

## SAFETY PRECAUTIONS

### SERVICE WARNING

Only qualified service technicians who are familiar with safety checks and guidelines should perform service work. Before replacing parts, disconnect power source to protect electrostatically sensitive parts. Do not attempt to modify any circuit unless so recommended by the manufacturer. When servicing the receiver, use an isolation transformer between the line cord and power receptacle.

### SERVICING THE HIGH VOLTAGE AND CRT

Use EXTREME CAUTION when servicing the high voltage circuits. To discharge static high voltage, connect a 10K ohms resistor in series with a test lead between the receiver and CRT anode lead. DO NOT lift the CRT by the neck. Always wear shatterproof goggles when handling the CRT 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 CRT is the only potential source of X-rays. Keep an accurate high voltage meter available at all times. Check meter calibration periodically. Whenever servicing a receiver, check the high voltage at various brightness levels to be sure it is regulating properly. 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. When troubleshooting a receiver with excessive high voltage, avoid close contact with the CRT. DO NOT operate the receiver longer than necessary. To locate the cause of excessive high voltage, use a variable AC transformer to regulate voltage. In present receivers, 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.

### GENERAL GUIDELINES

Perform a final SAFETY CHECK before returning receiver to customer. Check repaired area for poorly soldered connections, and check entire circuit board for solder splashes. Check inner board wiring for pinched wires or wires contacting any high wattage resistors. Check that all knobs, shields, covers, grounds, and mounting hardware have been replaced. Be sure to replace all insulators and restore proper lead dress.

#### TEST JIG HOOKUP

Function	Chek-A-Color Adapter No.	PC Board Plug No.	Pin	Color
CRT	B239	DY	1	Green
Yoke	D482		2	Yellow
Yoke Setting	YP1		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.

©1997 by Howard W. Sams & Company  
A Bell Atlantic Company  
2647 Waterfront Parkway East Drive, Suite 100  
Indianapolis, IN 46214-2012  
Printed in the United States of America 5 4 3 2 1

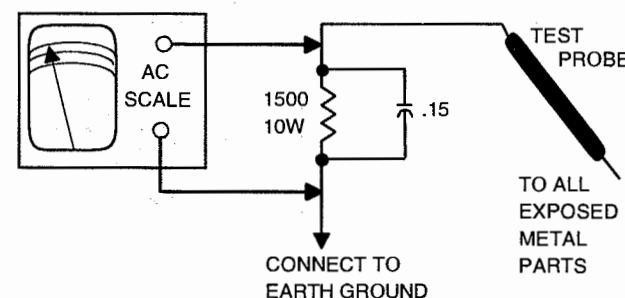
### SAFETY CHECKS -- FIRE AND SHOCK HAZARD

#### Cold Leakage Checks for Receivers with Isolated Ground

Unplug the AC cord, connect a jumper across the plug prongs, and turn the power switch on (if applicable). Use an ohmmeter to measure the resistance between the jumped 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 1M ohms and 5.2M ohms. Parts without a return path must measure infinity.

#### Hot Leakage Current Check

Plug the AC cord directly into an AC outlet. DO NOT use an isolation transformer. Use a 1500 ohms, 10W resistor in parallel with a .15µF capacitor to connect between any exposed metal parts on the receiver and a good earth ground. (See figure below.) Use an AC voltmeter with at least 5000 ohms per volt sensitivity to measure the voltage across the resistor. Check all exposed metal parts and measure voltage at each point. Voltage measurements should not exceed .75VAC, 500µA. Any value exceeding this limit constitutes a potential shock hazard and must be corrected. If the AC plug is not polarized, reverse the AC plug and repeat exposed metal part voltage measurement at each point.



#### HORIZONTAL OSCILLATOR DISABLE TEST

Place a jumper between pins 3 and 4 of IC803. Connect a high voltage probe to the CRT anode. Supply 45VAC to the receiver with a variable AC transformer. Turn the receiver on and slowly increase the AC supply. Confirm the high voltage does not exceed 36.8kV when the horizontal just begins to pull out of sync. If the high voltage should exceed 36.8kV or the receiver fails to lose horizontal sync, refer to the "Horizontal Oscillator Disable" section of the Troubleshooting guide. Remove jumper.



97PF01211



0 81262 03891 8

# PHOTOFACT® Technical Service Data

SET 3891

MODEL CT-27G12V (CHASSIS AEDP280)

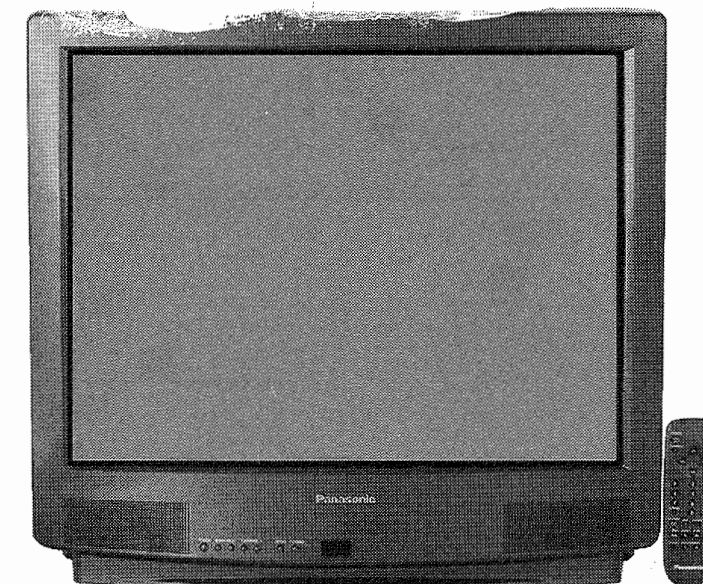
PANASONIC

#### INDEX

GridTrace Location	
Main Board	3
Horizontal Oscillator Disable Test	1
IC Functions	1
Important Parts Information	4
Miscellaneous Adjustments	1
Parts List	4
Placement Chart	1
Safety Precautions	1
Schematics	
Audio	2
Power Supply	2
System Control	2
Television	2
Schematic Notes	1
Test Equipment	4
Test Jig Hookup	1
Troubleshooting	1
Tuner Information	1

## PANASONIC

Model CT-27G12V (Chassis AEDP280)



Complete coverage  
for servicing a television receiver...

- Schematics
- Parts list
- Component locations
- Troubleshooting guide

Coverage includes these additional models and chassis:

MODELS	CHASSIS
CT-27G12CV	AEDP280
CT-27G12UV	AEDP280

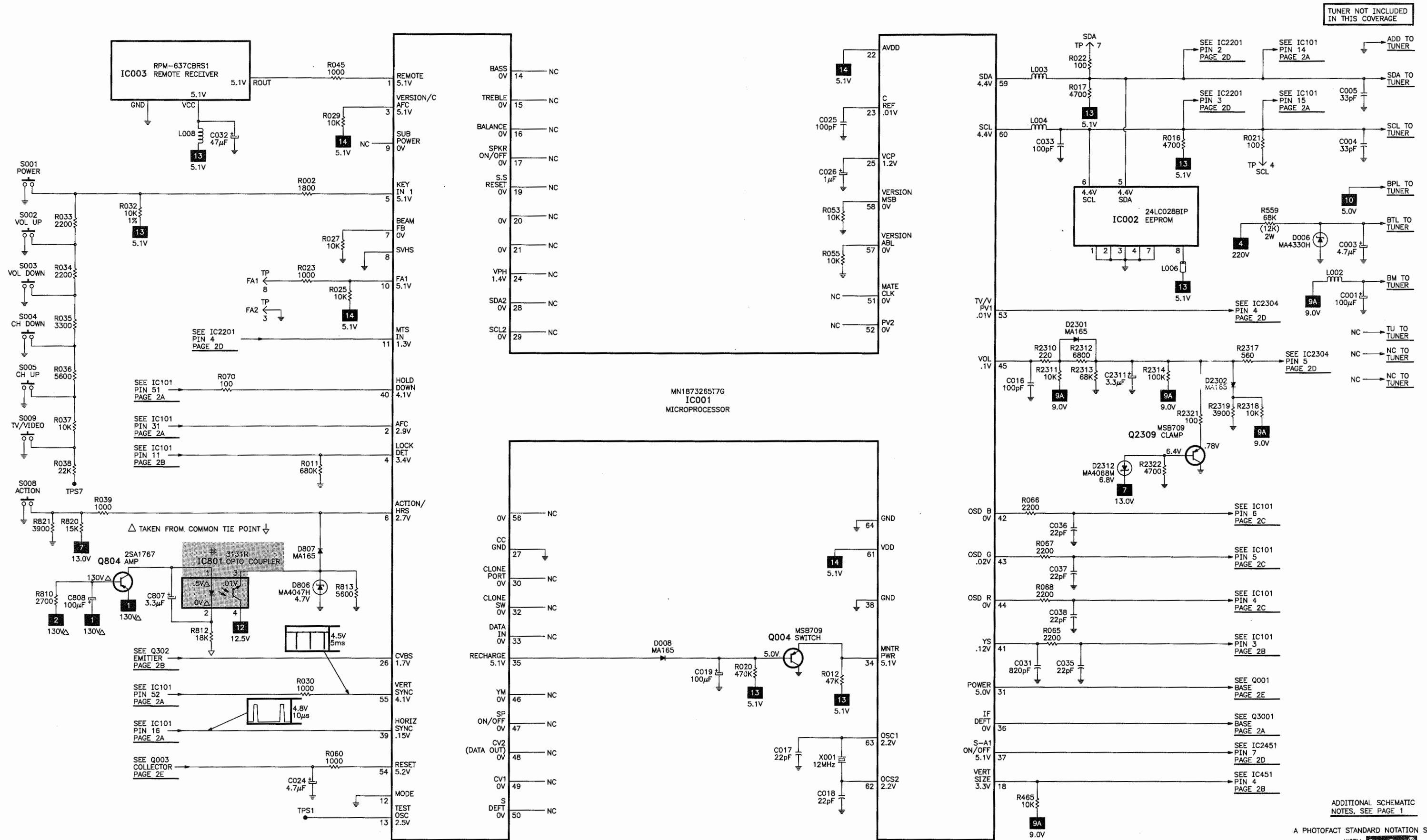


HOWARD W. SAMS & COMPANY

OCTOBER 1997 SET 3891

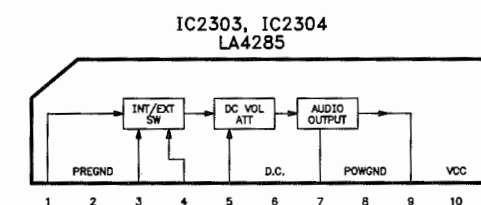
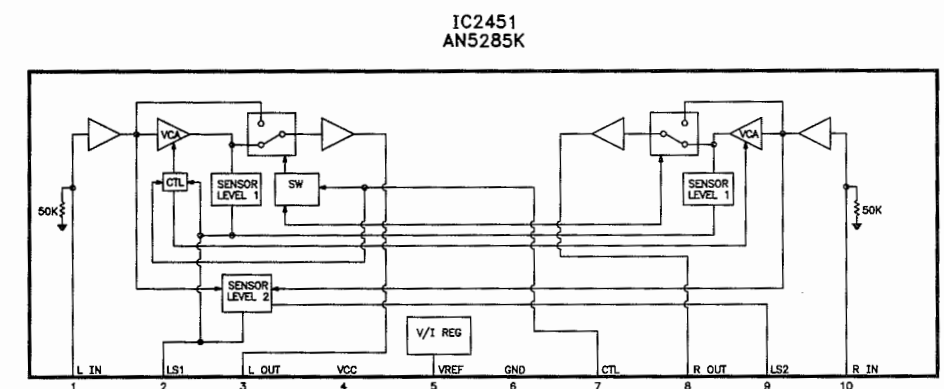
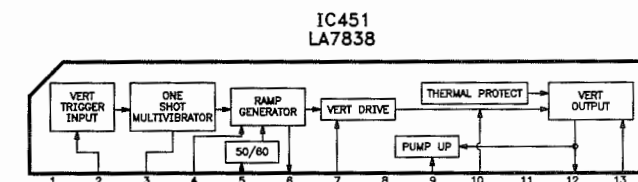
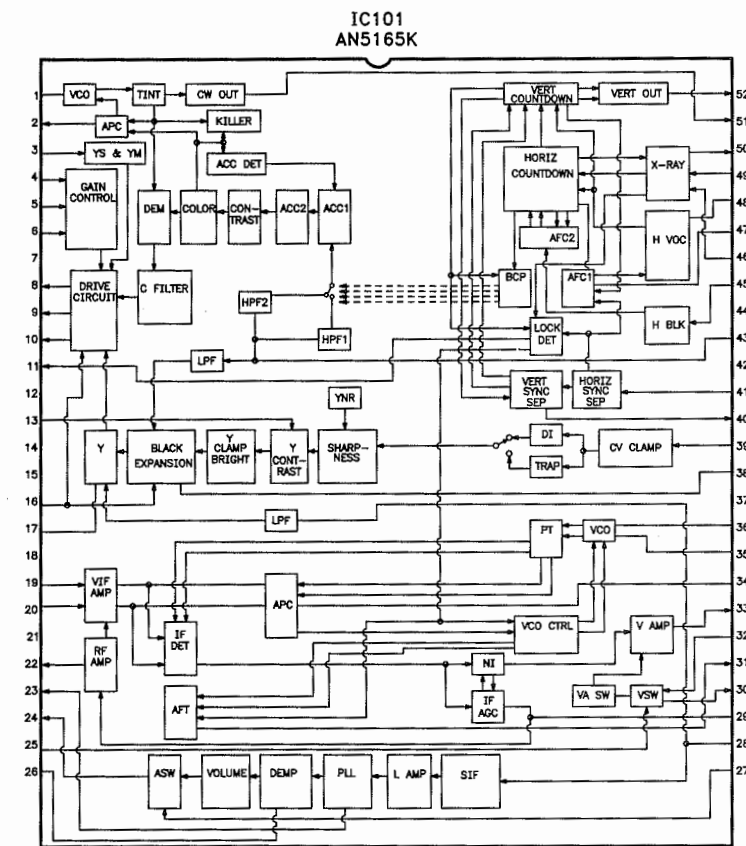
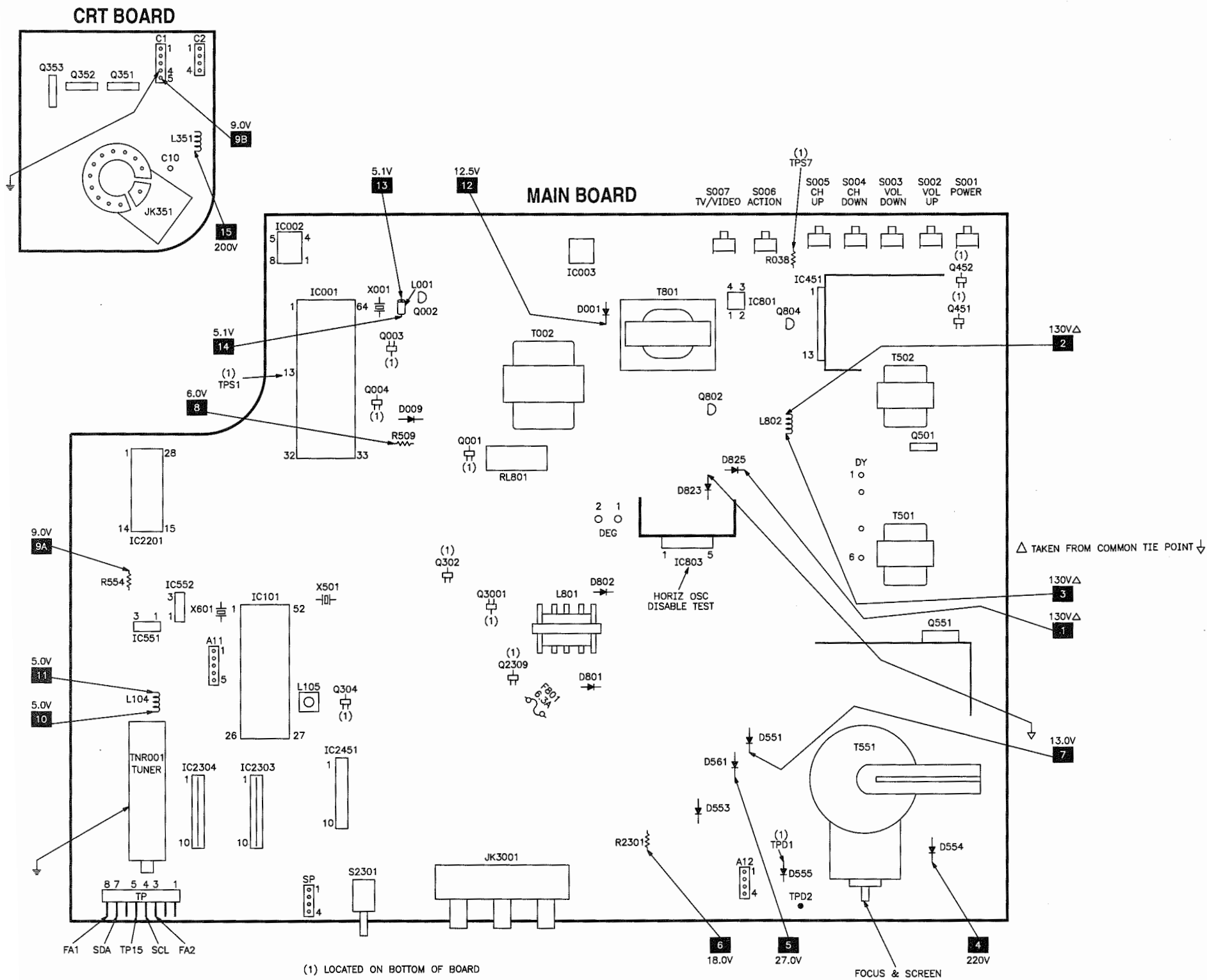
For Supplier Address,  
See PHOTOFACT Annual Index

