SAFETY PRECAUTIONS

SERVICE WARNING

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

SERVICING THE HIGH VOLTAGE AND CRT

Use EXTREME CAUTION when servicing the high voltage circuits. To discharge static high voltage, connect a 10K ohms resistor in series with a test lead between the receiver and CRT anode lead. DO NOT lift the CRT by the neck. Always wear shatterproof goggles when handling the CRT to protect eyes in case of implosion.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Be aware of the instructions and procedures covering X-ray radiation. In solid-state receivers and monitors, the CRT is the only potential source of X-rays. Keep an accurate high voltage meter available at all times. Check meter calibration periodically. Whenever servicing a receiver, check the high voltage at various brightness levels to be sure it is regulating properly. Keep high voltage at rated value, NO HIGHER. Excessive high voltage may cause X-ray radiation or failure of associated components. DO NOT depend on protection circuits to keep voltage at rated value. When troubleshooting a receiver with excessive high voltage, avoid close contact with the CRT. DO NOT operate the receiver longer than necessary. To locate the cause of excessive high voltage, use a variable AC transformer to regulate voltage. In present receivers, many electrical and mechanical components have safety related characteristics which are not detectable by visual inspection. Such components are identified by a # on both the schematic and the parts list. For SAFETY, use only equivalent replacement parts when replacing these components.

GENERAL GUIDELINES

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

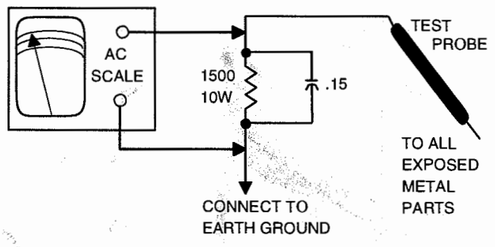
SAFETY CHECKS -- FIRE AND SHOCK HAZARD

Cold Leakage Checks for Receivers with Isolated Ground

Unplug the AC cord, connect a jumper across the plug prongs, and turn the power switch on (if applicable). Use an ohmmeter to measure the resistance between the jumped AC plug and any exposed metal cabinet parts such as antenna screw heads, control shafts, or handle brackets. Exposed metal parts with a return path should measure between 1M ohms and 5.2M ohms. Parts without a return path must measure infinity.

Hot Leakage Current Check

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



TEST JIG HOOKUP

Function	Chek-A-Color Adapter No.	PC Board Plug No.	Pin	Color
CRT	B239	P401	7	Red
Yoke	D4160		8	Blue
Yoke Setting	YP1A		9	Yellow
Comments	Focus Tap		10	Green

HIGH VOLTAGE SHUTDOWN TEST

Apply 120VAC, turn receiver on, set all digital customer controls for normal operation, and momentarily short test point X to test point R. Receiver should lose raster and sound. If receiver does not lose raster and sound, the shutdown circuit should be repaired. To resume normal operation, remove AC power and wait 30 seconds then turn receiver on.

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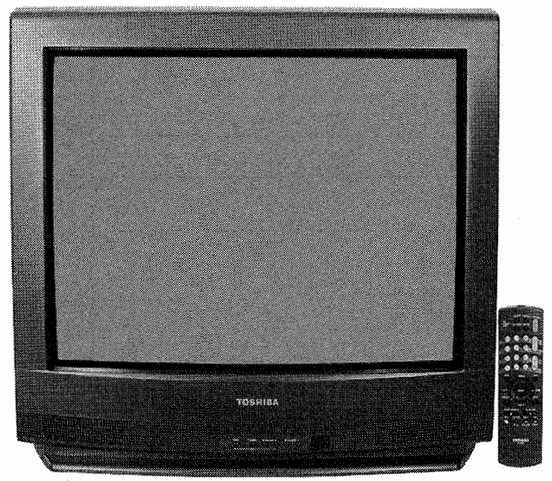
PHOTOFACT® Technical Service Data

INDEX

For Supplier Address, See PHOTOFACT Annual Index

TOSHIBA

Models CF27F50, CL29F50 (Chassis TAC9618)



Model CF27F50

Complete coverage for servicing a television receiver...

