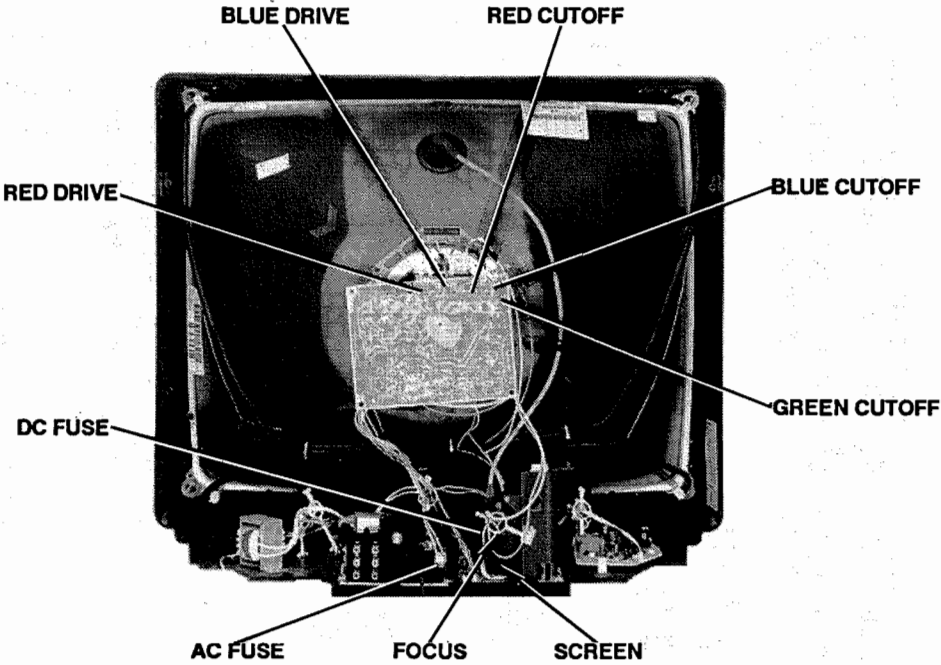


CABINET - REAR VIEW



| TEST JIG HOOKUP          |             |                  |     |        |
|--------------------------|-------------|------------------|-----|--------|
| Chek-A-Color<br>Function | Adapter No. | PC Board<br>Plug | Pin | Color  |
| CRT                      | B239        | # DY             | 1   | Red    |
| Yoke                     | D482        |                  | 3   | Blue   |
| Yoke Setting             | YP1         |                  | 4   | Yellow |
| Comments                 | Focus Tap   |                  | 5   | Black  |

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

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PHOTOFACT® Technical Service Data

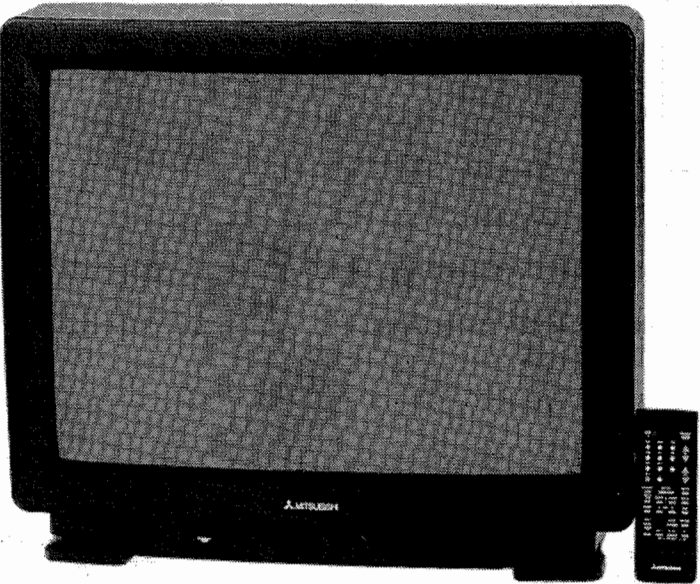
SET 2980

Model CS-2710R (Chassis UM2-C)

MITSUBISHI

| INDEX                        |     |
|------------------------------|-----|
| Convergence Adjustments      | 1   |
| Grid Trace Location Guide    |     |
| CRT Board                    | 5   |
| Main Board                   | 5   |
| Pincushion Board             | 5   |
| IC Functions                 | 4   |
| Important Parts Information  | 6   |
| Miscellaneous Adjustments    | 1   |
| Parts List                   | 6   |
| Photos                       |     |
| Cabinet-Rear View            | 1   |
| CRT Board                    | 3,5 |
| Main Board                   | 4,5 |
| Pincushion Board             | 5   |
| Quick-Checks Troubleshooting |     |
| CRT Board                    | 3   |
| Main Board                   | 4   |
| Placement Chart              | 4   |
| Safety Precautions           | 1   |
| Schematics                   |     |
| Audio Output                 | 3   |
| Comb Filter/Video            | 3   |
| CRT                          | 2   |
| Pincushion                   | 3   |
| Power Supply                 | 2   |
| Systems Control              | 3   |
| Television                   | 2   |
| Stereo Adjustments           | 1   |
| Terminal Guides and Notes    | 2   |
| Test Equipment               | 1   |
| Test Jig Hookup              | 1   |
| Troubleshooting              | 1   |
| Tuner Information            | 5   |

MITSUBISHI  
Model CS-2710R (Chassis UM2-C)



Complete coverage  
for servicing a television receiver...

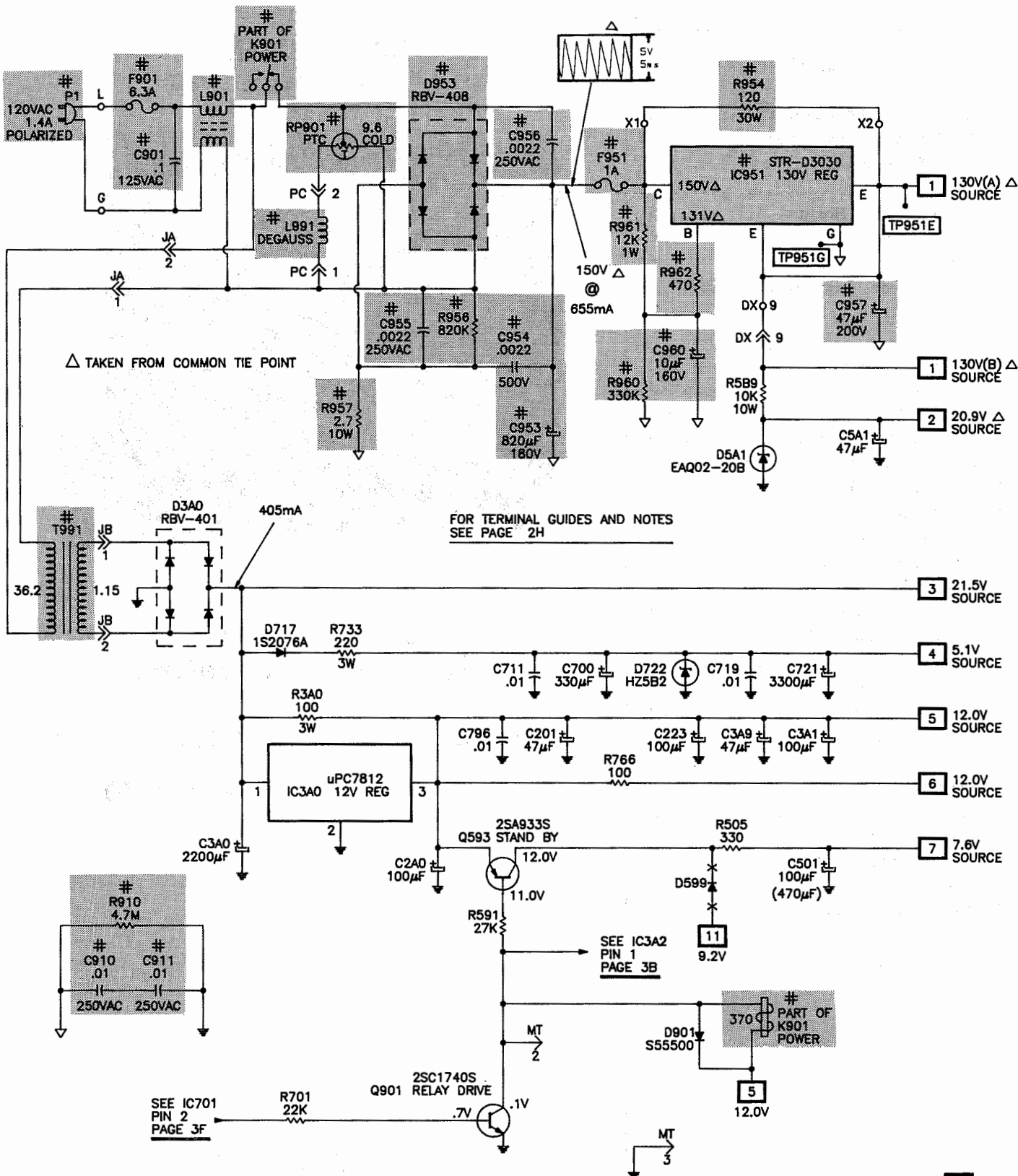
- Schematics
- Component locations
- Parts lists
- Troubleshooting guide

  
**HOWARD W. SAMS & COMPANY**  
MAY 1992 SET 2980

For Supplier Address,  
See PHOTOFACT Annual Index

2980

POWER SUPPLY SCHEMATIC

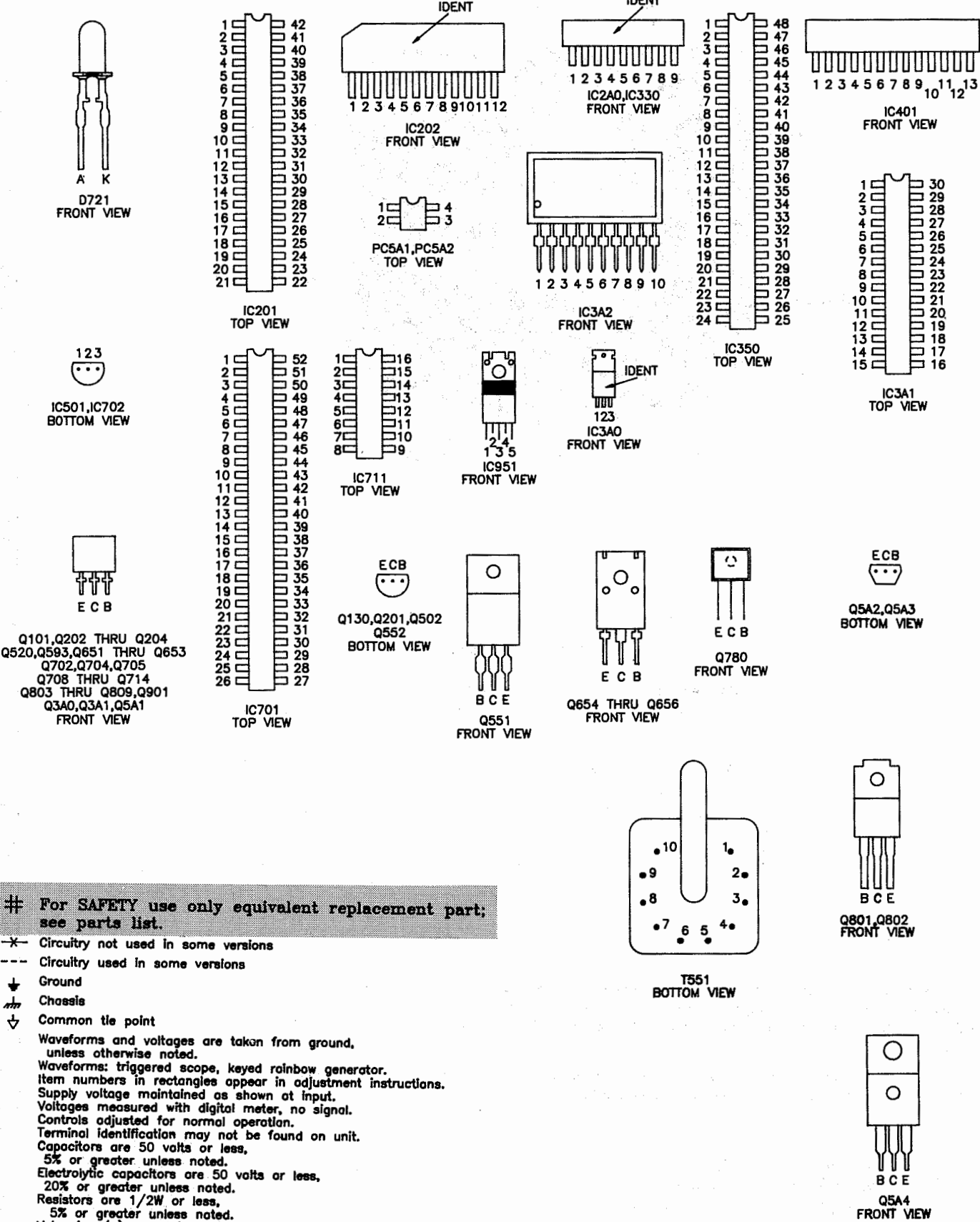


A PHOTOFAC STANDARD NOTATION SCHEMATIC  
WITH CIRCUITRACE  
© Howard W. Sams & Co. 1992

G

PHOTO CIRCUITRACE = 11  
SCHEMATIC CIRCUITRACE = 11

TERMINAL GUIDES AND NOTES



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

—X— Circuitry not used in some versions  
--- Circuitry used in some versions  
↓ Ground  
⏏ Chassis  
▽ Common tie point

Waveforms and voltages are taken from ground, unless otherwise noted.  
Waveforms: triggered scope, keyed rainbow generator.  
Item numbers in rectangles appear in adjustment instructions.  
Supply voltage maintained as shown at input.  
Voltages measured with digital meter, no signal.  
Controls adjusted for normal operation.  
Terminal identification may not be found on unit.  
Capacitors are 50 volts or less, 5% or greater unless noted.  
Electrolytic capacitors are 50 volts or less, 20% or greater unless noted.  
Resistors are 1/2W or less, 5% or greater unless noted.  
Value in ( ) used in some versions.  
Measurements with switching as shown, unless noted.

MITSUBISHI  
Model CS-2710R (Chassis UM2-C)

SAFETY PRECAUTIONS

SERVICE WARNING

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

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

SERVICING HIGH VOLTAGE AND PICTURE TUBE

Use EXTREME CAUTION when servicing the High Voltage circuits.

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

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

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

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

SAFETY CHECKS – FIRE AND SHOCK HAZARD

Cold Leakage Checks for Sets with Isolated Ground

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

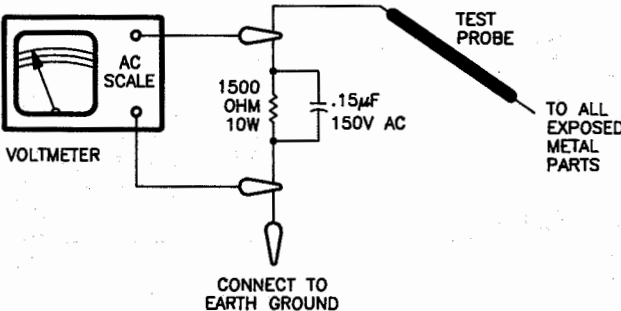
Hot Leakage Current Check

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

GENERAL GUIDELINES

Perform a final SAFETY CHECK before returning set to customer.

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



TROUBLESHOOTING

POWER SUPPLY

Check AC Fuse (F901) and DC Fuse (F951).

If Fuse F901 is open:

Check Bridge Rectifiers(D3A0, and D953), Capacitors C901, C955, and C956, and Electrolytic C953.

If Fuse F951 is open:

Check Power Regulator IC (IC951), and Horizontal Output Transistor (Q551).

Check for approximately 21.5V at the "+" pin of Bridge Rectifier D3A0. If 21.5V is missing:

Check voltages and components associated with Standby Transformer (T991), and Bridge Rectifier D3A0.

If 12.5V is present, apply 120VAC and check for 150V\* at the "+" pin of Bridge Rectifier D953.

If 150V\* is missing:

Check Line Filter (L901), and Power Relay (K901).

If 150V\* is present, check for 130V\* at TP951E.

If 130V\* is missing at TP951E:

Check the voltages and components associated with 130V Regulator IC (IC951).

IF 130V\* is present:

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

\* Taken with respect to isolated ground.

HORIZONTAL

Determine if set is in shutdown by referring to the "High Voltage Shutdown" section of this Troubleshooting guide.

If set is not in shutdown, inject a horizontal signal at the base of Horizontal Output Transistor (Q551).

If horizontal deflection is now present:

Check voltages, waveforms, and components associated with Horizontal Drive Transistor (Q552), and pins 20, 22, 24, and 25 of Signal Control IC (IC201).

If horizontal deflection is still missing:

Check the voltages, waveforms, and components associated with Transistor Q551, and Horizontal Output Transformer (T551).

Check voltages, and components associated with Diodes D552, D553, D561, and D582.

The High Voltage Rectifier is part of Transformer T551 and if defective will affect performance of horizontal circuit.

If horizontal oscillator is off frequency:

Check voltages, waveforms, and components associated with pins 24, and 25 of IC201.

Horizontal linearity or foldover problems may be caused by Capacitors C552, and C570 being defective.

VERTICAL

Inject a vertical signal at pin 2 of Vertical Out IC (IC401).

If vertical deflection is now present:

Check voltages, waveforms, and components associated with pin 27 of Signal Control IC (IC201).

If vertical deflection is still missing:

Check the voltages, waveforms, and components associated with IC401.

Vertical linearity or foldover problems may be caused by Electrolytics C450, C452, C454, C455, C458 being defective.

HIGH VOLTAGE SHUTDOWN

The High voltage is monitored by Diode (D582), rectifying pulses from Horizontal Output Transformer (T551). Should the high voltage increase, the rectified voltage at the cathode of Zener Diode (D503) will also increase and trigger pin 23 of Signal Control IC (IC201) into shutdown.

To troubleshoot, remove Resistor R520 from the circuit, and use a variac for AC power.

Start with 90VAC and increase as necessary to locate and repair the defect. Return R520 to the circuit.

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

HIGH VOLTAGE TEST

Apply 120VAC, turn set on, and set all customer controls for normal operation.

Momentarily short cathode of Diode D582 to Diode D503.

Set should lose raster and sound.

If set does not go into shutdown, the shutdown circuit requires repair.

To resume normal operation, remove AC power and wait 30 seconds then turn set on.

IF AGC

Inject a video IF signal at IF input and check for video on CRT.

If video is present:

Check the Tuner, Tuner Control, and Tuner AFC circuits.

