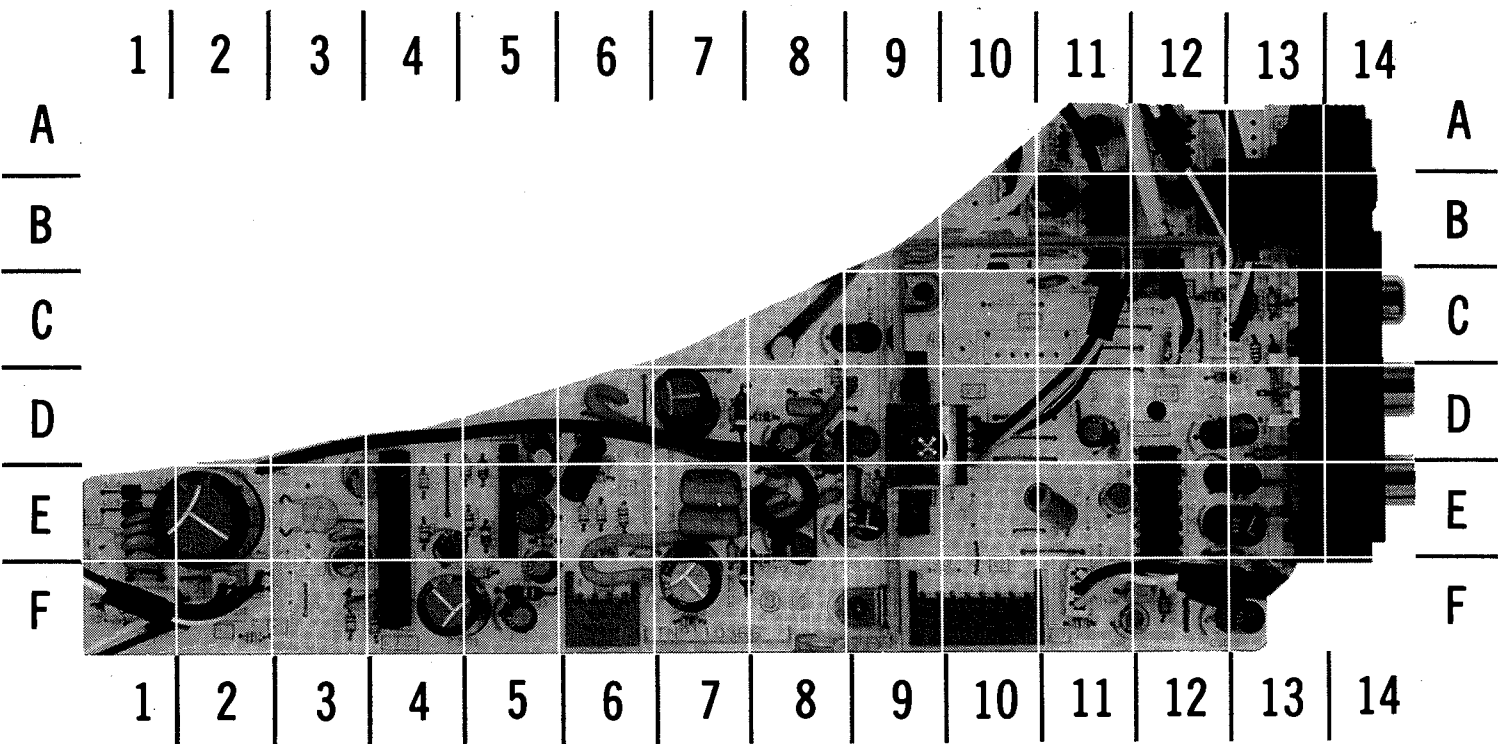
Test equipment listed by participating manufacturer illustrates typical or equivalent equipment used by Sams engineers to obtain measurements. This equipment is compatible with most types used by field service technicians.

