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MITSUBISHI MODELS CS-1951,CS-1972R

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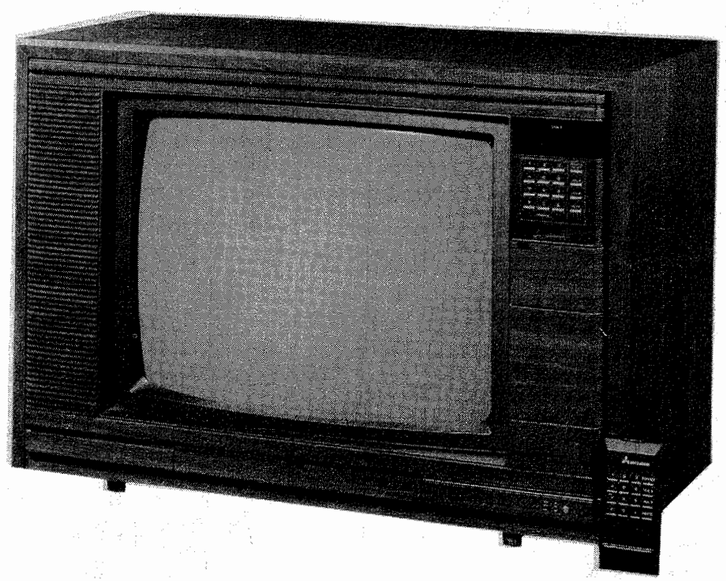

MODEL CS1972R

SAFETY PRECAUTIONS

See Page 1.

SERVICE INFORMATION

See Page 1.

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DATE 8-85 SET 2347 FOLDER 1

MITSUBISHI MODELS CS-1951,CS-1972R

SET 2347 FOLDER 1

TEST JIG HOOKUP

FUNCTION	Chek-A-Color ADAPTER NO.	RCA / TeleMatic ADAPTER NO.	ZENITH ADAPTER NO.
CRT	B239	10J683	852-422
YOKE	D4125(1)	10J755	852-392-2(3)
YOKE SETTING	YP2A,B208,V508/V509 100mH toward chassis, Focus tap.	Horiz 1.9,Vert 34, FVS-3950 Focus Voltage supply	Horiz 3.0,Vert 34, Focus tap

(1) Horizontal sweep is reversed.

"DY"	PIN 1	PIN 2	PIN 3	PIN 4	(PC Board)
(3)	GREEN	YELLOW	BLUE	RED	

TROUBLESHOOTING

POWER SUPPLY

If there is no raster or sound, check AC Fuse (F901) and DC Fuse (F902). If F902 is open, check Bridge Rectifier Diodes (D701, D901, D902, D903, D904), Transformer T701, Capacitors C901, C902, C903, C904 and Electrolytic C905. If F902 is open, check Power Regulator IC (IC991), Horizontal Output Transistor (Q591) and Sound Output Transistor (Q331). Apply 120V AC, depress power On/Off button and check for 163V at the cathode of D902. If voltage is absent, check Line Filter (L901), Resistor R901 and Relay K701. Check to be sure Relay is being actuated. If relay is not being actuated, check voltages and components associated with Relay Drive Transistor (Q702), Regulator Transistor (Q701) and pins 14 and 28 of Microprocessor IC (IC701). If 163V is present at the cathode of D902, check for 132V at the emitter of IC991. If voltage is absent, check the voltages and components associated with IC991. If 132V is present at the emitter of IC991, refer to the "Horizontal" section of this Troubleshooting guide. NOTE: If the voltage at the emitter of IC991 is 147V, voltage at pin 6 of Sync/Sweep/Chroma/Video/Process (IC201) is 9.3V, voltage at pin 5 of IC201 is 8.3V, the TV is in shutdown.

HORIZONTAL

Determine if TV is in shutdown. Refer to voltages at bottom of page. If TV is not in shutdown, inject a horizontal signal at the base of Horizontal Output Transistor (Q591). If horizontal deflection returns, check the voltages, waveforms and components associated with pins 1 thru 6 and 16 of sync/Sweep/Video/Chroma/Processor IC (IC201) and Horizontal Driver Transistor (Q531). If horizontal sweep does not return, check the voltages, waveforms and components associated with Transistor Q591 and Horizontal Output Transformer (T551). Check the B+ sources developed from T551. Check for 205V at the cathode of Diode D552, 13.8V at the cathode of Diode D553, and 34.0V at the cathode of Diode D581. If any of the above sources are missing or low, check components associated with that source. Horizontal linearity or foldover problems may be caused by Capacitors C552, C553, C554, C557 and C591 being defective. If the horizontal oscillator is off frequency, check the voltages and components associated with pins 1 and 2 of IC201.

NOTE: Voltages taken with TV in shutdown.

IC201	PIN 5	8.3V
IC201	PIN 6	9.3V
Q591	Collector	147V

HIGH VOLTAGE SHUTDOWN

The High Voltage is monitored by Diode D581, rectifying pulses from Horizontal Output Transformer (T551). Should the High Voltage increase, the rectified voltage at the cathode of D581 will also increase and at a certain value will turn on Transistor Q581, which turns on Transistor Q582 which triggers the fail-safe circuit at pin 4 of Sync/Sweep/Video/Chroma/Processor IC (IC201). This results in shutdown of set. To troubleshoot set that has been shutdown, short pin 4 of IC201 to ground, use a variac for AC power, start with approximately 60V AC and troubleshoot until defect has been located and corrected. Remove short to ground from pin 4 of IC201.

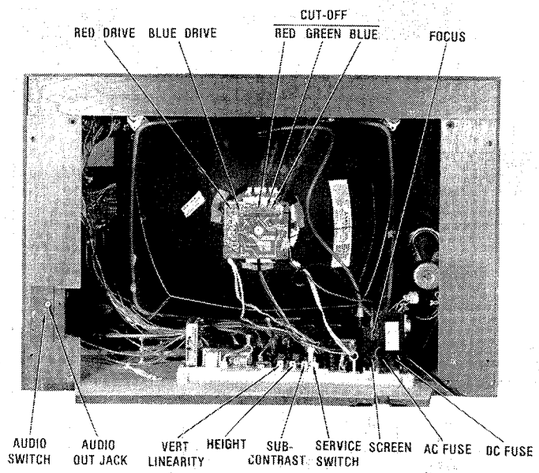
Voltages taken with TV in shutdown.

IC201	PIN 5	8.3V
IC201	PIN 6	9.3V
Q591	Collector	147V

NOTE: Care should be taken in defeating the High Voltage Shutdown circuit, as this may cause excessive Xradiation and damage to the CRT, Transformer T551 and associated components. Monitor High Voltage and troubleshoot according to instructions above.

IF-AGC

If there is no video or audio, inject a video IF signal at the IF input and check for video on the CRT. If video is present, check the Tuner and Tuner Control circuits. If video is not present on the CRT, check for a video waveform at TP12. If video is present, refer to the "Video" section of this Troubleshooting guide. If there is no video at TP12, apply AGC bias to pin 2 of Video IF/Det/AFT Sound IF/Det/AGC IC (IC101). If video is now present at TP12, check voltages, waveforms and components associated with the AGC and AFT circuits at pins 1, 2, 19, 24, 28 and 30 of IC101. If there is still no video at TP12, check the voltages, waveforms and components associated with IF Amp Transistor (Q101), TP12



CABINET—REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove five screws holding cabinet back and remove back. Channel readout indicator may be removed at this point of disassembly. Remove two screws holding readout to cabinet front and remove assembly from cabinet. Disconnect HV anode, CRT socket, deflection yoke connectors, degaussing coil connectors, speaker connectors and ground leads. Remove twelve screws holding tuning control, remote receiver and earphone jack, assemblies to cabinet front and remove assemblies from cabinet. Remove one screw holding audio output assembly to cabinet side and remove assembly from cabinet. Release two latches holding main board assembly to cabinet bottom and slide board assembly out of cabinet.

CRT REMOVAL

Follow "Chassis Removal" procedure and lay set facedown on a soft protective surface. Loosen and remove CRT neck assemblies. Remove four screws holding degaussing coil and CRT to cabinet front and lift CRT out of cabinet. Do not lift CRT by the neck.

SERVICING IN THE FIELD

CRT IMPLOSION PROTECTION AND CLEANING

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

FUSE DEVICES

A 1-amp fuse is used for low-voltage power-supply protection. (See photo, Cabinet-Rear View.)

A 4-amp fuse is used for AC line protection. (See photo, Cabinet-Rear View.)

READOUT ACCESSIBILITY

Readout is accessible after removing cabinet back.

VHF/UHF TUNER

See Miscellaneous Adjustments.

Ten buttons plus channel up and down have been provided for two digit channel entry. Tuning mode switch allows selection of automatic or manual fine tuning with (+) and (-) buttons for adjustment.

HORIZONTAL OSCILLATOR

Adjustment of the horizontal hold is accomplished by the proper setting of the horiz hold control. (See Placement Chart.)

FOCUS

The focus may be varied by a focus control. (See photo, Cabinet-Rear View.)

AGC

The AGC may be varied by an RF AGC control. (See photo, Cabinet-Rear View.)

SAFETY PRECAUTIONS

NOTICE. Observe all cautions and safety related notes located inside the receiver cabinet and on the receiver chassis.

WARNING

1. An isolation transformer should be used between the television receiver and the AC supply point before any test/service is performed on a HOT chassis television receiver.
2. Operation of this receiver, outside the cabinet or with the cover removed, involves a shock hazard from the receiver power supplies. Work on the receiver should not be attempted by anyone who is not thoroughly familiar with precautions necessary when working on high-voltage equipment.
3. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while the picture tube is being handled. Keep the picture tube away from the body while handling.

X-RADIATION WARNING

The surface of the picture tube may generate X-Radiation. Precaution during service and, if possible, the use of a lead apron is recommended for shielding while handling.

When replacing the picture tube, use only the designated replacement part since it is a critical component with regard to X-Radiation as noted above. (No high-voltage adjustments are provided.)

LEAKAGE CURRENT CHECK

Before returning the receiver to the customer, it is recommended that leakage current be measured according to the following methods.

1. Cold Check

With the AC plug removed from the 120V AC source, place a jumper across the two AC plug prongs. Turn the receiver AC switch on. Using an ohm-meter, connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (antennas, handle bracket, metal cabinet, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 1 megohm. Any resistance below this value indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

2. Hot Check

The test sequence, with reference to the measuring circuit in Fig. 1, is as follows:

(1) With switch S1 open, the receiver is to be connected to the measuring circuit. Immediately after connection, the leakage current is measured using both positions of switch S2, and with the switching devices in the receiver in all of their operating positions.

(2) Switch S1 is then to be closed, energizing the receiver, and immediately after closing the switch, the leakage current is to be measured using both positions of switch S2, and with the switching devices in the receiver in all of their operating positions.

Current measurements of items (1) and (2) are to be repeated after the receiver has reached thermal stabilization.

The leakage current shall not be more than 0.5 milliampere.

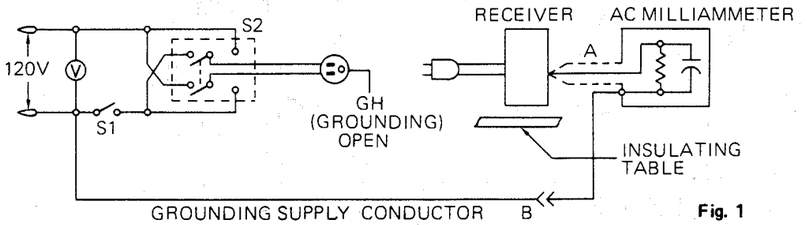


Fig. 1

TROUBLESHOOTING (Continued)

and pins 3 thru 8, 22, 23, 26 thru 29 of IC101. A defective AGC circuit can cause an overloaded picture, excessive snow or loss of picture and sound. See AGC Voltage Chart for voltages that change with signal.

AGC VOLTAGE CHART		
IC101	PIN 2	5.4V
IC101	PIN 30	4.4V

AUDIO

If there is no audio, inject an audio signal at TP22. With volume control at Maximum, check for sound at the speaker. If there is no sound, check the voltages, waveforms and components associated with Audio Preamp IC (IC301) and Audio Output Transistors (Q331, Q332). If there is sound at the speaker with an audio sidgnal injected at TP22, inject a modulated sound IF signal at TP21. If sound is present at the speaker, check the voltages, waveforms and components associated with pins 16 thru 23 of Video IF/Det/Audio IF/Det/AFT/ AGC IC (IC101). If there is no audio at the speaker with a signal injected at TP21, check the voltages, waveforms and components associated with pins 8 thru 15 of IC101. Check the voltages and components associated with volume control and Mute Transistors (Q705, Q704, Q703). At MINIMUM volume and at Mute, Q705(C) should measure 5.0V and at Maximum volume .59V. Also check Audio Switch (S3A1) and Audio Drive Transistor (Q3A1.)

VIDEO

If there is no video, inject a video signal at TP12. If video is now present, refer to the "IF-AGC" section of this Troubleshooting guide. If there is still no video on the CRT, check for a video waveform at pin 18 of Sync/ Sweep/Video/Chroma/Processor IC (IC201). If the waveform is missing, check the voltages, waveforms and components associated with pins 18 and 32 thru 38 of IC201 and TP12. If there is video at pin 18 of IC201, check the voltages, waveforms and components associated with Video Drive Transistor (Q201), Red, Green and Blue Output Transistors (Q651, Q652, Q653) and the CRT. If there is insufficient or too much brightness, check the voltages and components associated with Beam Limiter Transistor (Q583).

VERTICAL

If there is no vertical sweep, inject a vertical drive signal at pin 14 of Sync/Sweep/Video/Chroma/Processor IC (IC201). If vertical deflection returns, check the voltages, waveforms and components associated with pins 7 thru 15 of IC201. If vertical sweep does not return, check the voltages, waveforms and components associated with Vertical Output Transistors (Q401, Q402) and the Deflection Yoke. Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits. Check Electrolytics C410, C411, C412 and C414 for defects. If the vertical oscillator is off frequency, check the voltages and components associated with pins 9 thru 12 of IC201.

SYNC

If there is no vertical or horizontal sync, check for both vertical and horizontal sync pulses at TP33. If these pulses are missing, check the voltages and components associated with pins 39 and 40 of Sync/Sweep/Video/ Chroma/Processor IC (IC201). If the proper pulses are present, check for the proper vertical pulses at pin 9 of IC201 and check for the proper horizontal pulses at pins 1 and 3 of IC201.

RASTER

Check the CRT and CRT voltages. If the raster is magenta, check the voltages and components associated with pin 19 of Sync/Sweep/Video/ Chroma/Processor IC (IC201) and Green Output Transistor (Q652). If the raster is yellow, check the voltages and components associated with pin 21 of IC201 and Blue Output Transistor (Q653). If the raster is cyan, check the voltages and components associated with pin 20 of IC201 and Red Output Transistor (Q651). If the raster has a keystone shape, check the Deflection Yoke. If the raster has height or width problems, refer to the "Vertical" or "Horizontal" and "Power Supply" sections of this Troubleshooting guide.

CHROMA

If there is no color, check for a color waveform at TP41. If the color waveform is absent, check the voltages and components associated with TP41. If there is a chroma waveform at TP41, check for the proper chroma waveforms at pins 19, 20 and 21 of Sync/Sweep/Video/Chroma/Processor IC (IC201). If the waveforms are absent, check the voltages, waveforms and components associated with pins 19 thru 31 of IC201. Check to be sure the 3.58MHz oscillator is operating at the proper frequency. If there is improper hue, check the voltages and components associated with pin 22 of IC201. If the proper color waveforms are present at pins 19, 20 and 21 of IC201, check the voltages, waveforms and components associated with Red, Green and Blue Output Transistors (Q651, Q652, Q653) and the CRT.

TROUBLESHOOTING CHECK CHART

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

PICTURE OR SOUND

NO PIC, NO SOUND, NO RASTER: Check AC power supply and sources generated from Horizontal Output Transformer (T551). Refer to "Troubleshooting" Power Supply and Horizontal circuits.

NO PIC, NO SOUND, HAS RASTER: Check IF-AGC and source voltages from Horizontal Output Transformer (T551). Refer to "Troubleshooting" IF-AGC and Horizontal circuits.

NO PIC, HAS SOUND, NO RASTER: Check Horizontal Output Transformer (T551) sources and Video circuit. Refer to "Troubleshooting" Horizontal and Video circuits.

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

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

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

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

SWEEP

NO RASTER, HAS SOUND: Check HV rectifier, Part of Horizontal Output Transformer (T551). Refer to "Troubleshooting" Horizontal circuit.

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

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

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

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

NARROW PICTURE: Refer to "Troubleshooting" Horizontal circuit.

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

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

SYNC

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

RASTER

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

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

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

COLOR (B/W operating normally)

NO COLOR: Refer to "Troubleshooting" Chroma circuit.

WEAK COLOR: Refer to "Troubleshooting" Chroma circuit.

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

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

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

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

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

MISCELLANEOUS ADJUSTMENTS

RF AGC ADJUSTMENT

Tune in a strong TV station. Set RF AGC Control (VR101) counterclockwise then adjust VR101 clockwise to a point where snow (noise just disappears from the picture.

HORIZONTAL HOLD ADJUSTMENT

Tune in a picture, connect a jumper from test points TP-8A to TP-8B. Adjust Horizontal Hold Control (VR501) to a point where the picture is in sync (stops) or slowly floats across the screen.

SUB CONTRAST ADJUSTMENT

Tune in a picture, set Contrast and Brightness Controls to detent position. Adjust Sub Contrast Control (VR204) for sufficient contrast and Brightness without white highlight glare.