If video is missing, check for a video waveform at TP12. If waveform is present at TP12:

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

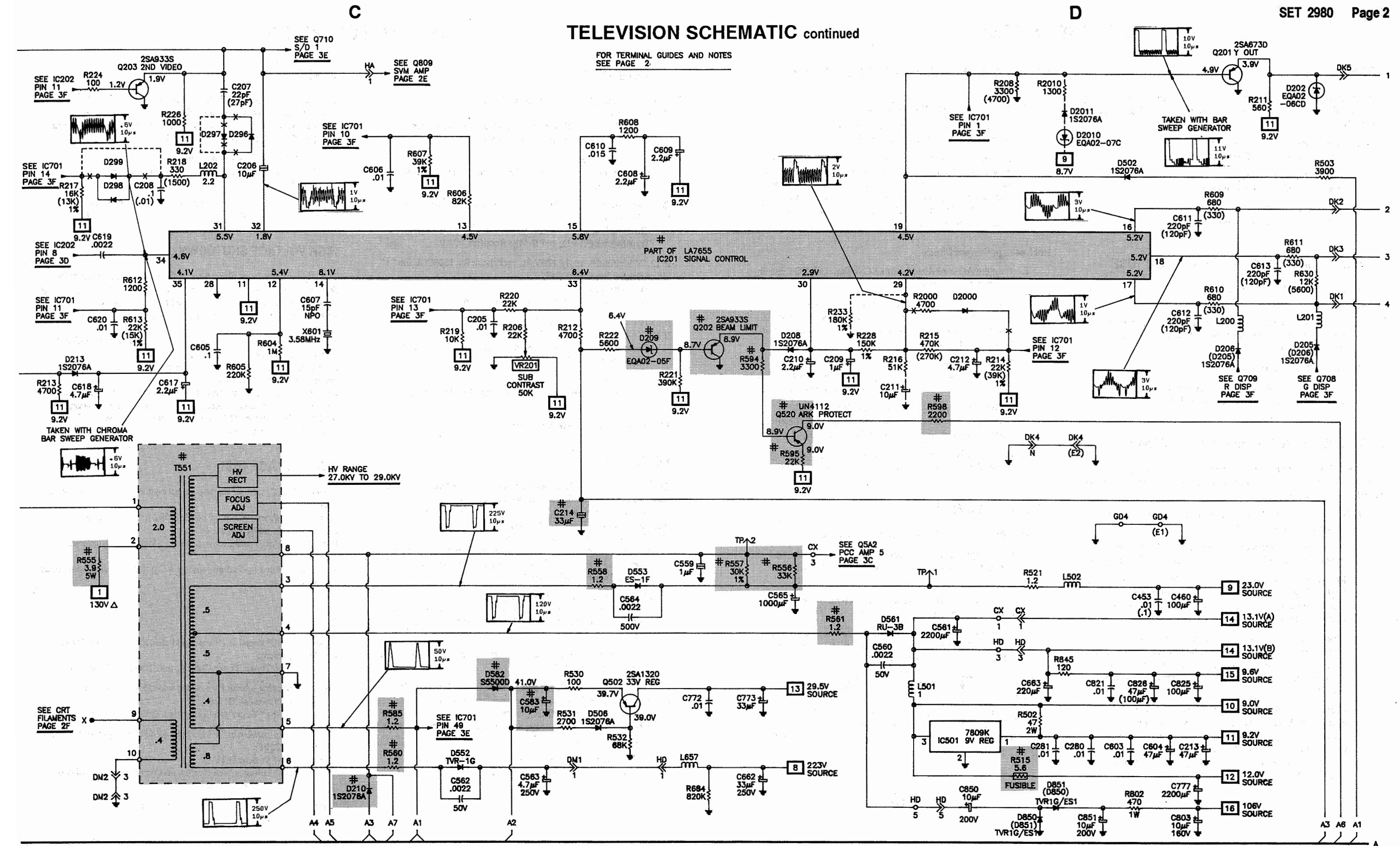
If waveform is missing at TP12, apply AGC bias to pin 10 of Signal Control IC (IC201).

If video is now present at TP12:

Check the voltages, waveforms, and components associated with pins 8, 10, and 40 of IC201.

If video waveform is still missing from TP12:

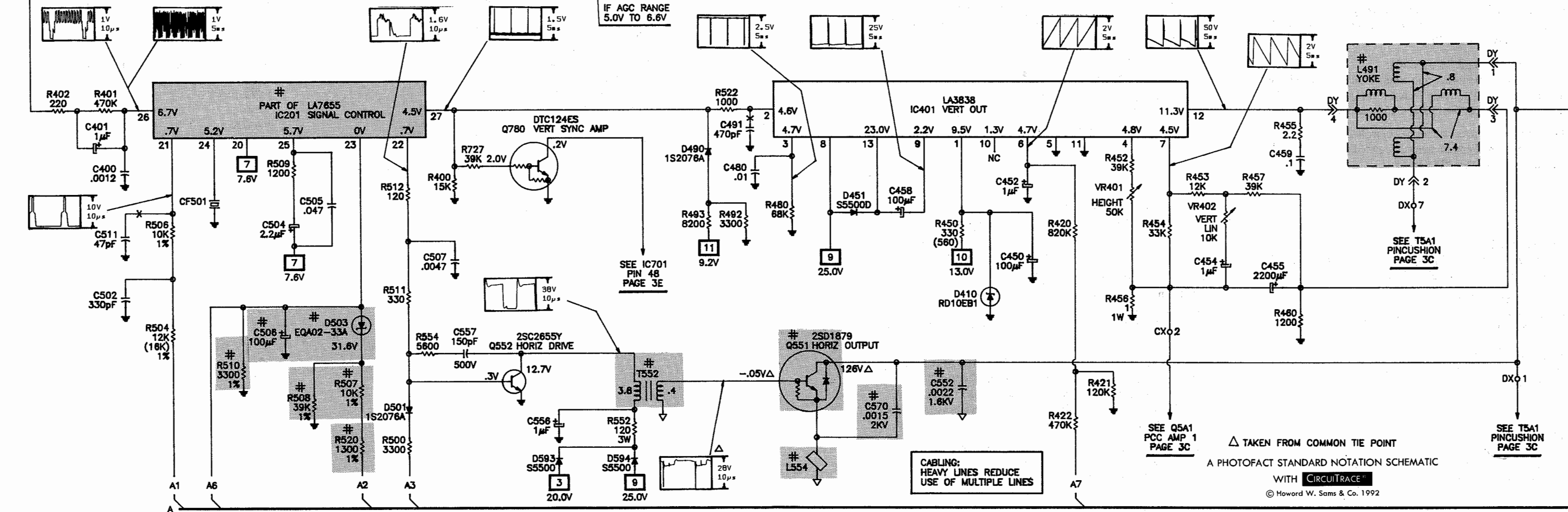
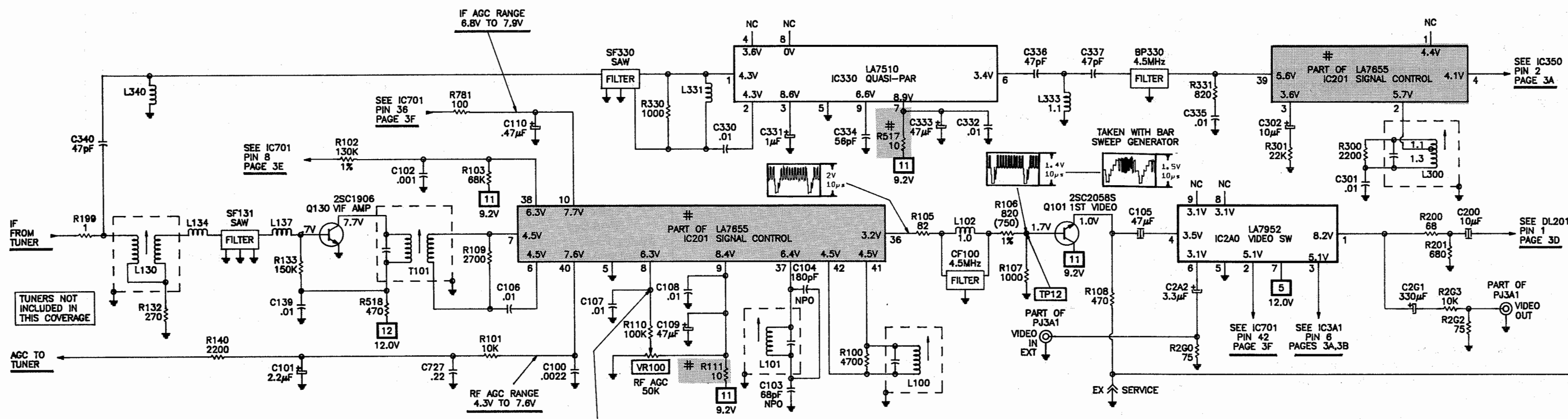




A

B

TELEVISION SCHEMATIC



TROUBLESHOOTING
continued

Check the voltages, waveforms, and components associated with VIF Transistor (Q130), and pins 5 thru 10, 35, 37, 38, 40, 41, and 42 of IC201.

A defective AGC circuit can cause an overloaded picture, excessive snow, or loss of audio and video. See the AGC Voltage Chart for AGC voltages with signal.

| AGC Voltage Chart |      |
|-------------------|------|
| IC201             |      |
| Pin 8             | 5.6V |
| Pin 10            | 7.1V |
| Pin 40            | 7.7V |

VIDEO

Inject a video signal at TP12 and check for Video on CRT.  
If video is present on CRT:  
Refer to the "IF AGC" section of this Troubleshooting guide.

If there is no video on CRT, check for a video waveform on pin 32 of Signal Control IC (IC201). If video is missing on pin 32 of IC201:  
Check the voltages, waveforms, and components associated with 1st Video Transistor (Q101), Video Switch IC (IC2A0), Y/C Switch IC (IC202), Y Buffer Transistor (Q204), and 2nd Video Transistor (Q203).

If waveform is present at pin 32 of IC201, check for a video waveform at pin 19 of IC201. If video is missing:  
Check the voltages, waveforms, and components associated with pins 29 thru 32 of IC201.

If waveform is present at pin 19 of IC201:  
Check voltages, waveforms, and components associated with Y Out Transistor (Q201), Drive Transistors (Q651, Q652, Q653), Output Transistors (Q654, Q655, Q656), and the CRT.

If brightness is inadequate or cannot be controlled:  
Check voltages, and components associated with pin 29 of IC201, and pin 7 of the CRT.

SYNC

If horizontal and vertical sync are missing:  
Check the voltages, waveforms, and components associated with pin 26 of Signal Control IC (IC201).

If horizontal sync is missing:  
Check the voltages, waveforms, and components associated with pins 22, 24, and 26 of IC201.

If vertical sync is missing:  
Check the voltages, waveforms, and components associated with pins 26, and 27 of IC201.

CHROMA

Check for a chroma waveform at pin 34 of Signal Control IC (IC201). If waveform is missing at pin 34 of IC201:

Check the voltages, waveforms, and components associated with pin 34 of IC201, and Y/C Switch IC (IC202).

If waveform is present at pin 34 of IC201, check for the proper waveforms at pins 16, 17, and 18 of IC201. If the waveforms are missing:

Check the voltages, waveforms, and components associated with pins 11 thru 18, 33, 34, and 35 of IC201.

Check the 3.58MHz oscillator at pin 14 of IC201.

If proper waveforms are present at pins 16, 17, 18 of IC201:  
Refer to the "Raster" section of this Troubleshooting guide.

RASTER

Check the CRT and CRT voltages.  
If red is missing:  
Check voltages, waveforms, and components associated with pin 16 of Signal Control IC (IC201), Red Drive Transistor (Q651), and Red Output Transistor (Q654).

If green is missing:  
Check the voltages, waveforms, and components associated with pin 17 of IC201, Green Drive Transistor (Q652), and Green Output Transistor (Q655).

If blue is missing:  
Check the voltages, waveforms, and components associated with pin 18 of IC201, Blue Drive Transistor (Q653), and Blue Output Transistor (Q656).

If raster has keystone shape:  
Check the Deflection Yoke (L491).

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

AUDIO

Select an active TV channel and check for an audio waveform at pin 2 of MCS IC (IC350). If waveform is missing:  
Check voltages, waveforms, and components associated with pins 2, 3, 4, and 39 of Signal Control IC (IC201).

If audio waveform is present at pin 2 of IC350, check for audio waveforms at pins 34 and 35 of IC350. If waveforms are missing at pins 34 and 35 of IC350:  
Check voltages, waveforms, and components associated with IC350.

If audio waveforms are present at pins 34 and 35 of IC350, check for audio waveforms at pins 23 and 25 of Audio Control IC (IC3A1).  
If audio waveforms are missing at pins 34 and 35 of IC3A1:  
Check voltages, waveforms, and components associated with IC3A1 and AVC Transistor (Q3A1).

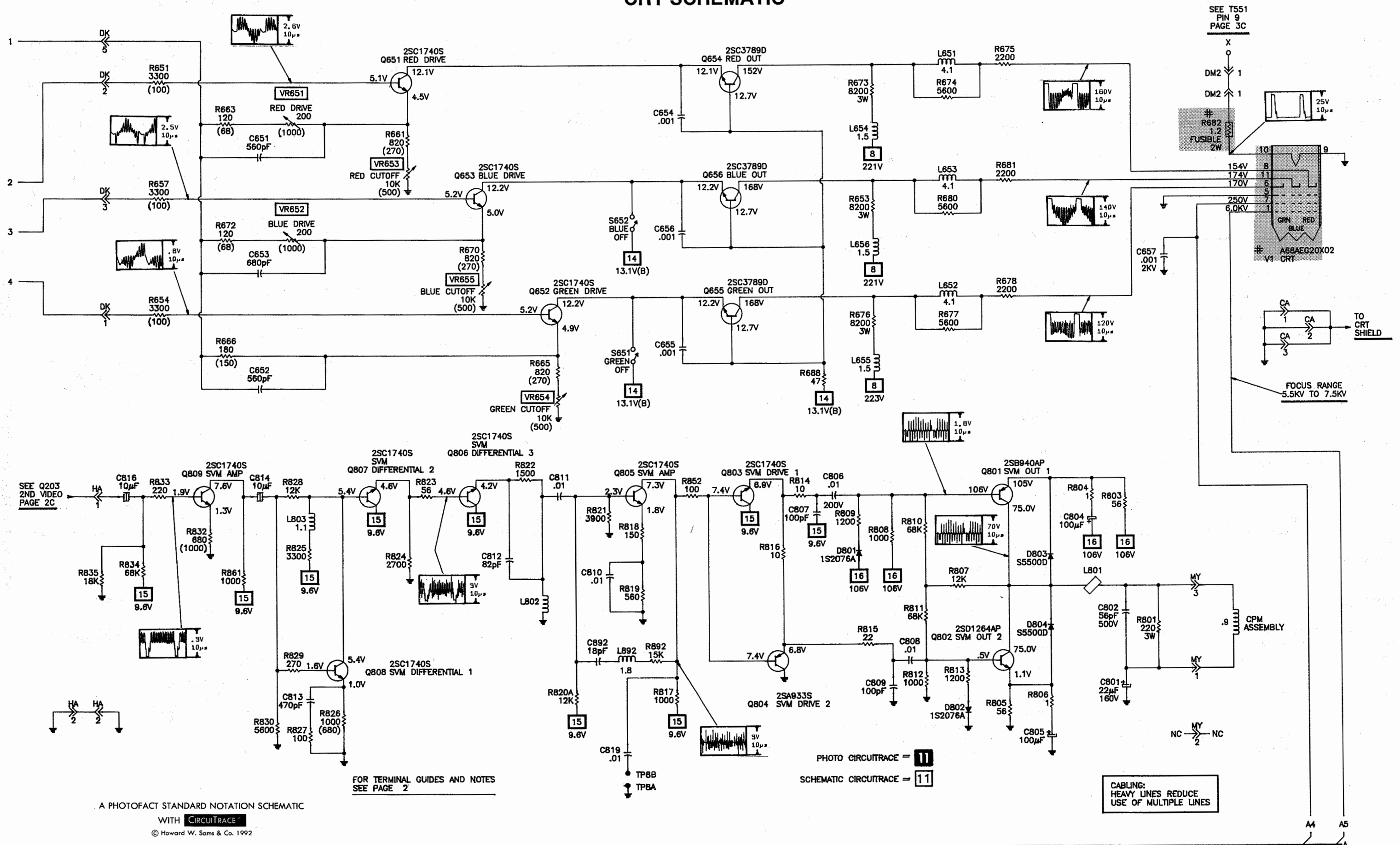
If audio waveforms are present at pins 34 and 35 of IC3A1:  
Check voltages, waveforms, and components associated with Audio Out IC (IC3A2), and Speaker On/Off Transistor (Q3A0).

TEST EQUIPMENT

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

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

## CRT SCHEMATIC





## MISCELLANEOUS ADJUSTMENTS

### PRETUNING

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

#### Auto Memory

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

#### Add Channel

1. Press the Mode button until "Channel Memory" appears on screen.
2. Select channel. Use direct channel access buttons.
3. Press the Enter button to add channel.
4. Repeat Steps two and three to add additional channels.
5. Press Mode button to end process.

#### Delete Channel

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

Note: This set employs digital customer controls. Adjust all settings to Midrange unless otherwise indicated. To adjust controls, press Video button (S709) or Audio button (S710) to select desired control. Press Adj Up (S707) or Adj Down (S708) to change control setting. Remote transmitter may be used.

### B+ VOLTAGE CHECK

Tune in a picture. Connect a digital Voltmeter to TP951E (IC951 pin E), low side to TP951G (IC951 pin G). With line voltage at 120VAC, B+ should read 130V +/- 1V.

### HIGH VOLTAGE CHECK

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

### RF AGC

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

### SUB CONTRAST

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

### CHARACTER POSITION

Tune in a picture. Press "Disp" Button on remote transmitter. Adjust OSC Control (VR701) to center display on screen.

### PINCUSHION

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

### HORIZONTAL WIDTH

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

### HORIZONTAL BIAS

Tune in acrosshatch pattern. Set Bias Control (VR5A4) to fully Counterclockwise position. Reduce horizontal width by adjusting Horizontal Width Control (VR5A3) until sides are visible. Adjust Bias Control Clockwise until horizontal width just begins to change. Perform "Horizontal Width" adjustment.

### COLOR PURITY

Caution: Some sets employ a CRT with neck assembly permanently bonded. Do not attempt to remove these assemblies.

Operate receiver for at least 15 minutes. Use a degaussing coil to demagnetize the CRT and mounting hardware. Set Color, Contrast, Red Cutoff Control (VR653), and Blue Cutoff Control to MINIMUM. Set Brightness and Green Cutoff Control (VR654) to produce visible green raster. Loosen the Deflection Yoke clamp screw and remove rubber wedges. Slide Deflection Yoke (L491) forward to produce a vertical green band. Adjust the Purity Tabs to center green band on the screen. Slide Deflection Yoke back until a uniform green screen is obtained. Replace the rubber wedges. Tighten Deflection Yoke clamp screw. Check red and blue purity.

### COLOR TEMPERATURE

Tune in a crosshatch pattern. Set Brightness, Contrast, Color, Red Cutoff Control (VR653), Green Cutoff Control (VR654), Blue Cutoff

## MISCELLANEOUS ADJUSTMENTS continued

Control (VR655), and Screen Control to MINIMUM. Set Red Drive Control (VR651), and Blue Drive Control (VR652) to Midrange. Slowly advance Screen Control until crosshatch is just visible. Note color of pattern and adjust the other Cutoff Controls for a white pattern. Set Brightness, and Contrast to Maximum. Adjust the Blue and Red Drive Controls for best black and white picture. Check tracking at low and high brightness. If necessary, readjust controls for best white balance.

### CONVERGENCE

Caution: Some sets employ a CRT with neck assembly permanently bonded. Do not attempt to remove these assemblies.