# SYSTEM CONTROL SCHEMATIC

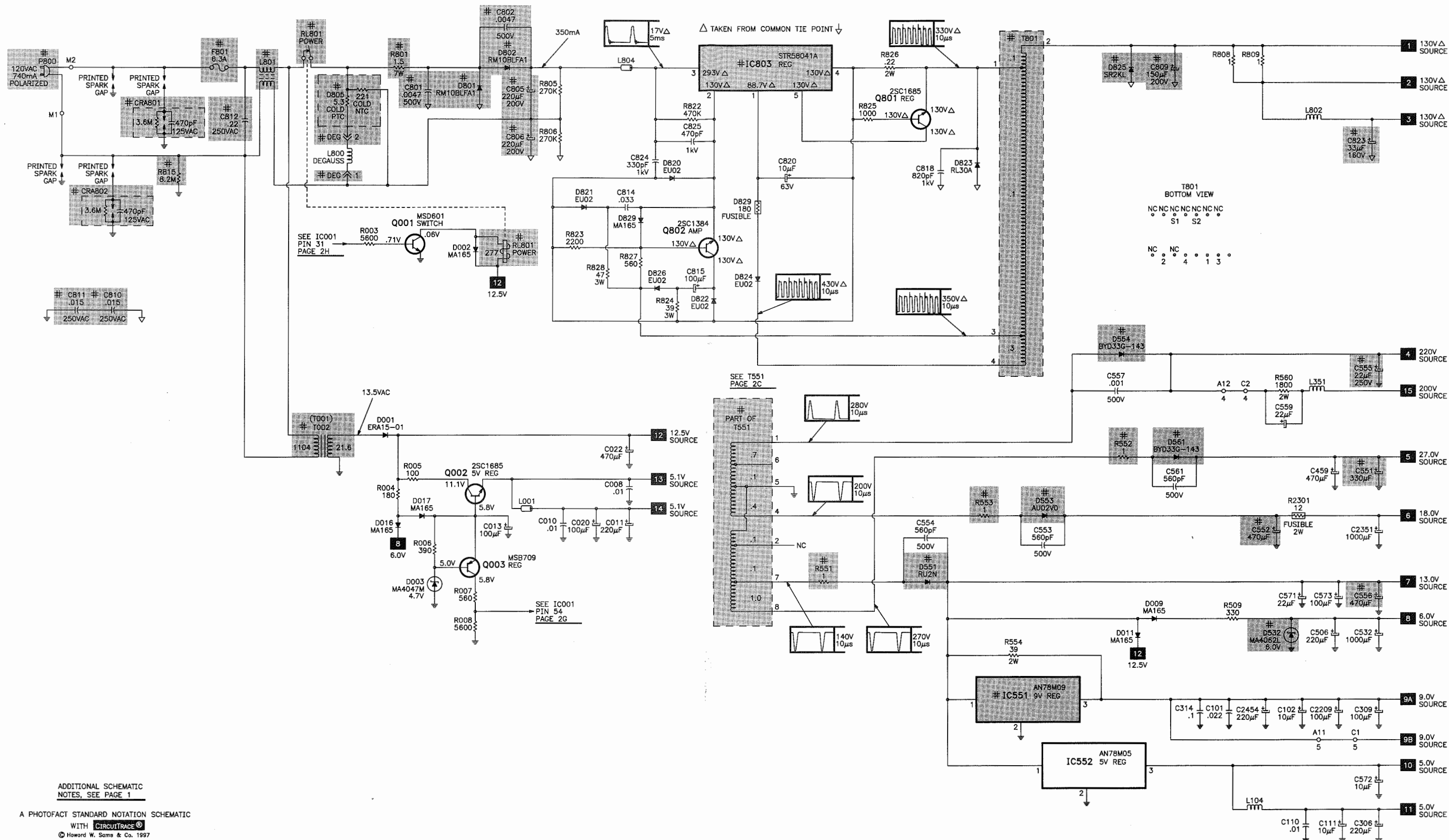


## PLACEMENT CHART

## IC FUNCTIONS



# POWER SUPPLY SCHEMATIC

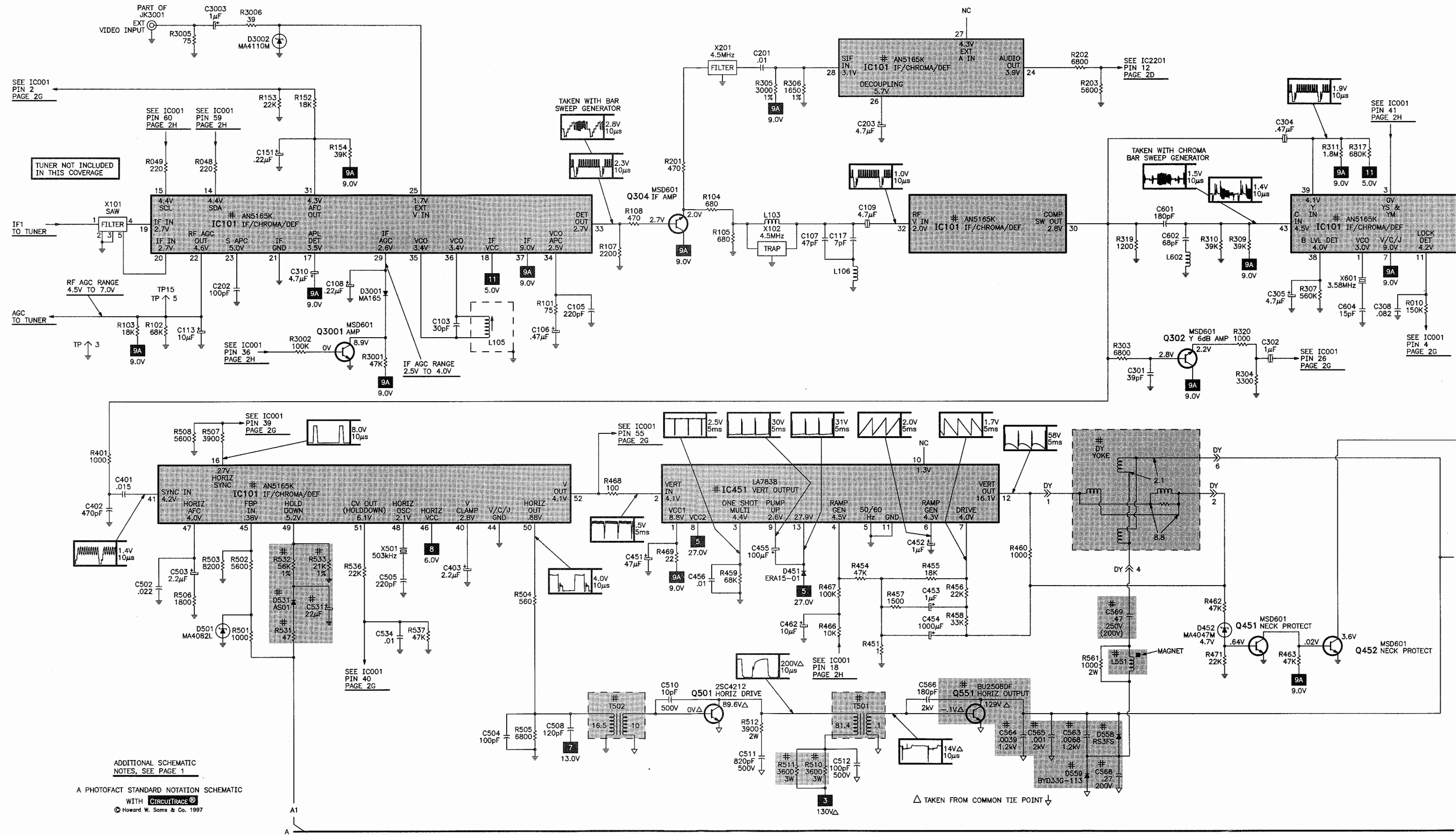


ADDITIONAL SCHEMATIC  
NOTES, SEE PAGE 1

A PHOTOFACT STANDARD NOTATION SCHEMATIC  
WITH CIRCUITTRACE®  
© Howard W. Sams & Co. 1997



TELEVISION SCHEMATIC



ADDITIONAL SCHEMATIC  
NOTES, SEE PAGE 1

A PHOTOFAC STANDARD NOTATION SCHEMATIC  
WITH CIRCUITRACE  
© Howard W. Sams & Co. 1997

Δ TAKEN FROM COMMON TIE POINT ↓

## MISCELLANEOUS ADJUSTMENTS continued

### Sub Brightness (B2)

This adjustment must be made after sub picture and color temperature adjustments are made. DO NOT adjust screen after sub brightness is set. Connect a color bar signal with pure white and pure black to the antenna input. Set color to minimum. Enter serviceman mode and select DAC adjustment. Select sub brightness (B2). Adjust until the black bars start to turn gray, then decrease adjustment until bars turn black.

### Sub Contrast (B3)

NOTE: This adjustment is factory set, DO NOT adjust unless CRT or CRT board is replaced.

Connect a color bar signal to the antenna input. Connect oscilloscope to pin 2 of connector C1 on CRT board. Connect the TPD2 to ground. Enter serviceman mode and select DAC adjustment. Select sub contrast (B3). Adjust for 2.8Vp-p ± .1Vp-p from white to black level. Do not include sync tip in measurement. Remove jumper.

### Video Adjustment (B5)

Connect a color bar signal to the antenna input. Connect oscilloscope to pin 32 of IC101. Enter serviceman mode and select DAC adjustment. Select video adjustment (B5). Adjust for 1.0Vp-p ± .05Vp-p.

### Audio Adjustment (B6)

NOTE: This adjustment is factory set, do not adjust unless IC002 or IC101 has been replaced.

Connect a generator with a 1kHz mono audio tone to the antenna terminal. Connect an oscilloscope to junction of R202 and R203. Enter serviceman mode and select DAC adjustment. Select audio adjustment (B6). Adjust for .7V ±.2V.

## CRT ADJUSTMENTS

Follow same procedure used for DAC adjustments.

CRT Adjustment Range and Default Levels

Adjustment	Range	Default Level	On-Set Level
Red Cutoff (C0)	0 0 thru 1 255	0 128	0 146
Green Cutoff (C1)	0-255	64	64
Blue Cutoff (C2)	0 0 thru 1 255	0 128	0 94
Red Drive (C3)	0-127	64	81
Blue Drive (C4)	0-127	64	63
YNR Switch (C5)	0-1	0	0
AFT (C6)	0 0 thru 1 255	0 120	1 123
RF AGC (C7)	0-127	64	64
YNR (C8)	0-7	0	0
Horiz Centering (C9)	0-31	16	12
Beam Limit (Ca)	0-7	0	4
Y Delay (Cb)	0-2	2	2

### Color Temperature (C0 thru C4)

NOTE: Observe low and high brightness areas of a B/W picture for proper tracking.

Enter serviceman mode and select CRT adjustments. Set the red cutoff (C0), green cutoff (C1), and blue cutoff (C2) for a gray picture. Set the red drive (C3) and blue drive (C4) for correct white areas.

### RF AGC (C7)

Tune in a picture. Enter serviceman mode and select CRT adjustments. Decrease the on-set level until snow appears in picture, then increase the data value to a point just past where snow disappears.

### Horizontal Centering (C9)

Tune in a crosshatch pattern. Enter serviceman mode and select CRT adjustments. Select horizontal centering (C9) adjustment and adjust crosshatch pattern for correct horizontal centering.

### Beam Limit (Ca)

Tune in a picture. Enter serviceman mode and select CRT adjustments. Adjust beam limit for best picture.

## FACTORY ADJUSTMENTS

Factory adjustments for PIP can be entered but no adjustments should be necessary. They are factory set for normal PIP performance. Write original values in case one of the adjustments is changed by mistake. Confirm that the values are as shown for default level.