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

A BOARD



X BOARD

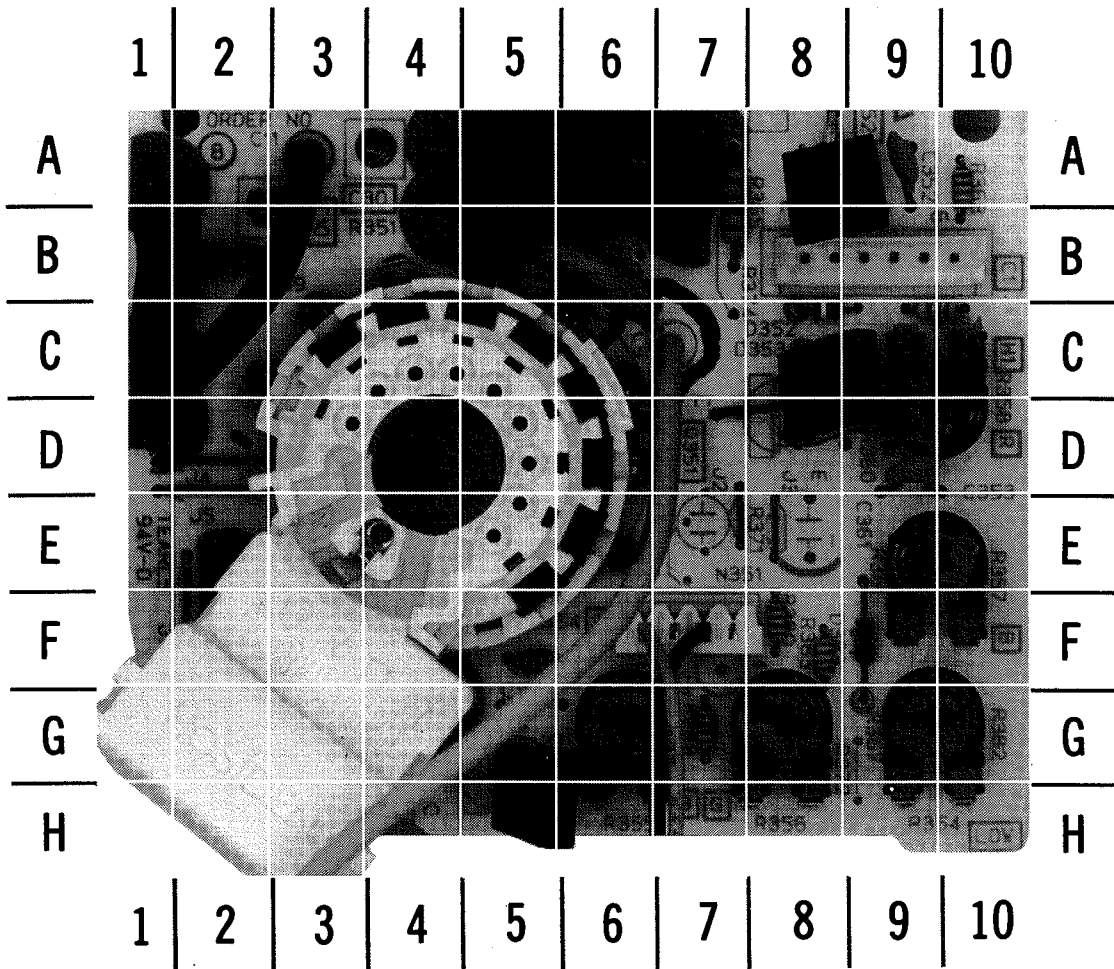


A HOWARD W. SAMS GRIDTRACE™ PHOTO

X BOARD, GRIDTRACE LOCATION GUIDE

C2109	F-4	C2410	E-1	D3253	B-12	R2303	E-6	R3110	E-5
C2110	F-3	C3004	D-12	D3254	A-11	R2304	E-9	R3111	E-6
C2111	E-3	C3007	F-12	D3255	D-11	R2305	D-7	R3112	E-6
C2112	D-6	C3008	F-12	D3256	E-13	R2306	D-7	R3113	E-6
C2113	F-5	C3009	E-11	D3257	E-14	R2307	D-7	R3114	E-6
C2147	E-4	C3010	E-11	D3258	D-12	R2308	E-7	R3201	A-12
C2152	E-3	C3013	E-13	D3259	C-13	R2309	F-7	R3202	C-13
C2153	E-3	C3014	E-13	IC2101	F-4	R2310	E-7	R3203	A-11
C2154	F-3	C3015	F-13	IC2102	D-5	R2311	D-8	R3211	C-12
C2301	D-8	C3016	E-13	IC2301	D-9	R2312	E-8	R3212	B-12
C2302	E-9	C3017	D-11	IC3002	D-12	R2403	F-1	R3220	B-12
C2303	E-7	C3103	D-5	IC3201	B-11	R3018	F-12	X1	E-7
C2304	D-7	C3104	F-5	J3200	A-14	R3019	F-11	X2	F-10
C2305	E-8	C3117	E-5	P1200	D-14	R3032	D-13	X3	F-6
C2306	E-8	C3118	E-5	P1201	E-14	R3033	E-13	X4	F-1
C2307	D-8	C3201	A-11	P3000	C-14	R3034	F-13	X5	F-2
C2308	E-8	C3206	B-12	P3001	D-14	R3035	F-13	X7	X-11
C2309	D-9	C3208	B-12	P3002	E-14	R3040	C-13	X8	F-2
C2310	D-8	C3209	B-11	R2119	E-4	R3046	F-7	X9	B-13
C2311	E-9	C3214	C-12	R2120	E-4	R3051	C-13	X11	B-10
C2312	E-7	C3215	C-11	R2121	F-5	R3101	E-5	X12	E-10
C2313	C-9	D2401	F-1	R2124	F-4	R3104	E-5	X19	C-12
C2314	F-7	D2402	F-1	R2149	F-3	R3105	E-5	X25	C-13
C2402	E-1	D2403	E-1	R2152	F-2	R3106	F-5	X26	A-12
C2403	E-1	D2404	E-1	R2156	F-4	R3107	E-4		
C2405	E-2	D3101	D-6	R2301	D-6	R3108	E-5		
C2406	F-1	D3102	E-6	R2302	D-8	R3109	E-5		

C BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

C BOARD, GRIDTRACE LOCATION GUIDE

C1	B-8	C360	G-6	R351	A-6	R360	D-9	R380	F-8
C2	F-6	D352	C-8	R352	A-6	R361	E-9	R382	G-10
C10	B-2	D353	C-8	R353	B-1	R363	A-10	R383	F-8
C30	A-4	D383	F-9	R354	G-10	R364	A-6	R384	C-9
C350	B-6	L354	F-5	R355	G-6	R365	A-7		
C351	C-9	Q351	C-8	R356	G-8	R367	G-9		
C352	A-9	Q352	A-9	R357	E-10	R368	G-7		
C353	D-9	Q353	G-5	R358	D-10	R369	B-2		

PARTS LIST continued

MISCELLANEOUS

Item No.	Description	Mfr. Part No.	Notes
# CRA801	Capristor	EXNG131P155	130pF1.5M
# F001	Fuse	XBA1F40NU100	4 Amp 125V
L010	Ferrite Bead	EXCELSA24	-
L012	Ferrite Bead	EXCELSA24	-
L105	VCO	TLI158755	-
L109	Ferrite Bead	EXCELSA35	-
L306	Delay Line	EFDEN645B35B	-
# L555	Ferrite Bead	EXCELSA24	-
# L556	Ferrite Bead	EXCELSA24	-
# L559	Ferrite Bead	EXCELSA24	-
# L564	Ferrite Bead	TSC910	-
# L565	Ferrite Bead	TSC910	-
# L751	Reactor	TLH15727	Pincushion
# L801	Choke	ELF18D656K	AC Line
# L804	Degaussing	OLK19020	-
LC1802	Filter	ELXTS121CA (1)	-
LC1803	Filter	ELXTS391CA (1)	-
LC1804	Filter	ELXTS391CA (1)	-
LC1805	Filter	ELXTS101MA	-
LC1806	Filter	ELXTS391CA	-
LC1807	Filter	ELXTS101MA	-
LC1808	Line Choke	EXCEMT103DCM	-
LC1809	Line Choke	EXCEMT103DCM	-
LC1810	Filter	ELXTS121CA	-
LC1811	Filter	ELXTS121CA	-
LC1812	Filter	ELXTS121CA	-
LC1814	Filter	ELXTS121CA	-
LC1815	Filter	ELXTS391CA	-
LC1816	Filter	ELXTS181CA	-
LC1817	Filter	ELXTS181CA	-
LC4401	Trap	ELB5A082	3.58MHz
# P800	Cord	TSX5140X	AC Line
# 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	Menu
S010	Switch	EVQQBH12T	TV / Video
S2301	Switch	ESD1512250	Speaker (External/Internal)
SP1	Speaker	EAS12D522KG	3" x 5", 8 Ohm
SP2	Speaker	EAS12D522KG	3" x 5", 8 Ohm
# V1	CRT	M68JUA99X	-
X001	Oscillator	TSS2077MX	Crystal
X101	Filter	EFCH45MVK12N	SAW
X102	Trap	EFCS4R5MW3BA	4.5MHz

For SAFETY use only equivalent replacement part.
(1) Used in some models

MISCELLANEOUS continued

Item No.	Description	Mfr. Part No.	Notes
X201	Filter	EFCS4R5MS4W	4.5MHz
X501	Oscillator	EF0A503KS41	Crystal
X601	Oscillator	TSS816MX	3.58MHz
X4401	Crystal	TAFC5B503F38	Clock
X4402	Crystal	TSS816MX	3.58MHz
	PC Board	TNP110367 (1)	W
	PC Board	TNP110368 (1)	Y
	PC Board	TNP110385ZA (1)	L
	PC Board	TNP110386ZA (1)	F
	PC Board	TNP101656BZ (1)	E
	PC Board	TNP101659 (1)	Z
	PC Board	TNP110384 (1)	D
	PC Board	TNP110366AZ (1)	X
	PC Board	TNP190131BZ (1)	A
	PC Board	TNP110622ZA (1)	C
	Magnetic Rings	TLC2047-2	Purity and Static Convergence
	Remote Receiver	TNQ2683 (2)	-
	Remote Receiver	TNQ2683A (3)	-
	Remote Transmitter	EUR51601 (2)	-
	Remote Transmitter	EUR51709 (3)	-
	Socket	TJS1A5050	For CRT
#	Tuner	ENV568C4G3 (1)	UHF/VHF
	Wedge	TMM2A30201	Yoke

For SAFETY use only equivalent replacement part.

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

(2) Used in model CTN-2768S Only.