Operate receiver for 15 minutes. Tune in a dot pattern. Adjust 4 pole magnets to converge the red and blue dots at the center of the screen. Loosen the magnet locking ring. Adjust the 6 pole magnets to converge the red/blue dots over the green dots. Note: Rotate the tabs of each set of magnets equally and opposite to converge vertically and rotate the tabs of each set of magnets equally and in the same direction to converge horizontally. 4 and 6 pole magnets interact, repeat adjustment until center convergence is correct. Tighten the magnet locking ring. Tune in a crosshatch pattern. Loosen the Deflection Yoke clamp screw. Remove the rubber wedges. 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 of the screen. Tilt the Deflection Yoke left and right to converge the horizontal lines at the top and bottom of the screen and the vertical lines at the left and right side of the screen. Replace rubber wedges and tighten the Deflection Yoke clamp screw.

## STEREO ADJUSTMENTS

Note: The following adjustments were made with B&K model 2009 MTS TV Stereo generator connected to the antenna terminals. Equivalent generator may be used.

### COMPOSITE LEVEL

Select Pilot, 1kHz Audio Frequency, and L+R Modulating signal. Select Stereo mode on receiver. Connect an oscilloscope to TP-MO. Adjust Composite Level Control (VR350) for 500mV p-p.

### STEREO FILTER

Select SAP, 1kHz Audio Frequency, and L-R Modulating signal. Select SAP mode on receiver. Connect an oscilloscope to TP-N1. Adjust Stereo Filter Control (VR351) for Maximum.

### SAP FILTER

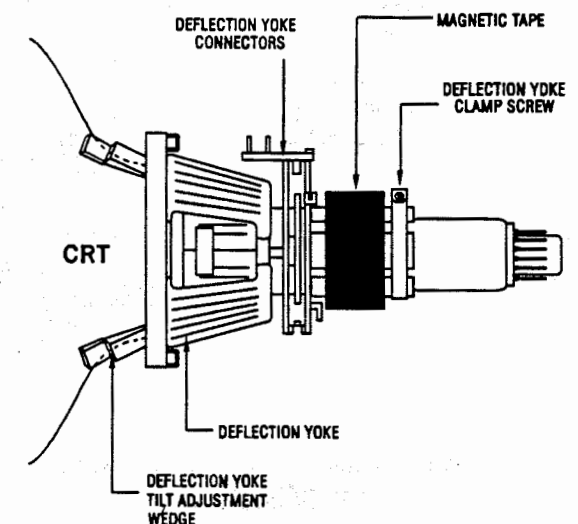
Select Pilot, 1kHz Audio Frequency, and L+R Modulating signal. Select Stereo mode on receiver. Connect an oscilloscope to TP-L4. Adjust DBX Filter Control (VR352) for 400mV p-p.

### STEREO VCO

Select Pilot, 1kHz Audio Frequency, and L-R Modulating signal. Select Stereo mode on receiver. Connect a frequency counter to TPM1. Connect a jumper to TP-L1 and TP-L2. Adjust Stereo VCO Control (VR355) for 15.75kHz. Remove jumper.

### SEPARATION AND SPECTRAL

Select Pilot, 300Hz Audio Frequency, and L Modulating signal. Select Stereo mode on receiver. Connect an oscilloscope to TP-M2. Adjust Separation Control (VR353) for MINIMUM amplitude of waveform. Select 8kHz Audio Frequency. Adjust Spectral Control (VR354) for MINIMUM amplitude of waveform. Repeat adjustments until no further decrease in waveform amplitude occurs.





A

B

AUDIO OUTPUT SCHEMATIC

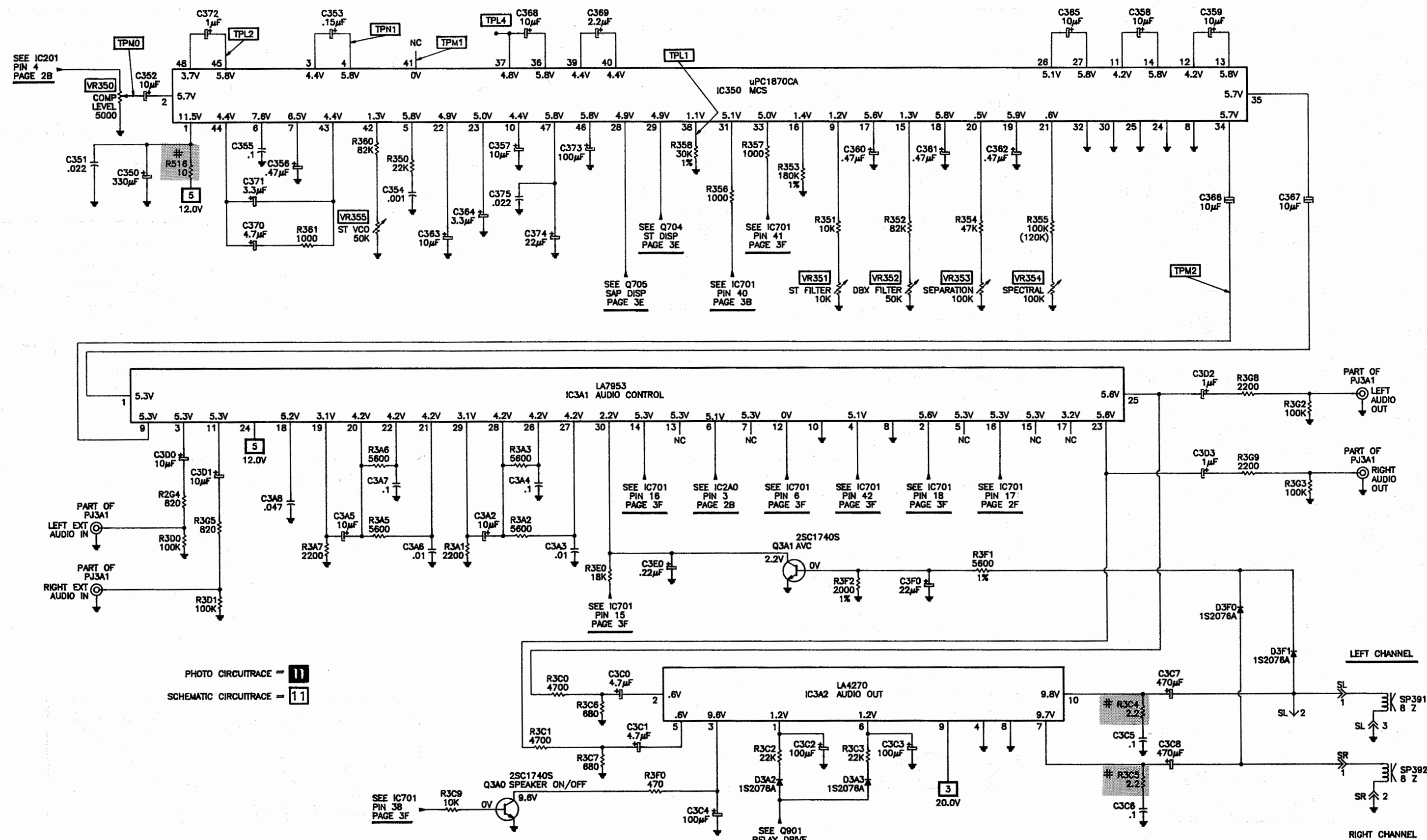
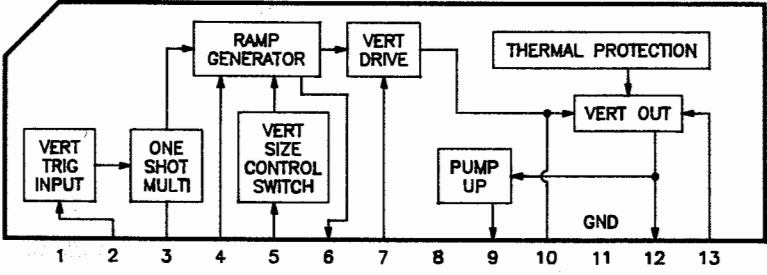
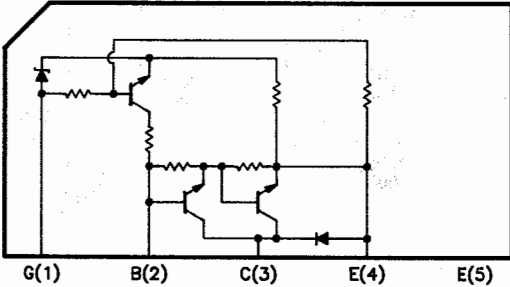
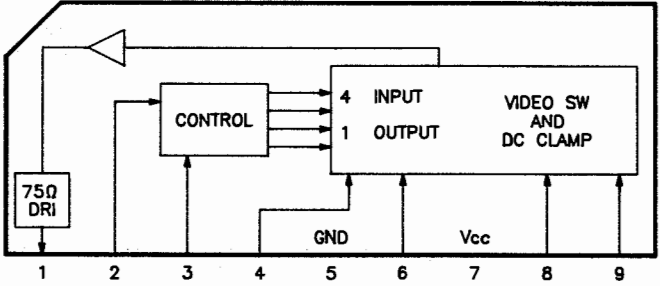
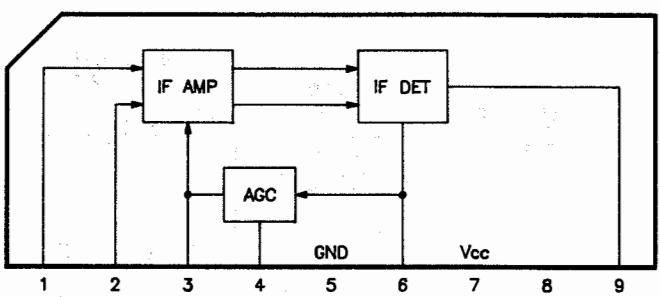
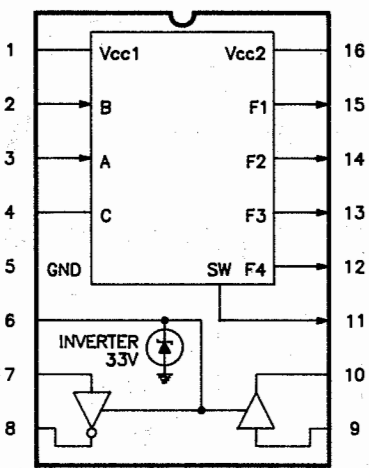
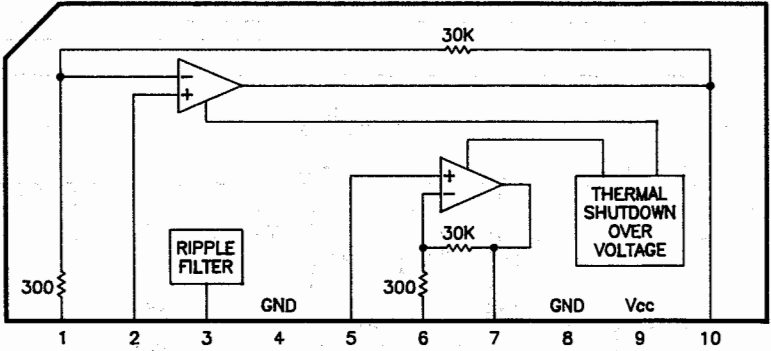
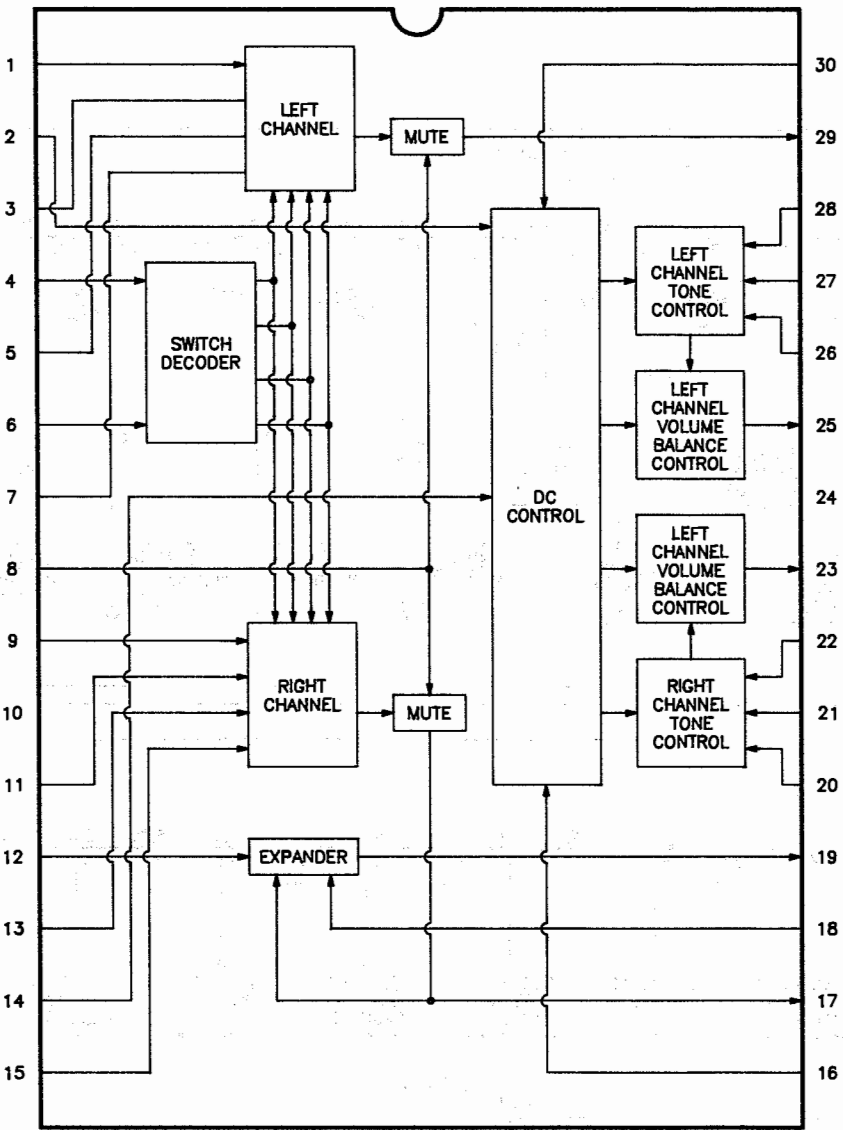
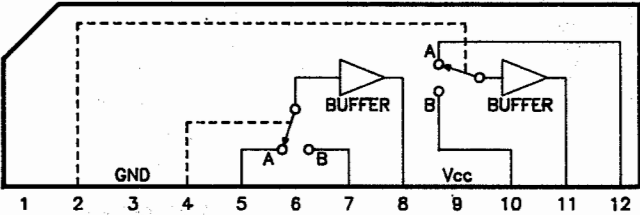
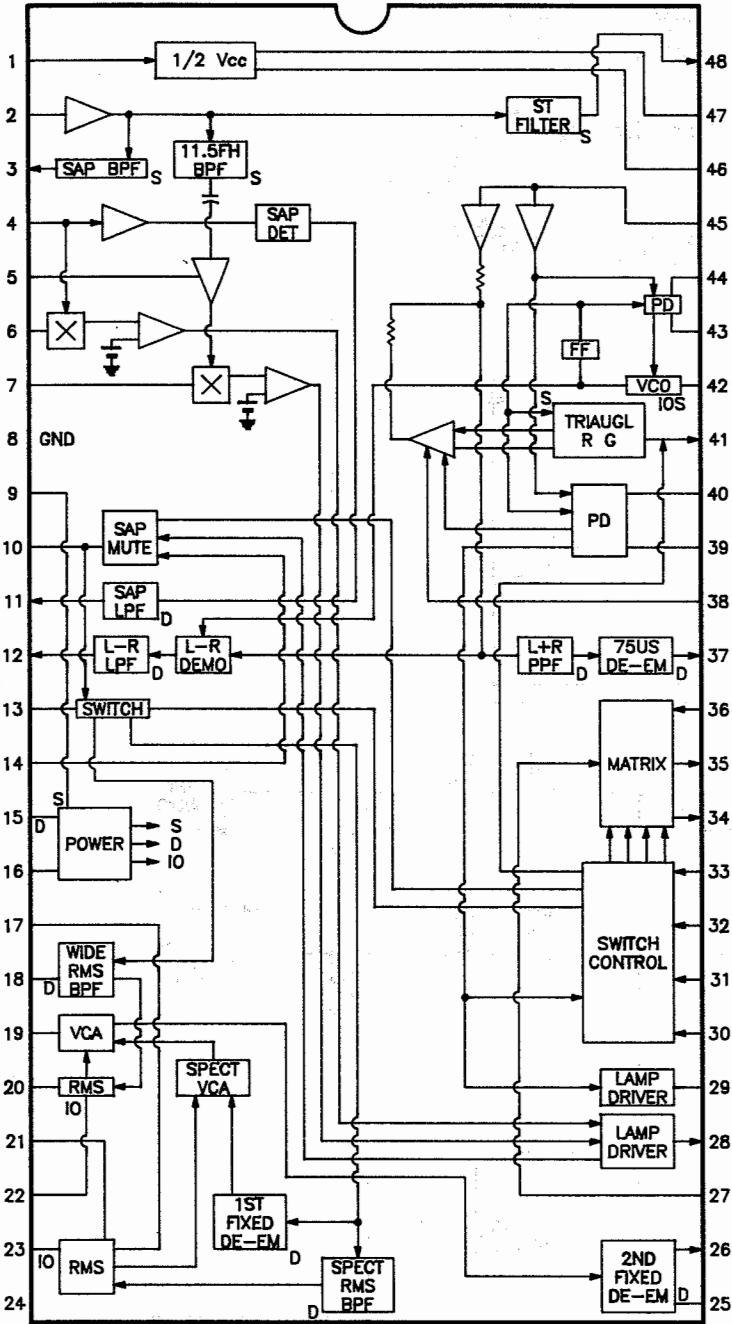
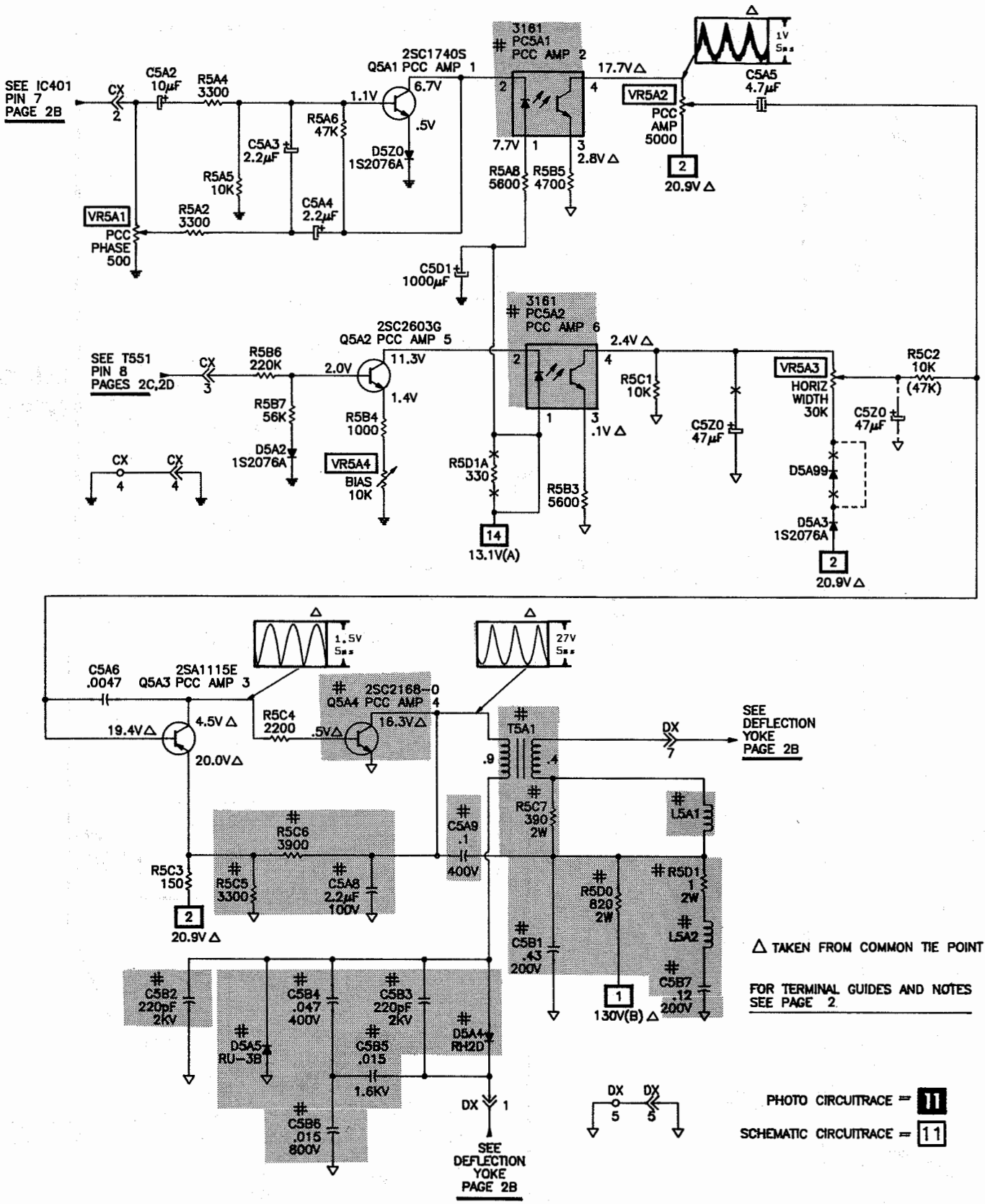