Factory Adjustment Range and Default Levels

Service Adjustment	Range	Default Level	On-Set Level
PIP Color (S0)	0-127	80	80
PIP Contrast (S1)	0-127	52	52
PIP Upper Vertical Position (S2)	0-255	26	26
PIP Lower Vertical Position (S3)	0-255	146	146
PIP Left Horizontal Position (S4)	0-255	9	9
PIP Right Horizontal Position (S5)	0-255	103	103
Small PIP Upper Vertical Position (S6)	0-255	27	27
Small PIP Lower Vertical Position (S7)	0-255	163	163
Small PIP Left Horizontal Position (S8)	0-255	9	9
Small PIP Right Horizontal Position (S9)	0-255	118	118
Freerun (Sa)	-	-	-
Clock Adjustment (Sb)	0-255	128	73
PIP Tint (Sc)	0-63	50	50
Loudness Compensation (Sd)	0-63	52	52

### PIP Color (S0), PIP Contrast (S1), and PIP Tint (Sc)

Tune in a picture. Enter the serviceman mode and select factory adjustments. Select PIP color (S0). Adjust to match color of the PIP with color of the main picture. Select PIP contrast (S1) and adjust to match contrast of the PIP with contrast of the main picture. Select PIP tint (Sc) and adjust to match tint of the PIP with tint of the main picture.

### Clock Adjustment (Sb)

Connect a frequency counter to pin 13 of IC001. Turn receiver off. Record the frequency. Turn the receiver on and enter the serviceman mode and select factory adjustments. Select clock adjustment (Sb). Adjust (Sb) based on the following formula:

$$(Sb) = 128 + .901 \times 10000000 \frac{[244.1406 - \text{pin 13 (measured in Hz)}]}{244.1406}$$

## STEREO ADJUSTMENTS

All adjustments were made using a MTS TV / Stereo generator connected to the antenna terminal. Set the customer controls to normal listening levels and select stereo mode.

Stereo Adjustment Range and Default Levels

Adjustment	Range	Default Level	On-Set Level
Input Level (M0)	0-63	31	38
VCO (M1)	0-63	31	29
Filter (M2)	0-63	31	23
Low-Level Separation (M3)	0-63	31	46
High-Level Separation (M4)	0-63	31	18

### Input Level (M0)

On generator select pilot, 1kHz audio frequency, and L+R modulating signal. Connect an oscilloscope to pin 25 of IC2201. Enter serviceman mode and select stereo adjustments. Select input level (M0). Adjust the data value for 1Vp-p.

### VCO (M1)

On generator select pilot, 1kHz audio frequency, and L-R modulating signal. Connect digital DC voltmeter to pin 6 of IC2201. Enter serviceman mode and select stereo adjustments. Select VCO (M1). Adjust the data value for maximum voltage.

### Filter (M2)

Select SAP mode on the receiver. On generator select SAP, 1kHz audio frequency, and L-R modulating signal. Connect a digital DC voltmeter to pin 4 of IC2201. Enter serviceman mode and select stereo adjustments. Select filter

## TROUBLESHOOTING

## POWER SUPPLY

Check F801. If F801 is open, check T002, D801, D802, Q551, C801, C805, and C806. Apply 120VAC and check for 5.1V at the emitter of Q002. If 5.1V is missing, check D001, Q002, and T002. If 5.1V is present, turn receiver on and check for 293V\* at pin 3 of IC803. If 293V\* is missing, check D801 and D802. If 293V\* is present, check for 130V\* at pin 2 of T801. If 130V\* is missing, check T801, IC803, Q801, and Q802. If 130V\* is present, refer to the "Horizontal" section of this Troubleshooting guide.

\* Taken from common tie point.

## HORIZONTAL

To determine if the receiver is in shutdown, refer to the "Horizontal Oscillator Disable" section of this Troubleshooting guide. If the receiver is not in shutdown, inject a horizontal signal at the base of Q551. If horizontal deflection is now present, check Q501, T501, T502, and pins 44 thru 50 of IC101. If horizontal deflection is still missing, check Q551, T551, D554, D551, D553, and D561. The high voltage rectifier is part of T551 and if defective, it will affect the performance of the horizontal circuits. Horizontal linearity or width problems may be caused by C563 thru C566, C568, C569, or associated components.

## HORIZONTAL OSCILLATOR DISABLE

NOTE: Care should be taken in defeating the high voltage shutdown circuit, as this may cause excessive X-radiation and damage to the CRT, T551, and associated components.

The high voltage from T551 is monitored and rectified by D531. Should the high voltage increase, the rectified voltage at the cathode of D531 will also increase. This causes the horizontal oscillator frequency to increase which lowers the high voltage. To troubleshoot, remove D531. Use a variable AC power supply to supply 90VAC and turn on the receiver. Slowly increase AC voltage as required to isolate and repair the malfunction. Return D531 to the circuit.

## VERTICAL

Inject a vertical signal at pin 2 of IC451. If vertical deflection is present, check pins 40, 41, and 52 of IC101. If vertical deflection is missing, check IC451. Vertical linearity or height problems may be caused by vertical feedback and bias circuits, check C451 thru C455, and C462 for defects.

(M2). Adjust the data value to 0 and increase the data value until the voltage goes low. Note the data value. Adjust the data value to 63 and decrease the data value until the voltage goes low. Note the data value. Set the data value to the average of the two noted data values.

### Low-Level Separation (M3) and High-Level Separation (M4)

On generator select pilot, 300Hz audio frequency, and left modulating signal. Connect an oscilloscope to pin 25 of IC2201. Enter serviceman mode and select stereo adjustments. Select low-level separation (M3). Adjust the data value for minimum amplitude of waveform. On generator select 8kHz audio frequency. Select high-level separation (M4). Adjust the data value for minimum amplitude of the waveform. Repeat until no further decrease in amplitude can be obtained.

## RASTER

Check the CRT and CRT voltages. If red is missing, check Q351 and pin 8 of IC101. If green is missing, check Q352 and pin 9 of IC101. If blue is missing, check Q353 and pin 10 of IC101. If raster has height or width problems, refer to the "Vertical", "Horizontal", or "Power Supply" section of this Troubleshooting guide.

## AUDIO

Select an active channel and check for a MTS waveform at pin 12 of IC2201. If the waveform is missing, check pins 24, 26, and 28 of IC101. If waveform is present, select a station transmitting a signal in stereo and check for audio waveforms at pins 3 and 8 of IC2451. If waveforms are missing, check IC2201 and IC2451. If waveforms are present, check IC2303, IC2304, and pin 45 of IC001.

## VIDEO/CHROMA

Inject a video signal at pin 33 of IC101 and check for video on the CRT. If video is present, refer to the "IF AGC" section of this Troubleshooting guide. If the video is missing on the CRT, check for a video waveform at pin 39 of IC101. If missing, check Q304 and pins 30 and 32 of IC101. If present, check voltages and waveforms at pins 1, 8, 9, 10, and 12 of IC101. If any voltages or waveforms are incorrect, check IC101. If voltages and waveforms are correct, refer to the "CRT Protection" and "Raster" sections of this Troubleshooting guide.

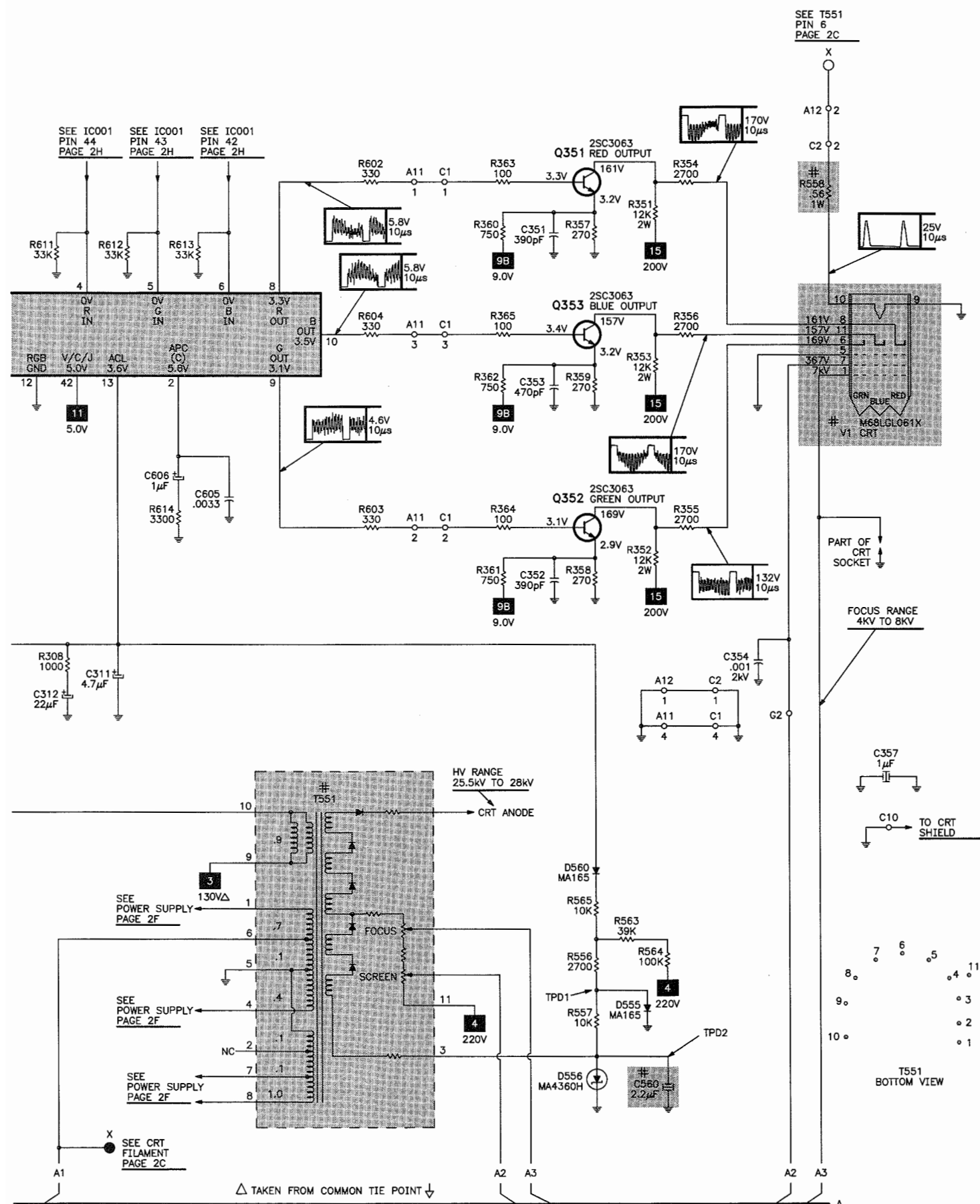
## IF AGC

Inject a video IF signal at the IF input and check for video on the CRT. If video is present, check the tuner, tuner control, and tuner AFC circuits. If video is missing on the CRT, check for a video waveform at pin 33 of IC101. If video is present, refer to the "Video/Chroma" section of this Troubleshooting guide. If video is missing at pin 33 of IC101, apply AGC bias to pin 29 of IC101. If video is now present at pin 33 of IC101, check IC101. If video is still missing at pin 33 of IC101, check pins 17 thru 20, 34, 35, 36, and 37 of IC101. A defective AGC circuit can cause an overloaded picture, excessive snow or loss of video.