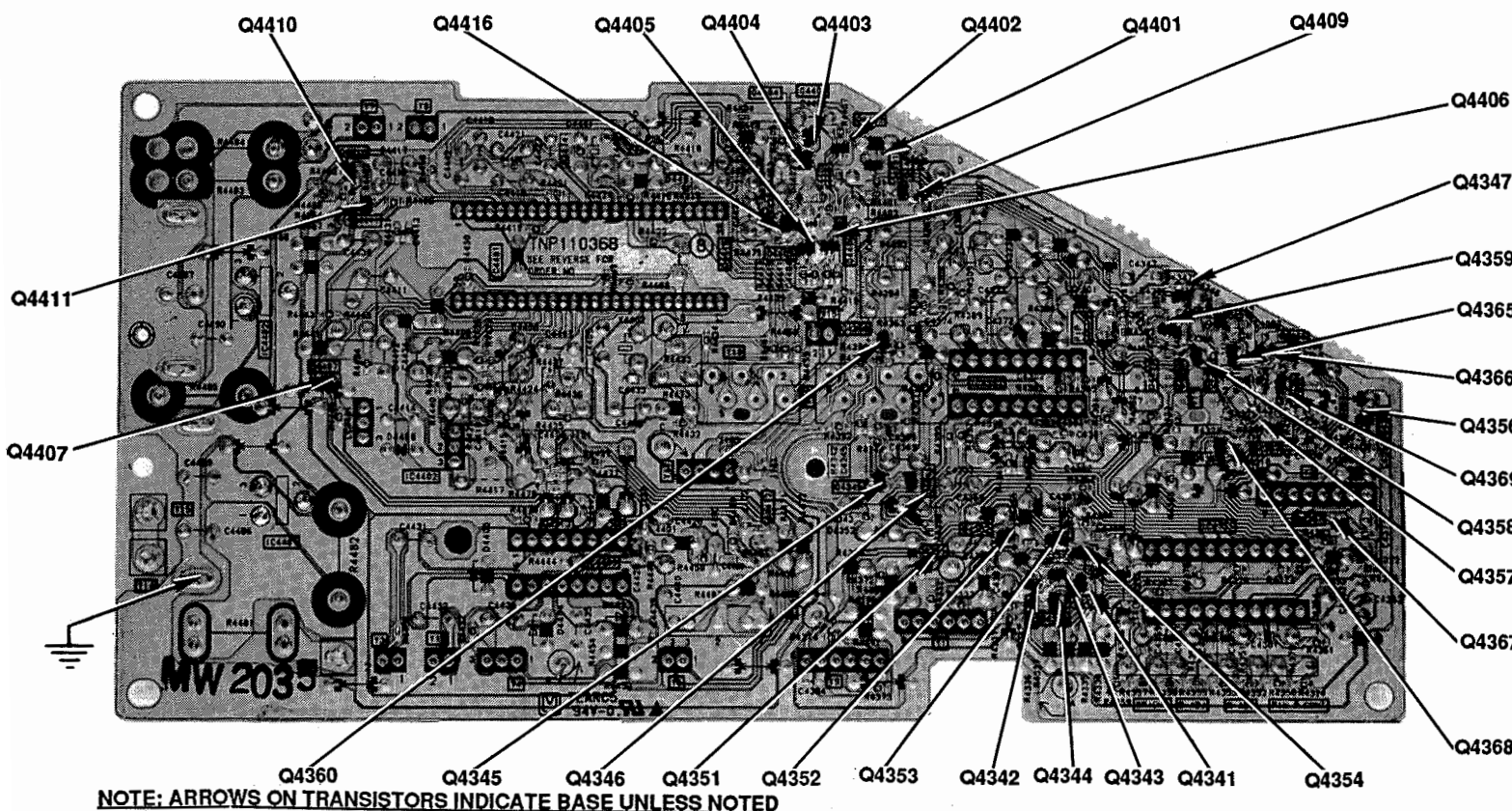
(3) Used in model CTP-2768S Only.

Y BOARD - BOTTOM VIEW

NEW CIRCUITS

PANASONIC

MODELS CTN-2768S, CTP-2768S (CHASSIS ANEDP206)



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.

HORIZONTAL OSCILLATOR DISABLE CIRCUIT

This circuit protects against excessive high voltage. If for any reason high voltage exceeds a predetermined level, the circuit operates to shift the horizontal frequency and limit the 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 12V (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 12V to the Y-output (video line). The 12V 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 90VAC. Connect 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 27KV 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.

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.
Q3255	2SD637-Q	-	NTE16	ECG16	SK9664
	2SD637Q	-	NTE16	ECG16	SK9664
Q4341 Thru					
Q4344	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q4345 Thru					
Q4347	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4351 Thru					
Q4353	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q4354	2SB710A	-	NTE2407	ECG2407	SK10098
	2SB710AQRS	-	NTE2407	ECG2407	SK10098
	2SB710AW	-	NTE2407	ECG2407	SK10098
Q4356 Thru					
Q4360	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4365, 66	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4367, 68	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q4369	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4401 Thru					
Q4407	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4409	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4410	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q4411	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q4416	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099