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SCHEMATIC CIRCUITRACE = 11

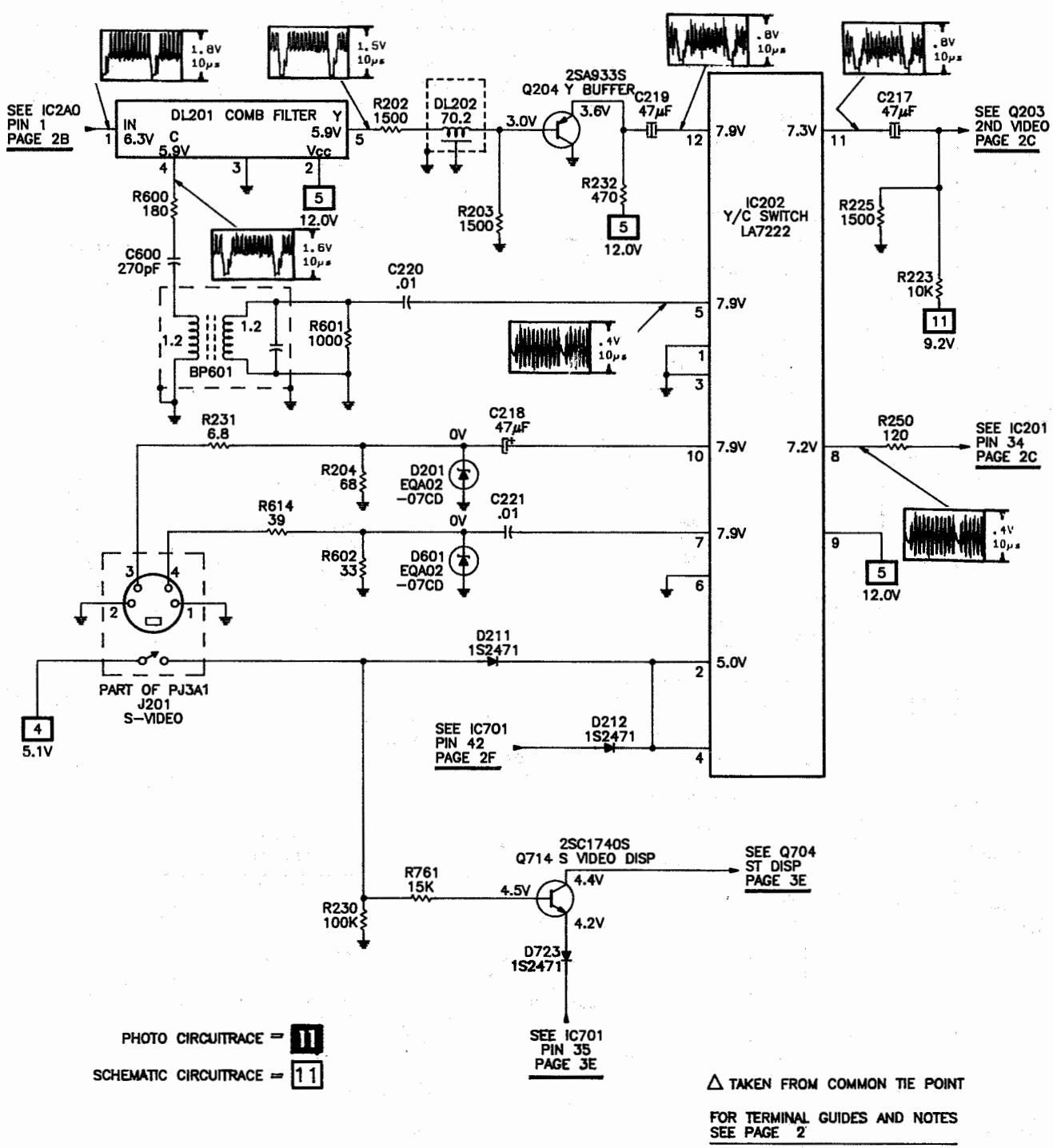
IC FUNCTIONS



C  
PINCUSHION SCHEMATIC

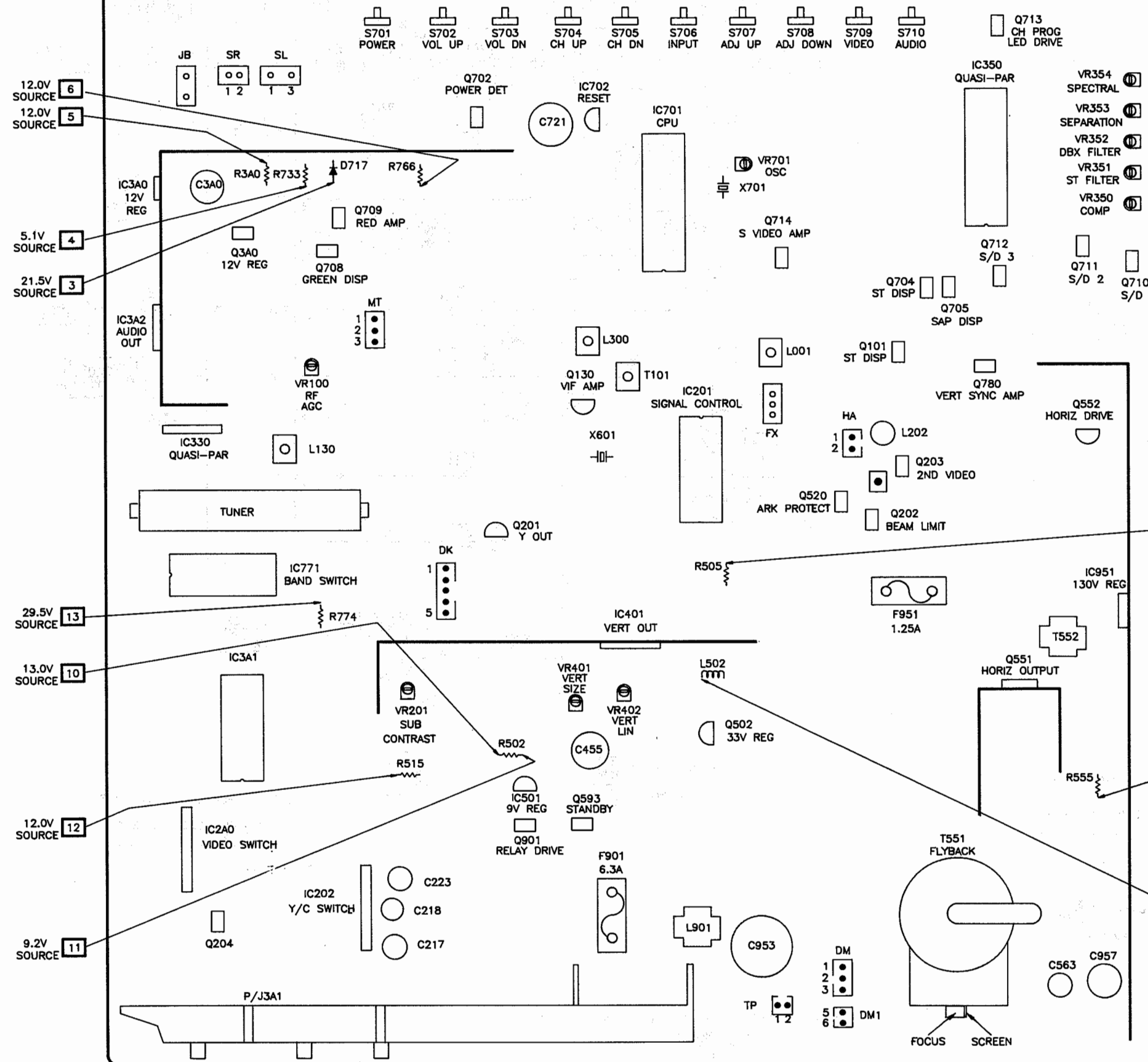


D  
COMB FILTER/VIDEO SCHEMATIC

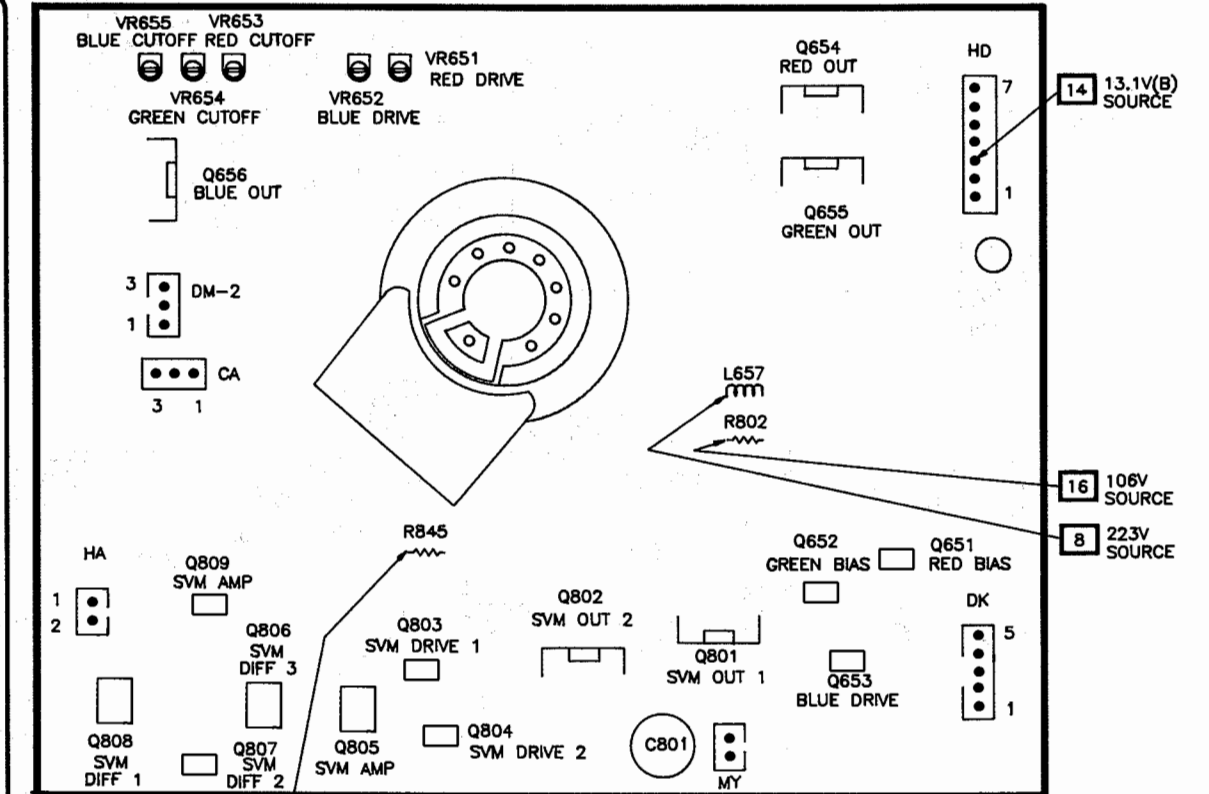


## PLACEMENT CHART

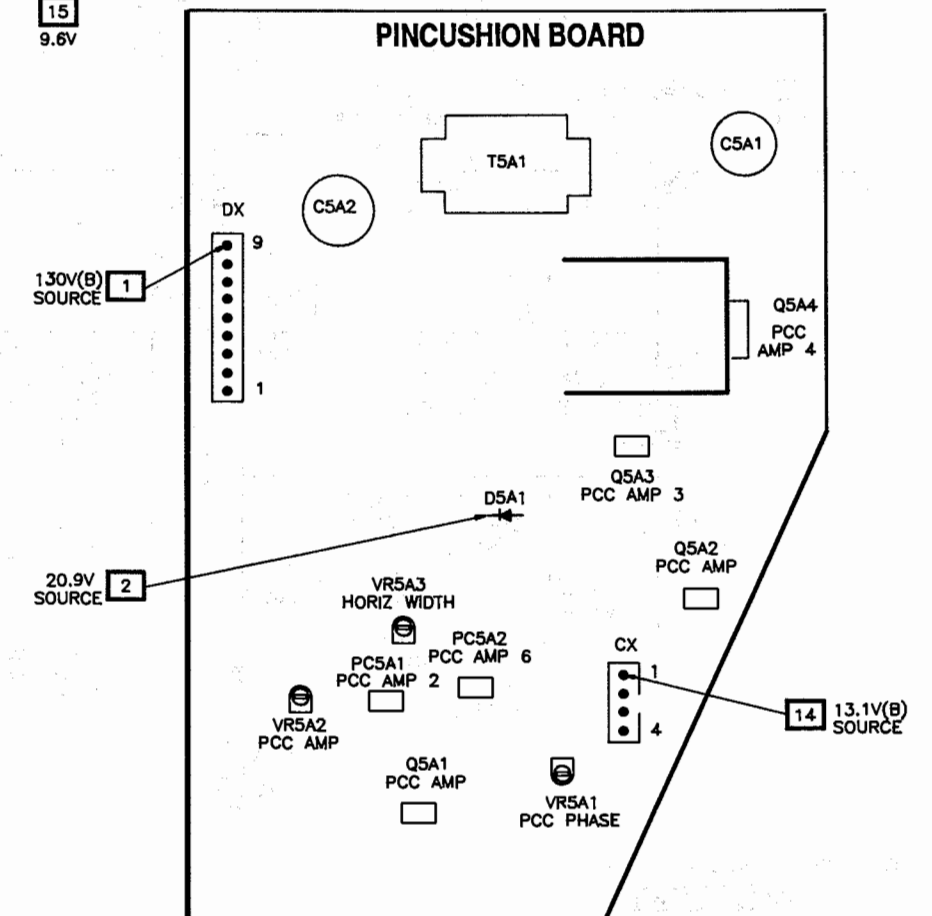
## MAIN BOARD



## CRT BOARD

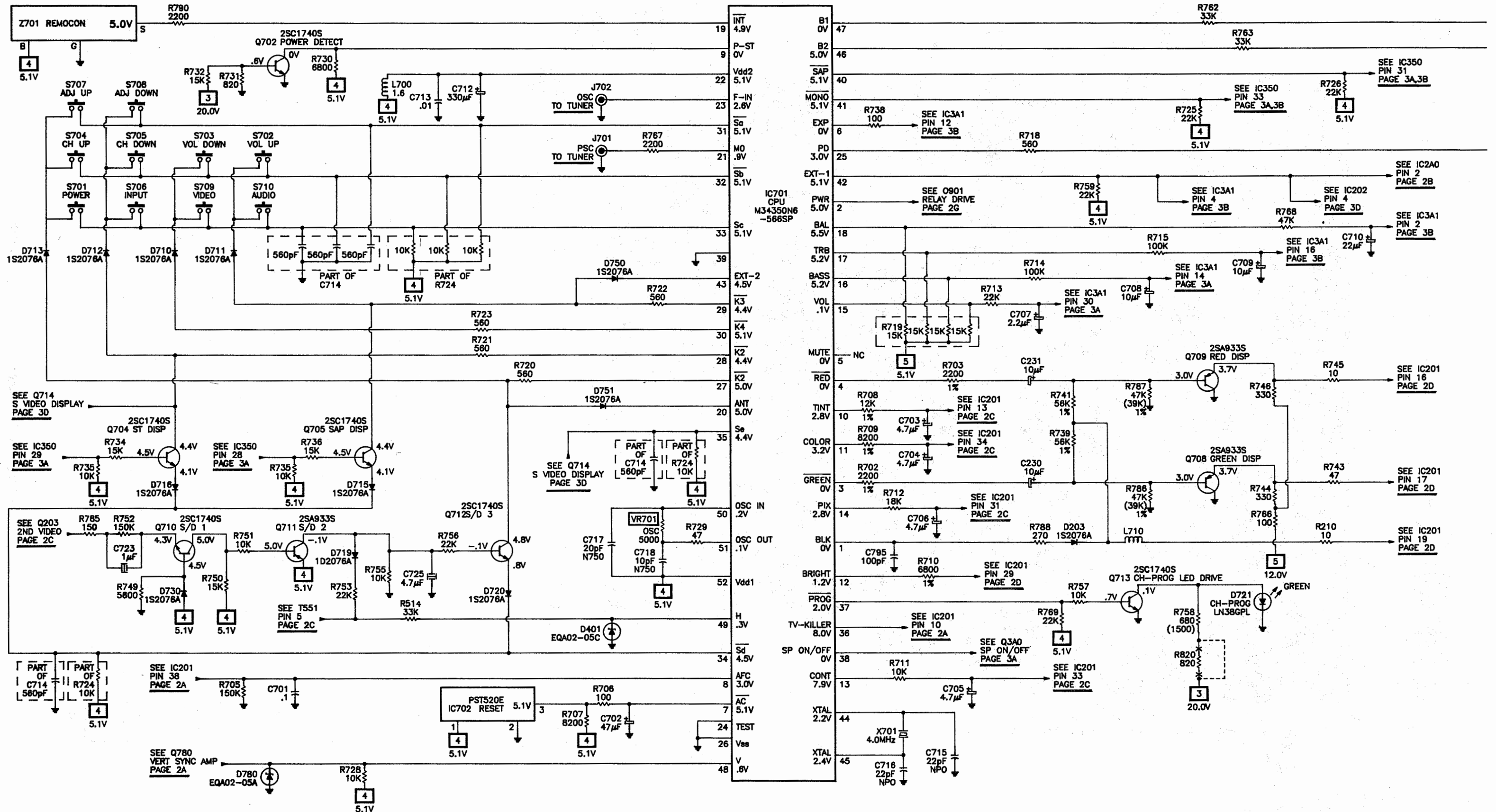


### PINCUSHION BOARD

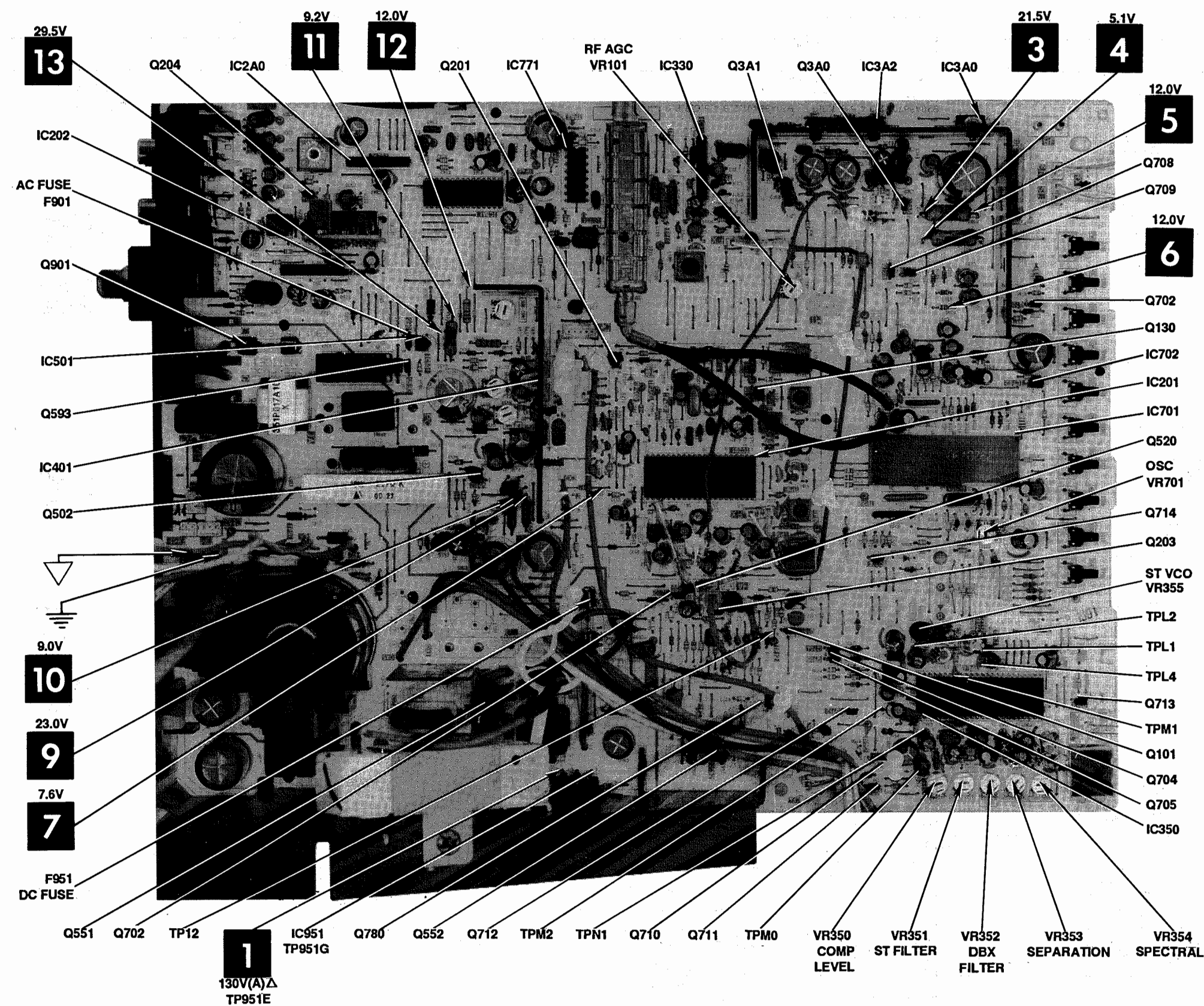