## CRT PROTECTION

The CRT protection circuit is made up of Q451 and Q452. This circuit blanks out the CRT if vertical deflection failure occurs. It is important for the life of the CRT that this circuit be tested before returning the receiver to the customer. To test, short the base of Q452 to ground. The screen should go blank if this circuit does not need repair. Remove short.

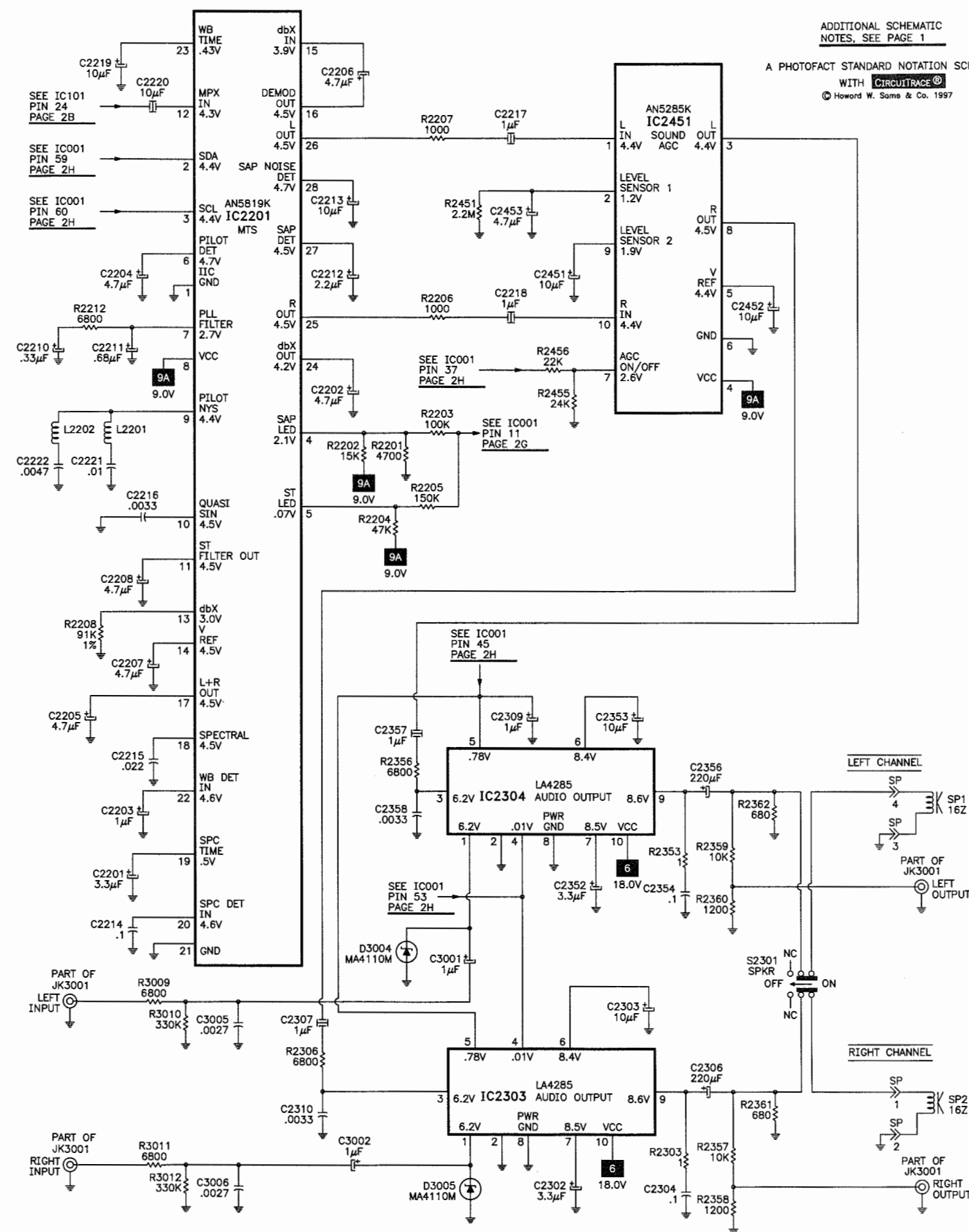
**C**  
**TELEVISION SCHEMATIC** continued



## D AUDIO SCHEMATIC

ADDITIONAL SCHEMATIC  
NOTES, SEE PAGE 1

A PHOTOFACT STANDARD NOTATION SCHEMATIC  
WITH **CIRCUITRACE®**  
© Howard W. Sams & Co. 1997

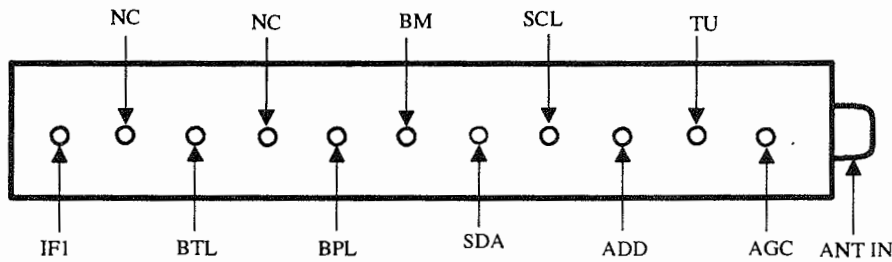


TUNER INFORMATION

TUNER VOLTAGE CHART			
Pin	VHF Low Band	VHF High Band	UHF Band
AGC	4.8V	5.6V	4.6V
TU	1.1V	4.7V	5.2V
ADD	0V	0V	0V
SCL	4.4V	4.4V	4.4V
SDA	4.4V	4.4V	4.4V
BM	8.9V	8.8V	8.9V
BPL	5.0V	5.0V	5.0V
NC	0V	0V	0V
BTL	4.3V	7.9V	8.3V
NC	0V	0V	0V
IF1	0V	0V	0V

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

TUNER TERMINAL GUIDE



SCHEMATIC NOTES

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

- ✕ Circuitry not used in some versions.
- Circuitry used in some versions.
- ⏏ Ground
- ⏏ Chassis ground
- ⏏ Common tie point
- △ Taken from common tie point
- 3 Schematic **CIRCUITRACE®**: Voltage source tie point.
- A— Cabling: Heavy lines reduce use of multiple lines.

Waveforms and voltages are taken from ground, unless noted otherwise.  
Waveforms taken with triggered scope and colorbar signal. Waveform voltage is peak to peak. Timebase is per division. Waveforms shown at 10 divisions. Supply voltages maintained as seen at input. Voltages measured with digital meter and a 1000µV RF signal, with colorbar pattern, applied to antenna terminal. 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.

MISCELLANEOUS ADJUSTMENTS

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

B+ CHECK

Connect a digital DC voltmeter to pin 2 of T801 and the common tie point. Set brightness and picture to minimum. With AC line voltage set to 120VAC, B+ should read 130V\* ±1.0V\*.

\* Taken from a common tie point.

HIGH VOLTAGE CHECK

Tune in a picture. Set brightness and picture for a black raster. Connect a high voltage probe to CRT anode. High voltage should read 25.5kV to 28kV.

PURITY CHECK

Press recall button on remote transmitter to enter purity check mode.

NOTE: Receiver must be in serviceman mode for purity colors to display on screen. Press recall button to cycle through white, red, green, blue, and normal screens.

PURITY

Enter serviceman mode. See "Purity Check" to display a green raster. Loosen 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

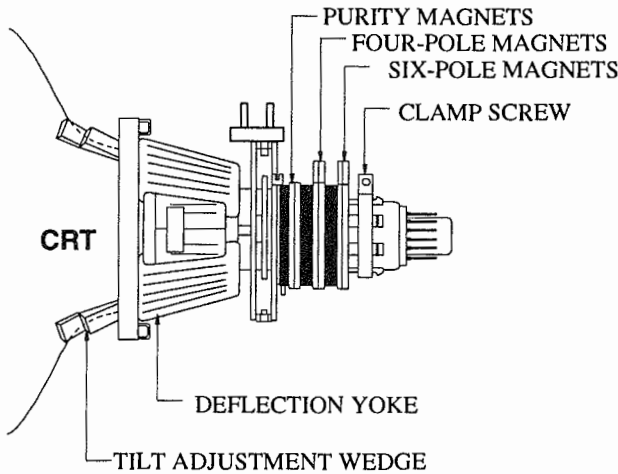
Connect a signal generator to antenna terminal and tune in a dot pattern. Adjust the 4-pole magnets to converge the red and blue dots at the center of the screen. Adjust the 6-pole magnets to converge the red/blue dots over the green dots at the center of the screen.

NOTE: Spread the two tabs of each set of magnets equally and opposite to converge vertically, and rotate both tabs in the same direction to converge horizontally. Since the four and six pole magnets interact, repeat the adjustment until center convergence is correct.

Tune in a crosshatch pattern. Remove rubber wedges between the deflection yoke and 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.

If the yoke or CRT is replaced, a convergence corrector strip (Part No. 0FMK014ZZ) may be required to match the yoke and CRT for optimum convergence. Position the strip between the CRT and yoke for best convergence at corners of screen and secure with tape.

CRT NECK ASSEMBLY



ENTERING SERVICEMAN MODE

There are two methods to enter the serviceman mode.

Turn the receiver on and momentarily short pins 3 and 8 of connector TP. In the upper left side of the picture, CHK is displayed in yellow. Press the action and volume up buttons on the receiver. The CHK display turns red.

Turn the receiver on and press the action button. Select SET UP and press the action button. Select ANT and set to cable. Press the action button, select TIMER, and press the action button again. Select SLEEP TIMER and set to 30. Press the action button twice, tune in channel 124, and set the volume to minimum. Press the volume button on the receiver. CHK is displayed in red.