RESISTORS

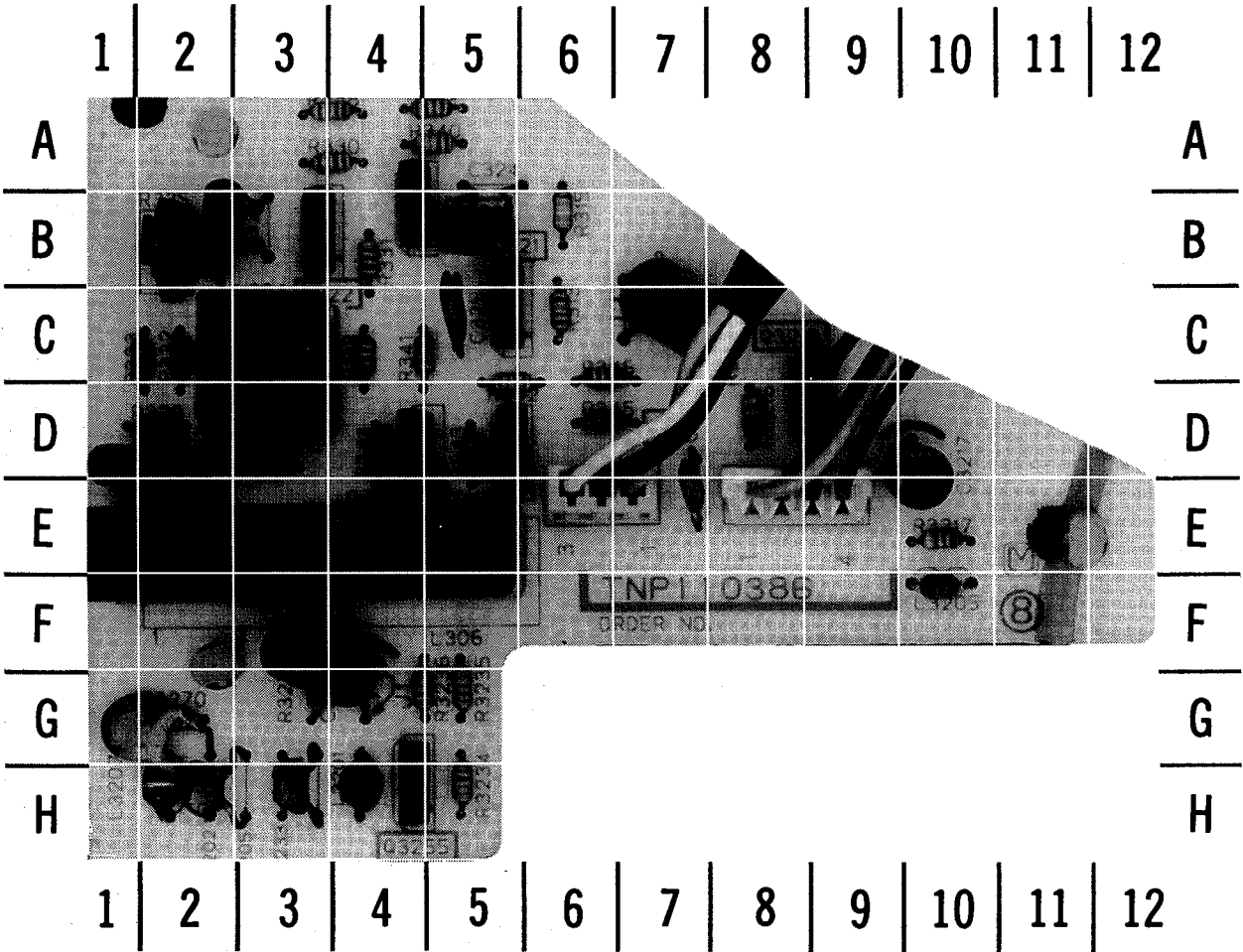
Item No.	Rating	Mfr. Part No.	NTE Replacement
# D806	5.2 PTC, 136 NTC	ERPW5B0M050D	-
R050	10K 1% 1/4W Metal Film	ER0S2CKF1002	-
R051	10K 1% 1/4W Metal Film	ER0S2CKF1002	-
# R509	3900 5% 2W Metal Film	ERG2ANJ392	2W239
# R510	3600 5% 3W Metal Film	ERG3SJS362	3W236
# R511	3600 5% 3W Metal Film	ERG3SJS363	3W236
# R531	47 5% 1/4W Carbon Film	ERD25FJ470	QW047
# R532	24.3K 1% 1/4W Metal Film	ER0S2CKF2432	-
# R533	10.2K 1% 1/4W Metal Film	ER0S2CKF1022	-
# R534	680K 5% 1/4W Carbon Film	ERDS2TJ684	QW468
# R535	560 5% 1/4W Carbon Film	ERDS2TJ561	QW156
# R536	820 5% 1/4W Carbon Film	ERDS2TJ821	QW182
# R537	18K 5% 1/4W Carbon Film	ERDS2TJ183	QW318
# R538	8200 5% 1/4W Carbon Film	ERDS2TJ822	QW282
# R539	15K 5% 1/4W Carbon Film	ERDS2TJ153	QW315
# R545	5600 5% 1/4W Carbon Film	ERDS2TJ562	QW256
# R551	1 5% 1W Fusible	ERQ1CJP1R0	FIW1D0
# R552	1.8 5% 1/2W Fusible	ERQ12HJ1R8	-
# R553	1 5% 1/2W Carbon Film	ERDS1FJ1R0	HW1D0
# R558	1.3 5% 1W Fusible	ERQ1CJP1R3	FIW1D3
R559	68 5% 3W Metal Film	ERG3ANJ680	3W068
R560	62 2% 2W Metal Film	ERG2SG620	2W062
# R569	27 5% 2W Metal Film	ERG2ANJ270	2W027
# R580	680 5% 5W Metal Film	ERG5ZJ681	-
R768	10 5% 2W Fusible	ERQ2CJP100	F2W010
R769	5600 5% 3W Metal Film	ERG3ANJ562	3W256
# R801	.82 10% 5W Wirewound	ERF5ZKR82	5WD82
# R802	120 5% 20W Wirewound	ERF20ZJ121	-
# R803	470 5% 5W Wirewound	ERF5ZJ471	5W147
# R804	220K 5% 1/4W Carbon Film	ERDS2TJ224	QW422
# R805	10K 5% 1/2W Carbon Film	ERDS1TJ103	HW310
# R807	47 5% 1/4W Carbon Film	ERD25FJ470	QW047
# R809	33 5% 1/4W Carbon Film	ERD25FJ330	QW033
# R810	4.7 10% 5W Wirewound	ERF5ZK4R7	5W4D7
# R815	2.7M 10% 1/2W Carbon Comp	ERC12ZGK275 (1)	HW527
	8.2M 10% 1/2W Carbon Comp	ERC12ZGM825 (2)	HW582
# R816	1 10% 1/2W Wirewound	ERW12PK1R0	-
R2210	43K 1% 1/4W Metal Film	ER0S2CKF4302	-
R2222	44.2K 1% 1/4W Metal Film	ER0S2CKF4422	-
R2238	47K 1% 1/4W Metal Film	ER0S2CKF4702	-
R2403	.27 10% 1/2W Fusible	ERQ12HKR27	-
R4481	12 5% 5W Wirewound	ERF5ZJ120	5W012

For SAFETY use only equivalent replacement part.

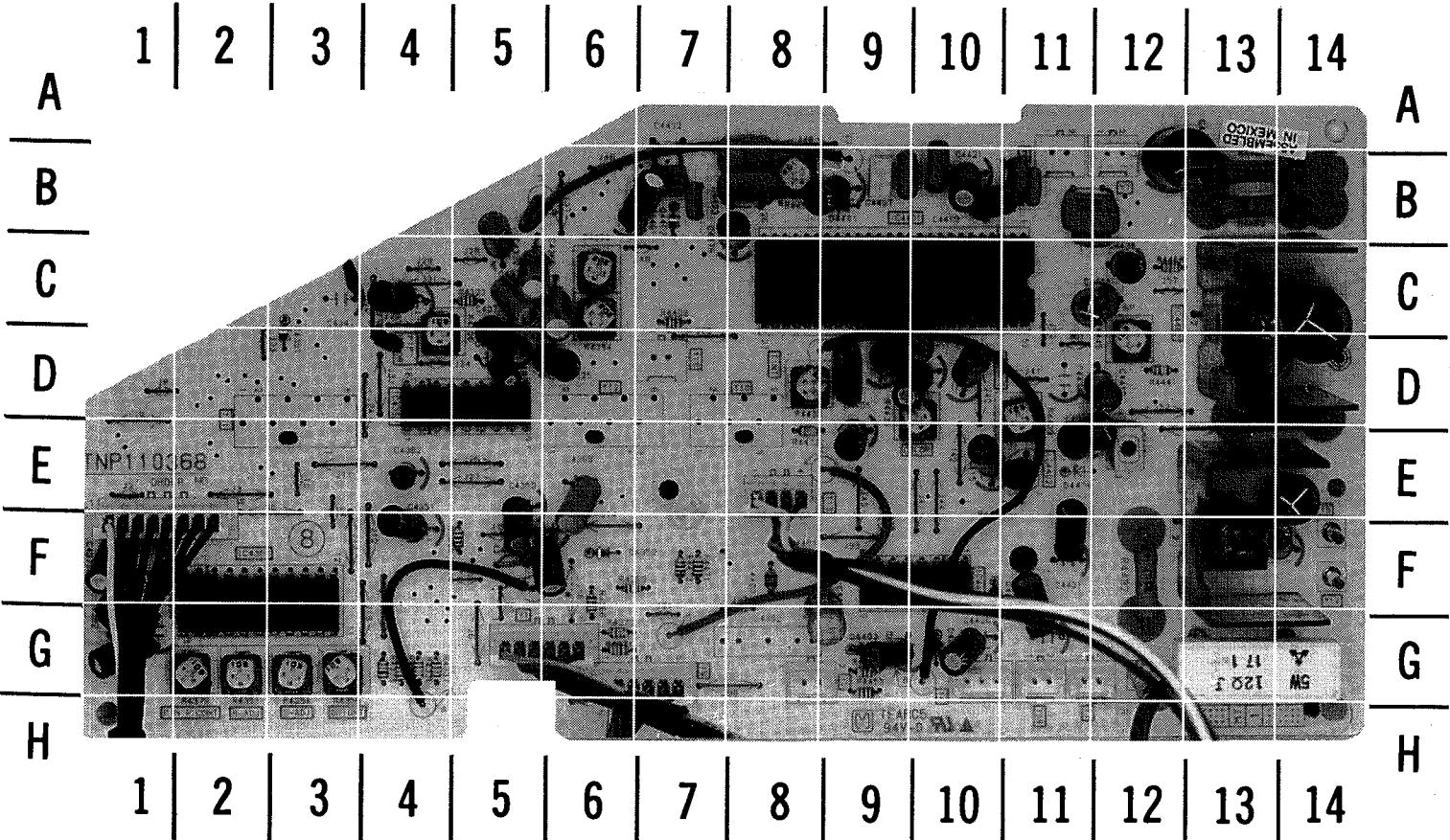
(1) Used in model CTN-2768S Only.