## SYSTEMS CONTROL SCHEMATIC



MAIN BOARD



SYSTEMS CONTROL SCHEMATIC continued

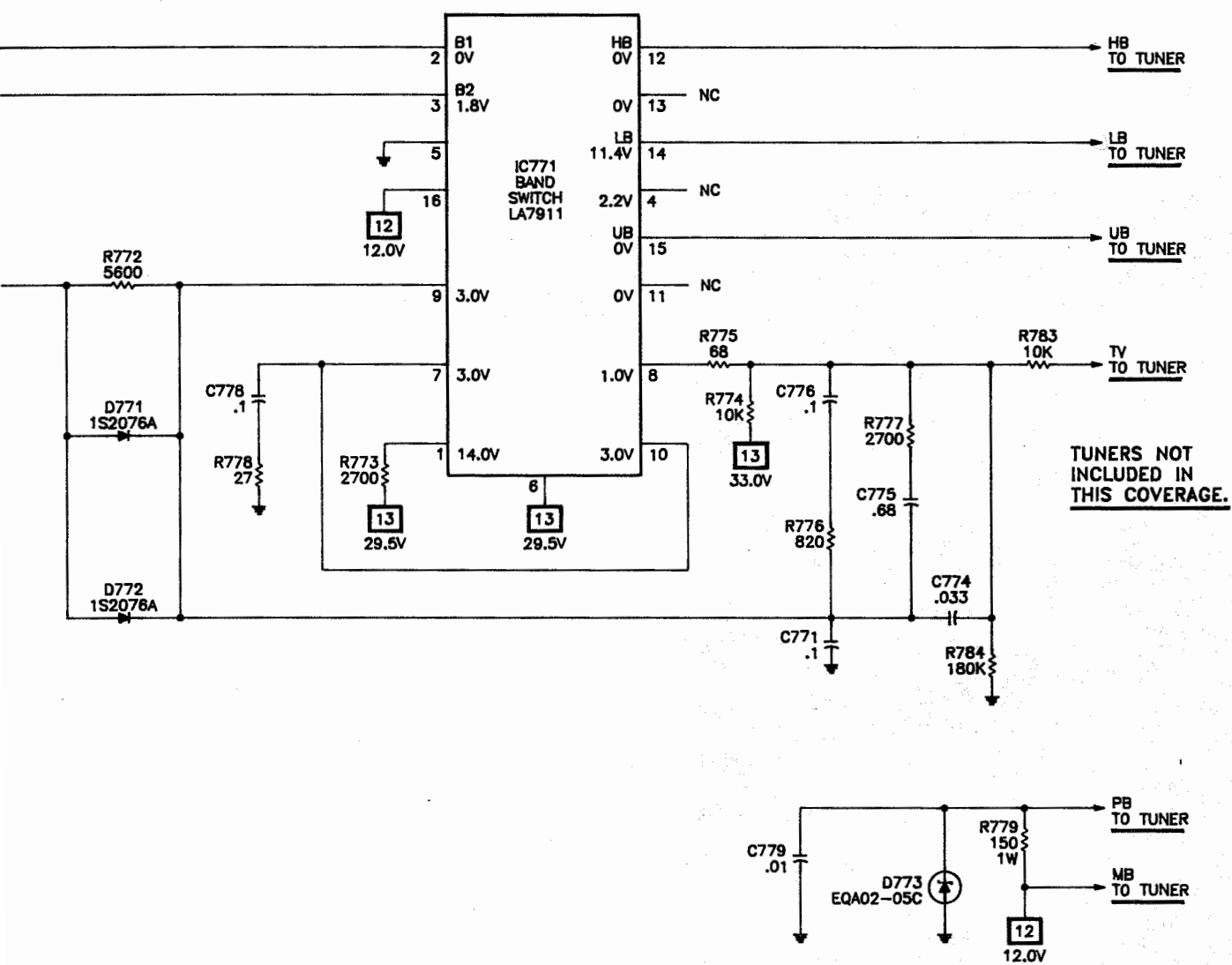
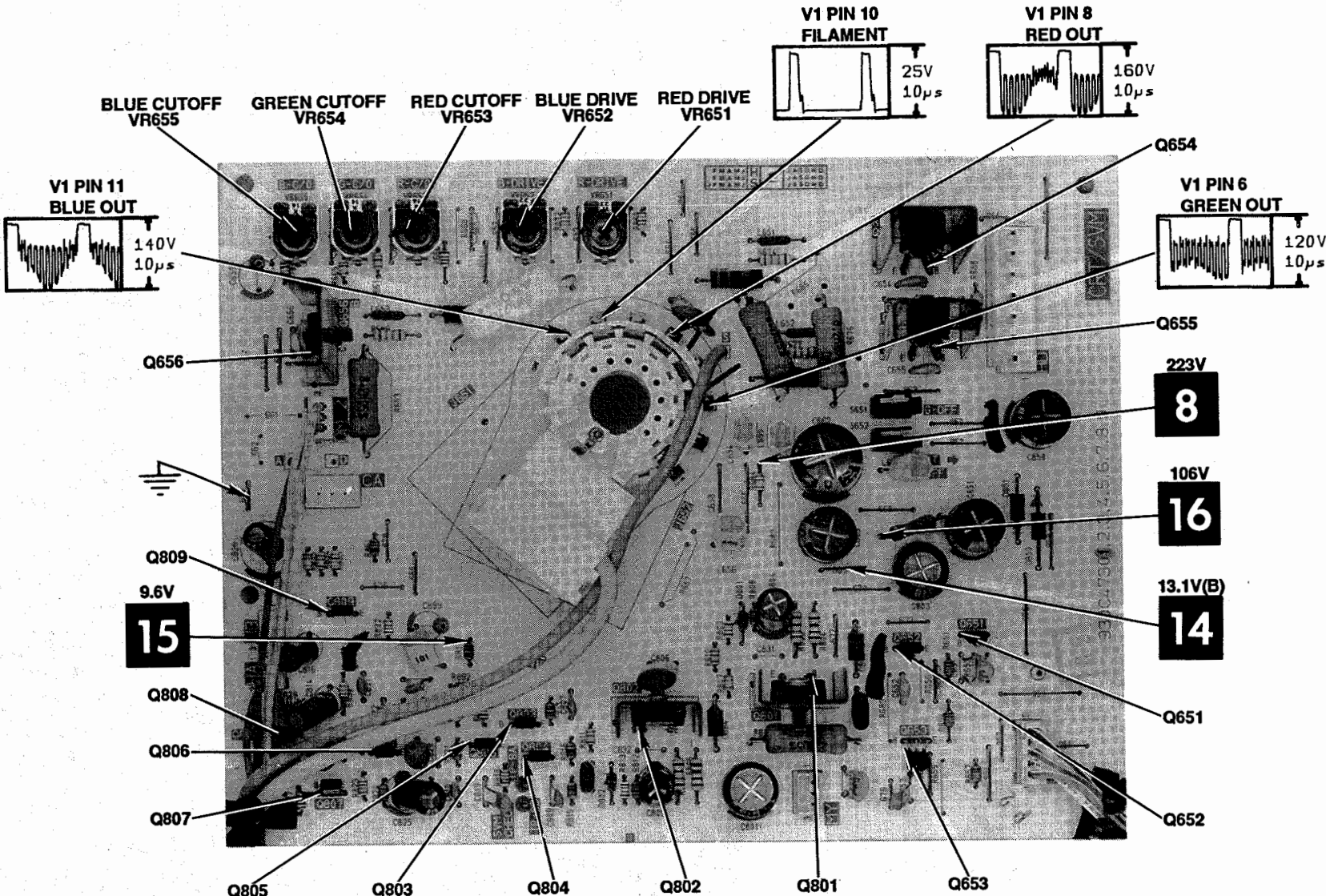


PHOTO CIRCUITRACE = **11**  
SCHEMATIC CIRCUITRACE = **11**

FOR SCHEMATIC NOTES  
SEE PAGE 2

CRT BOARD



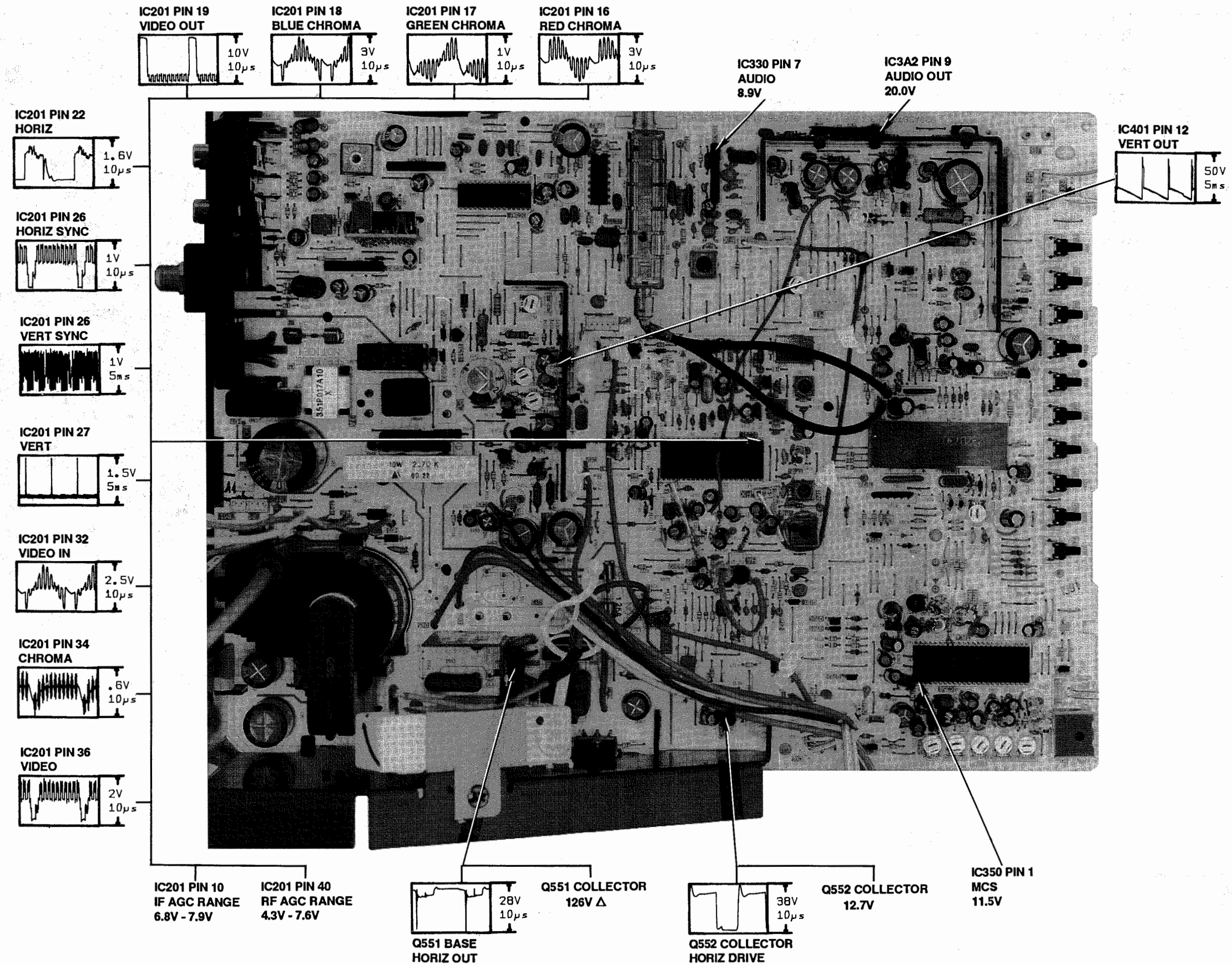
A HOWARD W. SAMS QUICK-CHECKS™ PHOTO

A PHOTOFAC STANDARD NOTATION SCHEMATIC  
WITH CIRCUITRACE  
© Howard W. Sams & Co. 1992

MITSUBISHI Model CS-2710R (Chassis UM2-C)