The serviceman mode is indicated by CHK displayed in red at the upper left side of the picture. Press the power button on the remote or the action and volume down buttons on the receiver repeatedly to select one of five modes.

- B = DAC Adjustments
- C = CRT Adjustments
- S = Factory Adjustments
- M = Stereo Adjustments
- CHK = Normal operation of channel and volume buttons.

EXIT SERVICEMAN MODE

NOTE: Always exit serviceman mode when finished making adjustments.

Press action and power buttons on receiver control panel simultaneously for approximately 2 seconds to exit serviceman mode. The receiver will display a self check menu with audio on channel 3.

DAC ADJUSTMENTS

NOTE: Write down original values in detail before making any adjustments in case a misadjustment occurs.

Press channel up or down buttons on remote to select any of the service adjustment addresses. Press volume up or down buttons on remote to change level of adjustment.

DAC Adjustment Range and Default Levels

Adjustment	Range	Default Level	On-Set Level
Sub Color (B0)	0-63	33	33
Sub Tint (B1)	0-63	33	43
Sub Brightness (B2)	0-255	80	96
Sub Contrast (B3)	0-63	34	26
Killer/ABL/Gamma (B4)	0-7	5	5
Video Adjustment (B5)	0-15	8	7
Audio Adjustment (B6)	0-31	16	28
Vertical Size (B7)	0-63	20	30

Sub Color (B0)

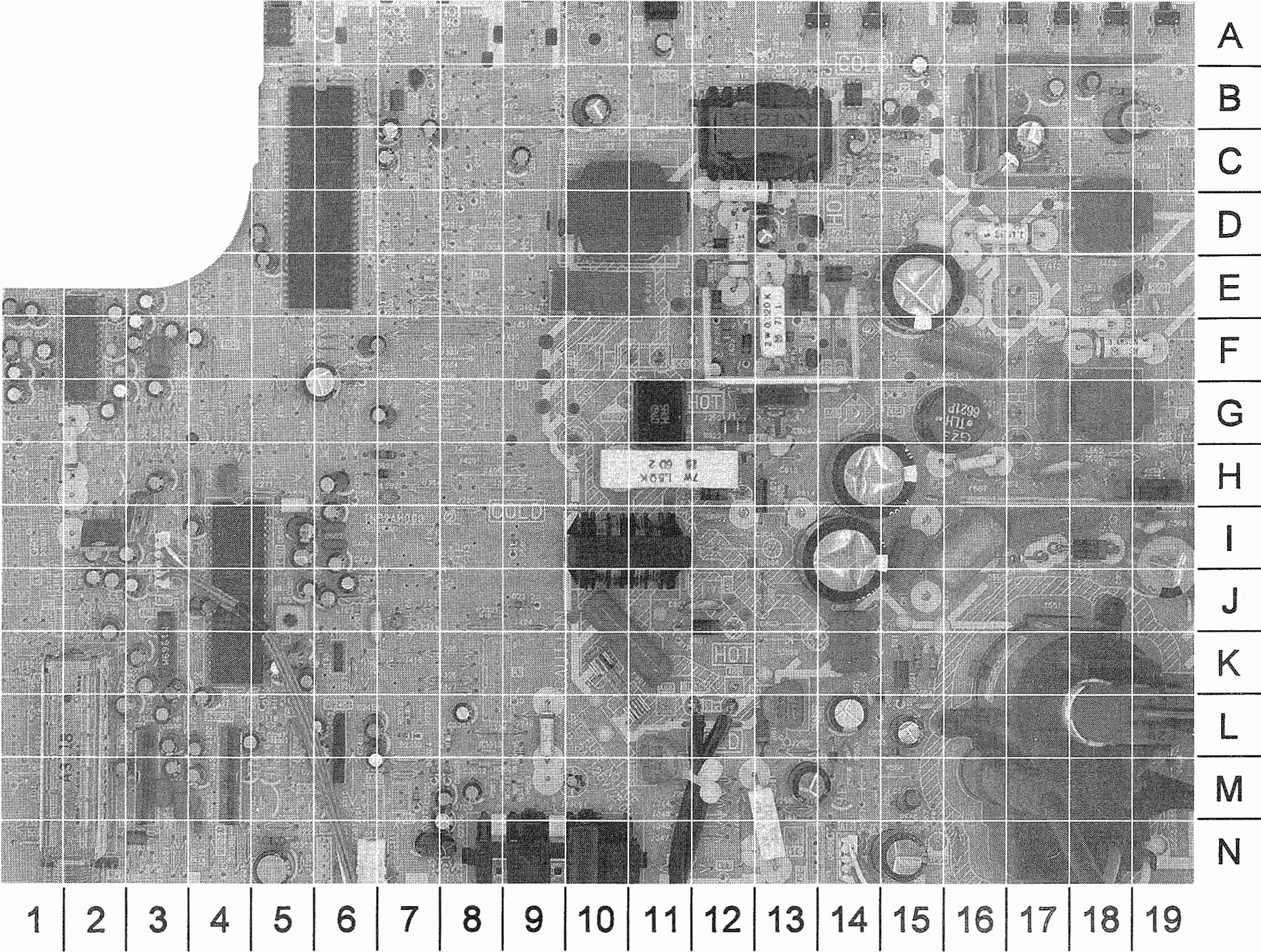
Tune in a color bar signal. Connect oscilloscope to pin 1 of connector C1 on the CRT board. Connect TPD2 to ground. Enter serviceman mode and select DAC adjustment. Select sub color (B0). Adjust waveform for .9Vp-p ±.05Vp-p. Remove jumper.

Sub Tint (B1)

Tune in a color bar signal. Connect oscilloscope to pin 1 of connector C1 on the CRT board. Connect TPD2 to ground. Enter serviceman mode and select DAC adjustment. Select sub tint (B1). Adjust waveform so the 1st and 4th peaks are of equal amplitude. Remove jumper.



MAIN BOARD - TOP VIEW



A HOWARD W. SAMS    GridTRACE™    PHOTO

MAIN BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE

A11	I-3	C801	J-12	D017	B-7	L602	H-7	S002	A-18
A12	N-14	C802	I-12	D451	C-16	L801	I-11	S003	A-17
C001	K-3	C805	H-14	D452	B-19	L802	D-15	S004	A-17
C003	L-2	C806	I-14	D501	H-6	L804	H-13	S005	A-16
C011	C-7	C807	C-14	D531	H-7	L2201	F-1	S008	A-14
C013	C-7	C808	B-15	D532	G-6	L2202	F-1	S009	A-13
C019	F-6	C809	E-15	D551	K-15	Q002	B-7	S2301	N-6
C020	D-5	C810	I-15	D553	L-14	Q501	E-18	SCL	N-2
C022	B-10	C811	K-14	D554	M-19	Q551	H-19	SDA	N-1
C024	C-7	C812	K-11	D555	N-15	Q801	F-13	SP	N-6
C026	E-5	C814	E-12	D556	N-14	Q802	D-13	T002	D-10
C032	A-11	C815	D-13	D558	I-18	Q804	B-15	T501	G-18
C102	J-6	C818	E-14	D559	I-17	R004	C-8	T502	D-18
C106	K-5	C820	F-12	D560	I-9	R005	B-8	T551	L-18
C108	K-5	C823	I-19	D561	L-15	R032	A-9	T801	B-13
C109	K-5	C824	H-13	D801	J-12	R039	A-8	TNR001	L-2
C111	J-2	C825	H-12	D802	H-12	R152	N-3	TP	N-2
C113	K-3	C2201	F-2	D805	G-11	R305	L-5	TP15	N-1
C151	K-3	C2202	F-3	D806	B-15	R451	B-18	TPD2	N-15
C203	L-4	C2203	F-3	D807	B-13	R460	C-17	X001	B-6
C302	G-7	C2204	E-1	D820	F-12	R502	H-6	X101	K-3
C304	J-6	C2205	G-3	D821	E-12	R509	E-7	X102	K-6
C305	J-5	C2206	G-2	D822	D-12	R510	D-16	X201	J-6
C306	I-5	C2207	G-1	D823	E-13	R511	F-18	X501	H-5
C308	H-4	C2208	F-1	D824	F-13	R512	F-18	X601	H-4
C309	J-2	C2209	F-1	D825	E-14	R531	H-7		
C310	J-4	C2210	E-1	D826	D-13	R551	K-15		
C311	J-3	C2211	F-1	D829	D-13	R552	K-15		
C312	J-2	C2212	E-3	D2301	D-8	R553	L-15		
C401	I-6	C2213	E-2	D2302	L-7	R554	H-2		
C403	I-6	C2214	F-3	D2312	J-9	R556	N-15		
C451	B-17	C2215	F-3	D3001	L-5	R557	M-15		
C452	B-17	C2217	F-4	D3002	M-7	R559	L-9		
C453	B-18	C2218	F-3	D3004	M-7	R561	H-15		
C454	B-19	C2219	F-2	D3005	M-8	R563	M-19		
C455	C-17	C2220	G-2	DEG	F-11	R564	M-19		
C456	B-16	C2302	L-4	DY	E-17	R565	M-13		
C459	C-17	C2303	M-4	F801	K-10	R801	H-11		
C462	A-15	C2304	M-3	FA1	N-1	R805	H-13		
C502	I-6	C2306	N-8	FA2	N-2	R806	F-14		
C503	I-6	C2307	L-4	IC001	C-6	R808	B-14		
C506	I-5	C2309	L-3	IC002	A-5	R809	C-15		
C510	E-19	C2311	C-9	IC003	A-11	R810	C-14		
C511	F-17	C2351	N-5	IC101	I-4	R812	C-14		
C512	E-18	C2352	M-2	IC451	B-16	R815	L-13		
C531	H-6	C2353	M-3	IC551	I-2	R822	G-12		
C532	G-6	C2354	M-3	IC552	I-3	R823	E-12		
C551	L-14	C2356	N-7	IC801	B-14	R824	D-12		
C552	M-13	C2357	L-3	IC803	G-13	R825	F-13		
C553	L-14	C2451	M-6	IC2201	F-2	R826	F-13		
C554	L-15	C2452	L-6	IC2303	M-4	R827	D-13		
C555	N-15	C2453	L-6	IC2304	M-3	R828	D-12		
C556	L-15	C2454	L-6	IC2451	L-6	R829	F-12		
C557	M-19	C3001	M-8	JK3001	N-9	R2301	N-13		
C560	M-15	C3002	M-8	L001	B-7	R2303	N-5		
C561	L-14	C3003	L-8	L002	L-1	R2310	D-7		
C563	I-17	CRA801	M-11	L003	B-5	R2319	L-7		
C564	G-17	CRA802	L-13	L004	A-5	R2321	J-8		
C565	H-17	D001	B-12	L006	A-5	R2353	M-4		
C566	I-19	D002	E-9	L008	A-10	R3005	L-9		
C568	I-16	D003	B-7	L009	N-3	R3006	L-8		
C569	F-16	D006	K-2	L103	K-6	R3009	M-8		
C571	I-2	D008	E-7	L104	J-2	R3011	M-8		
C572	I-13	D009	D-8	L105	J-5	R3012	M-9		
C573	H-3	D011	D-8	L106	J-7	RL801	E-10		
C606	I-4	D016	C-8	L551	G-16	S001	A-19		