COLOR TEMPERATURE ADJUSTMENT

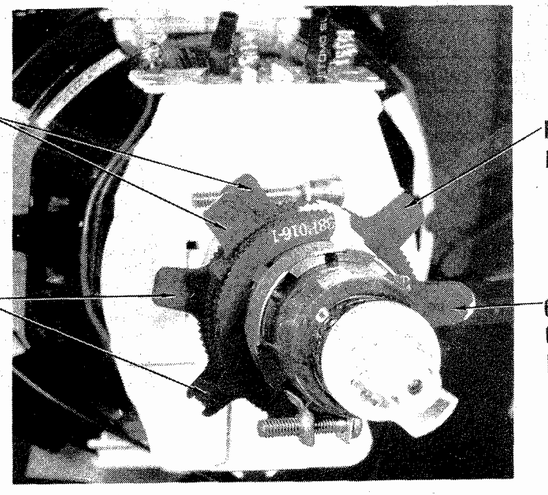
Tune in a local station and set Color Control to MINIMUM. Set the Brightness and Contrast Controls to center posiiton. Set Red (VR651) and Blue (VR652) Drive Controls to center position. Set Red (VR653), Green (VR654), Blue (VR655) Cut-Off Controls and CRT Screen Control (VR592A) to MINIMUM. Move the Service Switch (S201) from center to the left position. Advance CRT Bias Control (VR592A) to produce a faintly visible line of one predominat color. Advance the Cut-Off Controls of the two misdsing colors to produce a faintly visible white line. If the CRT Screen Control will not produce a visible line, set control at Maximum and advance each Cut-Off Control to produce a faintly visible white line. Move the Service Switch to normal position and adjust Red (VR651) and Blue (VR652) Drive Controls for best black-and-white hightlights.

PURITY ADJUSTMENTS

If picture tube appears to be magnetized, use a degaussing coil to demagnetize the picture tube and mounting brackets. Perform center convergence if necessary. Remove the rubber wedges between the picture tube and deflection yoke. Slide the deflection yoke forward. Disconnect Connectors B and G to obtain a red band on the screen. Adjust the purity magnets to position the band vertically and horizontaly at the center of the screen. Slide the deflection yoke back to produce a uniform red screen. Check Blue and Green Purity by the following methods. For Blue, disconnect Plug G and connect a jumper from base to emitter of Q651. For Green, Disconnect Plug B and connect the jumper from emitter to base of Q651.

CONVERGENCE ADJUSTMENTS

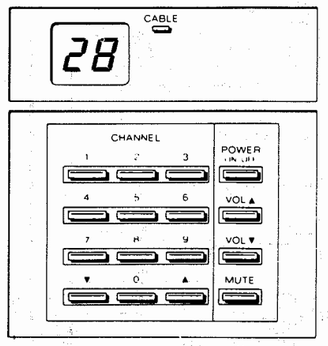
Connect crosshatch generator to the antenna terminals and tune in a normal crosshatch pattern. Adjust four pole convergence magnets to converge red and blue, vertical and horizontal lines at the center of the screen. Adjust six pole convergence magnets to converge red/blue and green, vertical and horizontal lines at the center of the screen. Remove the rubber wedges between the deflection yoke and picture tube. To converge the vertical center lines (top and bottom of the screen) and the horizontal center lines (right and left sides of the screen), tilt the front of the deflection yoke up ro down. Check center convergence. To converge the vertical lines (right and left sides of the screen), tilt the front of the deflection yoke to the right or left. Replace the rubber yoke wedges and check center convergence.



CRT NECK ASSEMBLY

CHANNEL SELECTION PROCEDURE

This set is equipped with a frequency synthesizer (FS) electronic tuning system. The FS system provides direct channel selection and automatic scan channel selection. A total of 139 channels can be selected and include: Broadcast channels 02-13 (VHF), 14-83 (UHF) and cable (CATV) channels 02-13 (VHF0, 14-22 (mid-band), 23-36 (super-band), 37-64 (hyper-band) and 69-74 (mid-band).



Indicator Panel

CHANNEL Selector Key Pad

TV BROADCAST CHANNEL SELECTION

1. CABLE ⟷ TV — Set the reception mode switch to the TV position.

2. MANUAL ⟷ AUTO — Set the tuning mode switch to the "AUTO" position.

3. Direct Channel Selection (Auto tuning mode)
Channel selection of all VHF (02-13) and UHF (14-83) channels may now proceed by pressing the desired channel number on the channel selector key pad. For example, to receive channel "23" press 2 and then 3 in sequence. Single digit channels (02-09) may be selected by pressing a combination of 0 and the channel number (eg. 05, 09, etc.). The new channel selection will appear immediately. Single digit channels may also be selected by pressing the single channel number without pressing the number 0. Using this method, there is an automatic 3 second delay before the new channel selection appears.

Note: Since there are no channel numbers 00, 01 or 84-99, if these channel numbers are pressed the channel remains unchanged. If the channel number selected is an inactive channel, the tuning system automatically switches to the next higher active channel.

3a. Direct Channel Selection (Manual tuning mode)

MANUAL ⟷ AUTO

Direct channel selection with the tuning mode switch set to the "MANUAL" position operates as described in 3. above with the following exception: If the channel number selected is an inactive channel the tuning system will remain on the channel.

Note: For normal use, the tuning mode switch should be set to the "AUTO" position.

4. Automatic Scan Channel Selection (auto tuning mode)
Press the channel selector buttons marked ▲ or ▼ for automatic scan channel selection. Pressing the channel selector button marked ▲ switches to the next higher channel available, skipping any inactive channels in-between. Pressing the channel selector button marked ▼ switches to the next lower channel available, skipping any inactive channels in-between. Pressing continuously continues the scan until the button is released.

Note: Since there are no channel numbers 00, 01 or 84-99, automatic scan channel selection will skip these channel numbers.

4a. (manual tuning mode)

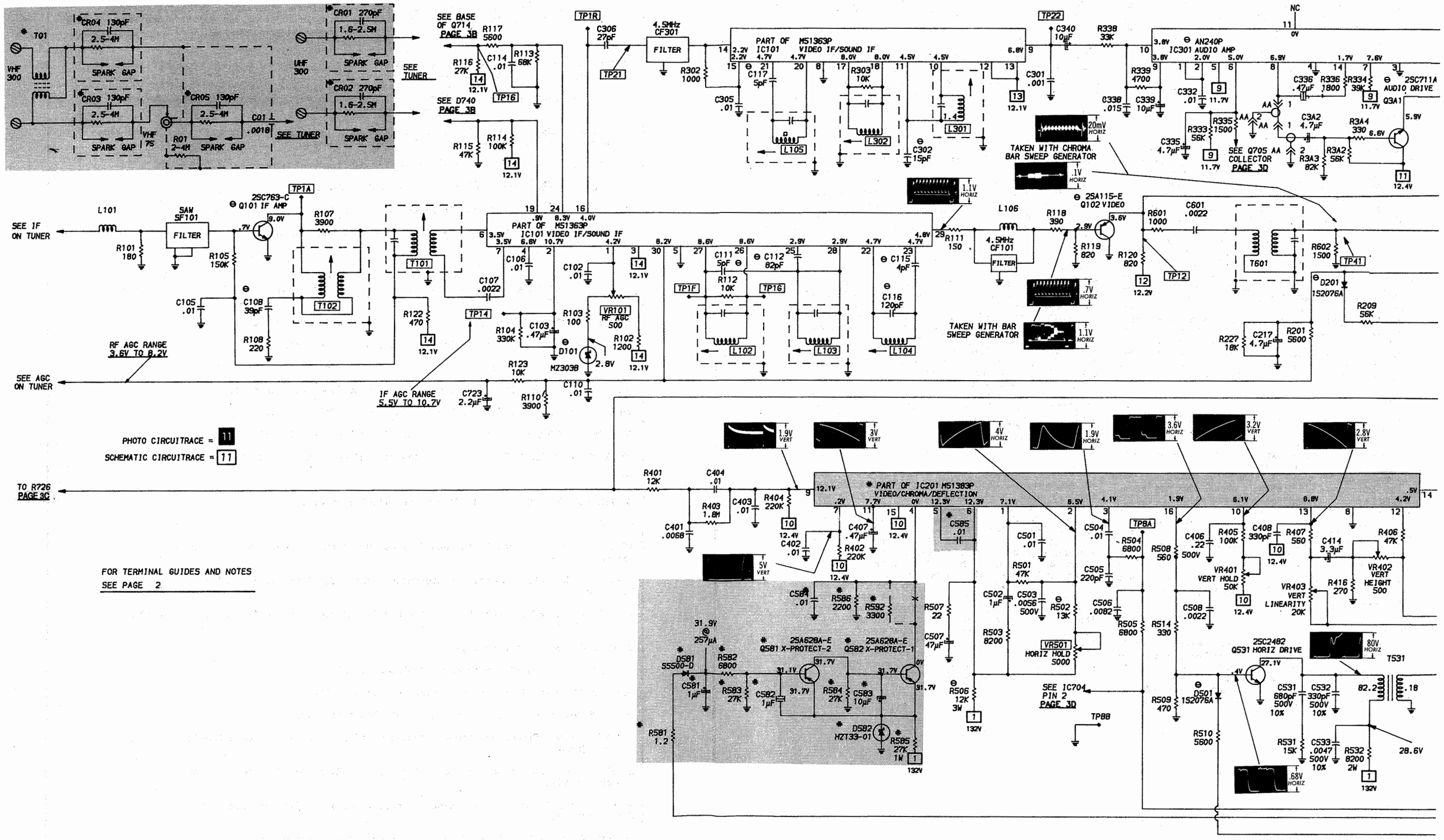
MANUAL ↔ AUTO

When the tuning mode switch is set to the "MANUAL" position, automatic scan channel selection is not possible. Pressing the ▲ or ▼ channel selector buttons advances to the next higher or lower channel and does not skip inactive channels.

Note: For normal use, the tuning mode switch should be set to the "AUTO" position.