(2) Used in model CTP-2768S Only.

F BOARD



Y BOARD-TOP VIEW



A HOWARD W. SAMS **GridTrace™** PHOTO

F BOARD, GRIDTRACE LOCATION GUIDE

C321	C-7	F1	E-7	Q325	D-4	R331	B-4	R346	C-6
C322	D-1	F2	E-8	Q3216	C-9	R332	C-2	R3215	C-7
C323	B-3	L304	C-3	Q3255	G-4	R333	C-2	R3216	D-8
C324	B-5	L306	E-1	R313	C-6	R335	B-2	R3217	E-10
C325	C-5	L3201	H-4	R315	B-6	R338	B-2	R3233	H-3
C3202	G-2	L3205	F-10	R319	C-4	R340	A-5	R3234	H-5
C3204	H-3	L3207	H-2	R321	D-3	R341	C-4	R3235	G-5
C3205	H-3	Q321	B-5	R322	A-5	R342	D-5	R3236	G-5
C3210	G-4	Q322	B-3	R328	A-4	R343	D-5	R3270	G-2
C3216	E-7	Q323	A-4	R329	D-2	R344	D-4	R3271	G-3
C3217	D-10	Q324	D-5	R330	A-4	R345	D-6		

Y BOARD, GRIDTRACE LOCATION GUIDE , TOP VIEW

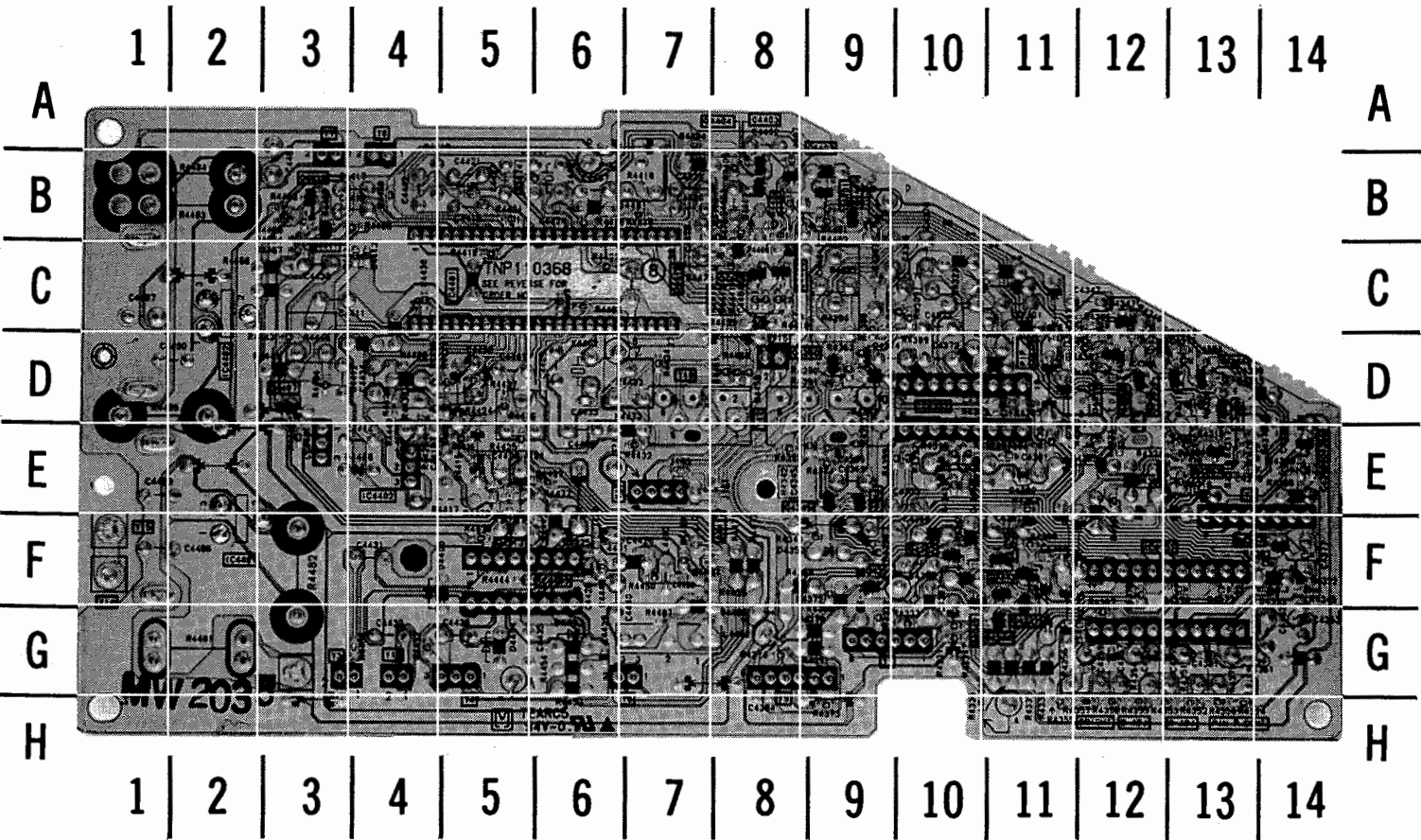
C4301	C-4	C4414	E-11	D4351	D-2	R4354	G-3	R4482	F-12
C4351	F-4	C4415	E-10	D4352	F-6	R4356	G-3	R4483	B-14
C4352	F-6	C4416	B-11	D4353	F-1	R4365	F-5	R4484	B-14
C4353	E-5	C4417	B-11	D4401	B-9	R4368	G-6	R4485	D-14
C4354	G-1	C4418	B-11	D4402	B-7	R4369	F-6	X4401	B-9
C4362	G-1	C4419	B-10	D4403	G-9	R4370	G-6	X4402	D-9
C4366	C-5	C4420	B-8	D4404	G-10	R4371	G-6	Y1	G-5
C4367	C-6	C4421	B-10	D4405	F-10	R4379	G-2	Y2	F-1
C4369	E-6	C4422	B-8	IC4351	G-2	R4393	C-6	Y3	G-11
C4370	C-5	C4423	B-10	IC4352	E-4	R4394	C-6	Y4	G-10
C4371	C-5	C4431	F-11	IC4401	C-11	R4409	C-7	Y5	G-8
C4372	D-5	C4432	G-11	IC4402	E-11	R4418	B-8	Y6	G-12
C4373	D-5	C4435	G-9	IC4403	F-10	R4433	D-8	Y7	B-12
C4374	D-6	C4436	G-10	IC4481	F-13	R4436	D-10	Y9	G-6
C4377	F-1	C4437	B-9	IC4482	C-13	R4439	D-11	Y10	E-7
C4382	E-4	C4438	C-12	L4401	L-8	R4441	D-12	Y11	E-2
C4401	B-6	C4440	F-9	L4403	L-8	R4445	D-12	Y12	E-6
C4402	B-7	C4441	B-9	LC4401	E-12	R4453	G-9	Y13	E-8
C4403	B-7	C4442	B-11	R4306	E-4	R4454	G-9	Y14	F-14
C4405	D-9	C4479	B-8	R4323	C-5	R4468	C-12	Y15	F-14
C4406	E-9	C4486	F-14	R4335	G-4	R4471	F-7	Y19	G-11
C4407	D-10	C4487	C-14	R4336	G-4	R4472	F-7		
C4408	D-10	C4488	A-13	R4337	G-4	R4473	E-8		
C4411	C-11	C4489	E-14	R4338	G-4	R4479	A-8		
C4412	D-12	C4490	D-13	R4351	G-2	R4481	G-13		