PARTS LIST

SEMICONDUCTORS

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D001	-	ERA15-01	NTE552	ECG552	SK9000
D002	-	MA165	NTE519	ECG519	SK3100
D003	-	MA4047M	NTE5009A	ECG5009A	SK4A7
D006	-	MA4330H	-	-	-
D008 , 09, 11, 16, 17	-	MA165	NTE519	ECG519	SK3100
D451	-	ERA15-01	NTE552	ECG552	SK9000
D452	-	MA4047M	NTE5009A	ECG5009A	SK4A7
D501	-	MA4082L	-	-	-
# D531	-	AS01	NTE552	ECG552	SK9000
# D532	-	MA4062L	NTE5012A	ECG5012A	SK6A0
	-	MA4062LTV	NTE5012A	ECG5012A	SK6A0
# D551	RU2N	TVSRU2N	NTE552	ECG552	SK9000
# D553	-	AU02V0	NTE552	ECG552	SK9000
	-	AU02	NTE552	ECG552	SK9000
# D554	-	BYD33G-143	-	-	-
D555	-	MA165	NTE519	ECG519	SK3100
D556	-	MA4360H	-	-	-
# D558	-	RS3FS	NTE552	ECG552	SK9000
# D559	-	BYD33G-113	-	-	-
D560	-	MA165	NTE519	ECG519	SK3100
# D561	-	BYD33G-143	-	-	-
# D801, 02	-	RM10BLFA1	-	-	-
	-	RM10B	NTE125	ECG125	SK3081
D806	-	MA4047H	NTE5009A	ECG5009A	SK4A7
D807	-	MA165	NTE519	ECG519	SK3100
D820, 21, 22	-	EU02	NTE551	ECG551	SK3125A
	-	EU02V1	-	-	-
D823	-	RL30A	-	-	-
D824	-	EU02	NTE551	ECG551	SK3125A
	-	EU02V1	-	-	-
# D825	SR2KL	TVSSR2KL	-	-	-
D826	EU02	-	NTE551	ECG551	SK3125A
	EU02V1	-	-	-	-
D829	-	MA165	NTE519	ECG519	SK3100
D2301, 02	-	MA165	NTE519	ECG519	SK3100
D2312	-	MA4068M	NTE5014A	ECG5014A	SK6A8
D3001	-	MA165	NTE519	ECG519	SK3100
D3002, 04, 05	-	MA4110M	-	-	-
IC001	-	MN1873265T7G	-	-	-
	-	MN1873265T8X	-	-	-
IC002	-	24LC028BIP	-	-	-
# IC101	-	AN5165K	-	-	-
# IC451	-	LA7838	NTE7039	ECG7039	-
# IC551	-	AN78M09	NTE1902	ECG1910	SK3962
IC552	-	AN78M05	NTE960	ECG960	SK3591
# IC801	3131R	0N3131R	-	-	-
# IC803	-	STR58041A	-	-	-
IC2201	-	AN5819K	-	-	-
IC2303, 04	-	LA4285	-	-	-
IC2451	-	AN5285K	-	-	-
Q001	MSD601	MSD601-RT1	-	-	-

# For SAFETY use only equivalent replacement part.

SEMICONDUCTORS continued

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
Q002	2SC1685Q	2SC1685QRS	NTE85	ECG85	SK9229
	-	JC501PQ	NTE85	ECG85	SK3124A
Q003, 04	MSB709	MSB709-RT1	-	-	-
Q302, 04	MSD601	MSD601-RT1	-	-	-
Q351, 52, 53	2SC3063RL	2SC3063	NTE157	ECG157	SK3747
Q451, 52	MSD601	MSD601-RT1	-	-	-
Q501	2SC4212	2SC4212H	-	-	-
# Q551	-	BU2508DF	NTE2353	ECG2353*	-
Q801	2SC1685Q	2SC1685QRS	NTE85	ECG85	SK9229
	-	JC501RS	-	-	-
Q802	2SC1384	2SC1384RS	NTE293	ECG293	SK3849
Q804	2SA1767	2SA1767Q	-	-	-
Q2309	MSB709	MSB709-RT1	-	-	-
Q3001	MSD601	MSD601-RT1	-	-	-

# 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.

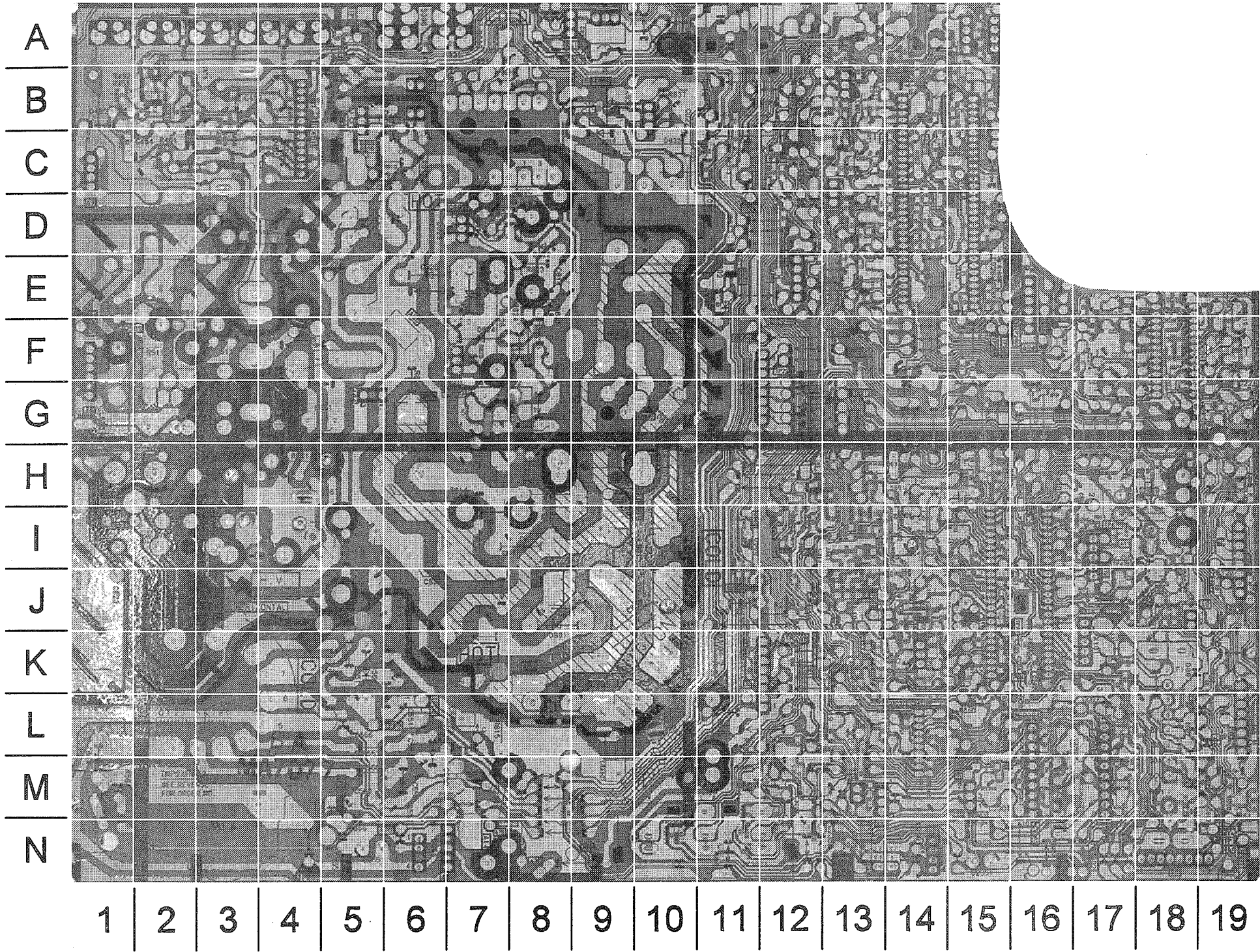
Participating Vendors

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)
- Sencore, Inc.
- NTE Electronics, Inc. (NTE)
- Terrell & Nobis (TNI Electronics)
- Philips ECG Company (ECG)
- Thomson Consumer Electronics, Inc. (SK, TCE)
- PTS Electronics Corporation (PTS)