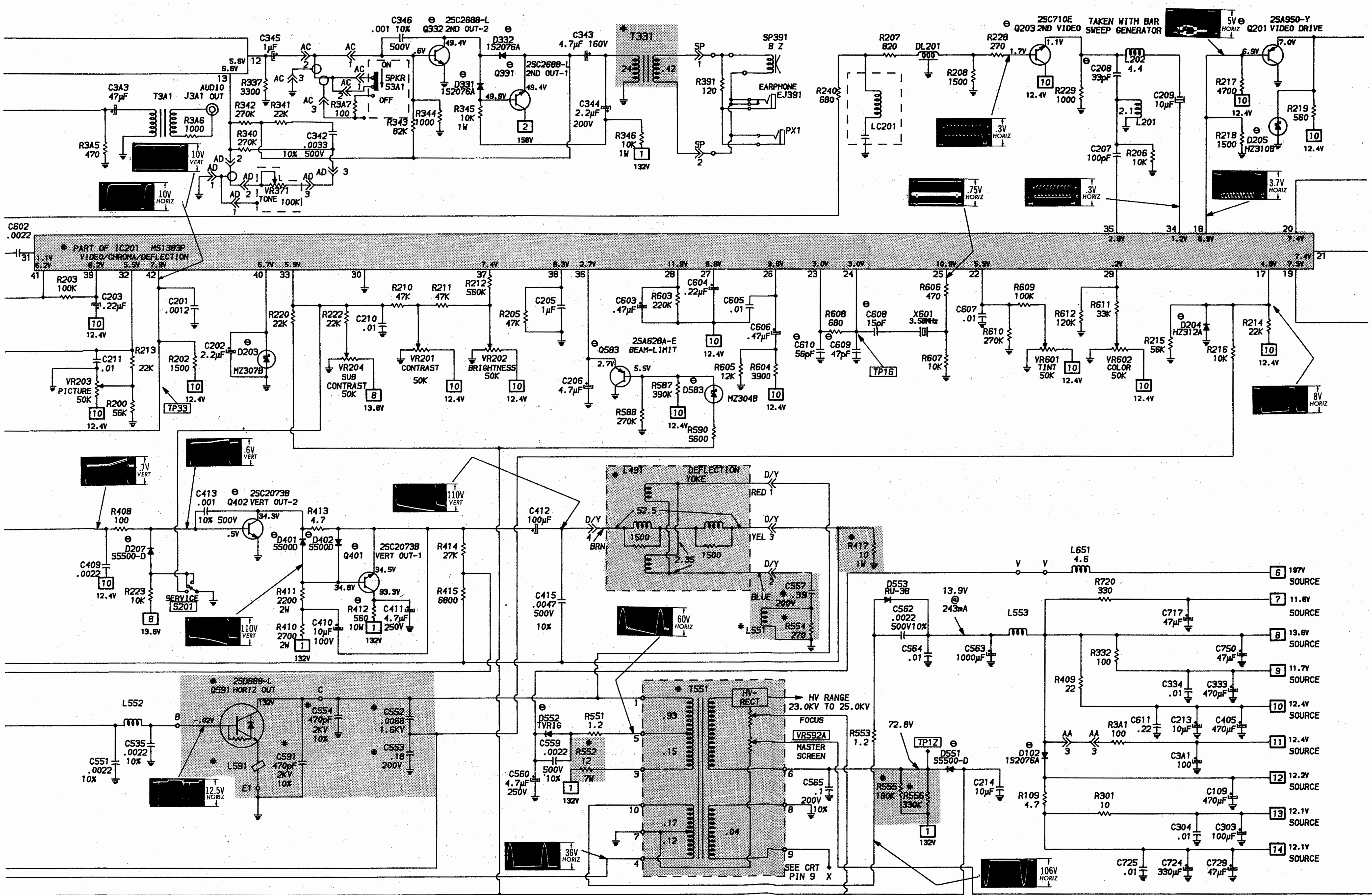
A

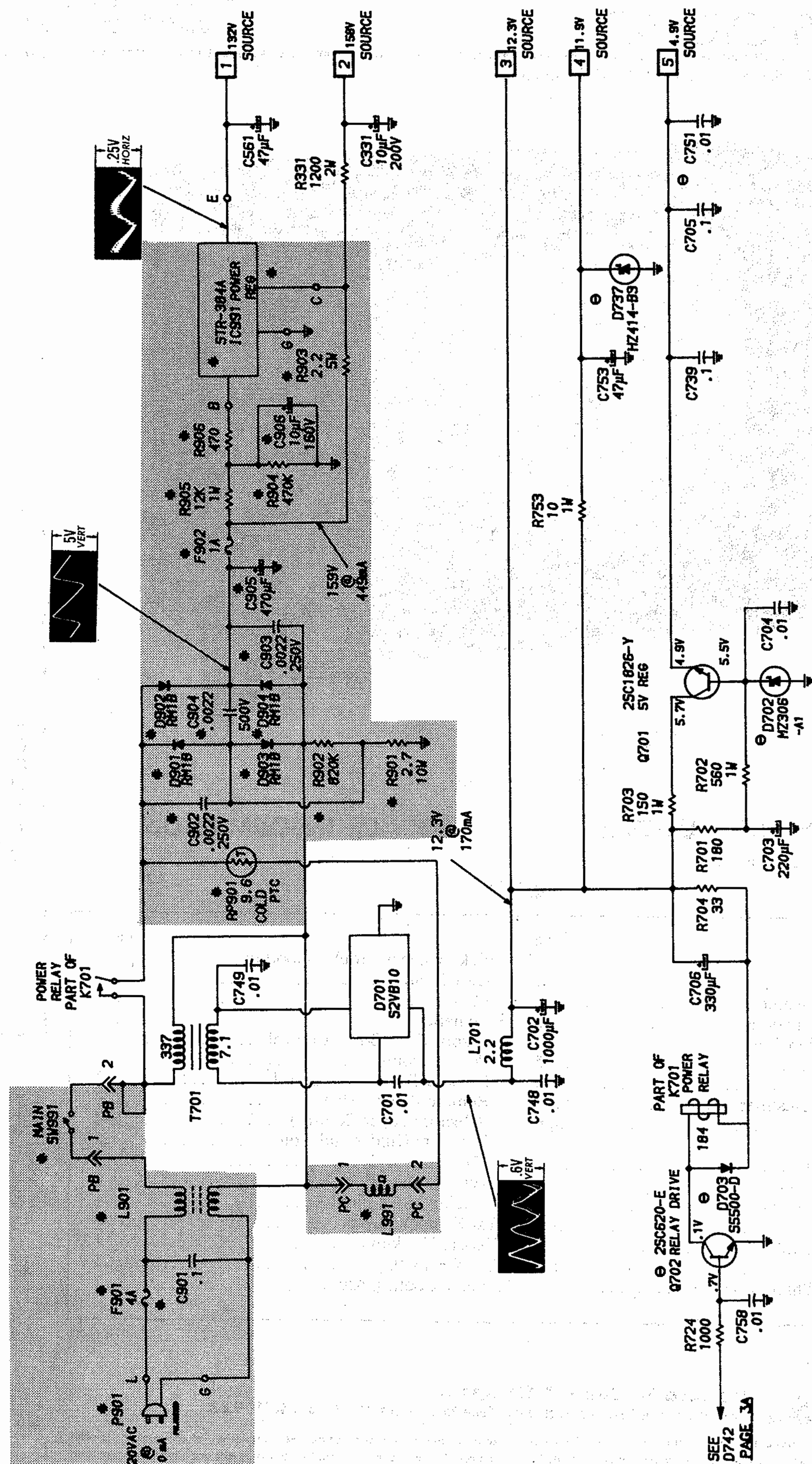
B


T01
VHF 300
UHF 300
CR04 130pF
2.5-4M
SPARK GAP
CR03 130pF
CR05 130pF
CR01 270pF
1.6-2.5M
CR02 270pF
VHF 7S
R01 2-4M
C01 .0018
SEE TUNER
SEE BASE OF Q714 PAGE 3B
SEE D740 PAGE 3B
R117 5600
R113 68K
R116 27K
C114 .01
R115 47K
R114 100K
TP16
TP1R
C306 27pF
TP21
4.5MHz CF301 FILTER
R302 1000
C305 .01
PART OF IC101 M51363P VIDEO IF/SOUND IF
C117 5pF
L105
R303 10K
L302
L301
C302 15pF
TP22
C340 10μF
R338 33K
C301 .001
AN240P IC301 AUDIO AMP
R339 4700
C338 .015
C339 10μF
C332 .01
R335 1500
R333 56K
C335 4.7μF
C336 .47μF
R336 1800
R334 39K
2SC711A AUDIO DRIVE Q3A1
C3A2 4.7μF
R3A4 330
R3A3 82K
R3A2 56K
SEE Q705 AA COLLECTOR PAGE 3D
20mV HORIZ
TAKEN WITH CHROMA BAR SWEEP GENERATOR
1.1V HORIZ
2SA115-E Q102 VIDEO
L106
R118 390
R119 820
R120 820
R111 150
4.5MHz CF101 FILTER
TP12
C601 .0022
R601 1000
T601
R602 1500
TP41
D201 1S2076A
R209 56K
.7V HORIZ
TAKEN WITH BAR SWEEP GENERATOR
R227 18K
C217 4.7μF
R201 5600
TP1A
2SC763-C Q101 IF AMP
L101
SAW SF101 FILTER
R101 180
R105 150K
R107 3900
C105 .01
C108 39pF
R108 220
T101
T102
C107 .0022
C106 .01
C102 .01
R103 100
VR101 RF AGC 500
R104 330K
C103 .47μF
D101 MZ303B 2.8V
R102 1200
R122 470
TP14
R123 10K
C723 2.2μF
R110 3900
C110 .01
TP1F
C111 5pF
R112 10K
C112 82pF
L102
L103
C115 4pF
C116 120pF
L104
R111 150
SEE IF ON TUNER
SEE AGC ON TUNER
RF AGC RANGE 3.6V TO 8.2V
IF AGC RANGE 5.5V TO 10.7V
PHOTO CIRCUITRACE = 11
SCHEMATIC CIRCUITRACE = 11
TO R726 PAGE 3C
FOR TERMINAL GUIDES AND NOTES SEE PAGE 2
1.9V VERT
3V VERT
4V HORIZ
1.9V HORIZ
3.6V HORIZ
3.2V VERT
2.8V VERT
5V VERT
PART OF IC201 M51363P VIDEO/CHROMA/DEFLECTION
R401 12K
C404 .01
R403 1.8M
C403 .01
C401 .0068
R404 220K
C402 .01
R402 220K
C407 .47μF
C584 .01
R586 2200
R592 3300
R581 1.2
C581 1μF
R582 6800
D581 S5500-D
31.9V 257μA
25A628A-E Q581 X-PROTECT-2
25A628A-E Q582 X-PROTECT-1
R583 27K
C582 1μF
R584 27K
C583 10μF
D582 HZT33-01
R585 27K 1W
132V
C585 .01
R507 22
C507 47μF
R506 12K 3W
C501 .01
R501 47K
C502 1μF
C503 .0056 500V
R503 8200
R502 13K
VR501 HORIZ HOLD 5000
C504 .01
C505 220pF
C506 .0082
R505 6800
R504 6800
TP8A
SEE IC704 PIN 2 PAGE 3D
TP8B
R508 560
C406 .22 500V
R405 100K
C408 330pF
R407 560
C414 3.3μF
R406 47K
VR401 VERT HOLD 50K
VR403 VERT LINEARITY 20K
VR402 VERT HEIGHT 500
R416 270
C508 .0022
R514 330
25C2482 Q531 HORIZ DRIVE
80V HORIZ
T531
D501 1S2076A
R509 470
R510 5600
C531 680pF 500V 10%
C532 330pF 500V 10%
82.2
.18
R531 15K
C533 .0047 500V 10%
R532 8200 2W
28.6V
.68V HORIZ

C

D


C346 .001 10% 500V
Q332 2SC2688-L 2ND OUT-2
D332 1S2076A
Q331 2SC2688-L 2ND OUT-1
D331 1S2076A
R345 10K 1W
158V
C343 4.7μF 160V
C344 2.2μF 200V
R346 10K 1W
132V
T331
SP391 8 Z
R391 120
EARPHONE EJ391
PX1
C345 1μF
5.6V
6.6V
R337 3300
R342 270K
R341 22K
R340 270K
C342 .0033 10% 500V
R3A7 100
SPKR S3A1
ON
OFF
R343 82K
R344 1000
C3A3 47μF
T3A1
J3A1 AUDIO OUT
R3A6 1000
R3A5 470
10V VERT
10V HORIZ
VR371 TONE 100K
C602 .0022
PART OF IC201 M51383P VIDEO/CHROMA/DEFLECTION
R203 100K
C203 .22μF
C201 .0012
R220 22K
R222 22K
C210 .01
R210 47K
R211 47K
R212 560K
R205 47K
C205 1μF
C202 2.2μF
D203 MZ307B
R213 22K
R202 1500
C211 .01
VR203 PICTURE 50K
R200 56K
TP33
VR204 SUB CONTRAST 50K
VR201 CONTRAST 50K
VR202 BRIGHTNESS 50K
12.4V
13.8V
R207 820
DL201
R208 1500
R240 680
LC201
R228 270
Q203 2SC710E 2ND VIDEO
TAKEN WITH BAR SWEEP GENERATOR
5V HORIZ
Q201 2SA950-Y VIDEO DRIVE
R229 1000
C208 33pF
L202 4.4
L201 2.1
C209 10μF
C207 100pF
R206 10K
R217 4700
R218 1500
D205 HZ310B
R219 560
.3V HORIZ
.75V HORIZ
3.7V HORIZ
C603 .47μF
R603 220K
C604 .22μF
C605 .01
C606 .47μF
Q583 2SA628A-E BEAM-LIMIT
C206 4.7μF
R587 390K
D583 MZ304B
R588 270K
R590 5600
R605 12K
R604 3900
R608 680
C608 15pF
X601 3.58MHz
C610 56pF
C609 47pF
TP16
R606 470
R607 10K
C607 .01
R610 270K
R609 100K
VR601 TINT 50K
R612 120K
R611 33K
VR602 COLOR 50K
R215 56K
D204 HZ312A
R216 10K
R214 22K
8V HORIZ
.7V VERT
.6V VERT
110V VERT
R408 100
C409 .0022
D207 S5500-D
R223 10K
SERVICE S201
C413 .001 10% 500V
Q402 2SC2073B VERT OUT-2
D401 S500D
D402 S500D
R413 4.7
Q401 2SC2073B VERT OUT-1
R411 2200 2W
R410 2700 2W
C410 10μF 100V
R412 560 10W
C411 4.7μF 250V
R414 27K
R415 6800
C412 100μF
C415 .0047 500V 10%
L491 DEFLECTION YOKE
RED 1
YEL 3
BLUE
BRN
52.5
1500
2.35
C557 .39 200V
L551
R554 270
R417 10 1W
60V HORIZ
L552
C535 .0022 10%
C551 .0022 10%
Q591 2SD869-L HORIZ OUT
-.02V
C554 470pF 2KV 10%
C552 .0068 1.6KV
C553 .18 200V
L591
C591 470pF 2KV 10%
E1
12.5V HORIZ
T551
HV-RECT
HV RANGE 23.0KV TO 25.0KV
FOCUS
VR592A MASTER SCREEN
D552 TVR1G
R551 1.2
C559 .0022 500V 10%
R552 12 7W
C560 4.7μF 250V
C565 .1 200V 10%
SEE CRT PIN 9
36V HORIZ
.93
.15
.17
.12
.04
D553 RU-3B
C562 .0022 500V10%
13.9V @ 243mA
L553
C564 .01
C563 1000μF
R553 1.2
72.8V
TP1Z
D551 S5500-D
R555 180K
R556 330K
C214 10μF
106V HORIZ
L651 4.6
R720 330
C717 47μF
R332 100
C750 47μF
R409 22
C334 .01
C333 470μF
C611 .22
C213 10μF
C405 470μF
R3A1 100
C3A1 100
D102 1S2076A
R109 4.7
R301 10
C109 470μF
C304 .01
C303 100μF
C725 .01
C724 330μF
C729 47μF
6 197V SOURCE
7 11.6V SOURCE
8 13.6V SOURCE
9 11.7V SOURCE
10 12.4V SOURCE
11 12.4V SOURCE
12 12.2V SOURCE
13 12.1V SOURCE
14 12.1V SOURCE



FOR TERMINAL GUIDES AND NOTES
SEE PAGE 2

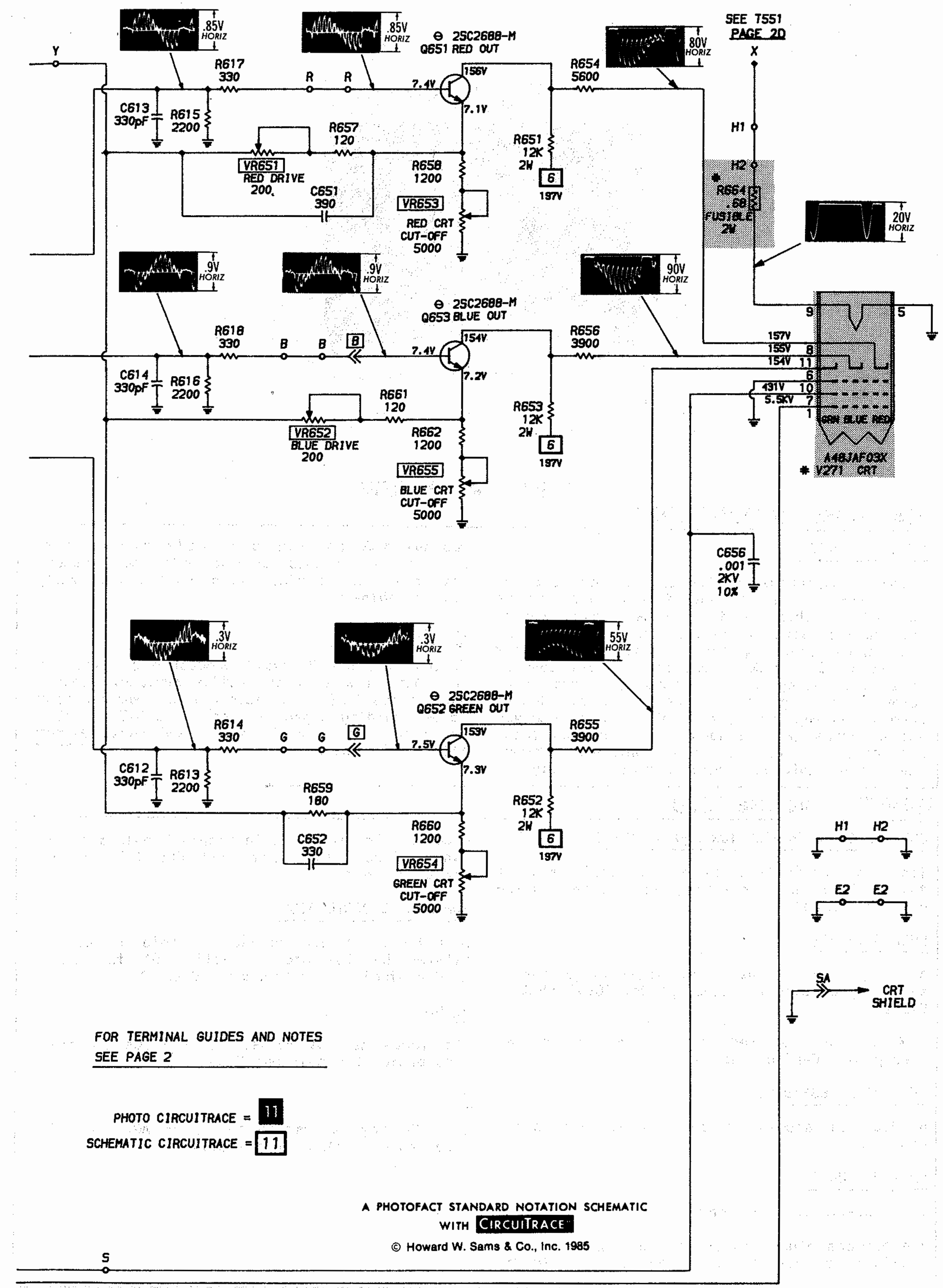
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE

G

MITSUBISHI MODELS
CS-1951,CS-1972R



FOR TERMINAL GUIDES AND NOTES
SEE PAGE 2

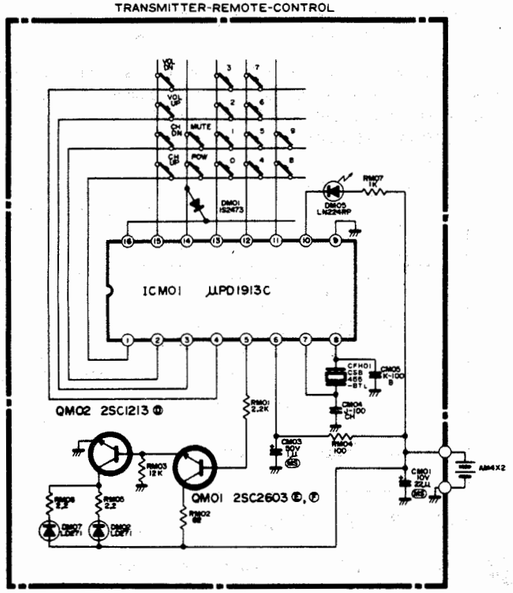
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

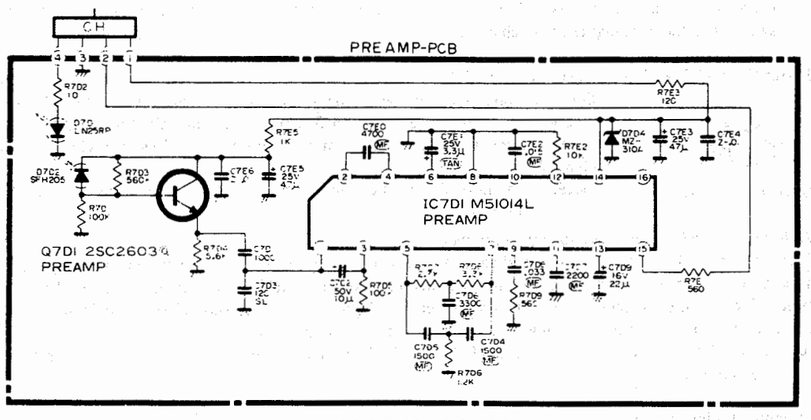
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE

H

TRANSMITTER-REMOTE-CONTROL



TRANSMITTER/REMOTE CONTROL



PREAMP BOARD

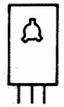
Courtesy of the Manufacturer

REMOTE TRANSMITTER/PREAMP

TERMINAL GUIDES

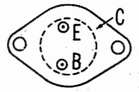
Q3A1,Q101,Q203
Q581-Q583,Q702
BOTTOM VIEW

Q102,Q201,
Q531,Q712
BOTTOM VIEW

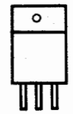


Q331,Q332
Q651,Q652
Q653
FRONT VIEW

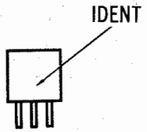
Q401,Q402
FRONT VIEW



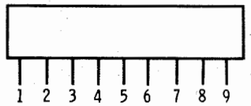
Q591
TOP VIEW



Q701
FRONT VIEW

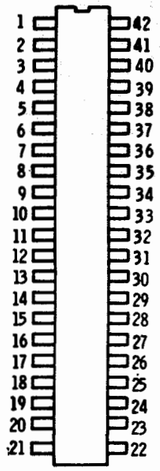


Q703 THRU Q705
Q707,Q708,Q711,
Q714
FRONT VIEW

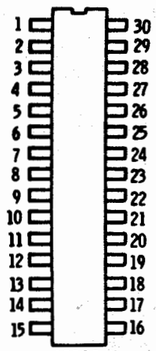


IC702,IC704
FRONT VIEW

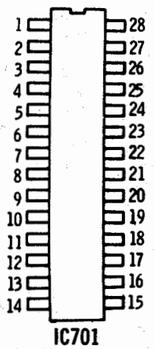
IC991
TOP VIEW



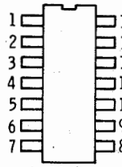
IC201
TOP VIEW



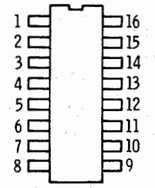
IC101
TOP VIEW



IC701
TOP VIEW



IC301
TOP VIEW



IC703
TOP VIEW

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

—x— Circuitry not used in some versions

- - - Circuitry used in some versions

Θ See parts list

※ Nominal value

⏚ Ground

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

Waveforms: triggered scope, keyed rainbow generator.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltages 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% unless noted.

Electrolytic capacitors are 50 volts or less, 20% unless noted.