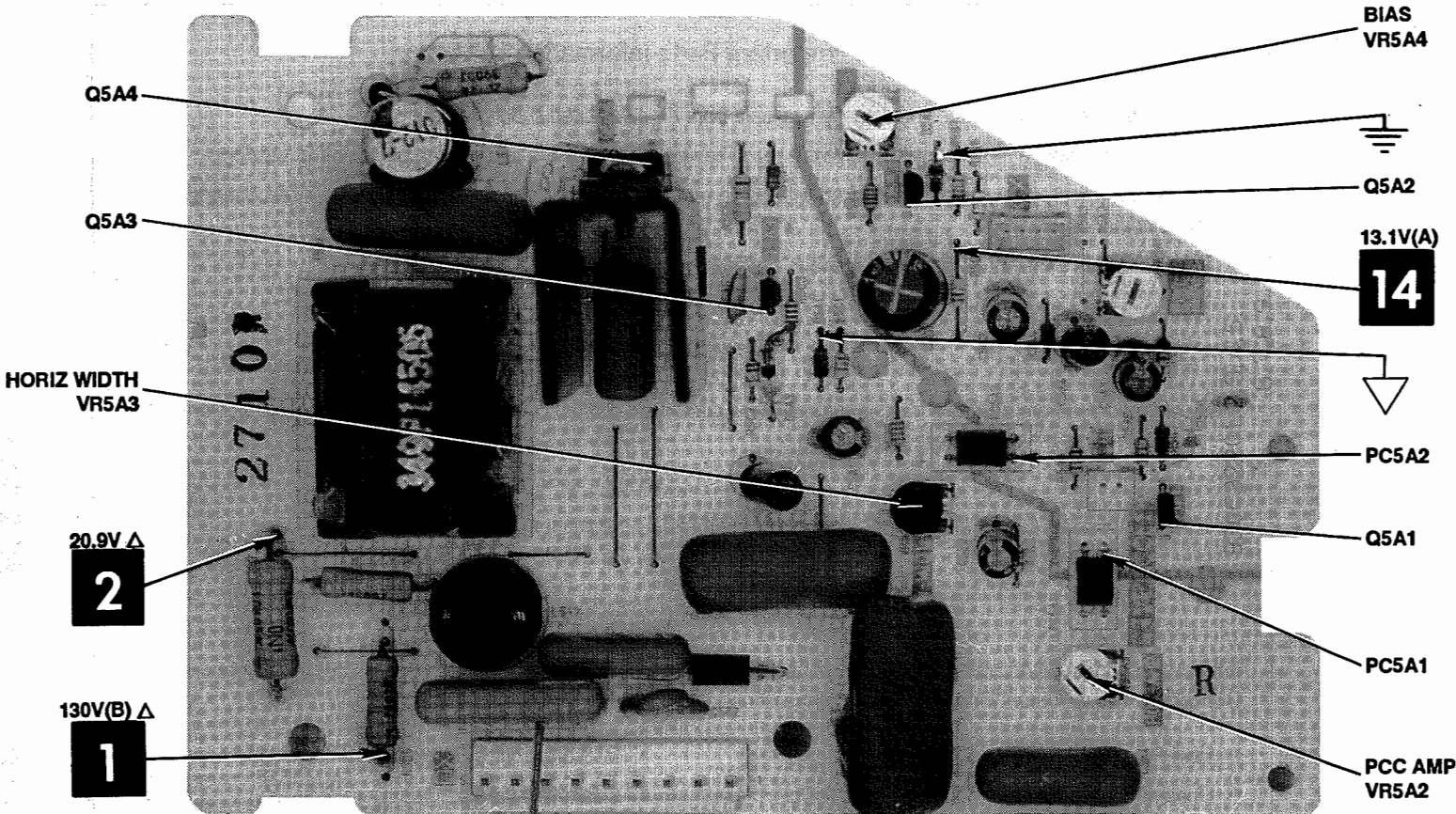
# MAIN BOARD



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PINCUSHION BOARD



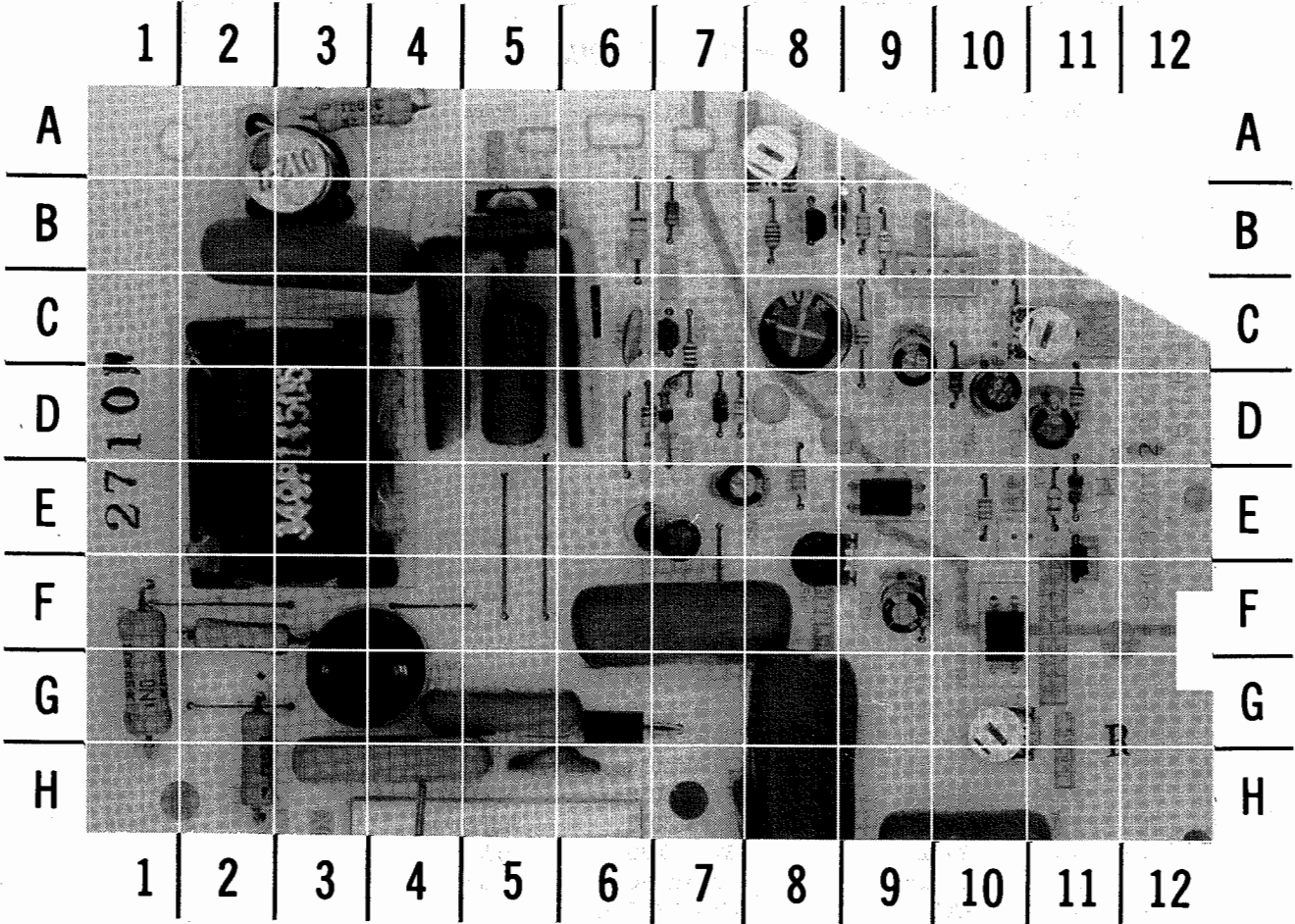
Δ COMMON TIE POINT

Δ TAKEN FROM COMMON TIE POINT

NOTE: ARROWS ON IC'S INDICATE PIN ONE UNLESS NOTED

A HOWARD W. SAMS CIRCUITRACE™ PHOTO

PINCUSHION BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

PINCUSHION BOARD, GRIDTRACE LOCATION GUIDE

|      |      |       |     |       |      |      |      |       |      |
|------|------|-------|-----|-------|------|------|------|-------|------|
| CSA1 | E-8  | CSB5  | H-8 | DSZ0  | E-11 | R5A5 | D-11 | R5C4  | C-5  |
| CSA2 | C-9  | CSB6  | F-7 | DX    | H-6  | R5A6 | E-11 | R5C5  | B-7  |
| CSA3 | D-11 | CSB7  | G-5 | L5A1  | A-3  | R5A8 | E-10 | R5C6  | B-6  |
| CSA4 | D-10 | CSB1  | C-8 | L5A2  | G-3  | R5B3 | E-8  | R5C7  | A-3  |
| CSA5 | E-7  | CSZ0  | F-9 | PC5A1 | F-10 | R5B4 | B-8  | R5D0  | H-2  |
| CSA6 | C-6  | CX    | B-9 | PC5A2 | E-9  | R5B5 | F-9  | R5D1  | F-2  |
| CSA8 | C-5  | D5A1  | D-7 | Q5A1  | F-11 | R5B6 | B-9  | R5D1A | C-9  |
| CSA9 | B-3  | D5A2  | B-9 | Q5A2  | B-8  | R5B7 | B-9  | T5A1  | C-2  |
| CSB1 | H-4  | D5A3  | D-7 | Q5A3  | C-7  | R5B9 | G-1  | VR5A1 | C-11 |
| CSB2 | H-5  | D5A4  | H-8 | Q5A4  | B-5  | R5C1 | D-7  | VR5A2 | G-10 |
| CSB3 | H-8  | D5A5  | G-6 | R5A2  | C-10 | R5C2 | D-6  | VR5A3 | E-8  |
| CSB4 | H-10 | D5A99 | D-7 | R5A4  | D-2  | R5C3 | C-7  | VR5A4 | A-8  |

PARTS LIST continued

MISCELLANEOUS

| Item No. | Description      | Mfr. Part No.  | Notes          |
|----------|------------------|----------------|----------------|
| BP330    | Filter           | 296P067010     | 4.5MHz Ceramic |
| CF100    | Filter           | 296P024020     | 4.5MHz Ceramic |
| CF501    | Resonator        | 299P051030     | Ceramic        |
| DL201    | Delay Line       | 337P096070     | -              |
| DL202    | Delay Line       | 337P110020     | -              |
| # F901   | Fuse             | 283D060030     | 6.3Amps        |
| # F951   | Fuse             | 283D076020     | 1.25Amps       |
| # K901   | Power Relay      | 287P049020     | -              |
| # L991   | Degaussing Coil  | 409B080060     | -              |
| # L554   | Ferrite Bead     | 411P001010     | -              |
| L801     | Ferrite Bead     | 411D009020     | -              |
| # P1     | AC Power Cord    | 242C499040     | -              |
| SF131    | SAW Filter       | 296P065020     | -              |
| SF330    | SAW Filter       | 296P066010     | SAF41MD70Z     |
| S651     | Switch           | 434C021010     | Green Off      |
| S652     | Switch           | 434C021010     | Blue Off       |
| S701     | Switch           | 432P066030     | Power          |
| S702     | Switch           | 432P066030     | Vol Up         |
| S703     | Switch           | 432P066030     | Vol Down       |
| S704     | Switch           | 432P066030     | Ch Up          |
| S705     | Switch           | 432P066030     | Ch Down        |
| S706     | Switch           | 432P066030     | Input          |
| S707     | Switch           | 432P066030     | Adj Up         |
| S708     | Switch           | 432P066030     | Adj Down       |
| S709     | Switch           | 432P066030     | Video          |
| S710     | Switch           | 432P066030     | Audio          |
| # V1     | CRT              | A68AEG20X02    | -              |
| X601     | Crystal          | 285P015010     | 3.58MHz        |
| X701     | Crystal          | 285P029030     | -              |
| Z701     | Preamp           | 939P296090     | -              |
|          | CRT Socket       | 449C081020     | -              |
|          | PC Board         | 930C473001 (1) | CRT            |
|          | Remote Hand Unit | 939P317050     | -              |
|          | Tuner            | 295P081010     | -              |

# For SAFETY use only equivalent replacement part.  
(1) Contact PTS Electronics Corporation for replacement; order by manufacturer's part number.

CABINET PARTS

| Item           | Part No.   |
|----------------|------------|
| Cabinet Front  | 701A491010 |
| Cabinet Rear   | 700C120010 |
| Door           | 702C833080 |
| Door Latch     | 761C352010 |
| Speaker Grille | 702A324010 |

Important Parts Information

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

Obtaining Parts

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

800-428-7267

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

Participating Vendors

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

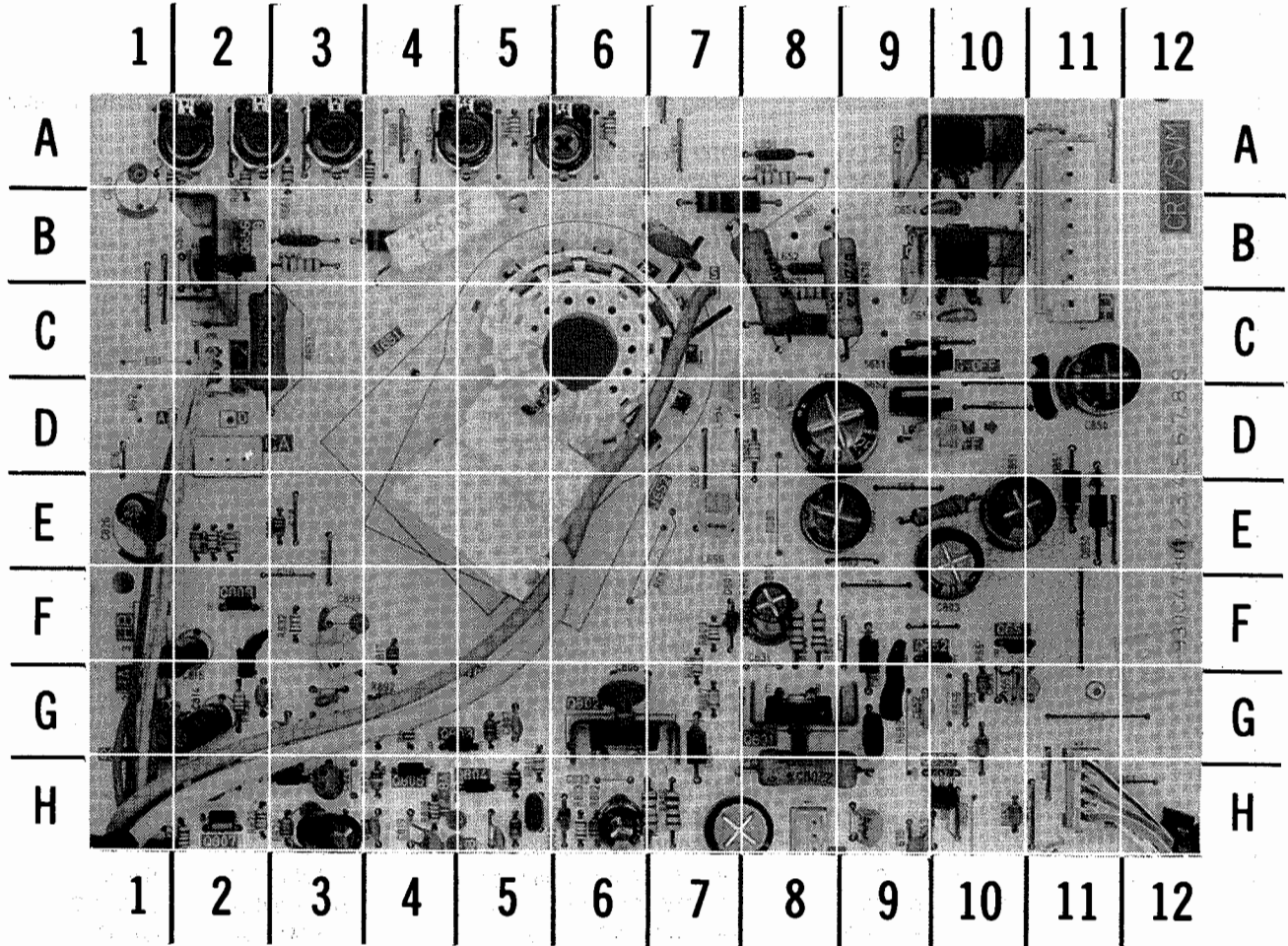
- |  |  |
|--|--|
| ▪ B&K Precision                                | ▪ PTS Electronics Corporation (PTS)            |
| ▪ Custom Components Corporation (Chek-A-Color) | ▪ Quam-Nichols Co. (Quam)                      |
| ▪ EVG / Russell Industries, Inc.               | ▪ Sencore, Inc.                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



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B. Smith, J. Watson

CRT BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

CRT BOARD , GRIDTRACE LOCATION GUIDE

|      |      |      |      |      |      |      |      |       |     |
|------|------|------|------|------|------|------|------|-------|-----|
| C651 | G-10 | C826 | F-1  | Q651 | F-10 | R675 | B-7  | R819  | H-3 |
| C652 | G-9  | C850 | D-11 | Q652 | F-9  | R676 | C-9  | R820A | G-4 |
| C653 | H-9  | C851 | E-10 | Q653 | H-10 | R677 | C-8  | R821  | H-4 |
| C654 | B-10 | C892 | G-3  | Q654 | A-10 | R678 | C-8  | R822  | G-3 |
| C655 | C-10 | CA   | D-2  | Q655 | C-10 | R680 | B-3  | R823  | H-2 |
| C656 | B-2  | D801 | F-7  | Q656 | B-2  | R681 | B-4  | R824  | H-3 |
| C657 | B-7  | D802 | H-6  | Q801 | G-8  | R682 | B-4  | R825  | H-2 |
| C662 | D-8  | D803 | F-9  | Q802 | G-6  | R684 | D-8  | R826  | H-1 |
| C663 | E-9  | D804 | G-7  | Q803 | G-4  | R688 | B-10 | R827  | H-2 |
| C801 | H-7  | D850 | E-11 | Q804 | H-5  | R801 | H-8  | R828  | G-1 |
| C802 | H-9  | D851 | E-11 | Q805 | H-4  | R802 | E-10 | R829  | G-1 |
| C803 | F-10 | DK   | H-11 | Q806 | H-3  | R803 | F-8  | R830  | G-2 |
| C804 | F-8  | DM2  | D-2  | Q807 | H-2  | R804 | F-8  | R832  | F-3 |
| C805 | H-6  | HA   | G-1  | Q808 | G-1  | R805 | H-9  | R833  | E-2 |
| C806 | G-6  | HD   | C-11 | Q809 | F-2  | R806 | H-7  | R834  | E-2 |
| C807 | G-5  | L651 | A-8  | R651 | G-10 | R807 | G-7  | R835  | E-2 |
| C808 | H-5  | L652 | B-8  | R653 | C-2  | R808 | F-8  | R845  | G-5 |
| C809 | H-5  | L653 | B-3  | R654 | G-10 | R809 | F-7  | R852  | G-4 |
| C810 | H-4  | L654 | D-7  | R657 | H-10 | R810 | G-7  | R861  | E-3 |
| C811 | G-3  | L655 | D-8  | R661 | A-3  | R811 | H-5  | R892  | G-4 |
| C812 | G-3  | L656 | E-7  | R663 | A-6  | R812 | H-6  | S651  | C-9 |
| C813 | H-2  | L657 | D-10 | R665 | A-2  | R813 | H-6  | S652  | D-9 |
| C814 | G-2  | L801 | G-9  | R666 | A-4  | R814 | G-5  | VR651 | A-6 |
| C816 | F-2  | L802 | H-3  | R670 | A-1  | R815 | H-5  | VR652 | A-5 |
| C819 | H-4  | L803 | H-2  | R672 | A-5  | R816 | H-5  | VR653 | A-3 |
| C821 | G-2  | L892 | G-3  | R673 | B-8  | R817 | F-4  | VR654 | A-2 |
| C825 | H-3  | MY   | H-8  | R674 | A-8  | R818 | H-4  | VR655 | A-2 |

mitsubishi

Model CS-2710R (Chassis UM2-C)

PARTS LIST continued

CONTROLS

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

| Item No. | Function      | Resistance | Mfr. Part No. |
|----------|---------------|------------|---------------|
| VR100    | RF AGC        | 50K        | 127C081010    |
| VR201    | Sub Contrast  | 50K        | 127C081010    |
| VR350    | Comp Level    | 5000       | 127C080070    |
| VR351    | Stereo Filter | 10K        | 127C080080    |
| VR352    | DBX Filter    | 50K        | 127C081010    |
| VR353    | Separation    | 100K       | 127C081020    |
| VR354    | Spectral      | 100K       | 127C081020    |
| VR355    | Stereo VCO    | 50K        | 127C091010    |
| VR401    | Vert Size     | 50K        | 127C081010    |
| VR402    | Vert Lin      | 10K        | 127C080080    |
| VR5A1    | PCC Phase     | 500        | 127C080030    |
| VR5A2    | PCC Amp       | 5000       | 127C080070    |
| VR5A3    | Horiz Width   | 30K        | 127C091000    |
| VR5A4    | Bias          | 10K        | 127C080080    |
| VR651    | Red Drive     | 200        | 127C020010    |
| VR652    | Blue Drive    | 200        | 127C020010    |
| VR653    | Red Cutoff    | 10K        | 127C020080    |
| VR654    | Green Cutoff  | 10K        | 127C020080    |
| VR655    | Blue Cutoff   | 10K        | 127C020080    |
| VR701    | OSC           | 5000       | 127C080070    |

CAPACITORS

| Item   | Rating           | Mfr. Part No. |
|--------|------------------|---------------|
| C5B1   | .43 200V 5%      | 189P071060    |
| C5B7   | .12 200V 5%      | 189P071040    |
| # C552 | .0022 1.6KV 5%   | 172P179950    |
| # C570 | .0015 2KV 10%    | 154P252000    |
| # C901 | .1 125V / 250VAC | 189P033050    |
| # C910 | .01 250V AC      | 189P133010    |
| # C911 | .01 250V AC      | 189P133010    |
| # C954 | .0022 500V       | 142P014000    |
| # C955 | .0022 250VAC     | 189P060060    |
| # C956 | .0022 250VAC     | 189P060060    |