MAIN BOARD - BOTTOM VIEW



A HOWARD W. SAMS GRIDTRACE™ PHOTO

MAIN BOARD - BOTTOM VIEW, GRIDTRACE  
LOCATION GUIDE

C004	M-18	R029	B-15	R533	I-15
C005	M-18	R030	C-13	R536	H-15
C008	A-15	R033	A-2	R537	H-15
C010	B-13	R034	A-2	R602	I-17
C016	E-13	R035	A-3	R603	I-17
C017	B-13	R036	A-4	R604	I-16
C018	B-13	R037	A-5	R611	I-16
C025	E-15	R038	A-5	R612	I-17
C031	E-13	R045	A-14	R613	I-16
C033	A-15	R048	J-18	R614	I-17
C035	E-13	R049	J-18	R813	B-6
C036	D-14	R053	B-14	R820	C-12
C037	F-17	R055	C-14	R821	A-7
C038	D-14	R060	C-14	R2201	E-19
C101	J-15	R065	D-13	R2202	F-18
C103	J-15	R066	D-14	R2203	F-18
C105	K-16	R067	D-14	R2204	F-18
C107	K-13	R068	D-14	R2205	F-18
C110	J-16	R070	F-15	R2206	F-17
C117	K-13	R101	K-15	R2207	E-17
C201	K-15	R102	M-18	R2208	G-18
C202	K-16	R103	N-18	R2212	F-19
C301	I-12	R104	K-14	R2306	L-16
C314	J-16	R105	K-14	R2311	D-12
C402	I-14	R107	K-15	R2312	C-12
C504	H-15	R108	J-14	R2313	C-11
C505	H-15	R153	M-19	R2314	I-12
C508	F-13	R154	L-18	R2317	M-16
C534	H-15	R201	J-14	R2318	L-13
C601	I-13	R202	K-16	R2322	J-12
C602	I-13	R203	J-16	R2356	L-17
C604	H-17	R303	I-12	R2357	M-11
C605	H-17	R304	I-13	R2358	M-12
C2216	F-18	R306	K-15	R2359	N-10
C2221	F-19	R307	J-15	R2360	N-10
C2222	F-19	R308	J-17	R2361	N-11
C2310	M-16	R309	H-13	R2362	N-11
C2358	L-17	R310	I-15	R2451	L-14
C3005	M-12	R311	I-14	R2455	L-14
C3006	N-12	R317	J-15	R2456	L-13
Q001	E-11	R319	K-15	R3001	J-12
Q003	C-13	R320	H-13	R3002	I-12
Q004	E-13	R401	I-14	R3010	L-12
Q302	H-12	R454	B-4	TPS1	C-15
Q304	J-14	R455	B-3	TPS7	A-5
Q451	B-2	R456	B-3		
Q452	B-2	R457	B-2		
Q2309	J-11	R458	B-3		
Q3001	I-12	R459	B-3		
R002	B-15	R462	C-1		
R003	E-15	R463	B-2		
R006	B-13	R465	A-13		
R007	C-13	R466	C-11		
R008	C-13	R467	B-4		
R010	E-16	R468	B-4		
R011	B-15	R469	B-4		
R012	F-14	R471	B-1		
R016	A-15	R501	H-13		
R017	A-15	R503	I-15		
R020	F-14	R504	H-15		
R021	M-19	R505	H-15		
R022	M-19	R506	I-14		
R023	K-19	R507	I-16		
R025	D-15	R508	I-16		
R027	D-15	R532	H-15		

PARTS LIST continued

CAPACITORS & ELECTROLYTICS

Item No.	Rating	Mfr. Part No.
C109	4.7µF 50V NP	ECEA1HN4R7U
C302	1µF 50V NP	ECEA1HN010U
C304	.47µF 50V NP	ECEA1HNR47U
C354	.001 10% 2kV	ECKD3D102KB
C357	1µF 50V NP	ECEA1HN010S
C452	1µF 25V Tantalum	ECSF1EE105
# C531	22µF 25V	ECA1EM220
# C551	330µF 35V	ECA1VM331
# C552	470µF 25V	ECA1EM471
# C555	22µF 250V	ECEA2EU220
# C556	470µF 16V	ECA1CM471
# C560	2.2µF 50V NP	ECEA1HN2R2U
# C563	.0068 5% 1.2kV	ECWH12H682JS
# C564	.0039 5% 1.2kV	ECWH12H392JS
# C565	.001 5% 2kV	ECKD3D102JB
C566	180pF 5% 2kV	ECKD3D181JB
# C568	.27 5% 200V	ECQM2274JZ
# C569	.47 5% 250V	-
	.47 5% 200V	ECWF2474JBB
# C801, 02	.0047 +100% -0% 500V	ECKD2H472PU
# C805, 06	220µF 200V	EC0S2DA221BB
# C809	150µF 200V	EC0S2DG151DG
# C810, 11	.015 20% 250VAC	ECQU2A153MN
# C812	.22 20% 250VAC	ECQU2A224MN
C818	820pF 10% 1kV	ECKD3A821KB
# C823	33µF 160V	ECEA160V33Z
C824	330pF 10% 1kV	ECKD3A331KB
C825	470pF 10% 1kV	ECKD3A471KB
C2201	3.3µF 16V Tantalum	AP335K016CAE
C2217, 18	1µF 50V NP	ECEA1HN010U
C2219	10µF 16V Tantalum	AP106K016CAE
C2220	10µF 16V NP	ECEA1CN100U
C2307, 57	1µF 50V NP	ECEA1HN010U

# For SAFETY use only equivalent replacement part.

CONTROLS & RESISTORS

Item No.	Function/Rating	Mfr. Part No.	NTE Part No.
# D805	5.3 Cold PTC, 221 Cold NTC	TRPW5B0M050D	
R032	10K 1% 1/4W	ER0S2CKF1002	-
R305	3000 1% 1/4W	ER0S2CKF3001	-
R306	1650 1% 1/10W	ERJ6ENF1651	-
# R510, 11	3600 5% 3W	ERG3FJ362H	3W236
# R531	47 5% 1/4W	ERD25FJ470	QW047
# R532	56K 1% 1/10W	ERJ6ENF5602	-
# R533	21K 1% 1/10W	ERJ6ENF2102	-
# R551, 52, 53	1 5% 1/2W	ERDS1FJ1R0	HW1D0
# R558	.56 10% 1W	ERQ1CKPR56	1WD56
# R801	1.5 10% 7W Wirewound	ERF7ZK1R5	-
# R815	8.2M 20% 1/2W	ERC12ZGM825	HW582
R824	39 5% 3W	ERG3FJ390H	3W030
R828	47 5% 3W	ERG3FJ470H	3W047
R829	180 5% 1/4W Fusible	ERQ14AJ180	-
R2208	91K 1% 1/10W	ERJ6ENF9102	-
R2301	12 5% 2W Fusible	ERQ2CJP120	F2W012

# For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS

Item No.	Function/Rating	Mfr. Part No.
# DY	Yoke Horiz 1.3mH Vert 15.9mH	TLY2AA003
L001	Ferrite Bead	TSKA074
L002	39µH	TLTACT390K
L003, 04	2.2µH	TLUABTA2R2K
L006	Ferrite Bead	TSKA072
L008	47µH	TLUABTA470K
L009	Ferrite Bead	TSKA074
L103	12µH	TLUABTA120K
L104	1µH	TLUABTA1R0K
L105	VCO	EIV7EN053B
L106	18µH	TLTACT180J
L351	100µH	TLUABTA101K
# L551	Horizontal Linearity	TLH6621P
L602	12µH	TLTACT120J
# L800	Degaussing	0LK19045A
# L801 (1)	Line Filter	ELF17N017A
# L801 (2)	Line Filter	ELF18D650K
L802	68µH	ELEIE680KA
L804	Ferrite Bead	TSKA076
L2201	1000µH	TLTACT102J
L2202	470µH	ELESN471JA
# T002	Power	TLP16297
# T501	Horizontal Driver	TLH15452
# T502	Horizontal Coupling	ETE19Z30AY
# T551 (3)	Horizontal Output	KFT4AB055F
# T801	Switch Mode	ETS28AE219NC

# For SAFETY use only equivalent replacement part.

(1) Used in models CT-27G12V and CT-27G12UV.

(2) Used in model CT-27G12CV.

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

MISCELLANEOUS

Item No.	Description	Mfr. Part No.	Notes
# CRA801, 02	Capristor	EXNG471P365	470pF, 125VAC, 3.6M, Spark Gap
# F801	Fuse	0BA1C63NU100	6.3Amp, 125V, Slow Blow
IC003	Receiver	RPM-637CBRS1	Remote
JK351	Socket	TJSC00300	CRT
JK3001	Jack	TJB2A9063B	Assembly
# P800	Line Cord	TSX2AA0011	AC, Polarized
# RL801	Relay	TSEH8007	Power
S001	Switch	EVQPF106K	Power
S002	Switch	EVQPF106K	Volume Down
S003	Switch	EVQPF106K	Volume Up
S004	Switch	EVQPF106K	Channel Down
S005	Switch	EVQPF106K	Channel Up
S008	Switch	EVQPF106K	Action
S009	Switch	EVQPF106K	TV/Video
S2301	Switch	ESB621283	Speaker
SP1, 2	Speaker	TAS2A0001	2" X 3 1/2", 16 Ohms, 3W
# TNR001 (1)(2)	Tuner	ENV56D18G3	UHF/VHF
# V1	CRT	M68LGL061X	-
X001	Crystal	TSS2AA002	12MHz
X101	Filter	M1969M	SAW
X102	Trap	EFCWS4504AB	4.5MHz
X201	Filter	EFCS4R5MS5W	Bandpass, 4.5MHz
X501	Crystal	TAFC5B503F38	503kHz
X601	Crystal	TSS2AA001	3.58MHz
	Correction Strip	0FMK014ZZ	Convergence
	Magnet	TLC2047-2	Purity/Convergence
	PC Board (1)	TNP2AA005	CRT
	PC Board (1)	TNP2AH003BA	Main
	PC Board (1)	TNP2AH003BH	Main
	Transmitter	EUR511000A	Remote
	Wedge	TMM2A30701	Yoke Positioning (3 Used)

# For SAFETY use only equivalent replacement part.

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

(2) Contact TNI Electronics for replacement; order by part number on tuner.

CABINET PARTS

Item	Mfr. Part No.
Badge, Panasonic	TBM2A10141
Button, 7-Key	TBX2AA00801G
Cabinet Back	TXFKU0197SER
Cabinet Front	TXFKY0497SER
Pushbutton, Speaker	TBX1886601
REMOTE TRANSMITTER	
Battery Cover	UR51EC810A

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.	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



Created with pride by the employees  
of Howard W. Sams & Company.

J. Barker, N. Beck, A. Bonner,  
B. Buchanan, T. Clensy,  
G. Farrell, B. Fink, M. Herkless,  
J. Kocho, F. Malek, B. Medaris,  
R. Raus, B. Skinner

PANASONIC

MODEL CT-27G12V (CHASSIS AEDP280)