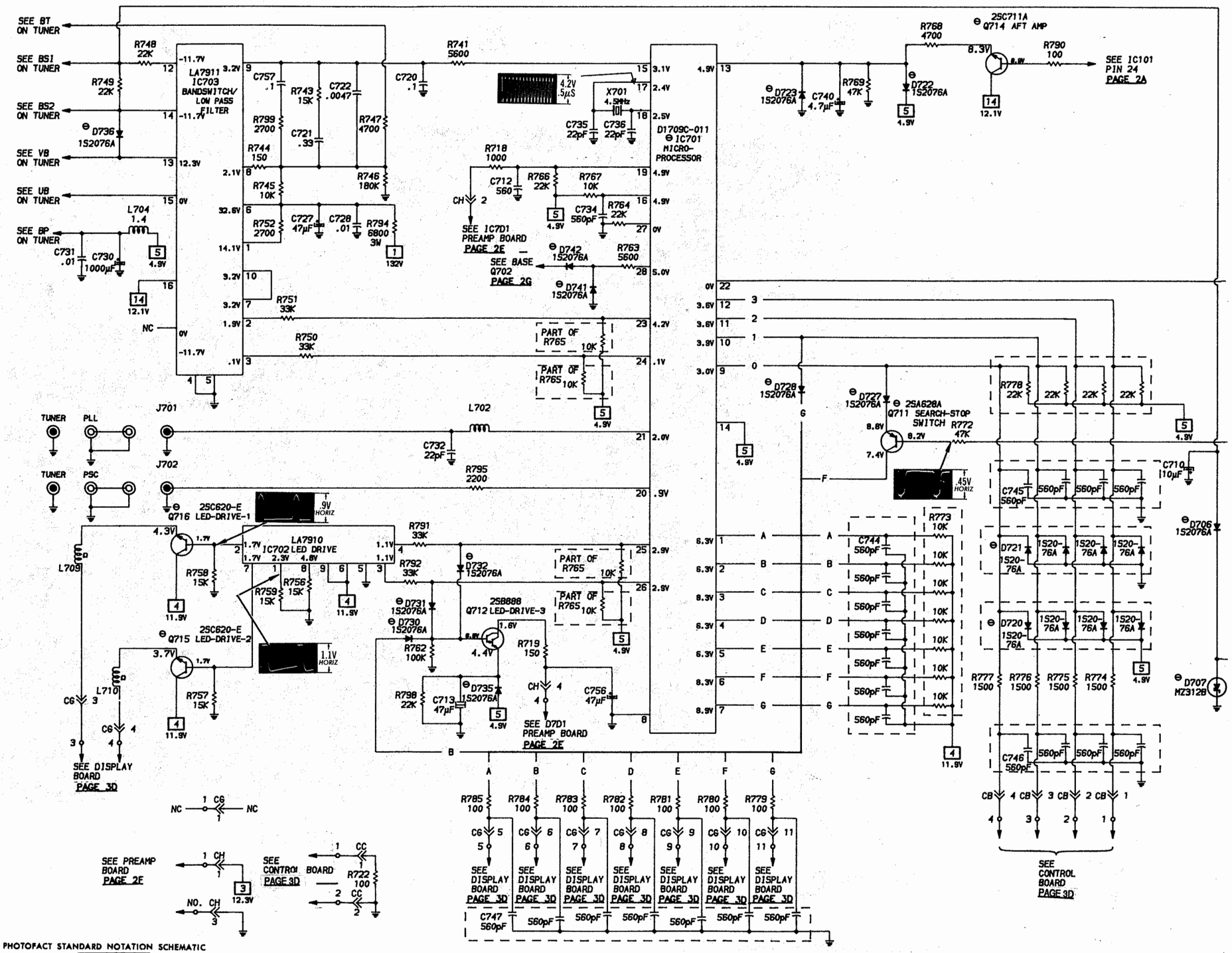
Resistors are ½W or less, 5% unless noted.

Value in ( ) used in some versions.

TERMINAL GUIDES AND NOTES

A

B



A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE

SELECTOR

TEST EQUIPMENT

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

TEST EQUIPMENT (TV)

Equipment Name	B & K Precision Equipment No.	Simpson Equipment No.		
OSCILLOSCOPE	1560	454		
GENERATORS				
BAR SWEEP				
COLOR BAR	1211A,1248,1251,1260	431		
SWEEP/MARKER				
ANALOG VOM	277	260-7		
DIGITAL VOM	2830	463,467,470,474		
FREQUENCY METER	1803,1805	710		
HI-VOLTAGE PROBE	HV-44	248		
ISOLATION TRANSFORMER	TR110,1604,1653,1655			
CAPACITANCE ANALYZER	820			
INDUCTANCE ANALYZER				

TV ALIGNMENT INSTRUCTIONS

Use an isolation transformer, or observe polarity, and maintain line voltage at 120VAC.
Allow a 20-minute warm-up period for receiver and test equipment.
Suggested Alignment Tools: GC ELECTRONICS
L104, Tuner IF Output Coil.....9296, 9297, 9300
L102, L103, L105, L301, L302, T101, T102.....9440

PRELIMINARY INSTRUCTIONS

Set the channel selector to the highest unused channel. Set scope sweep to external.
Connect scope vertical input to scope vertical input on sweep/marker generator. Connect scope external horizontal input to scope horizontal input on sweep/marker generator.
Ground test equipment to TV chassis unless specified otherwise. Use only enough generator output to provide a usable indication.
Note: Response may vary slightly from that shown.
Set RF AGC Control (VR101) fully clockwise.
Connect a +6V bias to TP14.

VIDEO IF ALIGNMENT (SWEEP MARKER GENERATOR)

DIRECT PROBE FROM SWEEP/MARKER GENERATOR	SWEEP GENERATOR OUTPUT	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	REMARKS
To TP12	To TP-1A	44MHz (10MHz Sweep)	41.25MHz 47.25MHz	Adjust L104 for MINIMUM. Adjust T102 for MINIMUM. See Figure 1.
"	"	"	41.25MHz 45.75MHz 47.25MHz	Adjust L102 for Maximum 45.75MHz. See Figure 2.
"	To TP on Tuner.	"	41.25MHz 42.17MHz 44.00MHz 45.75MHz 47.25MHz	Connect a 470 Ohm Resistor from TP-1F to TP-1G. Adjust T101 and Tuner IF Output Coil for Maximum gain and symmetry of response. T101 and Tuner IF Output Coil affect overall response. See Figure 3. Remove 470 Ohm Resistor. Adjust RF AGC Control.

TV ALIGNMENT INSTRUCTIONS (Continued)

VIDEO IF ALIGNMENT (BAR SWEEP GENERATOR)

BAR SWEEP GENERATOR	SCOPE INPUT	REMARKS
To TP on Tuner	To TP12	Perform Video IF Adjustments per SWEEP/MARKER GENERATOR instructions above. See Figure 7.

AUTOMATIC FINE TUNING ALIGNMENT

Connect as explained in preliminary instructions unless specified otherwise.
Connect + 6V Bias to TP-14.

DIRECT PROBE FROM SWEEP/MARKER GENERATOR	SWEEP GENERATOR OUTPUT	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	REMARKS
To TP-16	To TP-1A	44MHz (10MHz Sweep)	45.75MHz	Adjust L103 to place 45.75MHz marker at crossover as shown. See Figure 4.

SOUND IF ALIGNMENT

Connect as explained in preliminary instructions unless specified otherwise.

DIRECT PROBE FROM SWEEP/MARKER GENERATOR	SWEEP GENERATOR OUTPUT	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	REMARKS
To TP-R	To TP-1A	44MHz (10MHz Sweep)	43.50MHz 47.25MHz	Adjust L105 for MINIMUM 43.50MHz. See Figure 5.
"	"	"	46.00MHz 47.25MHz	Adjust L302 for Maximum 46.00MHz. See Figure 6.

Tune in a station and adjust L301 for Maximum sound. Reduce signal strength at the antenna terminals until distortion appears. Continue to reduce the signal while aligning for undistorted output by adjusting L301.

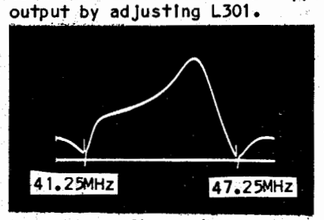


Figure 1

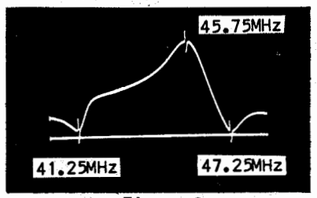


Figure 2

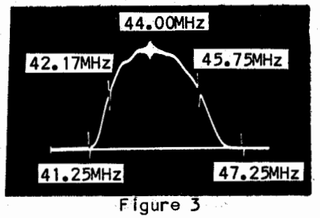


Figure 3

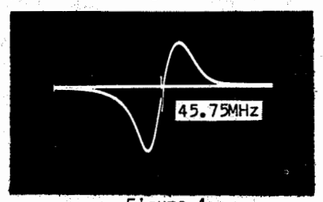


Figure 4

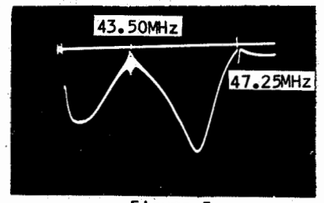


Figure 5

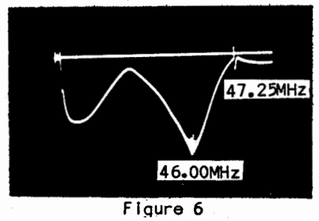


Figure 6

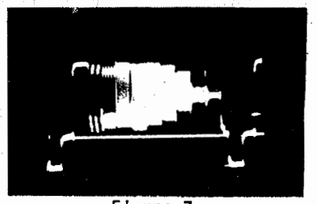


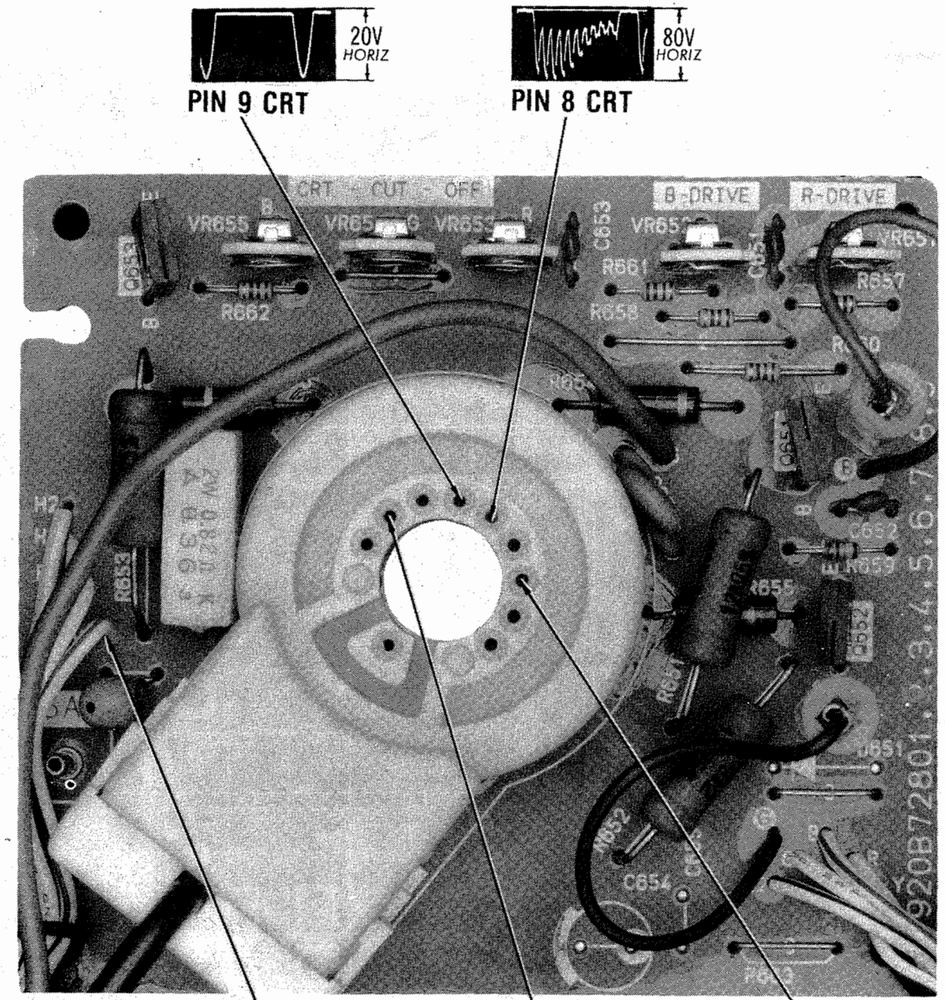
Figure 7

RESISTANCE MEASUREMENTS

MEASUREMENTS TAKEN WITH LOW POWER OHMS METER

ITEM	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 12	PIN 13	PIN 14
IC101	3560	325K	1210	INF	0	12K	12K	0	INF	INF	INF	2040	2040	INF
	PIN 15	PIN 16	PIN 17	PIN 18	PIN 19	PIN 20	PIN 21	PIN 22	PIN 23	PIN 24	PIN 25	PIN 26	PIN 27	PIN 28
	INF	7290	4720	4720	33K	INF	INF	INF	INF	23K	23K	4340	4340	23K
													PIN 29	PIN 30
													1000	2770
IC201	72K	25K	INF	2180	15K	9760	220K	0	200K	102K	INF	48K	13K	1215
	PIN 15	PIN 16	PIN 17	PIN 18	PIN 19	PIN 20	PIN 21	PIN 22	PIN 23	PIN 24	PIN 25	PIN 26	PIN 27	PIN 28
	969	1364	13K	1084	2170	2170	2190	78K	5790	5120	9700	INF	INF	222K
	PIN 29	PIN 30	PIN 31	PIN 32	PIN 33	PIN 34	PIN 35	PIN 36	PIN 37	PIN 38	PIN 39	PIN 40	PIN 41	PIN 42
	32K	0	5930	14K	8280	10K	INF	INF	30K	47K	104K	INF	5870	2220
IC301	INF	INF	0	0	985	13K	7700	10K	5440	10K	INF	2400	6140	49K
IC701	700K	700K	700K	700K	700K	700K	700K	0	24K	24K	24K	24K	3800	2320
	PIN 15	PIN 16	PIN 17	PIN 18	PIN 19	PIN 20	PIN 21	PIN 22	PIN 23	PIN 24	PIN 25	PIN 26	PIN 27	PIN 28
	INF	12K	INF	INF	25K	INF	INF	120K	12K	12K	12K	12K	22K	INF
IC702	15K	15K	46K	46K	0	INF	15K	15K	INF					
IC703	24K	46K	46K	0	0	21K	INF	29K	INF	INF	INF	1.3M	436	1.3M
													PIN 15	PIN 16
													520	2020
IC704	59K	3300	71K	14K	0	7910	INF	61K	1109					
IC991	B 19K	C 16K	E 15K	G 0										
V271	INF	NC	NC	INF	0	INF	7M	INF	FIL	FIL	INF	INF		

ITEM	E	B	C		ITEM	E	B	C		ITEM	E	B	C	
Q3A1	470	34K	992		Q581	44K	17K	27K		Q704	0	49K	75K	
Q101	0	152K	2490		Q582	44K	27K	5620		Q705	0	75K	14K	
Q102	1887	700	0		Q583	INF	158K	0		Q707	2320	55K	1000	
Q201	988	1197	0		Q591	0	.3	17K		Q708	1109	9650	6820	
Q203	980	1488	880		Q651	1090	2540	INF		Q711	48K	INF	391K	
Q331	64K	37K	17K		Q652	1083	2540	INF		Q712	22K	100K	INF	
Q332	0	1000	INF		Q653	1080	2560	INF		Q714	8610	21K	2020	
Q401	34K	22K	17K		Q701	2330	1.8M	1.8M		Q715	INF	15K	INF	
Q402	0	1315	34K		Q702	0	INF	751K		Q716	INF	15K	INF	
Q531	0	471	24K		Q703	0	44K	49K						