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.
IC4481	AN7812	-	NTE966	ECG966	SK3592
IC4482	AN7805	-	NTE960	ECG960	SK3591
	AN7805LB	-	NTE960	ECG960	SK3591
Q001	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q002	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q004	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q005	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q006, 07	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q015	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q019	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q101	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q102	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q301	2SC1685QR	-	NTE85	ECG85	SK9229
Q303	2SA719R	-	NTE290A	ECG290A	SK3114A
	2SA719QR	-	NTE290A	ECG290A	SK3114A
Q316	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q321 Thru					
Q325	2SD637-Q	-	NTE16	ECG16	SK9664
	2SD637Q	-	NTE16	ECG16	SK9664
Q351 Thru					
Q353	2SC3063	-	NTE157	ECG157	SK3747
	2SC3063RL	-	NTE157	ECG157	SK3747
Q451	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q454	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
# Q501	2SC4212(H)	-	-	-	-
	2SC4212HL	-	-	-	-
	2SC4212HLBS	-	-	-	-
# Q531	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
# Q532	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	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
# 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.
Q601 Thru					
Q604	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q751	2SD637-Q	-	NTE16	ECG16	SK9664
	2SD637PQR	-	NTE16	ECG16	SK9664
	2SC1685PQR	-	NTE85	ECG85	SK9229
Q752	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q753	2SD1266Q	-	NTE377	ECG377	SK9112
	2SD1266LB	-	NTE377	ECG377	SK9112
	2SD1266	-	NTE377	ECG377	SK9112
Q1805 Thru					
Q1808	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q1811	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q1812 Thru					
Q1814	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q1815	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q1816, 17	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601QRS	-	-	-	-
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q1818	2SB709A	-	NTE2409	ECG2409	SK10100
	2SB709AQRS	-	NTE2409	ECG2409	SK10100
	2SB709AW	-	NTE2409	ECG2409	SK10100
Q1819	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q1822	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q1824 Thru					
Q1826	2SD601A	-	NTE2408	ECG2408	SK10099
	2SD601AQRS	-	NTE2408	ECG2408	SK10099
	2SD601AW	-	NTE2408	ECG2408	SK10099
Q2201, 03	2SD637-Q	-	NTE16	ECG16	SK9664
	2SD637Q	-	NTE16	ECG16	SK9664
Q3102, 03	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q3104	2SA564AQ	-	NTE290A	ECG290A	SK3932
	2SA564AQR	-	NTE290A	ECG290A	SK3932
Q3105	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1685QR	-	NTE85	ECG85	SK9229
Q3216	2SD637-R	-	NTE16	ECG16	SK9664
	2SD637R	-	NTE16	ECG16	SK9664

Y BOARD-BOTTOM VIEW



A HOWARD W. SAMS GRIDTRACE™ PHOTO

Y BOARD, GRIDTRACE LOCATION GUIDE , BOTTOM VIEW

C4302	D-11	Q4354	F-11	R4324	H-13	R4386	C-12	R4437	D-5
C4345	E-9	Q4356	E-14	R4331	G-10	R4387	D-12	R4438	E-5
C4346	E-10	Q4357	E-13	R4332	G-9	R4388	C-9	R4440	D-4
C4355	G-13	Q4358	D-12	R4333	G-10	R4389	C-9	R4443	D-3
C4356	G-12	Q4359	D-12	R4334	G-10	R4390	D-9	R4446	E-3
C4357	G-12	Q4360	D-9	R4340	E-14	R4391	D-9	R4449	F-6
C4358	E-14	Q4365	D-13	R4341	E-10	R4392	E-8	R4450	F-7
C4359	G-12	Q4366	D-13	R4342	E-9	R4395	E-10	R4452	G-4
C4360	D-12	Q4367	F-14	R4343	F-9	R4397	E-10	R4456	G-4
C4361	G-13	Q4368	E-13	R4344	E-9	R4398	F-9	R4457	E-6
C4362	G-14	Q4369	D-13	R4345	F-14	R4399	E-10	R4458	B-4
C4364	D-12	Q4401	B-9	R4346	D-12	R4401	B-9	R4459	D-8
C4365	D-12	Q4402	B-8	R4347	C-12	R4403	B-8	R4460	D-8
C4375	D-13	Q4403	B-8	R4350	H-13	R4404	A-7	R4461	D-8
C4376	E-13	Q4404	B-8	R4352	H-13	R4405	B-8	R4462	B-3
C4381	E-11	Q4405	C-8	R4353	H-13	R4406	B-8	R4463	B-3
C4385	E-12	Q4406	C-8	R4355	H-13	R4407	B-8	R4464	B-3
C4387	F-10	Q4407	D-3	R4357	H-12	R4408	B-8	R4465	B-3
C4388	F-11	Q4409	B-9	R4358	H-13	R4410	C-8	R4466	B-4
C4404	C-8	Q4410	B-3	R4359	H-11	R4411	C-8	R4467	C-3
C4409	E-5	Q4411	B-3	R4360	E-14	R4412	C-8	R4469	F-7
C4410	D-5	Q4416	C-8	R4361	G-14	R4413	C-8	R4470	F-5
C4413	C-4	R4301	E-11	R4362	D-9	R4414	B-8	R4474	B-6
C4424	B-6	R4302	D-11	R4363	D-9	R4415	B-7	R4475	C-8
C4426	F-7	R4303	E-10	R4364	E-11	R4416	B-6	R4476	B-8
C4428	F-6	R4305	D-11	R4366	F-11	R4419	C-5	R4488	C-6
C4429	F-7	R4307	E-9	R4367	G-12	R4420	B-5	R4489	C-6
C4439	G-6	R4308	C-10	R4372	F-9	R4421	B-5	R4494	D-3
C4453	D-6	R4309	C-10	R4373	H-9	R4422	C-6		
Q4341	F-11	R4313	D-13	R4374	G-8	R4423	E-12		
Q4342	F-11	R4314	D-13	R4375	F-11	R4424	D-5		
Q4343	F-11	R4315	D-13	R4376	F-13	R4425	D-4		
Q4344	G-11	R4316	E-13	R4377	F-13	R4426	D-4		
Q4345	E-9	R4317	E-13	R4378	F-12	R4427	D-5		
Q4346	E-9	R4318	E-13	R4380	E-12	R4430	C-4		
Q4347	C-12	R4319	E-13	R4381	D-11	R4431	C-4		
Q4351	F-9	R4320	D-13	R4382	D-12	R4432	E-7		
Q4352	F-10	R4321	E-13	R4383	F-14	R4434	D-7		
Q4353	F-11	R4322	F-14	R4385	E-13	R4435	E-5		