# For SAFETY use only equivalent replacement part.

COILS (RF-IF)

| Item No. | Rating          | Mfr. Part No. |
|----------|-----------------|---------------|
| BP601    | Chroma Bandpass | 349P159040    |
| L100     | VIF             | 323P172010    |
| L101     | VIF 45.75MHz    | 323P171010    |
| L102     | 12uH            | 325C106040    |
| L130     | Trap            | 320P026030    |
| L134     | .82uH           | 325C125000    |
| L137     | 1.2uH           | 325C110020    |
| L200     | 8.2uH           | 325C101020    |
| L201     | 8.2uH           | 325C101020    |
| L202     | 100uH           | 325C177050    |
| L300     | SIF             | 327P073020    |
| L331     | 1.5uH           | 325C110030    |
| L333     | 18uH            | 325C106060    |
| L340     | 1.2uH           | 325C100020    |
| L501     | 33uH            | 321C031090    |
| L502     | 1uH             | 321C030010    |
| # L5A2   | Filter          | 409P252020    |
| L651     | 68uH            | 325C202030    |
| L652     | 68uH            | 325C202030    |
| L653     | 68uH            | 325C202030    |
| L654     | -               | 325C307030    |
| L655     | -               | 325C307030    |
| L656     | -               | 325C307030    |
| L657     | 15uH            | 325C306050    |
| L700     | 10uH            | 325C121030    |
| L802     | 10uH            | 325C106030    |
| L803     | 150uH           | 325C107070    |
| L892     | 100uH           | 325C307050    |
| T101     | VIF             | 323P173010    |

# For SAFETY use only equivalent replacement part.

ELECTROLYTIC CAPACITORS

| Item   | Rating       | Mfr. Part No. |
|--------|--------------|---------------|
| # C214 | 33 16V NP    | 181P121060    |
| # C506 | 100 16V      | -             |
|        | .001 50V 10% | 141P190090    |
| # C583 | 10 50V       | 181P118080    |
| # C953 | 820 180V     | 185D052040    |
| # C957 | 47 200V      | 181P189080    |
| # C960 | 10 160V      | 181P188060    |

# For SAFETY use only equivalent replacement part.

RESISTORS

| Item No. | Rating                    | Mfr. Part No. | NTE Replacement |
|----------|---------------------------|---------------|-----------------|
| # R111   | 4700 1/6W 5% Carbon       | 103P713030    | -               |
| # R3C4   | 2.2 1/6W 5% Carbon        | 103P715060    | -               |
| # R3C5   | 2.21/6W 5% Carbon         | 103P714070    | -               |
| # R507   | 1200 1/6W 5% Carbon       | 103P712060    | -               |
| # R508   | 470 1/6W 5% Carbon        | 103P712010    | -               |
| # R510   | 680 1/6W 5% Carbon        | 103P712030    | -               |
| # R515   | 5.6 1/2W 5% Fusible       | 103P398090    | -               |
| # R516   | 10 1/4W 5% Carbon         | 103P320010    | QW010           |
| # R517   | 10 1/4W 5% Carbon         | 103P410010    | QW010           |
| # R520   | 1300 1/4W 1% Metal Film   | 103P462080    | -               |
| # R555   | 3.9 5W 10% Wirewound      | 109D055070    | 5W3D9           |
| # R556   | 33K 1/4W 5% Carbon        | 103P414030    | QW333           |
| # R557   | 30K 1/4W 1% Metal Film    | 103P466000    | -               |
| # R558   | 1.2 1/4W 5% Carbon        | 103P338010    | QW1D2           |
| # R560   | 1.2 1/4W 5% Carbon        | 103P338010    | QW1D2           |
| # R561   | 1.2 1/4W 5% Carbon        | 103P338010    | QW1D2           |
| # R585   | 1.2 1/4W 5% Carbon        | 103P338010    | QW1D2           |
| # R594   | 3300 1/4W 5% Carbon       | 103P413010    | QW233           |
| # R595   | 22K 1/4W 5% Carbon        | 103P414010    | QW322           |
| # R598   | 2200 1/4W 5% Carbon       | 103P412090    | QW222           |
| # R682   | 1.2 2W 5% Fusible         | 103P438010    | F2W1D2          |
| R719     | 15K 1/8W Network          | 103P543090    | -               |
| R724     | 10K 1/8W Network          | 109P054060    | -               |
| # R910   | 4.7M 1/2W 10% Composition | 109D036020    | HW547           |
| # R954   | 120 30W 10% Wirewound     | 109D105010    | -               |
| # R956   | 820K 1/2W 10% Composition | 101P824030    | HW482           |
| # R957   | 2.7 10W 10% Wirewound     | 109D067070    | 10W2D7          |
| # R960   | 330K 1/4W 5% Carbon       | 103P415050    | QW433           |
| # R961   | 12K 1W 5% Metal Film      | 103C173080    | 1W312           |
| # R962   | 470 1/4W 5% Carbon        | 103P412010    | QW147           |
| # RP901  | 9.6 Cold PTC              | 265P071040    | -               |

# For SAFETY use only equivalent replacement part.

SPEAKERS

| Item No.     | Description     | Mfr. Part No. | Quam Part No. |
|--------------|-----------------|---------------|---------------|
| SP391, SP392 | 4" sq. 8 Ohm 5W | 480P400010    | -             |

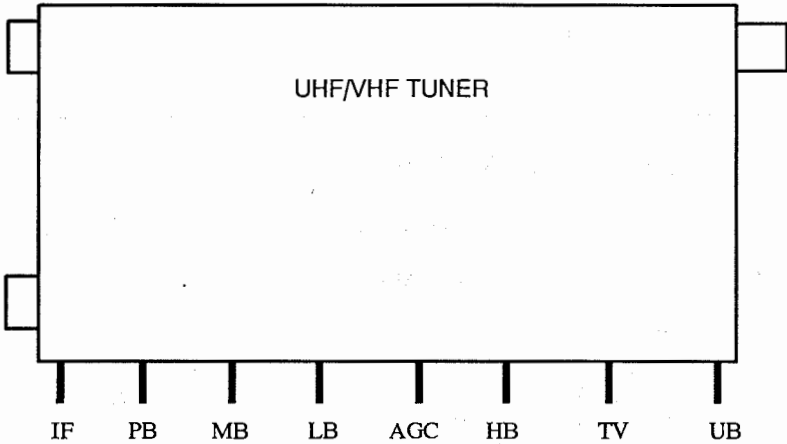


TUNER INFORMATION

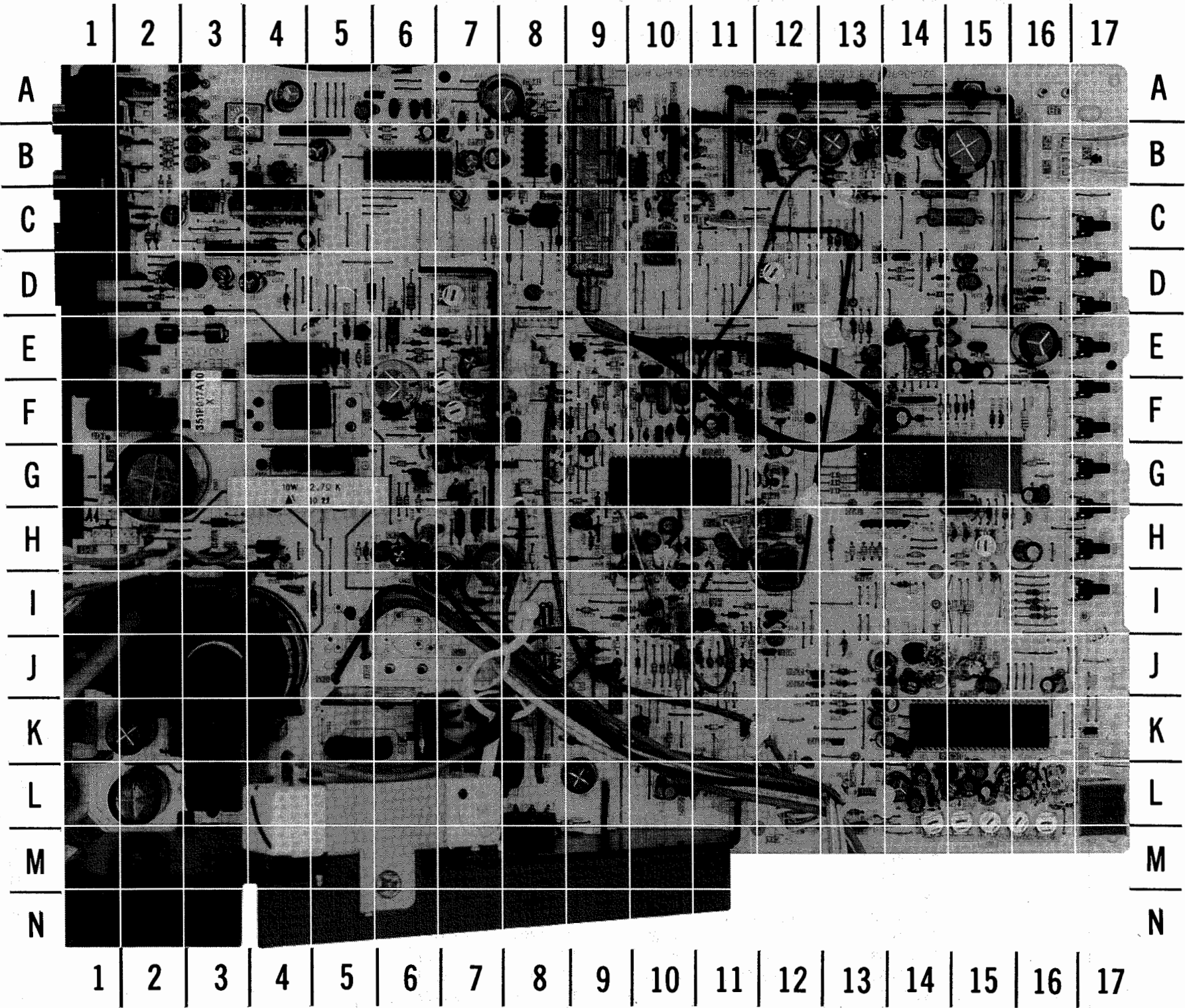
| TUNER VOLTAGE CHART |              |               |          |
|---------------------|--------------|---------------|----------|
| Pin                 | VHF Low Band | VHF High Band | UHF Band |
| PB                  | 5.0V         | 5.0V          | 5.0V     |
| MB                  | 12.0V        | 12.0V         | 12.0V    |
| LB                  | 11.4V        | 0V            | 0V       |
| AGC                 | 6.8V         | 6.8V          | 6.8V     |
| HB                  | 0V           | 11.8V         | 0V       |
| TV                  | 1.2V         | 4.2V          | 6.5V     |
| UB                  | 0V           | 0V            | 11.8V    |

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

TUNER TERMINAL GUIDE



MAIN BOARD



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. |
| Q654, 5, 6                             | 2SC3789D   | -             | NTE157       | ECG157       | SK3747       |
|  | 2SC3789-C  | 260P571010    | NTE157       | ECG157       | SK3747       |
|  | 2SC3789    | -             | NTE157       | ECG157       | SK3747       |
| Q702, 4, 5                             | 2SC3789-D  | 260P571010    | NTE157       | ECG157       | SK3747       |
|  | 2SC1740S   | 260P559030    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-E  | -             | NTE289A      | ECG289A      | SK9137       |
| Q708, 9                                | 2SC2603-F  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SA933S    | -             | NTE290A      | ECG290A      | SK9132       |
|  | 2SA933S-S  | 260P560040    | NTE290A      | ECG290A      | SK9132       |
| Q710                                   | 2SA1115-F  | -             | NTE290A      | ECG290A      | SK9138       |
|  | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
| Q711                                   | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SA933S    | -             | NTE290A      | ECG290A      | SK9132       |
|  | 2SA933S-Q  | 260P560050    | NTE290A      | ECG290A      | SK9132       |
| Q712, 3, 4                             | 2SA1115    | -             | NTE290A      | ECG290A      | SK9138       |
|  | 2SC1740S   | 260P559030    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-E  | -             | NTE289A      | ECG289A      | SK9137       |
| Q780                                   | 2SC2603-F  | -             | NTE289A      | ECG289A      | SK9137       |
|  | DTC124ES   | 260P632010    | NTE2357      | ECG2357      | SK9742       |
| Q801                                   | 2SB940AP   | -             | NTE398       | ECG398       | SK9363       |
|  | 2SB940A-P  | 260P573020    | NTE398       | ECG398       | SK9363       |
|  | 2SB940-P   | -             | NTE398       | ECG398       | SK9363       |
| Q802                                   | 2SD1264AP  | -             | NTE375       | ECG375       | SK9118       |
|  | 2SD1264A-P | 260P574020    | NTE375       | ECG375       | SK9118       |
|  | 2SD1264-D  | -             | NTE375       | ECG375       | SK9118       |
| Q803                                   | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-F  | -             | NTE289A      | ECG289A      | SK9137       |
| Q804                                   | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SA933S    | -             | NTE290A      | ECG290A      | SK9132       |
|  | 2SA933S-S  | 260P560040    | NTE290A      | ECG290A      | SK9132       |
| Q805                                   | 2SA1115-F  | -             | NTE290A      | ECG290A      | SK9138       |
|  | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
| Q806                                   | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC1740S   | 260P559030    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-E  | -             | NTE289A      | ECG289A      | SK9137       |
| Q807, 8, 9                             | 2SC2603-F  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
| Q901                                   | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
| Q3A0, 1                                | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC1740S   | 260P560040    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-E  | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC2603-F  | -             | NTE289A      | ECG289A      | SK9137       |

| SEMICONDUCTORS continued                           |            |               |              |              |              |
|--|------------|---------------|--------------|--------------|--------------|
| (Select replacement for best results.)             |            |               |              |              |              |
| Item No.   | Type No.   | Mfr. Part No. | NTE Part No. | ECG Part No. | TCE Part No. |
| Q5A1   | 2SC1740S   | -             | NTE85        | ECG85        | SK3122       |
|  | 2SC1740S-E | 260P559050    | NTE85        | ECG85        | SK3122       |
|  | 2SC2603-G  | -             | NTE289A      | ECG289A      | SK9137       |
| Q5A2   | 2SC2603G   | -             | NTE289A      | ECG289A      | SK9137       |
|  | 2SC2603-G  | 260P338050    | NTE289A      | ECG289A      | SK9137       |
|  | 2SA1115E   | -             | NTE290A      | ECG290A      | SK9138       |
| Q5A3   | 2SA1115-E  | 260P254010    | NTE290A      | ECG290A      | SK9138       |
|  | 2SC2168-O  | 260P428020    | NTE375       | ECG375       | SK3929       |
|  | 2SC2168Y   | 260P428020    | NTE375       | ECG375       | SK3929       |
| # Q5A4   | 2SC2073-B  | -             | NTE375       | ECG375       | SK3929       |
|  | 2SC2073-C  | -             | NTE375       | ECG375       | SK3929       |
|  | 2SD401A-K  | -             | NTE375       | ECG375       | SK3929       |
|  | 2SD401A-L  | -             | NTE375       | ECG375       | SK3929       |
|  |            |               |              |              |              |
| # For SAFETY use only equivalent replacement part. |            |               |              |              |              |

| COILS & TRANSFORMERS                               |  |               |             |                  |
|--|--|---------------|-------------|------------------|
| Item No.   | Function   | Mfr. Part No. | On-Unit No. | Russell Part No. |
| # L491   | Yoke 110 <sup>5</sup> Horiz .97mH<br>Vert 21.5mH | (1)           | 2G27007-504 | -                |
| # L5A1   | Horiz Lin 20.6                                   | 333P012070    | -           | -                |
| # L901   | Line Filter                                      | 351P017010    | -           | -                |
| # T551   | Horiz Output                                     | 334P160040    | -           | FBT-296          |
| # T552   | Horiz Drive                                      | 336P012040    | P01240      | -                |
| # T5A1   | Side Pincushion                                  | 349P145050    | -           | -                |
| # T991   | Power  | 350P439090    | -           | -                |
| # For SAFETY use only equivalent replacement part. |  |               |             |                  |
| (1) Permanently bonded part of CRT.                |  |               |             |                  |