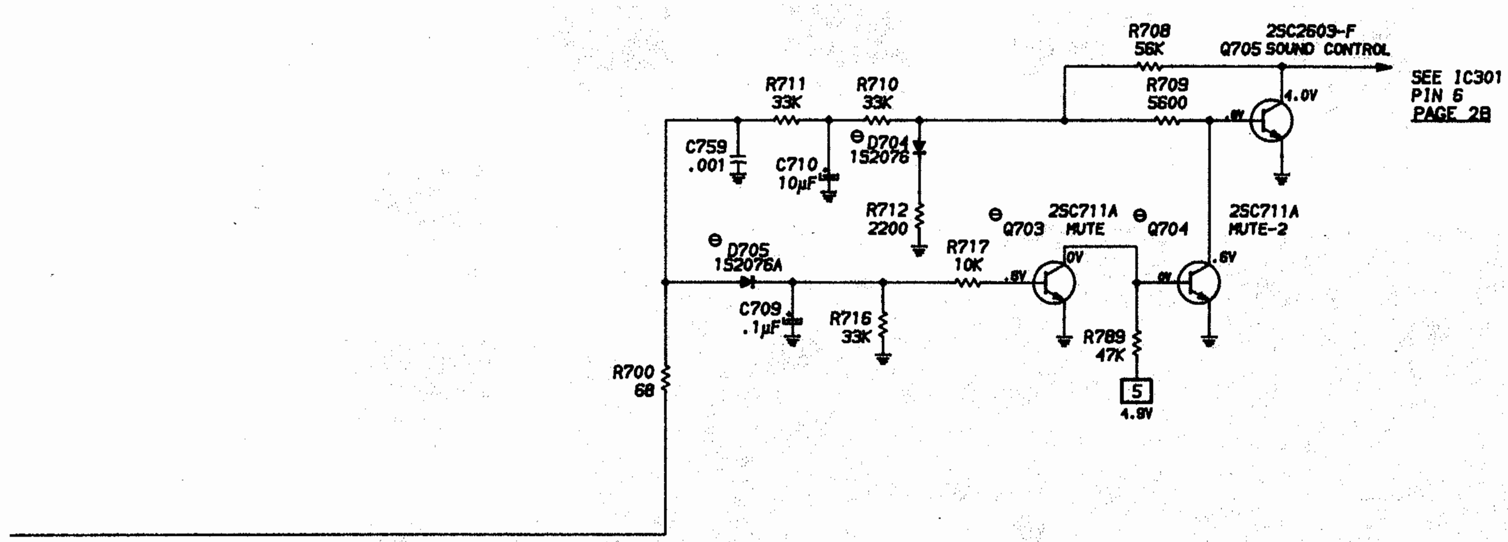


A Howard W. Sams QUICK-CHECKS™ Photo

CRT BOARD

MITSUBISHI MODELS
CS-1951,CS-1972R

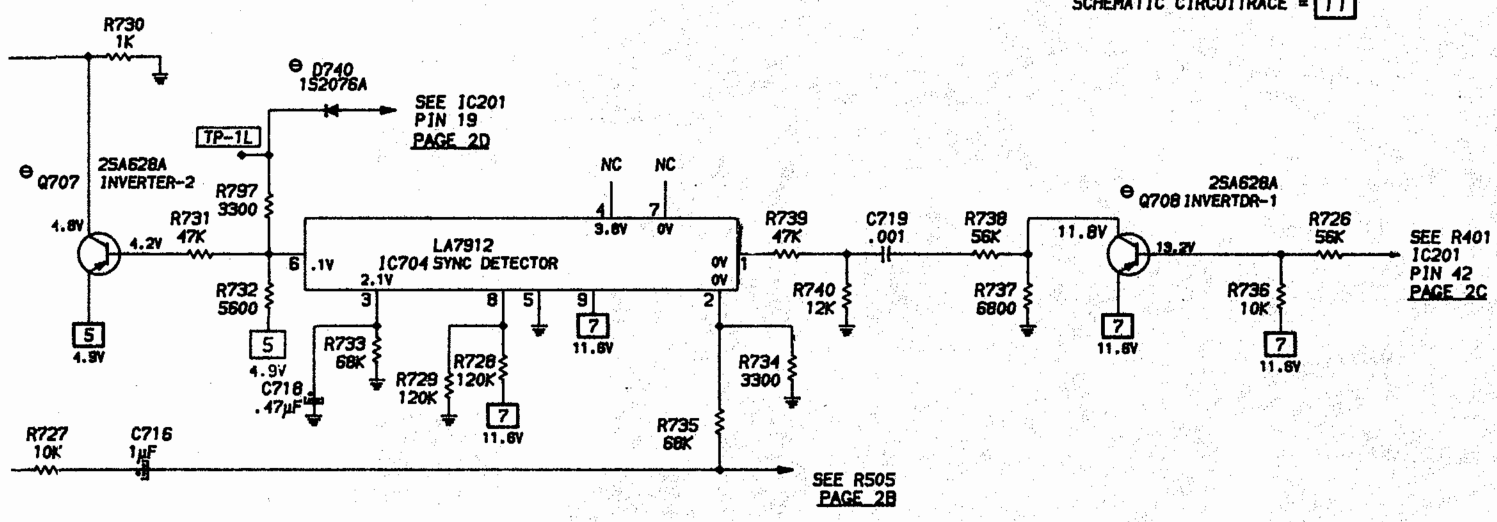
C



FOR TERMINAL GUIDES AND NOTES
SEE PAGE 2

PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11



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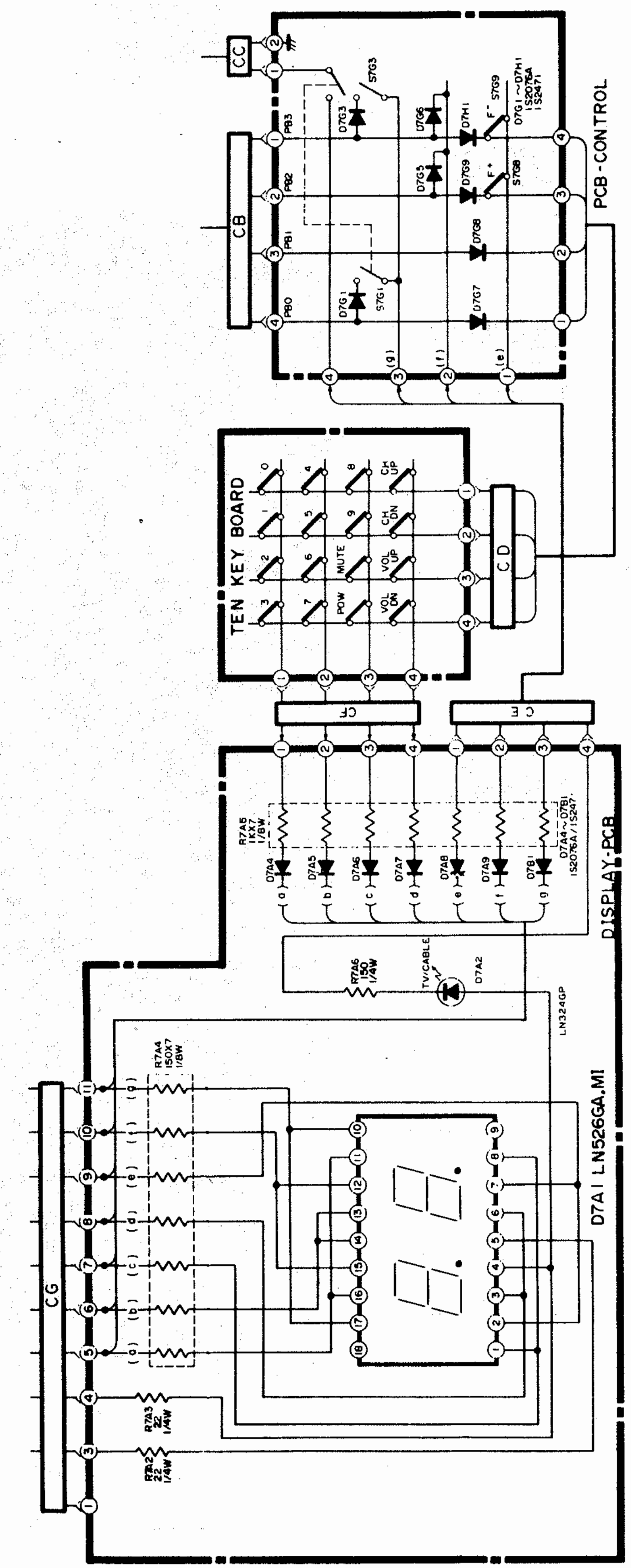
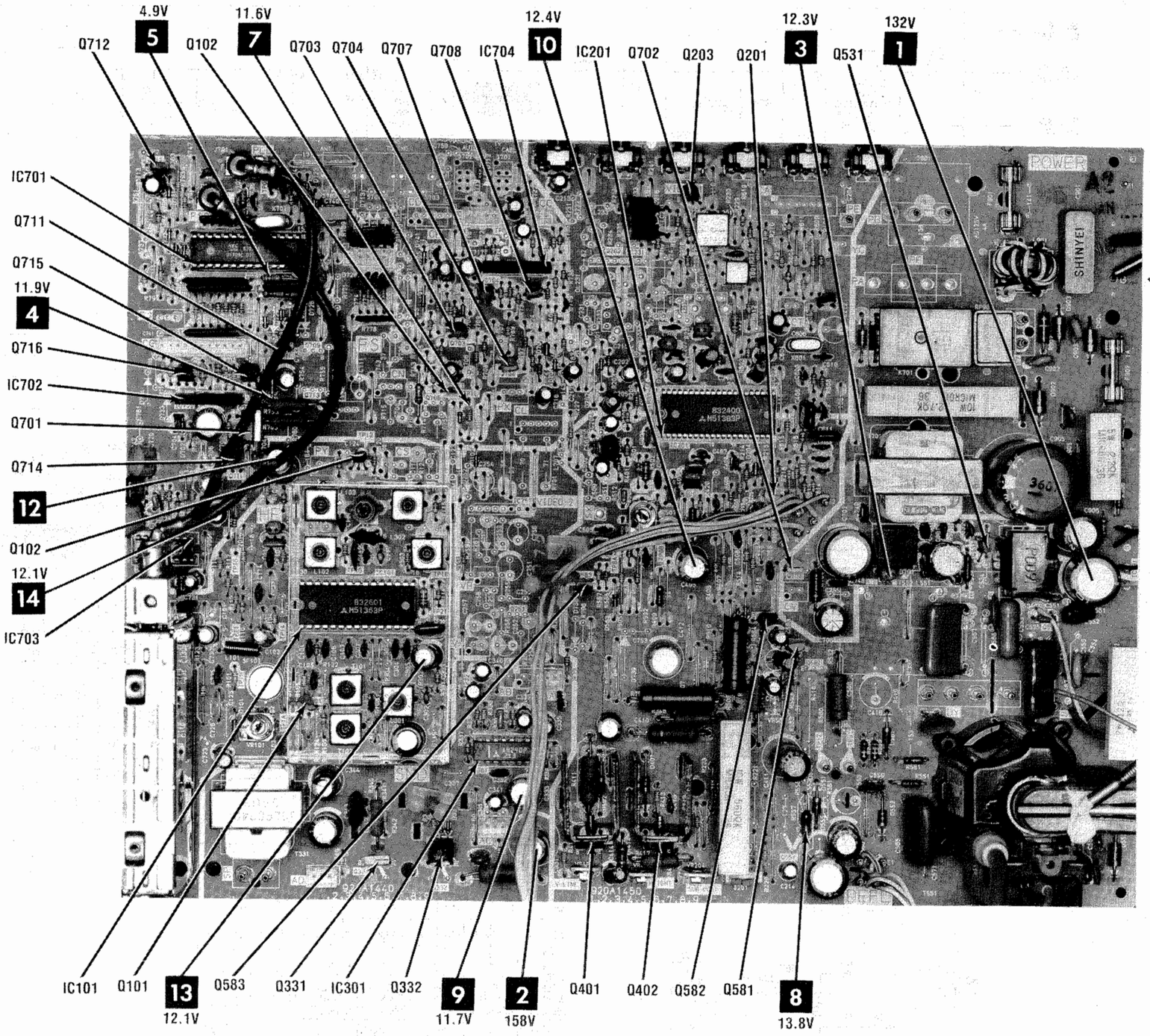