PARTS LIST

SEMICONDUCTORS

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D001, 02	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
	MA150	-	NTE177	ECG177	SK9091
D025	MA165	-	NTE519	ECG519	SK3100
D031	AM01Z	-	NTE116	ECG116	SK3313
	ERA15-01	-	NTE552	ECG552	SK9000
	ERA15-01V3	-	NTE552	ECG552	SK9000
D032	1N4532	-	NTE177	ECG177	SK9091
	MA162	-	NTE519	ECG519	SK3100
D034	SEL1410G	-	-	-	-
D201	1N4532 (2)	-	NTE177	ECG177	SK9091
D302	1N4532	-	NTE177	ECG177	SK9091
	MA150	-	NTE177	ECG177	SK9091
D352	MA165	-	NTE519	ECG519	SK3100
D353	MA4047L	-	NTE5009A	ECG5009A	SK4A7
D383	MA27WA	-	NTE605A	ECG605A	SK7952
D451	ERA15-01	-	NTE552	ECG552	SK9000
D452, 53	MA165	-	NTE519	ECG519	SK3100
D454	1N4532	-	NTE177	ECG177	SK9091
	MA150	-	NTE177	ECG177	SK9091
D455	MA165	-	NTE519	ECG519	SK3100
D457	MA4082M	-	NTE5016A	ECG5016A	SK8A2
D502	QA208C	TVSQA208C	NTE5016A	ECG5016A	SK8A2
# D531	AU01	-	NTE552	ECG552	SK9000
	AS01	-	NTE552	ECG552	SK9000
	ERA2204	-	NTE552	ECG552	SK9000
# D532	MA165 (1)	-	NTE519	ECG519	SK3100
# D533	QA206M	TVSQA206M	NTE5012A	ECG5012A	SK6A0
D540	MA27WB	-	NTE605A	ECG605A	SK7952
D542	MA165	-	NTE519	ECG519	SK3100
# D551	RU2N	-	NTE552	ECG552	SK9000
# D552	AU02	-	NTE552	ECG552	SK9000
# D553	EU2	-	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	-	NTE552	ECG552	-
# D559	RU2M	TVSRU2M	NTE552	ECG552	SK9000
D560	QB109SA	TVSQB109SA	NTE5073A	ECG5073A	SK8V7
D603	1N4532	-	NTE177	ECG177	SK9091
	MA150	-	NTE177	ECG177	SK9091

For SAFETY use only equivalent replacement part.
(1) Used in model CTN-2768S Only
(2) Used in model CTP-2768S Only

SEMICONDUCTORS continued

(Select replacement for best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D606	MA165	-	NTE519	ECG519	SK3100
D751	1N4532	-	NTE177	ECG177	SK9091
	MA150	-	NTE177	ECG177	SK9091
D752	QA228B	TVSQA228B	NTE5034A	ECG5034A	SK28A
D753	MA1300M	-	NTE5035A	ECG5035A	SK30A
# D801 Thru					
# D804	RM11B	TVSRM11B	NTE125	ECG125	SK3081
	ERC12-08	-	NTE125	ECG125	SK3081
D1802, 03	MA4082	-	NTE5016A	ECG5016A	SK8A2
D2201	QB109SA	TVSQB109SA	NTE5073A	ECG5073A	SK8V7
D2401 Thru					
D2404	ERA1502	-	NTE116	ECG116	SK3313
	ERA15-02	-	NTE552	ECG552	SK9000
D3101, 02	MA165	-	NTE519	ECG519	SK3100
D3253 Thru					
D3259	MA4110	-	NTE5020A	ECG5020A	SK11A
D4351 Thru					
D4353	MA165	-	NTE519	ECG519	SK3100
D4401	MA4062M	-	NTE5013A	ECG5013A	SK6A2
D4402	MA165	-	NTE519	ECG519	SK3100
D4403 Thru					
D4405	MA4110	-	NTE5020A	ECG5020A	SK11A
IC001	MN152810Q16	-	-	-	-
# IC101	AN5160NK	-	NTE7060	ECG7060	-
	AN5160NK-N	-	NTE7060	ECG7060	-
IC451	LA7836	-	-	-	-
	LA7836-TV	-	-	-	-
# IC551	AN78M12	-	NTE966	ECG966	SK3592
	AN78M12LB	-	NTE966	ECG966	SK3592
# IC801	STR3230	TVSSTR3230	NTE1742	ECG1742	SK9995
IC1801	MN8232	-	-	-	-
IC1802	MN47464L-12	-	-	-	-
	MN47464L-12A	-	-	-	-
IC1804	MN1280R	-	NTE15044	-	SK9854
IC1805, 06	MN6790S	-	-	-	-
IC2101	AN5836	-	NTE1780	ECG1780	SK9731
IC2102	M5218L (1)	TVSM5218L	NTE778S	ECG778S	SK10139
	XRA15218N (2)	-	-	-	-
IC2200	CXA1124AS	-	-	-	-
IC2301	AN7158N	-	NTE1373	ECG1373	SK4822
IC3002	M52055P	-	-	-	-
IC3201	M52055P	-	-	-	-
IC4351	AN5352N	-	NTE1835	ECG1835	SK9728
IC4352	AN5613	-	-	-	-
IC4401	AN5302K	-	-	-	-
IC4402	AN78L09	-	NTE1902	ECG1902	SK3962
IC4403	M52055P	-	-	-	-

For SAFETY use only equivalent replacement part.
(1) Used in model CTN-2768S Only
(2) Used in model CTP-2768S Only

PARTS LIST continued

CAPACITORS

Item	Rating	Mfr. Part No.
C022	33 N220 50V 5%	ECCF1H330JP
C023	15 N220 50V 5%	ECCF1H150JP
C031	30pF Trimmer	ECRHA030E41
C103	2 NP0 50V ±.25pF	ECCF1H020CC
C104	2 NP0 50V ±.25pF	ECCF1H020CC
C112	18 NPO 50V 5%	ECCF1H180JC
C151	68 NP0 50V 5%	ECCF1H680JC
C152	15 NP0 50V 5%	ECCF1H150JC
C155	2 NP0 50V ±.25pF	ECCF1H020CC
C314	18 NPO 50V 5%	ECCF1H180JC
C350	.001 2KV 10%	ECKD3D102KB
C360	33 N220 50V 5%	ECCF1H330JP
C503	220 N750 50V 5%	ECCF1H221JU
# C513	22 500V 10%	ECCD2H220K
# C514	680 500V 10%	ECKD2H681KB
# C515	100 500V 10%	ECKD2H101KB
# C533	.01 50V +80% -20%	ECKF1H103ZF (1)
# C551	.5 200V 5%	ECQF2H504JS
# C554	560 500V 10%	ECKD2H561KB
# C555	560 500V 10%	ECKD2H561KB
# C556	560 500V 10%	ECKD2H561KB (1)
# C561	820 2KV 5%	ECKD3D821JB
# C562	390 2KV 5%	ECKD3D391JB
# C564	.01 1.2KV 5%	ECWH12H103JS
# C565	.047 200V 5%	ECQM2473JZ
# C568	560 500V 10%	ECKD2H561KB
# C569	.0056 200V 5%	ECQM2562JZ
# C572	.0033 1.2KV 5%	ECWH12H332JS
# C573	180 2KV 5%	ECKD3D181JB
# C575	390 2KV 5%	ECKD3D391JB
	470 2KV 5%	ECKD3D471JB
	560 2KV 5%	ECKD3D561JB
	680 2KV 5%	ECKD3D681JB
	820 2KV 5%	ECKD3D821JB
# C580	560 2KV 10%	ECKD3D561KB
C605	8 N750 50V ±.5pF	ECCF1H080DU
# C802	.0047 500V +100% -0%	ECKD2H472PU
# C803	.0047 500V +100% -0%	ECKD2H472PU
# C804	.0047 500V +100% -0%	ECKD2H472PU
# C817	.015 125VAC 10%	ECQU1A153KH
# C818	.015 125VAC 10%	ECQU1A153KH
# C819	.0022 125VAC +80% -20%	ECKCFL222ZE
C3202	56 NP0 50V 5%	ECCF1H560JC
C3205	12 NP0 50V 5%	ECCF1H120JC

For SAFETY use only equivalent replacement part.
(1) Not used in model CTP-2768S.