## MAIN BOARD, GRIDTRACE LOCATION GUIDE

|       |      |       |      |      |      |       |      |       |      |       |      |      |      |       |      |      |      |       |      |              |      |
|-------|------|-------|------|------|------|-------|------|-------|------|-------|------|------|------|-------|------|------|------|-------|------|--------------|------|
| BP330 | B-11 | C360  | L-15 | C611 | F-10 | C3A2  | A-5  | D710  | I-16 | L102  | J-12 | R133 | E-11 | R455  | G-7  | R614 | C-2  | R766  | D-14 | R3G3         | B-2  |
| BP601 | C-3  | C361  | L-16 | C612 | F-10 | C3A3  | A-6  | D711  | I-16 | L130  | C-10 | R140 | B-9  | R456  | E-6  | R630 | E-9  | R767  | F-17 | R3G5         | A-2  |
| C100  | G-12 | C362  | L-16 | C613 | F-9  | C3A4  | A-6  | D712  | I-16 | L134  | E-12 | R199 | C-10 | R457  | F-6  | R701 | C-12 | R768  | E-14 | R3G8         | B-2  |
| C101  | G-12 | C363  | L-16 | C617 | H-11 | C3A5  | B-7  | D713  | I-16 | L137  | E-11 | R200 | B-4  | R460  | G-6  | R702 | F-15 | R769  | H-14 | R3G9         | B-2  |
| C102  | H-12 | C364  | L-16 | C618 | H-11 | C3A6  | A-6  | D715  | J-13 | L200  | C-11 | R201 | B-4  | R480* | F-7  | R703 | F-15 | R772  | E-13 | RF901        | F-4  |
| C103  | H-12 | C365  | J-16 | C619 | E-8  | C3A7  | A-6  | D716  | J-13 | L201  | D-8  | R202 | B-4  | R492  | E-6  | R705 | E-15 | R773  | B-8  | S701         | C-17 |
| C104  | H-12 | C366  | K-14 | C620 | J-11 | C3A8  | A-7  | D717  | C-15 | L202  | I-11 | R203 | B-3  | R493  | E-6  | R706 | F-16 | R774  | C-8  | S702         | D-17 |
| C105  | E-8  | C367  | K-13 | C700 | H-16 | C3A9  | B-14 | D719  | L-13 | L300  | F-12 | R204 | D-2  | R500  | K-11 | R707 | E-16 | R775  | C-8  | S703         | D-17 |
| C106  | G-11 | C368  | J-15 | C701 | E-15 | C3C0  | C-14 | D720  | K-13 | L331  | A-10 | R206 | E-8  | R502  | E-6  | R708 | F-15 | R776  | C-8  | S704         | E-17 |
| C107  | F-11 | C369  | J-15 | C702 | G-16 | C3C1  | B-11 | D721  | L-17 | L333  | B-11 | R208 | F-8  | R503  | F-8  | R709 | F-15 | R777  | C-8  | S705         | F-17 |
| C108  | F-11 | C370  | J-14 | C703 | E-15 | C3C2  | B-14 | D722  | D-16 | L340  | C-10 | R210 | D-8  | R504  | F-8  | R710 | F-15 | R778  | C-8  | S706         | F-17 |
| C109  | F-11 | C371  | J-14 | C704 | E-15 | C3C3  | B-13 | D723  | I-14 | L501  | H-7  | R211 | E-9  | R505  | G-8  | R711 | F-15 | R779  | B-10 | S707         | G-17 |
| C110  | F-11 | C372  | L-14 | C705 | E-13 | C3C4  | B-13 | D730  | L-14 | L502  | H-7  | R212 | K-10 | R506  | G-8  | R712 | F-14 | R781  | G-13 | S708         | H-17 |
| C139  | F-11 | C373  | J-14 | C706 | E-13 | C3C5  | A-11 | D750  | J-13 | L554  | L-6  | R213 | J-11 | R507  | H-9  | R713 | E-14 | R783  | B-9  | S709         | H-17 |
| C200  | B-4  | C374  | K-13 | C707 | E-15 | C3C6  | A-12 | D751  | H-13 | L700  | F-14 | R214 | J-10 | R508  | H-9  | R714 | E-14 | R784  | C-9  | S710         | I-17 |
| C201  | C-4  | C375  | J-14 | C708 | E-15 | C3C7  | B-12 | D771  | E-13 | L710  | C-13 | R215 | J-9  | R509  | H-10 | R715 | E-14 | R785  | J-10 | SF131        | E-12 |
| C205  | J-11 | C400  | H-10 | C709 | E-14 | C3C8  | B-13 | D772  | E-13 | L900  | F-3  | R217 | J-11 | R510  | G-9  | R718 | F-13 | R786  | D-14 | SF330        | B-10 |
| C206  | H-11 | C401  | H-10 | C710 | E-14 | C3D0  | A-3  | D773  | C-9  | PC    | F-5  | R218 | J-11 | R511  | J-10 | R719 | F-14 | R787  | D-14 | SL           | B-16 |
| C207  | I-11 | C450  | E-7  | C711 | D-16 | C3D1  | A-3  | D780  | H-15 | PJ3A1 | B-1  | R219 | J-11 | R512  | G-9  | R720 | H-13 | R788  | F-16 | SR           | B-16 |
| C208  | J-10 | C452  | F-7  | C712 | F-14 | C3D2  | B-3  | D901  | E-5  | Q101  | J-12 | R220 | J-11 | R514  | H-8  | R721 | H-13 | R790  | G-16 | T101         | F-11 |
| C209  | I-10 | C453  | G-7  | C713 | F-14 | C3D3  | B-3  | D953  | G-4  | Q130  | F-11 | R221 | I-10 | R515  | D-6  | R722 | H-13 | R820  | J-17 | T551         | J-3  |
| C210  | H-10 | C454  | F-6  | C714 | H-14 | C3E0  | C-7  | D2000 | J-9  | Q201  | E-1  | R222 | I-9  | R516  | L-13 | R723 | H-13 | R910  | H-1  | T552         | K-8  |
| C212  | J-9  | C455  | F-6  | C715 | H-15 | C3F0  | B-12 | D3A0  | B-16 | Q202  | I-10 | R223 | J-10 | R517  | C-11 | R724 | H-14 | R954  | L-6  | TP12         | J-11 |
| C213  | I-10 | C458  | F-7  | C716 | H-15 | CF100 | I-12 | D3A2  | C-13 | Q203  | I-10 | R224 | J-10 | R518  | E-11 | R725 | H-15 | R956  | G-5  | TP951E       | L-8  |
| C214  | H-6  | C459  | G-7  | C717 | I-15 | CF501 | H-9  | D3A3  | C-13 | Q204  | B-3  | R225 | J-10 | R520  | H-8  | R726 | H-15 | R957  | G-4  | TP951G       | L-8  |
| C217  | D-3  | C460  | G-7  | C718 | I-15 | D201  | D-2  | D3F0  | B-13 | Q502  | G-6  | R226 | J-10 | R521  | I-7  | R727 | K-11 | R960  | K-9  | TPL1         | J-15 |
| C218  | D-3  | C480* | F-7  | C719 | H-16 | D202  | E-9  | D3F1  | B-13 | Q520  | I-10 | R228 | H-10 | R522  | E-7  | R728 | H-15 | R961  | K-9  | TPL2         | L-14 |
| C219  | C-2  | C491  | E-7  | C721 | E-16 | D203  | D-15 | DL201 | C-4  | Q551  | K-6  | R230 | D-2  | R530  | G-6  | R729 | H-15 | R962  | L-9  | TPL4         | J-15 |
| C220  | C-3  | C501  | G-9  | C723 | L-12 | D205  | C-12 | DL202 | A-4  | Q552  | L-10 | R231 | D-2  | R531  | G-6  | R730 | D-14 | R2000 | J-9  | TPM0         | L-14 |
| C221  | C-3  | C502  | F-8  | C725 | L-13 | D206  | C-12 | DM1   | H-1  | Q593  | E-5  | R232 | C-3  | R532  | G-6  | R731 | D-16 | R2G0  | A-2  | TPM1         | K-15 |
| C223  | D-4  | C504  | H-9  | C727 | B-9  | D208  | I-10 | DM2   | H-2  | Q702  | D-16 | R250 | D-4  | R552  | K-10 | R732 | D-16 | R2G2  | B-2  | TPM2         | K-13 |
| C230  | D-15 | C505  | H-9  | C771 | C-7  | D209  | I-9  | DX    | J-6  | Q704  | J-12 | R300 | F-12 | R554  | L-11 | R733 | C-15 | R2G3  | B-2  | TPN1         | L-14 |
| C231  | D-15 | C506  | H-9  | C772 | A-7  | D210  | H-6  | F901  | E-2  | Q705  | J-12 | R301 | G-12 | R555  | M-4  | R734 | K-12 | R2G4  | A-2  | VR100        | D-12 |
| C280  | F-9  | C507  | I-9  | C773 | B-7  | D211  | D-4  | F951  | I-8  | Q708  | D-14 | R330 | A-10 | R556  | H-5  | R735 | K-13 | R3A0  | C-15 | VR201        | D-7  |
| C281  | G-12 | C511  | G-8  | C774 | C-8  | D212  | C-4  | HA    | I-10 | Q709  | D-14 | R331 | C-11 | R557  | H-5  | R736 | J-12 | R3A1  | B-5  | VR350        | L-14 |
| C301  | F-12 | C552  | K-5  | C775 | C-8  | D213  | I-11 | IC201 | G-11 | Q710  | M-13 | R350 | L-14 | R558  | I-5  | R737 | J-13 | R3A2  | B-6  | VR351        | L-15 |
| C302  | G-12 | C556  | L-10 | C776 | C-8  | D296  | I-11 | IC202 | C-4  | Q711  | L-13 | R351 | L-15 | R560  | K-3  | R738 | C-7  | R3A3  | B-6  | VR352        | L-15 |
| C330  | B-10 | C557  | L-11 | C777 | A-7  | D297  | I-11 | IC330 | A-10 | Q712  | K-13 | R352 | L-15 | R561  | H-3  | R739 | D-14 | R3A5  | B-6  | VR353        | L-16 |
| C331  | A-11 | C559  | H-6  | C778 | B-8  | D298  | J-11 | IC350 | K-14 | Q713  | K-17 | R353 | L-15 | R585  | H-3  | R741 | D-15 | R3A6  | B-6  | VR354        | L-16 |
| C332  | B-10 | C560  | H-4  | C779 | B-9  | D299  | J-11 | IC401 | E-7  | Q714  | I-13 | R354 | L-16 | R591  | E-5  | R743 | C-13 | R3A7  | A-7  | VR355        | J-14 |
| C333  | B-10 | C561  | H-7  | C795 | F-16 | D401  | H-15 | IC501 | E-5  | Q780  | K-11 | R355 | L-16 | R594  | I-10 | R744 | D-14 | R3C0  | A-13 | VR401        | F-7  |
| C334  | C-10 | C562  | K-2  | C796 | F-14 | D410  | E-7  | IC701 | G-16 | Q901  | E-5  | R356 | I-15 | R595  | I-10 | R745 | C-13 | R3C1  | B-11 | VR402        | F-7  |
| C335  | C-11 | C563  | K-2  | C901 | F-2  | D451  | F-7  | IC702 | E-16 | Q3A0  | B-14 | R357 | I-15 | R598  | H-10 | R746 | D-14 | R3C2  | C-14 | VR701        | H-15 |
| C336  | B-11 | C564  | I-4  | C910 | K-7  | D490  | E-7  | IC771 | A-8  | Q3A1  | B-12 | R358 | J-15 | R600  | C-4  | R749 | M-14 | R3C3  | C-13 | X601         | F-10 |
| C337  | B-11 | C565  | I-7  | C911 | K-7  | D501  | L-11 | IC951 | L-8  | R100  | H-12 | R360 | J-14 | R601  | C-3  | R750 | L-14 | R3C4  | A-12 | X701         | H-15 |
| C340  | C-10 | C570  | J-7  | C953 | G-2  | D502  | F-9  | IC2A0 | B-4  | R101  | G-12 | R361 | J-14 | R602  | C-2  | R751 | L-13 | R3C5  | A-13 | Z701         | L-17 |
| C350  | L-14 | C583  | H-6  | C954 | H-5  | D503  | H-9  | IC3A0 | A-15 | R102  | H-12 | R400 | I-10 | R604  | F-10 | R752 | L-12 | R3C6  | A-13 |              |      |
| C351  | K-14 | C600  | C-3  | C955 | G-5  | D506  | G-6  | IC3A1 | B-5  | R103  | H-11 | R401 | H-10 | R605  | E-10 | R753 | H-8  | R3C7  | B-13 | * LOCATED ON |      |
| C352  | L-14 | C603  | F-11 | C956 | G-4  | D552  | K-3  | IC3A2 | A-13 | R105  | I-11 | R402 | I-10 | R606  | G-9  | R755 | L-13 | R3C9  | G-13 | BOTTOM OF    |      |
| C353  | L-14 | C604  | F-10 | C957 | L-2  | D553  | I-4  | J701  | F-13 | R106  | I-12 | R420 | F-8  | R607  | J-11 | R756 | L-13 | R3D0  | A-2  | BOARD        |      |
| C354  | L-14 | C605  | F-10 | C960 | L-9  | D561  | H-4  | J702  | F-13 | R107  | I-12 | R421 | L-12 | R608  | F-10 | R757 | I-15 | R3D1  | A-2  |              |      |
| C355  | L-15 | C606  | G-8  | C2A0 | B-5  | D582  | H-3  | JA    | F-4  | R108  | J-11 | R422 | L-12 | R609  | F-10 | R758 | K-17 | R3E0  | C-12 |              |      |
| C356  | L-15 | C607  | F-10 | C2A2 | A-3  | D593  | D-5  | JB    | A-16 | R109  | F-11 | R450 | E-6  | R610  | F-9  | R759 | H-14 | R3F0  | B-13 |              |      |
| C357  | L-15 | C608  | E-10 | C2G1 | A-4  | D594  | F-6  | K901  | E-4  | R110  | F-11 | R452 | E-7  | R611  | F-9  | R761 | G-13 | R3F1  | B-12 |              |      |
| C358  | L-15 | C609  | E-10 | C3A0 | B-15 | D599  | E-5  | L100  | H-12 | R111  | E-11 | R453 | F-7  | R612  | J-11 | R762 | A-8  | R3F2  | B-12 |              |      |
| C359  | L-15 | C610  | F-10 | C3A1 | B-7  | D601  | C-2  | L101  | H-12 | R132  | C-10 | R454 | F-7  | R613  | J-11 | R763 | A-8  | R3G2  | B-2  |              |      |

PARTS LIST

SEMICONDUCTORS

(Select replacement for best results.)

| Item No.      | Type No.  | Mfr. Part No. | NTE Part No. | ECG Part No. | TCE Part No. |
|---------------|-----------|---------------|--------------|--------------|--------------|
| D201          | RD7.5FB2  | 264P485060    | NTE138A      | ECG138A      | SK7V5        |
| D202          | RD8.2FB3  | 264P486020    | NTE5072A     | ECG5072A     | SK8V2        |
| D203          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D205, 6       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D208          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| # D209        | RD5.6FB1  | 264P484020    | NTE136A      | ECG136A      | SK5V6        |
| # D210        | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D211, 2, 3    | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D401          | EQA02-05C | 264P460060    | NTE5010A     | ECG5010A     | SK5A1        |
| D410          | RD10FB1   | 264P486080    | -            | -            | -            |
| D451          | S5500D    | 264P285010    | NTE116       | ECG116       | SK3313       |
|               | EM1Z      | 264P285010    | NTE552       | ECG552       | SK9000       |
| D490          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D501, 2       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| # D503        | EQA02-33A | 264P471010    | NTE5036A     | ECG5036A     | SK33A        |
| D506          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D552          | TVR1G     | 264P295020    | NTE552       | ECG552       | SK9000       |
|               | ES1       | 264P295020    | NTE552       | ECG552       | SK9000       |
| D553          | ES1F      | 264P295030    | NTE558       | ECG558       | SK3998       |
| D561          | RU3B      | 264P102020    | NTE552       | ECG552       | SK3318A      |
| # D582        | S5500D    | 264P285010    | NTE116       | ECG116       | SK3313       |
| D593, 4       | S5500D    | 264P285010    | NTE116       | ECG116       | SK3313       |
|               | EM1Z      | 264P285010    | NTE552       | ECG552       | SK9000       |
| D599          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D601          | RD7.5FB2  | 264P485060    | NTE138A      | ECG138A      | SK7V5        |
| D710 - D713   | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D715, 6, 7    | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D719, 20      | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D721          | LN38GPL   | 264P550010    | NTE3010      | ECG3010      | SK2010A      |
| D722          | HZ5B2     | 264P341090    | NTE5009A     | ECG5009A     | SK4A7        |
| D723          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D730          | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D750, 1       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D771, 2       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D773          | EQA02-05C | 264P460060    | NTE5010A     | ECG5010A     | SK5A1        |
| D780          | EQA02-05A | 264P460040    | NTE5009A     | ECG5009A     | SK4A7        |
| D801, 2       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D850, 1       | TVR1G     | 264P295020    | NTE552       | ECG552       | SK9000       |
|               | ES1       | 264P295020    | NTE552       | ECG552       | SK9000       |
| D901          | S5500D    | 264P285010    | NTE116       | ECG116       | SK3313       |
|               | EM1Z      | 264P285010    | NTE552       | ECG552       | SK9000       |
| # D953        | RBV-408   | -             | NTE5311      | ECG5311      | SK5031       |
|               | RBV-40C   | 264P512020    | NTE5311      | ECG5311      | SK5031       |
| D2000         | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D2020 - D2023 | 1SS99     | 264P389010    | NTE112       | ECG112       | SK3089       |
| D3A0          | RBV-401   | 264P512030    | NTE5309      | ECG5309      | SK5028       |
| D3A2, 3       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D3F0, 1       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |
| D5A1          | RD22FB1   | 264P490040    | -            | -            | -            |
| D5A2, 3       | 1S2471    | 264P045040    | NTE519       | ECG519       | SK3100       |

# 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. |
|------------|-----------------|---------------|--------------|--------------|--------------|
| # D5A4     | MB-1FS          | 264P157040    | NTE558       | ECG558       | SK3998       |
|            | RH-2FS          | 264P157040    | NTE558       | ECG558       | SK3998       |
| # D5A5     | RU3B            | 264P102020    | NTE552       | ECG552       | SK3318A      |
| D5A9       | 1S2471          | 264P045040    | NTE519       | ECG519       | SK3100       |
| D5Z0       | 1S2471          | 264P045040    | NTE519       | ECG519       | SK3100       |
| # IC201    | LA7655N         | 272P238020    | NTE1863      | ECG1863      | -            |
| IC202      | LA7222          | 272P184010    | -            | -            | -            |
| IC330      | LA7510          | 272P188010    | -            | -            | -            |
| IC350      | UPC1870CA-001   | -             | -            | -            | -            |
|            | UPC1870CA-001-L | 272P187010    | -            | -            | -            |
| IC401      | LA7838          | 272P239040    | -            | -            | -            |
| IC501      | 78L09K          | -             | -            | -            | -            |
|            | NJM78L09K       | 266P923010    | -            | -            | -            |
| IC701      | M34350N6-567SP  | 263P228050    | -            | -            | -            |
| IC702      | PST520E         | 266P130030    | -            | -            | -            |
| IC771      | LA7911          | 266P197010    | -            | -            | -            |
| # IC951    | STR-D3030       | 267P925010    | -            | -            | -            |
| IC2A0      | LA7952          | 272P138010    | -            | -            | -            |
| IC3A0      | UPC7812H        | 266P934020    | NTE966       | ECG966       | SK3592       |
| IC3A1      | LA7953          | 272P139010    | -            | -            | -            |
| IC3A2      | LA4270          | 272P140010    | NTE1798      | ECG1798      | SK9745       |
| # PC5A1, 2 | 3161            | 268P033010    | NTE3098      | ECG3098      | SK10178      |
| Q101       | 2SC2058S        | -             | NTE85        | ECG85        | SK9229       |
|            | 2SC2058S-P      | 260P654020    | NTE85        | ECG85        | SK9229       |
| Q130       | 2SC1906         | 260P356010    | NTE107       | ECG107       | SK3293       |
| Q201       | 2SA673D         | -             | NTE290A      | ECG290A      | SK9132       |
|            | 2SA950-Y        | 260P255040    | NTE290A      | ECG290A      | SK3841       |
| # Q202     | 2SA933S         | -             | NTE290A      | ECG290A      | SK9132       |
|            | 2SA933S-S       | 260P560040    | NTE290A      | ECG290A      | SK9132       |
|            | 2SA1115-E       | -             | NTE290A      | ECG290A      | SK9138       |
|            | 2SA1115-F       | -             | NTE290A      | ECG290A      | SK9138       |
| Q203, 4    | 2SA933S         | -             | NTE290A      | ECG290A      | SK9132       |
|            | 2SA933S-S       | 260P560040    | NTE290A      | ECG290A      | SK9132       |
|            | 2SA1115-E       | -             | NTE290A      | ECG290A      | SK9138       |
|            | 2SA1115-F       | -             | NTE290A      | ECG290A      | SK9138       |
| Q502       | 2SA1320         | -             | NTE288*      | ECG288*      | SK3434*      |
|            | 2SA1321         | 260P469010    | NTE288*      | ECG288*      | SK3434*      |
| # Q520     | UN4112          | 260P603010    | NTE2358      | ECG2358      | SK9741       |
|            | DTA124ES        | 260P603010    | NTE2358      | ECG2358      | SK9741       |
| # Q551     | 2SD1879         | 260P608010    | NTE2331      | ECG2331      | SK10088      |
| Q552       | 2SC2655Y        | -             | NTE293       | ECG293       | SK3849       |
|            | 2SC2655-Y       | 260P325030    | NTE293       | ECG293       | SK3849       |
| Q593       | 2SA933S         | -             | NTE290A      | ECG290A      | SK9132       |
|            | 2SA933S-S       | 260P560040    | NTE290A      | ECG290A      | SK9132       |
|            | 2SA1115-E       | -             | NTE290A      | ECG290A      | SK9138       |
|            | 2SA1115-F       | -             | NTE290A      | ECG290A      | SK9138       |
| Q651, 2, 3 | 2SC1740S        | 260P559030    | NTE85        | ECG85        | SK3122       |
|            | 2SC2603-E       | -             | NTE289A      | ECG289A      | SK9137       |
|            | 2SC2603-F       | -             | NTE289A      | ECG289A      | SK9137       |

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\* Lead configuration may vary from original.