DISPLAY/KEY/CONTROL BOARDS

Courtesy of the Manufacturer



ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

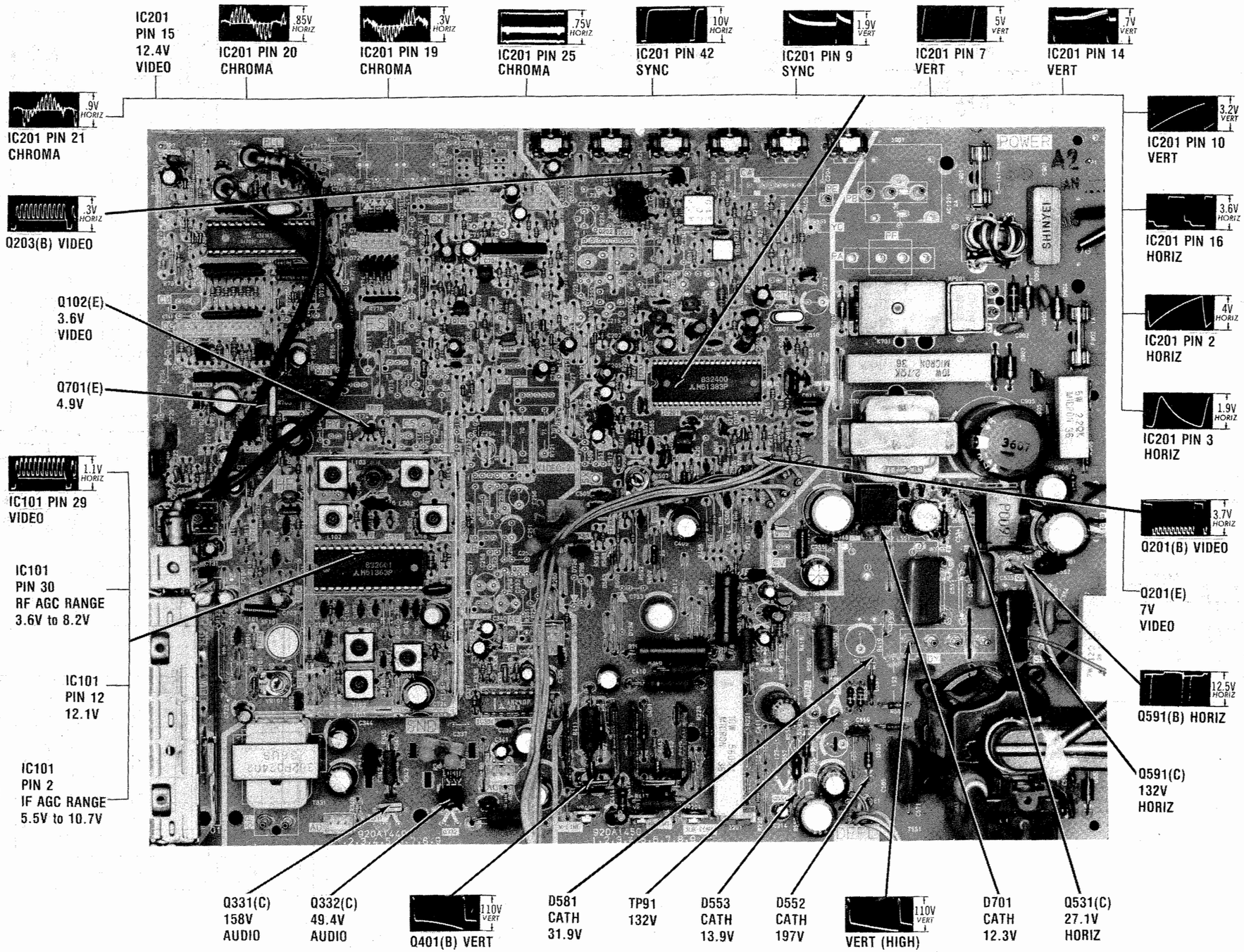
A Howard W. Sams CIRCUITRACE® Photo

MAIN BOARD

MAIN BOARD

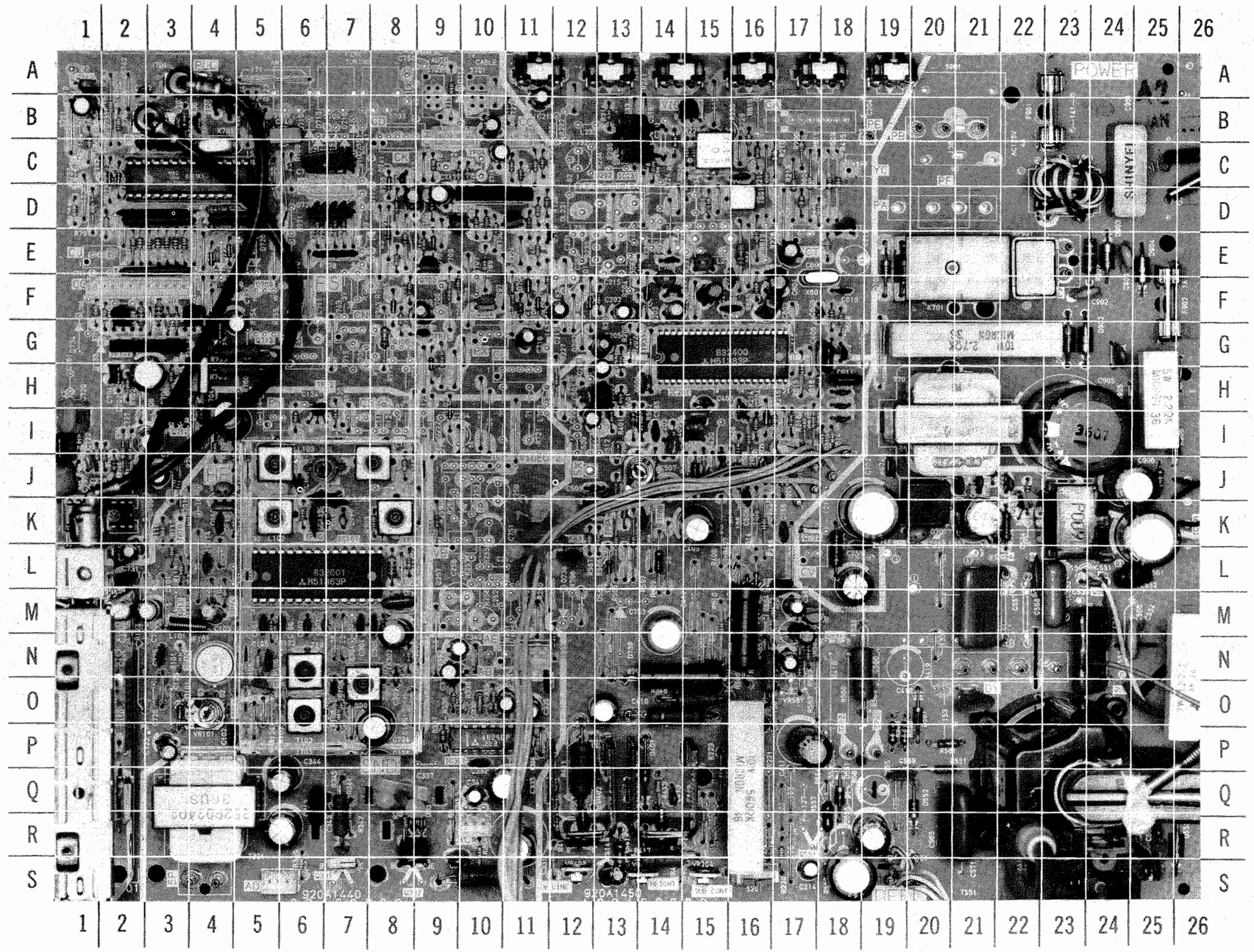
MAIN BOARD GridTrace LOCATION GUIDE

C102	P-4	C535	L-24	C757	J-1	L302	K-8	R217	J-16	R601	D-15	R772	E-8		
C103	M-4	C551	L-24	C758	K-17	L551	K-21	R218	I-17	R602	C-16	R773	D-3		
C104	M-5	C552	N-24	C759	G-8	L552	L-25	R219	J-17	R603	F-16	R774	D-6		
C105	N-5	C553	M-23	C901	C-24	L553	R-18	R220	R-17	R604	D-17	R775	D-6		
C106	M-6	C554	N-25	C902	F-23	L591	R-26	R222	R-15	R605	D-17	R776	D-7		
C107	M-6	C557	M-21	C903	E-24	L701	K-20	R223	Q-15	R606	F-18	R777	D-7		
C108	O-7	C559	Q-19	C904	G-24	L702	B-3	R227	H-12	R607	G-18	R778	E-7		
C109	I-4	C560	R-19	C905	I-24	L704	I-4	R228	C-15	R608	F-18	R779	E-3		
C110	K-4	C561	K-25	C906	J-25	L709	F-2	R229	B-16	R609	C-18	R780	E-3		
C111	J-6	C562	S-25	CF101	K-4	L710	F-3	R240	C-14	R610	E-18	R781	E-3		
C112	K-6	C563	S-18	CF301	M-8	L901	C-23	R301	N-8	R611	C-17	R782	E-3		
C114	L-4	C564	R-25	D101	O-3	LC201	C-13	R302	M-8	R612	E-16	R783	E-3		
C115	K-7	C565	R-21	D102	I-9	Q101	O-5	R303	K-8	R613	I-18	R784	E-2		
C116	K-7	C581	N-17	D201	F-12	Q102	H-6	R331	S-10	R614	I-18	R785	E-2		
C117	K-7	C582	N-17	D203	F-14	Q201	I-17	R332	N-12	R615	H-17	R789	E-10		
C201	H-14	C583	M-17	D204	I-16	Q203	B-15	R333	P-11	R616	H-17	R790	J-3		
C202	F-13	C584	K-14	D207	O-14	Q331	S-7	R334	P-11	R617	I-17	R791	D-1		
C203	F-14	C585	I-14	D331	R-9	Q332	R-9	R335	K-9	R618	I-17	R792	D-2		
C205	G-13	C591	R-26	D332	R-9	Q401	R-12	R336	O-9	R700	E-8	R794	N-14		
C206	H-13	C601	C-16	D401	Q-14	Q402	R-14	R337	P-9	R701	H-3	R795	C-3		
C207	F-14	C602	E-16	D402	Q-13	Q531	K-22	R338	O-10	R702	H-2	R797	F-10		
C208	E-14	C603	F-16	D501	L-16	Q581	M-17	R339	O-10	R703	H-5	R798	B-1		
C209	F-15	C604	F-17	D551	Q-18	Q582	L-17	R340	S-6	R704	L-18	R799	I-1		
C210	F-16	C605	E-17	D552	Q-20	Q583	L-12	R341	R-7	R708	F-9	R901	G-21		
C211	F-16	C606	E-17	D553	R-26	Q591	R-26	R342	R-7	R709	F-9	R902	E-24		
C213	B-11	C607	D-18	D581	O-20	Q701	H-4	R343	B-8	R710	E-9	R903	H-25		
C214	S-17	C608	F-18	D582	N-17	Q702	K-17	R344	R-10	R711	E-8	R904	J-25		
C217	F-12	C609	G-18	D583	L-13	Q703	E-9	R345	R-7	R712	D-9	R905	H-24		
C301	M-6	C610	F-18	D701	K-20	Q704	F-10	R346	O-15	R716	F-8	R906	I-26		
C302	O-8	C611	H-18	D702	H-2	Q705	G-9	R401	I-13	R717	F-8	RP901	E-22		
C303	N-8	C612	I-18	D703	E-19	Q707	D-9	R402	I-14	R718	C-9	S201	S-16		
C304	M-7	C613	H-18	D704	E-9	Q708	D-11	R403	J-15	R719	A-9	SF101	N-4		
C305	M-8	C614	H-18	D705	F-8	Q711	F-4	R404	J-15	R720	G-9	T101	N-6		
C306	L-8	C701	J-21	D706	F-11	Q712	A-1	R405	C-18	R722	B-11	T102	O-6		
C331	R-11	C702	K-19	D707	F-11	Q714	I-3	R406	K-15	R724	F-11	T331	Q-4		
C332	P-10	C703	H-3	D720	D-7	Q715	F-3	R407	K-16	R726	F-11	T531	K-23		
C333	Q-10	C704	H-2	D721	D-4	Q716	F-2	R408	I-16	R727	F-11	T551	Q-24		
C334	O-11	C705	G-6	D722	B-5	R101	N-3	R409	L-14	R728	C-9	T601	D-16		
C335	O-11	C706	L-18	D723	B-5	R102	O-4	R410	O-14	R729	C-10	T701	I-21		
C336	N-9	C709	F-9	D727	E-4	R103	O-4	R411	Q-12	R730	D-10	VR101	O-4		
C338	O-10	C710	D-8	D728	E-4	R104	M-4	R412	Q-16	R731	D-10	VR201	A-11		
C339	O-11	C712	C-8	D730	C-2	R105	N-5	R413	Q-14	R732	D-10	VR202	A-13		
C340	N-9	C713	B-1	D731	C-2	R107	O-6	R414	R-13	R733	C-11	VR203	A-14		
C341	Q-10	C715	L-2	D732	C-2	R108	O-7	R415	R-12	R734	C-11	VR204	S-15		
C342	Q-6	C716	G-11	D735	B-1	R109	I-4	R416	S-14	R735	C-11	VR401	A-19		
C343	R-6	C717	D-9	D736	L-1	R110	L-3	R417	S-14	R736	D-11	VR402	S-14		
C344	Q-6	C718	C-10	D737	G-4	R111	K-4	R501	H-13	R737	D-11	VR403	S-12		
C346	S-9	C719	E-11	D740	G-9	R112	K-6	R502	I-14	R738	D-11	VR501	J-14		
C401	K-12	C720	I-1	D741	C-8	R113	L-3	R503	I-13	R739	D-11	VR601	A-16		
C402	I-14	C721	I-1	D742	E-8	R114	L-8	R504	J-13	R740	E-11	VR602	A-18		
C403	I-15	C722	J-1	D901	G-23	R115	J-8	R505	K-13	R741	B-5	X601	F-18		
C404	I-15	C723	P-3	D902	G-23	R116	K-3	R506	M-16	R743	J-1	X701	C-4		
C405	K-15	C724	P-8	D904	E-25	R117	L-3	R507	J-14	R744	J-1				
C406	G-18	C725	N-3	DL201	C-15	R118	J-4	R508	I-16	R745	J-2				
C407	H-15	C727	I-3	F901	B-23	R119	I-6	R509	J-22	R746	J-2				
C408	J-15	C728	J-2	F902	F-25	R120	I-7	R510	M-15	R747	I-1				
C409	H-16	C729	J-3	IC101	L-6	R122	M-5	R514	K-16	R748	L-1				
C410	O-13	C730	M-3	IC201	G-15	R123	N-2	R531	J-22	R749	L-1				
C411	P-17	C731	L-2	IC301	P-10	R200	C-17	R532	N-19	R750	I-2				
C412	N-14	C732	A-2	IC701	C-3	R201	K-3	R551	Q-20	R751	J-2				
C413	Q-14	C733	G-5	IC702	G-3	R202	F-13	R552	N-26	R752	J-2				
C414	S-13	C734	B-4	IC703	K-2	R203	F-13	R553	R-25	R753	G-5				
C415	O-21	C735	B-4	IC704	D-10	R205	G-13	R554	K-22	R756	G-3				
C501	H-12	C736	B-4	IC991	J-26	R206	E-13	R555	P-19	R757	G-3				
C502	I-12	C739	D-5	K701	E-21	R207	B-14	R556	P-19	R758	F-2				
C503	H-13	C740	B-6	L101	M-3	R208	C-15	R581	P-20	R759	F-1				
C504	I-13	C744	D-3	L102	K-5	R209	G-13	R582	N-17	R762	C-1				
C505	J-12	C745	D-4	L103	I-5	R210	C-16	R583	N-17	R763	B-2				
C506	K-12	C746	C-6	L104	J-6	R211	B-13	R584	M-16	R764	B-2				
C507	J-14	C747	E-3	L105	J-8	R212	C-16	R585	N-16	R765	C-3				
C508	J-16	C748	L-19	L106	J-4	R213	C-17	R586	K-13	R766	D-8				
C531	J-21	C749	J-19	L201	F-14	R214	I-16	R587	K-12	R767	B-5				
C532	J-22	C751	D-4	L202	E-15	R215	I-17	R588	K-13	R768	D-1				
C533	L-22	C756	B-10	L301	O-7	R216	K-16	R590	N-16	R769	C-6				