ELECTROLYTIC CAPACITORS

Item	Rating	Mfr. Part No.
C028	10 16V Tantalum	ECSF16E10VB
C202	1 50V NP	ECEA1HN010S
C301	10 16V NP	ECEA1CN100S
C321	47 10V NP	ECEA1AN470S
C452	1 25V Tantalum	ECSF25E1VB
# C531	33 25V	ECEA1EU330
# C552	220 25V	ECEA1EU221
# C553	22 250V	ECEA2EU220W
# C557	2.2 50V	ECEA1HU2R2
# C559	220 25V	ECEA1EU221
# C566	470 35V	ECEA1VU471
C753	22 16V Tantalum	ECSZ16EF22
# C805	470 200V	ECES2DU471M4
# C806	22 160V	ECEA2CU220W
# C812	33 160V	ECEA160V33Z
C1821	.47 50V NP	ECEA1HNR47S
C1822	.47 50V NP	ECEA1HNR47S
C2200	10 16V NP	ECEA1CN100S
C2204	.22 50V NP	ECEA1HNR22S
C2209	10 16V Tantalum	ECSZ16EF10
C2211	3.3 16V Tantalum	ECSZ16EF3R3
C2212	4.7 25V NP	ECEA1EN4R7S
C2213	4.7 25V NP	ECEA1EN4R7S
C3007	3.3 50V NP	ECEA1HN3R3S
C3008	3.3 50V NP	ECEA1HN3R3S
C3009	3.3 50V NP	ECEA1HN3R3S
C3010	3.3 50V NP	ECEA1HN3R3S
C4366	1 50V NP	ECEA1HN010S
C4367	1 50V NP	ECEA1HN010S
C4369	1 50V NP	ECEA1HN010S
C4370	1 50V NP	ECEA1HN010S
C4371	1 50V NP	ECEA1HN010S
C4411	33 16V NP	ECEA1CN330S
C4440	22 16V NP	ECEA1CN220S

For SAFETY use only equivalent replacement part.

Important Parts Information

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

Obtaining Parts

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

800-428-7267

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

Participating Vendors

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

- 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)

NOTES

PARTS LIST continued

CONTROLS

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

Item No.	Function	Resistance	Mfr. Part No.
R106	RF AGC	5000	EVN60AA00B53
R114	Video Level	500	EVND4AA00B52
R304	Sub Contrast	2000	EVND4AA00B23
R318	Sub Brightness	10K	EVN60AA00B14
R335	Balance	200	EVN60AA00B22
R354	Red Bias	2000	EVN49AA00B23
R355	Blue Bias	2000	EVN49AA00B23
R356	Green Bias	2000	EVN49AA00B23
R357	Blue Drive	300	EVN49AA00B32
R358	Red Drive	300	EVN49AA00B32
R453	Vertical Size	30K	EVN60AA00B34
R524	Horizontal Centering	200	EVND4AA00B22
R619	Sub Tint	5000	EVND4AA00B53
R760	Horizontal Width	5000	EVND4AA00B53
R761	Parabola	10K	EVND4AA00B14
R1833	PIP R-Y Bias	500	EVND4AA00B52
R1835	PIP B-Y Bias	500	EVND4AA00B52
R1890	PIP Reference	10K	EVND4AA00B14
R2200	Input Level	10K	EVN60AA00B14
R2209	L-R Level	10K	EVND4AA00B14
R2213	Separation	5000	EVND4AA00B53
R2220	VCO	50K	EVND4AA00B54
R2221	Filter	20K	EVND4AA00B24
R4306	PIP Color	10K	EVND4AA00B14
R4351	Red Low Tracking	10K	EVND4AA00B14
R4354	Blue Low Tracking	10K	EVND4AA00B14
R4356	PIP Brightness	10K	EVND4AA00B14
R4379	PIP Contrast	10K	EVND4AA00B14
R4393	Blue High Tracking	2000	EVND4AA00B23
R4394	Red High Tracking	2000	EVND4AA00B23
R4418	PIP Horizontal Centering	200	EVND4AA00B22
R4433	PIP Tint	3000	EVND4AA00B33
R4436	PIP Sub Color	10K	EVND4AA00B14
R4439	PIP Sub Brightness	10K	EVND4AA00B14
R4445	PIP Sub Contrast	1000	EVND4AA00B13

COILS (RF-IF)

Item No.	Rating	Mfr. Part No.
L006	5.6μH	TLUABTA5R6K
L007	5.6μH	TLUABTA5R6K
L008	5.6μH	TLUABTA5R6K
L011	1.0μH	TLUABTA1R0K
L103	AFT	TLI67394-1
L104	1.2μH	TLQ012K205C
L105	VCO	TLI158755
L106	15μH	TLUABTA150K
L108	1.2μH	TLQ12K205C
L201	Quadrature	EIS1EG011B
L202	4.7μH	TLUABTA4R7K (1)
L304	Phase	TLK153152
L354	150μH	TLUABTA151K
L601	10μH	ELEPR100JA (2)
L1801	4.7μH	TLTACC4R7KR
L1802	4.7μH	TLTACC4R7KR
L1803	100μH	TLTACC101KR
L1804	100μH	TLTACC101KR
L1805	180μH	TLTACC181KR
L1806	2.2μH	TLTACC2R2KR
L3201	82μH	ELEPH820JA
L3205	12μH	TLUABTA120K
L3207	39μH	ELEPH390JA
L4401	220μH	TLUABTA221K
L4403	18μH	TLUABTA180K

(1) Not used in model CTP-2768S.
(2) Used in model CTP-2768S Only.

COILS & TRANSFORMERS

Item No.	Function	Mfr. Part No.	On-Unit No.
# L551	Linearity	TLH6618P	-
# L570	Yoke 110°	Horiz 1.02mH Vert 25.8mH	TLY15460F -
# T001	Power	TLP16297	-
# T501	Horizontal Driver	TLH15452	-
# T502	Horizontal Coupling	ETE19Z30AY	-
# T551	Horizontal Output	TLF15544F(1)	-
# T751	Pincushion	ETE16Z37AY	-
# T2401	Audio Power	TLP16298	-

For SAFETY use only equivalent replacement part.
(1) Focus and screen controls are part of horizontal output transformer T551.

CABINET PARTS

MODELS CTN-2768S, CTP-2768S

Item	Part No.
Assembly, 7 Pushbuttons	TBX2884901G
Cabinet Front	TXFKY171SER
Cabinet Rear	TXFKU161SER

REMOTE TRANSMITTER

MODEL EUR51601

Case, Bottom	EUR51VCS527
Case, Top	EUR51VCS535
Cover, Battery	EUR51EC727
Door	EUR51FT728D

MODEL EUR51709

Case, Bottom	EUR51VCS739A
Case, Top	EUR51VCS563
Cover, Battery	EUR51EC740A

NOTES