MAIN BOARD

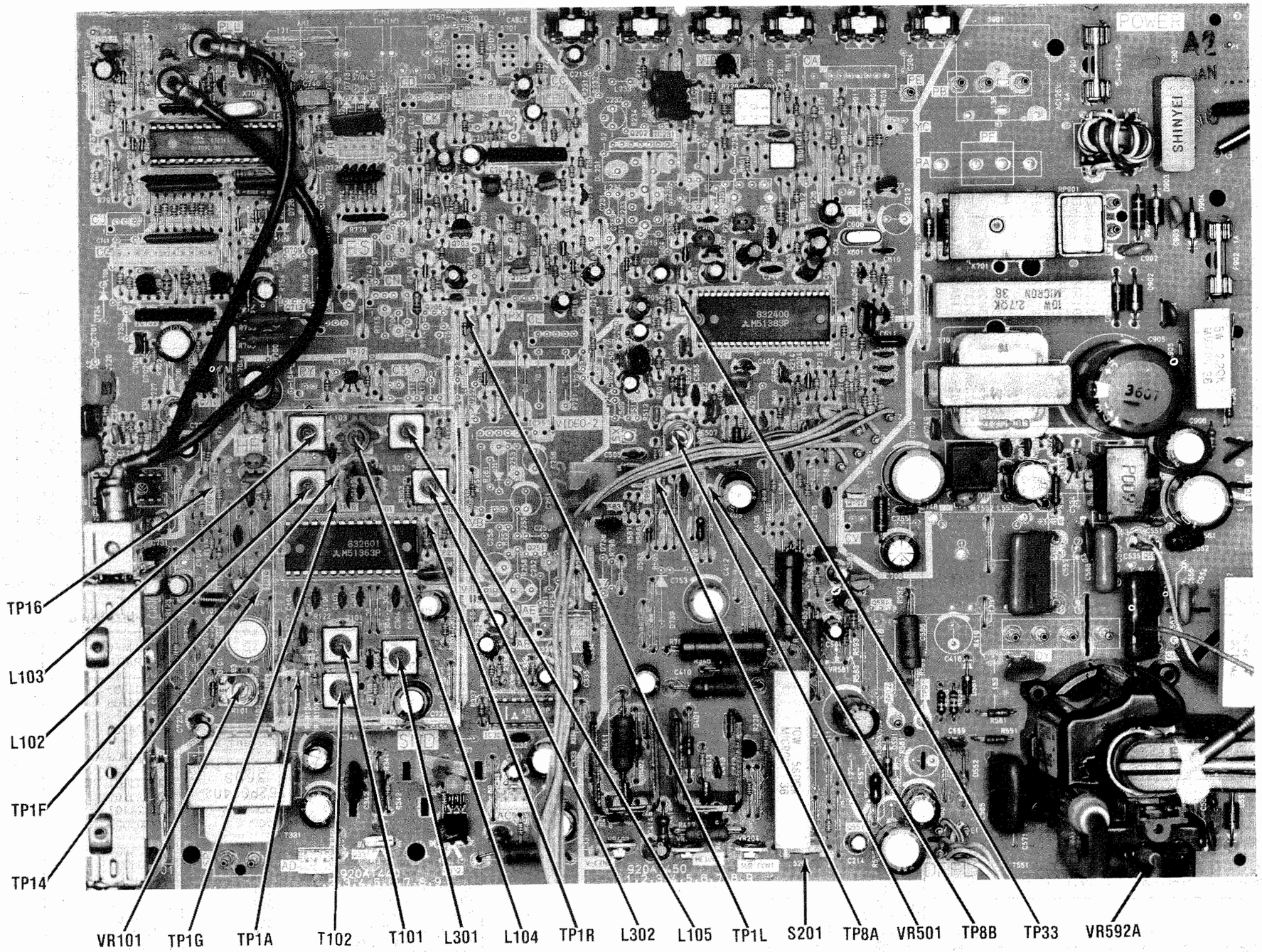
A Howard W. Sams QUICK-CHECKS™ Photo



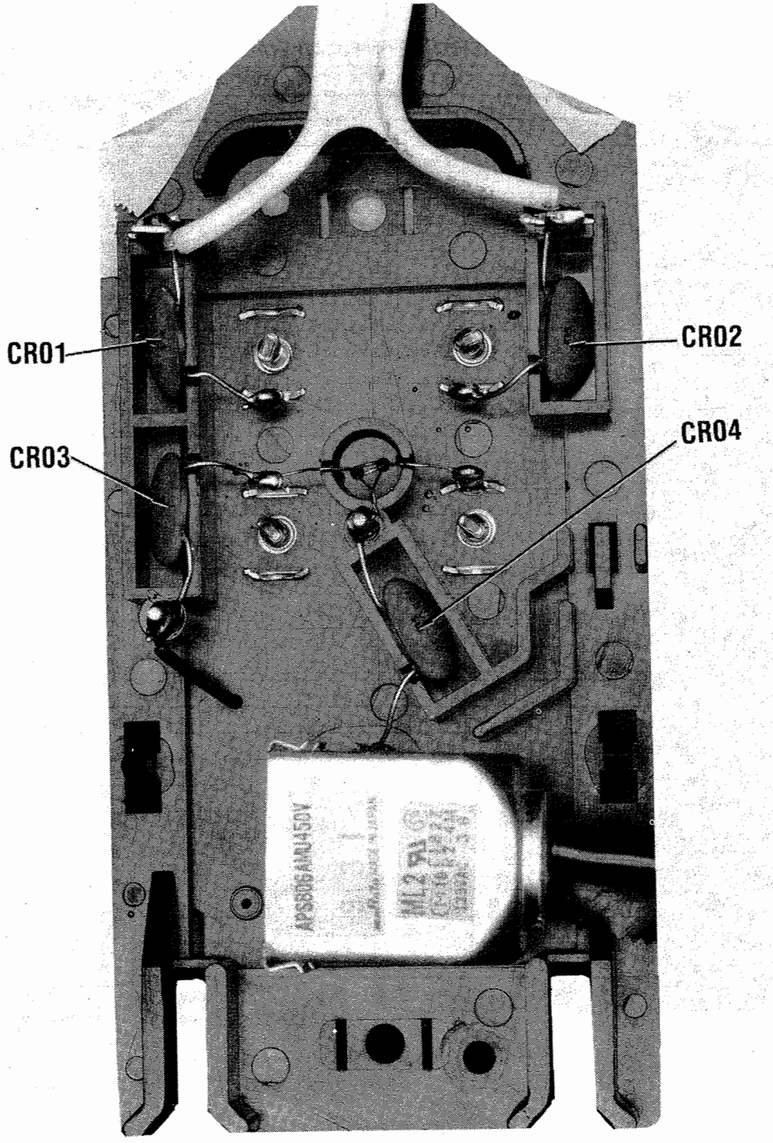
MAIN BOARD

A Howard W. Sams GRIDTRACE™ Photo

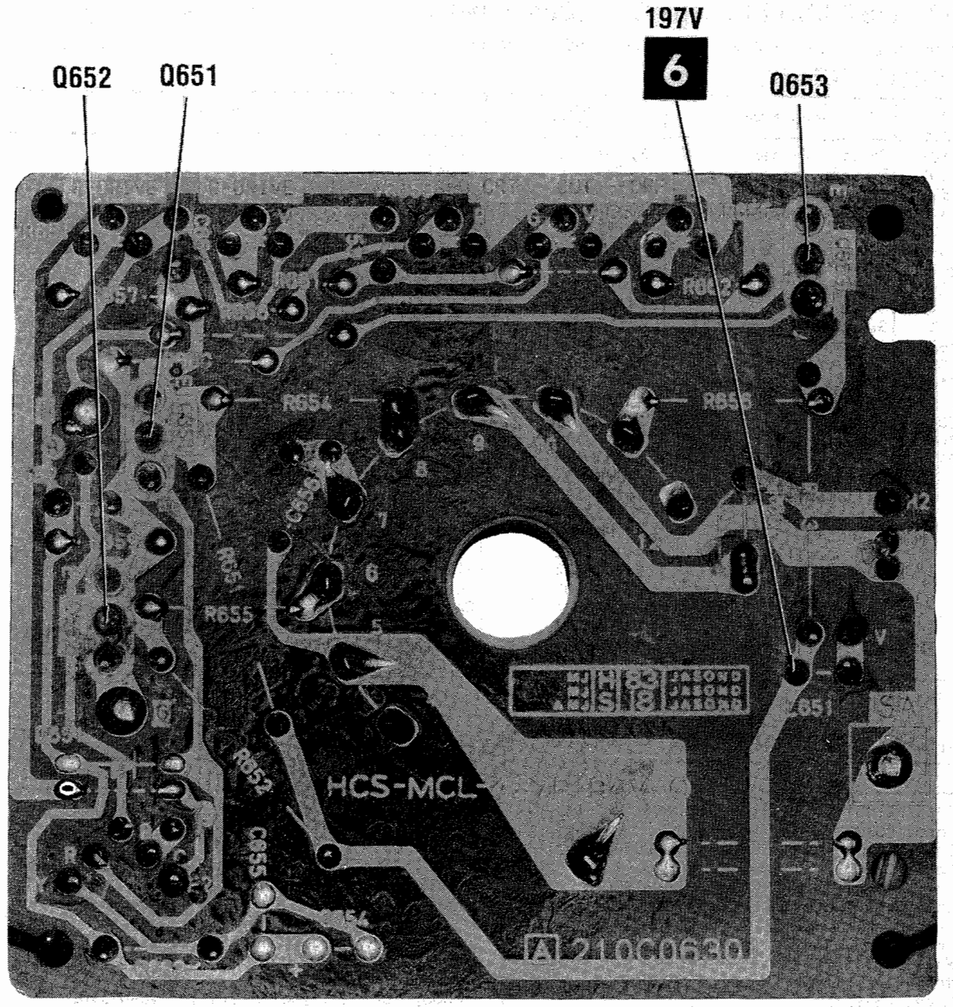
MAIN BOARD



MAIN BOARD ALIGNMENT

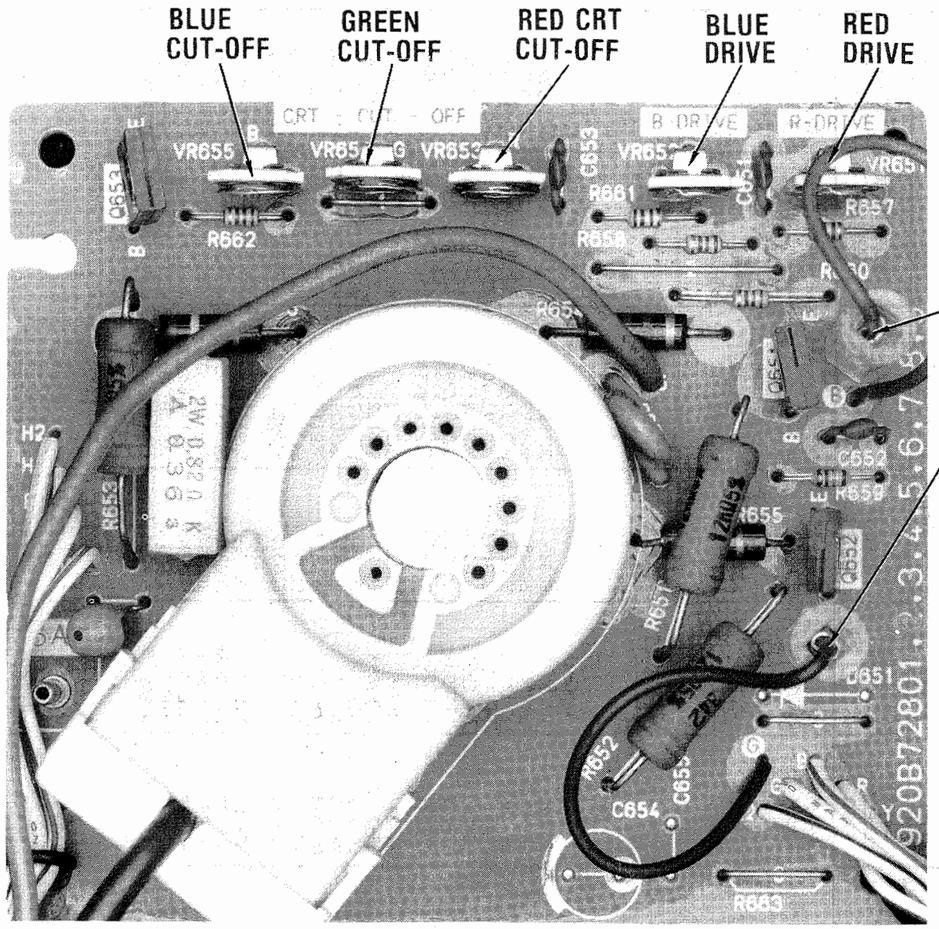


ANTENNA BOARD

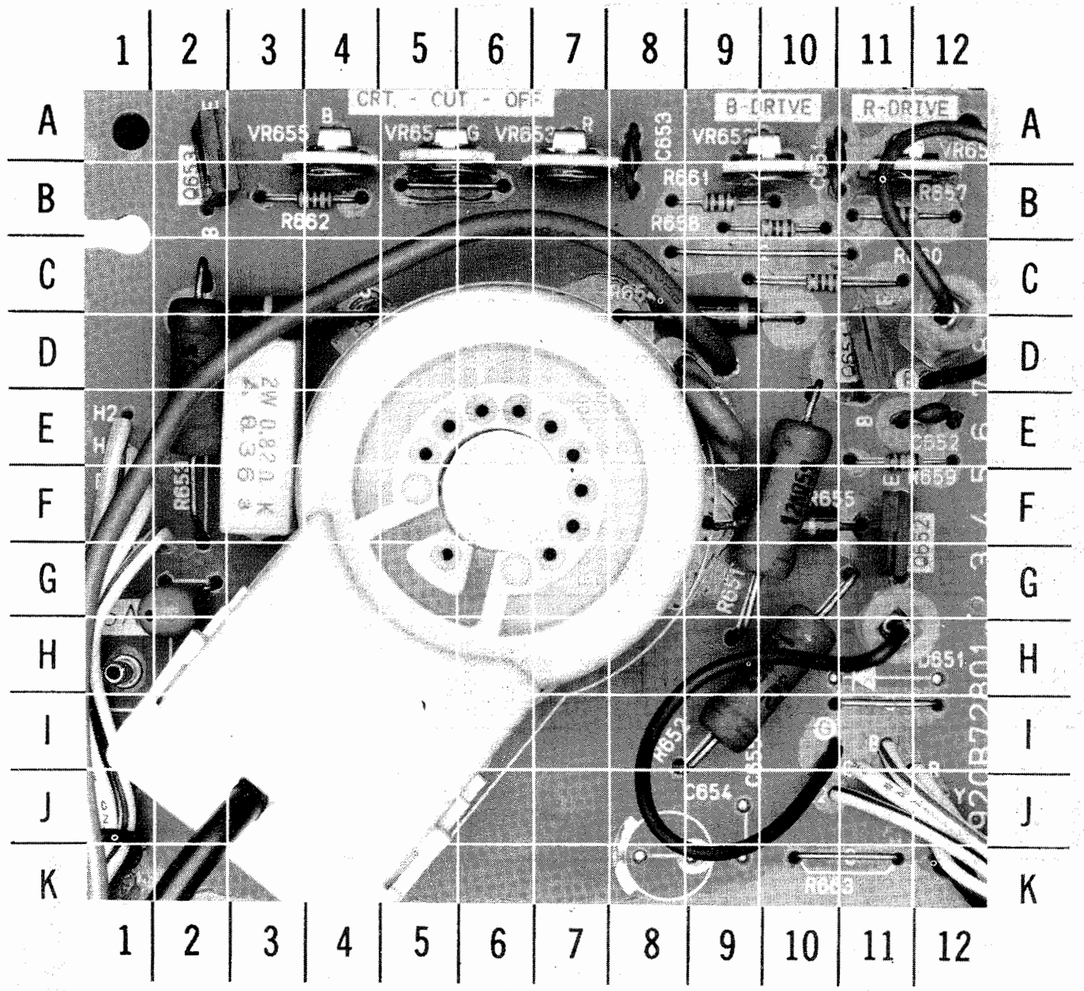


A Howard W. Sams CIRCUITRACE® Photo

CRT BOARD



CRT BOARD

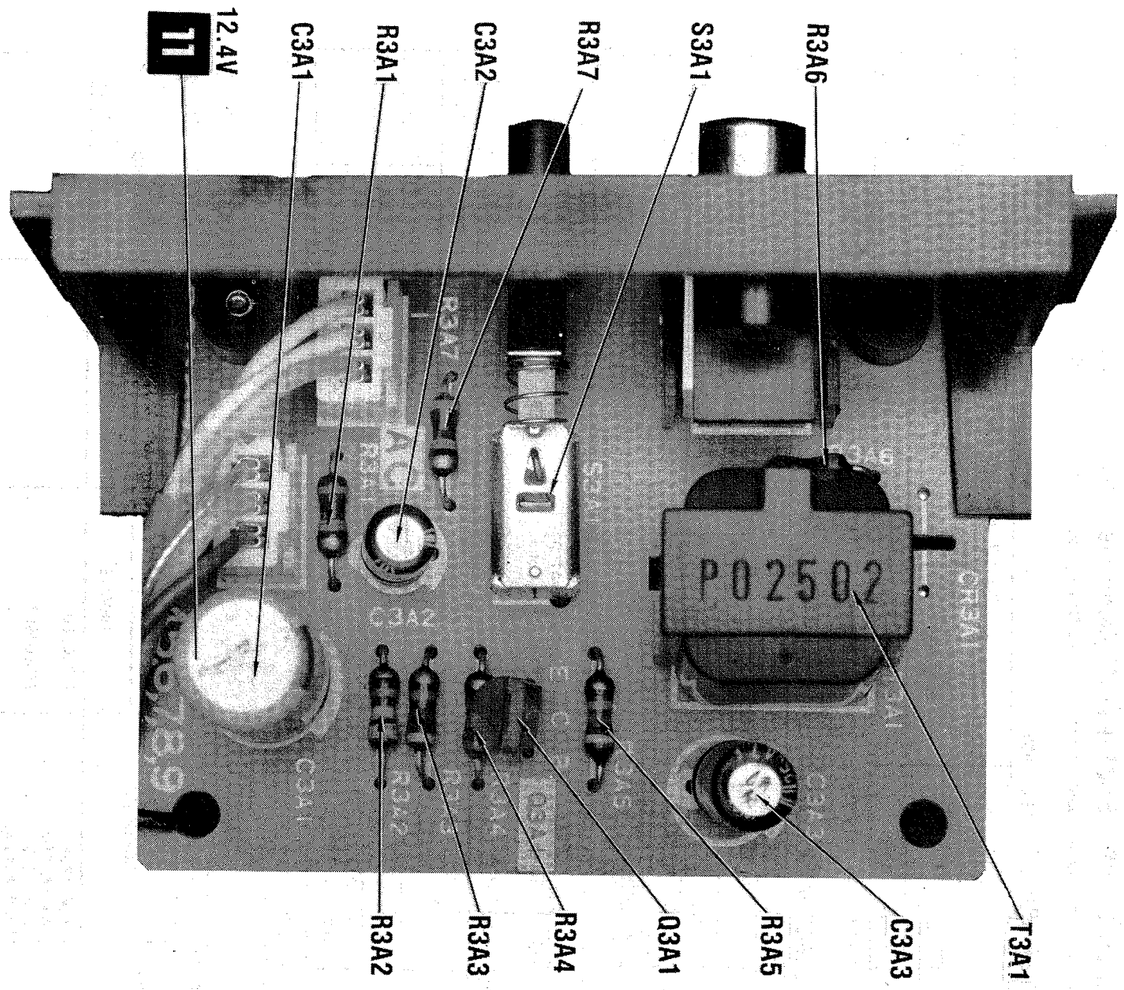


A Howard W. Sams GRIDTRACE™ Photo

CRT BOARD

CRT
SOCKET BOARD
GridTrace
LOCATION GUIDE

C651	A-10
C652	E-12
C653	A-8
C656	E-9
L651	G-2
Q651	D-11
Q652	F-11
Q653	A-2
R651	F-10
R652	H-10
R653	D-2
R654	C-9
R655	F-10
R656	C-3
R657	B-11
R658	B-10
R659	E-11
R660	C-10
R661	B-9
R662	B-4
R664	E-3
VR651	A-12
VR652	A-10
VR653	A-7
VR654	A-5
VR655	A-4



PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
D101	MZ303B	264P19305		NTE5004A	ECG5004A	SK3A0/5004A	WEP1404/5004	
	HZ3A07			NTE5004A	ECG5004A	SK3A0/5004A	WEP1404/5004	
	HZ303B			NTE5004A	ECG5004A	SK3A0/5004A	WEP1404/5004	
D102	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D201	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D203	MZ307B	264P22001	GEZD-6.8	NTE5014A	ECG5014A	SK6A8/5014A	WEP1415/5014	103-Z9009
	EQA02-07CD		GEZD-7.5	NTE5015A	ECG5015A	SK7A5/5015A	WEP1416/5015	103-Z9002
	EQA02-07CDA		GEZD-7.5	NTE5015A	ECG5015A	SK7A5/5015A	WEP1416/5015	103-Z9002
D204	HZ312A	264P22103	GEZD-12	NTE5021A	ECG5021A	SK12A/5021A	WEP1423/5021	103-279-21
	HZ11C25		GEZD-12	NTE5021A	ECG5021A	SK12A/5021A	WEP1423/5021	103-279-21
D205	HZ310B	264P22006	GEZD-10	NTE5019A	ECG5019A	SK10A/5019A	WEP1420/5019	103-Z9010
	EQA02-10CDA		GEZD-10	NTE5019A	ECG5019A	SK10A/5019A	WEP1420/5019	103-Z9010
D207	S5500D	264P28501	GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	EM-1Z		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	ERB12-02RK		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
D331,2	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D401,2	S5500D	264P28501	GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	EM1Z		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	ERB12-02RK		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
D501	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D551	S5500D	264P28501	GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	EM-1Z		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	ERB12-02RK		GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
D552	TVR1G	264P23101	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-287
	ES-1		GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-287
D553	RU-3B	264P10202						
# D581	S5500D	264P28501	GE-504A	NTE116	ECG116	SK3311	WEP158/116	212-76-02
	EM-1Z		GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	212-76-02

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	GENERAL ELECTRIC PART No.	REPLACEMENT DATA				
				NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
Q651 thru Q653	2SC2688-M,N 2SC2456	260P42504	GE-232 GE-232	NTE157 NTE157	ECG157 ECG157	SK3747/157 SK3747/157	WEP61/157 WEP61/157	121-Z9016 121-Z9016
Q701	2SC1826-Y	260P42706	GE-241	NTE196	ECG196	SK3054/196	WEP756/196	121-987-03
Q702	2SC620-E 2SC620D	260P10707	GE-20* GE-20*	NTE123AP* NTE123AP*	ECG85 ECG85	SK3124A/289A SK3124A/289A	WEP910/289 WEP910/289	121-Z9000A* 121-Z9000A*
Q703,4	2SC711A 2SC711A-E,F		GE-62 GE-62	NTE85 NTE85	ECG85 ECG85	SK3899 SK3899		121-972 121-972
Q705	2SC2603-E,F 603 (2SC2603-F)	260P33804 260P33803	GE-289A GE-289A	NTE289A NTE289A	ECG289A ECG289A	SK9137/382 SK9137/382	WEP910/289 WEP910/289	921-1114 921-1114
Q707,8	2SA628A 2SA628A-E,F		GE-82* GE-82*	NTE290A+ NTE290A+	ECG290A+ ECG290A+	SK3114A/290A+ SK3114A/290A+	WEP62/159* WEP62/159*	121-Z9003* 121-Z9003*
Q711	2SA1115-E,F 2SA628A 2SA628A-E,F 2SA1115-E,F	260P25601	GE-269 GE-82* GE-82* GE-269	NTE290A NTE290A+ NTE290A+ NTE290A	ECG290A ECG290A+ ECG290A+ ECG290A	SK9138/383 SK3114A/290A+ SK3114A/290A+ SK9138/383	WEP911/290 WEP62/159* WEP62/159* WEP911/290	121-Z9003* 121-Z9003* 121-Z9003* 121-Z9003*
Q712 Q714	2SB888 2SC711A	260P44501(1)	GE-62 GE-62	NTE85 NTE85	ECG85 ECG85	SK3899 SK3899		121-972 121-972
Q715,6	2SC711A-E,F 2SC2603-E,F 2SC620-E,D	260P33804 260P10707	GE-289A GE-20*	NTE289A NTE123AP*	ECG289A ECG85+	SK9137/382 SK3124A/289A+	WEP910/289 WEP910/289+	921-1114 121-Z9000A*

\# For SAFETY use only equivalent replacement part.
* Lead configuration may vary from original.
\+ Rotate 180° to conform with original lead configuration.
(1) Used In Model CS-1972R.

PARTS LIST AND DESCRIPTION (Continued)

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

ELECTROLYTIC CAPACITORS

	ITEM No.	RATING	MFGR. PART No.
	C209	10 25V NP	
	C407	47 35V	
#	C561	47 200V	181P19208
#	C581	1 50V	181P20501

	ITEM No.	RATING	MFGR. PART No.
#	C582	1 50V	181P12308
#	C583	10 50V	181P20505
#	C905	470 180V	185D05306
#	C906	22 160V	181P19100

\# For SAFETY use only equivalent replacement part.
Items Not Listed Are Normally Available At Local Distributors.

CAPACITORS

	ITEM No.	RATING	MFGR. PART No.
	C108	39 NP0 50V 5%	
	C111	5 NP0 50V 5%	
	C112	82 NP0 50V 5%	
	C115	4 NP0 50V 5%	
	C116	120 NP0 50V 5%	
	C117	5 N220 50V 5%	
	C208	33 NP0 50V 5%	
	C302	15 N220 50V 5%	
#	C552	.0068 1600V 5%	172P17101
#	C553	.18 200V 5%	189P07103
#	C554	470 2000V 10%	154P23801
#	C557	.39 200V 5%	189P07107
#	C584	.01 50V	142P02308
#	C585	.01 50V	142P02308

	ITEM No.	RATING	MFGR. PART No.
#	C591	470 2000 10%	154P03801
	C608	15 NP0 50V 5%	
	C609	47 NP0 50V 5%	
	C610	56 NP0 50V 5%	
	C735	22 NP0 50V 5%	
	C736	22 NP0 50V 5%	
	C744	560 50V	189D09701
	C745	560 50V	149D81104
	C746	560 50V	149D81104
	C747	560 50V	189D09701
	C751	.01 N470 25V	
#	C902	.0022 250V	189P06002
#	C903	.0022 250V	189P06002
#	C904	.0022 500V	142P01400

\# For SAFETY use only equivalent replacement part.
Items Not Listed Are Normally Available At Local Distributors.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR PART NO	NOTES
VR101	RF/AGC	500	127C02003	
VR201	Contrast	50K Detent @ 50%	120C24308	
VR202	Brightness	50K Detent @ 50%	120C24308	
VR203	Picture	50K Detent @ 50%	120C24308	
VR204	Sub Contrast	50K	127C03101	
VR371	Tone	100K	120C23109	
VR401	Vertical Hold	50K	120C24107	
VR402	Vertical Height (Size)	500	127C03003	
VR403	Vertical Linearity	20K	127C03009	
VR501	Horizontal Hold	5000	127C02007	
VR592	Focus	(1)		
VR592A	Screen	(1)		
VR601	TInt	50K	120C24107	
VR602	Color	50K	120C24107	
VR651	Red Drive	200	127C03001	
VR652	Blue Drive	200	127C03001	
VR653	Red-CRT Cut-Off	5000	127C03007	
VR654	Green-CRT Cut-Off	5000	127C03007	
VR655	Blue-CRT Cut-Off	5000	127C03007	

(1) Part of Horizontal Output Transformer T551, Part Number 334P09709.

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

	ITEM No.	PART NAME	MFGR. PART No.	NOTES
	CF101	Ceramic Filter	296P02402	4.5MHz
	CF301	Ceramic Filter	296P01401	4.5MHz
	EJ591	Earphone Jack	451C04102	
	J3A1	Audio Out Jack	451C04502	Model CS1972R
#	K701	Relay	287P02203	Power
	L991	Degaussing Coil	409B02906	
	S201	Switch	129P00709	Service
	S3A1	Switch	432C03101	Used In Model CS1972R.
	S7G1	Slide Switch	431C02101	TV/CATV
	S7G3	Slide Switch	431C02101	Auto/Manual
	S7G8	Keyboard Switch	432P03801	Fine Tuning +
	S7G9	Keyboard Switch	432P03801	Fine Tuning -
	SF101	Filter	295P03202	SAW
#	SW991	Switch	432C01802	AC Power
	X601	Crystal	285P01501	3.58MHz Color Oscillator
	X701	Crystal	285L00303	4.5MHz
#	V271	CRT	A48AAB50X	Used In Model CS1951.
			A48JAF03X	Used In Model CS1972R.
		Antenna Terminal	440P04606	
		Antenna	281C02701	UHF RUSSELL Replacement Loop (LIN-2H)
		Antenna	281C02302	VHF RUSSELL Replacement Assembly Rod (SIM-4H)
		CRT Socket	449C03102	
#		Cord	242C63802	AC Power
		Magnet	338P01601	Convergence/Purity Assembly
		Wedge	641P36501	Deflection Yoke
		Transmitter	939P05405	Remote Control (Used In Model CS1972R)
		IC Socket	449P01509	28 Pins (IC701)

For SAFETY use only equivalent replacement part.

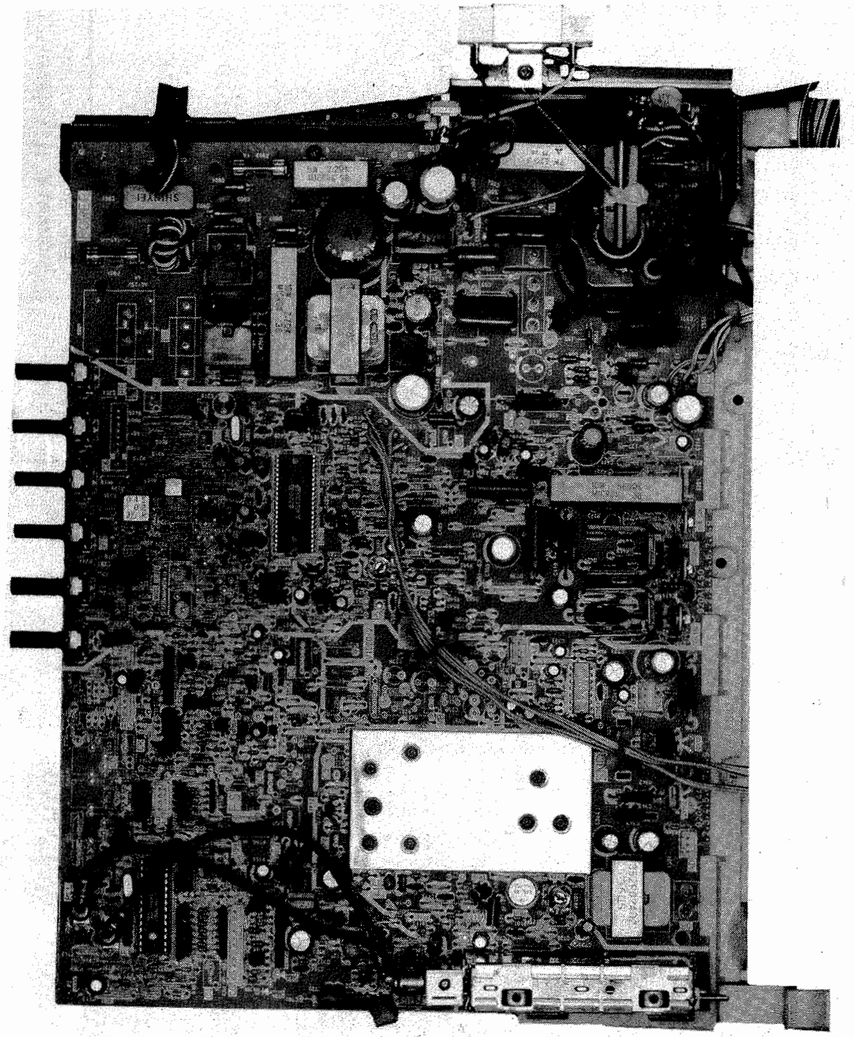
CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.
Cabinet/Walnut (Model CS1951)	960A17204
Cabinet/Silver (Model CS1951)	960D05001
Cabinet (Model CS1972R)	960A19001
Cabinet Back (Model CS1951)	960B28501
Cabinet Back (Model CS1972R)	960B27801
Control Door/Walnut (Model CS1951)	702C40204
Control Door/Silver (Model CS1951)	702C40205
Control Door (Model CS1972R)	702C40206
Lower Door/Walnut (Model CS1951)	702C40202

ITEM	PART No.
Lower Door/Silver (Model CS1951)	702C40203
Lower Door (Model CS1972R)	702C40207
Knob, Fine Tuning (2 used) (Model CS1951)	704D78701
Knob, Fine Tuning (2 used) (Model CS1972R)	704D78701
Knob, Vert Hold,Color,Tint, Picture,Bright,Contrast (Model CS1951)	734D00201
Knob, Vert Hold,Color,Tint, Picture,Bright,Contrast (Model CS1972R)	404D75502
Knob,Tone	704D89701

WIRING DATA

High Voltage Lead	Use BELDEN No.	8866 (40 KV)
Shielded Hook-up Wire	Use BELDEN No.	8401 or 8421 (Single-Conductor)
		8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8529 (Solid) Available in 13 Colors
		8522 (Stranded) Available in 13 Colors
300-Ohm Tuner Input Lead	Use BELDEN No.	8225
75-Ohm Tuner Input Lead	Use BELDEN No.	8241
300-Ohm Antenna Lead-In	Use BELDEN No.	8275 (Foam Core) or 8285 (Foam Jacketed)
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) 4-Conductor
		8485 (Round) 5-Conductor
		8488 (Round) 8-Conductor



MAIN BOARD SHIELD LOCATION

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

	ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
				GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
#	D582	HZT33-01	264P24401		NTE615P	ECG615A	SK9179/615A	WEP615/615	905-190
	D583	MZ304B	264P22008	GEZD-3.9	NTE5007A	ECG5007A	SK3A9/5007A	WEP1407/5007	
		HZ304B		GEZD-3.9	NTE5007A	ECG5007A	SK3A9/5007A	WEP1407/5007	
	D701	S2VB10	264P20006		NTE5313	ECG5313	SK3986/5313		
	D702	MZ306-A1	264P22105	GEZD-6.0	NTE5012A	ECG5012A	SK6A0/5012A	WEP1413/5012	
		HZ6A19		GEZD-6.0	NTE5012A	ECG5012A	SK6A0/5012A	WEP1413/5012	
	D703	S5500D	264P28501	GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	212-76-02
		EM-1Z		GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	212-76-02
		ERB12-02RK		GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	212-76-02
	D704	1S2076		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2076A	264P04501	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D705,6	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D707	MZ312B	264P19306	GEZD-12	NTE5021A	ECG5021A	SK12A/5021A	WEP1423/5021	103-279-21
		EQA02-11CD		GEZD-12	NTE5021A	ECG5021A	SK12A/5021A	WEP1423/5021	103-279-21
		EQA02-11CDB		GEZD-12	NTE5021A	ECG5021A	SK12A/5021A	WEP1423/5021	103-279-21
	D720	1S2076A	299D09005	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D721	1S2076A	299B09001	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D722,3	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D727,8	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D730 thru	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D732	1S2471	264P04504(1)	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D735,6	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
		1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D737	HZ414-B3	264P33004	GEZD-14	NTE144A	ECG144A	SK14V/144A	WEP1159/144	103-Z9012
		MZ414-B3		GEZD-14	NTE144A	ECG144A	SK14V/144A	WEP1159/144	103-Z9012
	D740 thru	1S2076A		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	D742	1S2471	264P04504	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

	ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
				GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
#	D901 thru	RM1B		GE-531	NTE125	ECG125	SK3032A	WEP170/125	903-334
	D904	RM-1B	264P10105	GE-531	NTE125	ECG125	SK3032A	WEP170/125	903-334
	IC101	M51363P	266P11501						
#	IC201	M51383P	266P21401						
	IC301	AN240P		GEIC-2	NTE712	ECG712	SK3072/712	WEP507/712	221-48
		M5144P	266P32301	GEIC-2	NTE712	ECG712	SK3072/712	WEP507/712	221-48
	IC701	D1709C-011							
		uPD1709C-011	266P05201						
	IC702	LA7910	266P19201		NTE1658	ECG1658			
	IC703	LA7911	266P19701						
	IC704	LA7912	266P19801						
#	IC991	STR-384A	267P90206						
	Q3A1(1)	2SC711A		GE-62	NTE85	ECG85	SK3899		121-972
		2SC711A-E,F		GE-62	NTE85	ECG85	SK3899		121-972
		2SC2603E,F		GE-289A	NTE289A	ECG289A	SK9137/382	WEP910/289	921-1114
	Q101	2SC763-C	260P17603	GE-61	NTE107	ECG107	SK3293/107	WEP56/108	121-522
	Q102	2SA1115-F,E	260P25601	GE-269	NTE290A	ECG290A	SK9138/383	WEP911/290	121-Z9003*
	Q201	2SA950-Y	260P25504	GE-269	NTE290A	ECG290A	SK3841/294	WEP911/290A	121-Z9003*
		2SA673D		GE-269	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	Q203	2SC710E,D		GE-211	NTE85	ECG85	SK3356	WEP710	121-522
		2SC2724-D,E	260P41905	GE-289A	NTE289A	ECG289A	SK3122		921-1114
	Q331,2	2SC2688-L,K	260P42502	GE-232	NTE157	ECG157	SK3747/157	WEP61/157	121-Z9016
	Q401,2	2SC2073B,C		GE-375	NTE375	ECG375	SK3929	WEP763/375	121-Z9106
		2SD386A-D,E		GE-375	NTE375	ECG375	SK9118/375	WEP763/375	121-Z9106
		2SD401A-K,L		GE-375	NTE375	ECG375	SK3929	WEP763/375	121-Z9106
		2SC2168-O,Y	260P42807	GE-375	NTE375	ECG375	SK3929	WEP763/375	121-Z9016
	Q531	2SC2482	260P42201	GE-222	NTE399	ECG399	SK9352/399	WEP68/287	121-Z9045
#	Q581,2	2SA628A-E	260P36003	GE-82*	NTE290A+	ECG290A+	SK3114A/290A+	WEP62/159*	121-Z9003*
		2SA1115E		GE-269	NTE290A	ECG290A	SK9138/383	WEP911/290	121-Z9003*
	Q583	2SA628A-E	260P36003	GE-82*	NTE290A+	ECG290A+	SK3114A/290A+	WEP62/159*	121-Z9003*
		2SA1115E		GE-269	NTE290A	ECG290A	SK9138/383	WEP911/290	121-Z9003*
#	Q591	2SD869-L	260P43201		NTE89	ECG89	SK9119/89	WEP89/89	121-Z9112

PARTS LIST AND DESCRIPTION (Continued)

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

RESISTORS (Power and Special)

	ITEM No.	RATING	REPLACEMENT DATA		
			MFGR. PART No.	NTE PART No.	WORKMAN PART No.
	R412	560 5% 10W WW	109D05109	10W156	
#	R417	10 5% 1W Metal Film	103C14001	1W010	22-3048
	R502	13K 1% 1/4W Carbon Film			
	R506	12K 5% 3W Metal Film			
#	R555	180K 5% 1/4W Carbon Film	103P31502	QW418	22-1150
#	R556	330K 5% 1/4W Carbon Film	103P31505	QW433	22-1156
#	R581	1.2 5% 1/4W Carbon Film	103P33801	QW1D2	
#	R582	68K 1% 1/4W Metal Film	103P30405		
#	R583	27K 1% 1/4W Metal Film	103P30509		
#	R584	27K 5% 1/6W Carbon Film	103P41402		
#	R585	27K 5% 1W Metal Film	103C14402	1W327	22-3130
#	R586	2200 5% 1/6W Carbon Film	103P41209		
#	R592	3300 5% 1/6W Carbon Film	103P41301		
#	R664	.82 5% 2W Fusible	109D06602		
	R794	6800 5% 3W Metal Film			
#	R901	2.7 10% 10W WW	102P08208	10W2D7	
#	R902	820K 5% 1/2W Carbon Comp	101P82403	HW482	22-2166
#	R903	2.2 10% 5W WW	102P08001	5W2D2	
#	R904	470K 5% 1/4W Carbon Film	103P31507	QW447	22-1160
#	R905	12K 5% 1W Metal Film	103D14308	1W312	22-3122
#	R906	470 5% 1/4W Carbon Film	103P33201	QW147	22-1088
#	R991	180 10% 15W WW	109D04406		
#	RP901	9.6 Cold PTC	265P04702		FR605

For SAFETY use only equivalent replacement part.

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
DL201	Delay Line	337P04502
L101	Peaking	321C04602
L102	Video IF	323P11102
L103	Video IF	323P11102
L104	41.25MHz Trap	320P02004
L105	Sound IF	303P11102
L106	Peaking (10uH)	325C10603
L201	Peaking (56uH)	321C10702
L202	Peaking	325C10709
L301	Sound Detector	327P04501
L302	Sound IF	323P11102
# L551	Linearity	333P01203

ITEM No.	FUNCTION	MFGR. PART No.
L552	RF Choke (.47uH)	321D01901
L553	RF Choke (10uH)	321C03104
L591	RF Choke	411P00101
L651	Peaking (270uH)	325C10800
L701	Peaking (5.6uH)	325C10100
L702	Peaking (1.0uH)	325C11001
L704	Peaking (5.6uH)	325C11100
L709	Peaking (10uH)	325C11103
L710	Peaking (10uH)	325C11103
L901	AC Line Choke	351P01102
LC201	3.58 Trap	349P06402

For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS (Sweep Circuits)

	ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
#	L491	Yoke Horiz 2.39mH 90° Vert 123mH	330P08101		
	T531	Horiz Driver	336P00504	P0091 (1)	
#	T551	Horiz Output	334P09709		

For SAFETY use only equivalent replacement part.

PARTS LIST AND DESCRIPTION (Continued)

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

TRANSFORMER (Audio Output)

	ITEM No.	IMPEDANCE		REPLACEMENT DATA		NOTES
		PRI.	SEC.	MFGR. PART No.	THORDARSON PART No.	
#	T331	450	8	352P02402		

For SAFETY use only equivalent replacement part.

TRANSFORMER (Audio Interstage)

	ITEM No.	IMPEDANCE		REPLACEMENT DATA		NOTES
		PRI.	SEC.	MFGR. PART No.	THORDARSON PART No.	
#	T3A1	93.4	80.9	352P02502 P02502 (1)		
		TURNS RATIO				
		1:	0.8			

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

TRANSFORMER (Power)

	ITEM No.	RATING			REPLACEMENT DATA		
		PRI.	SEC. 1	SEC. 2	MFGR. PART No.	THORDARSON PART No.	NOTES
#	T701	120V AC @ 37mA AC	11.6V AC @ 170mA DC		350P23101 CS4-8313-2 (1)		

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

FUSE DEVICES

	ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
			DEVICE	HOLDER	
#	F901	4A @ 125V Fast-Acting	283D03807		
#	F902	1A @ 125V Fast-Acting	283D03901		

For SAFETY use only equivalent replacement part.

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP391	4" X 6" PM 8 Ohms	480P63901	46C3Z8	