- Schematics
- Parts list
- Component locations
- Troubleshooting guide

Electronic Workshop

HOWARD W. SAMS & COMPANY

MARCH 1998 SET 3955

3955

TROUBLESHOOTING

POWER SUPPLY

Check F801, F860, F470, and F301. If F801 is open, check D801, D899, C801, C802, C805, C806, C810 thru C813, T801, T862, and Q801. If F860 is open, check Q801 and T862. If F470 is open, check Q402, Q404, and T461. If F301 is open, check D301, D302, D308, and Q301. Apply 120VAC and check for 5.0V at pin 5 of Q840. If 5.0V is missing, check Q840, D840, T840, C840, and C842. If 5.0V is present, press the power button, and check for 152V* at the cathode of D801. If 152V* is missing, check D801, Q801, and C810. If 152V* is present, check for 125V at F470. If 125V is missing, check D883, D884, T862, Q404, and Z801. If 125V is present, check for 32.0V at the cathode of D101, 19.0V at the cathode of D885, and refer to the "Horizontal" section of this Troubleshooting guide.

* Taken from common tie point.

HIGH VOLTAGE SHUTDOWN

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, T461, and associated components. Monitor the high voltage and troubleshoot.

The high voltage from T461 is monitored and rectified by D471. Should the high voltage increase, the rectified voltage at pin 13 of Z801 will also increase. Z801 will shut down Q801 via Q862. This shuts down the receiver. To troubleshoot, remove R473 from the circuit and use a variable AC supply. Start at 90VAC and gradually increase the AC to locate the defect. After isolating and eliminating the malfunction, return R473 to the circuit.

HORIZONTAL

To determine if receiver is in shutdown, refer to "High Voltage Shutdown" section of this Troubleshooting guide. If receiver is not in shutdown, inject a horizontal signal at base of Q404. If horizontal deflection is now present, check Q402, T401, and pins 30 thru 34 of Q501. If there is no horizontal sweep, check Q404 and T461. The high voltage rectifier is part of T461 and if defective will affect the performance of horizontal circuits. If the horizontal oscillator is off frequency, check pin 34 of Q501. Horizontal linearity or foldover problems may be caused by C440, C442, C444, and L441 being defective.

VERTICAL

Inject a vertical signal at pin 4 of Q301. If vertical deflection is now present, check pins 22 thru 25 of Q501. If vertical sweep is still missing, check Q301. Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits, check C301, C305, C306, C308, and C315 for defects.

AUDIO

Check for audio waveforms at pins 5 and 6 of QV01. If audio waveforms are missing, check H002 and QV01. If audio waveforms are present, check for audio waveforms at pins 4 and 2 of Q610. If audio waveforms are missing, check pins 18, 24, 16, and 26 of H002, and check Q610 thru Q613. If audio waveforms are present, check pins 8, 9, and 12 of Q610, C681, and C683.

VIDEO

Inject a video signal at pin 7 of H002 and check for video on the CRT. If video is present, check H002. If video is missing, check for a video waveform at pin 37 of Q501. If video waveform is missing, check QV01, QY11, QY14, and QA01. If video waveform is present, check for the proper waveforms at pins 19, 20, 21 of Q501. If the proper waveforms are missing, check Q501. If the proper waveforms are present, refer to the "Raster" section of this Troubleshooting guide. If the brightness is inadequate or cannot be controlled, check pin 36 of Q501 and pin 7 of V901.

RASTER

Check the CRT and CRT voltages. If red is missing, check pin 19 of Q501, Q902, and Q901. If green is missing, check pin 20 of Q501, Q904, and Q903. If blue is missing, check pin 21 of Q501, Q906, and Q905. If raster has a keystone shape, check deflection yoke. If raster has height or width problems, refer to the "Vertical", "Horizontal", or "Power Supply" sections of this Troubleshooting guide.

CHROMA

Check for a chroma waveform at pin 45 of Q501. If the waveform is missing, check for a chroma waveform at pin 51 of QY02. If the chroma waveform is present, check QY02 and QY23. If the chroma waveform is missing, check QV01 and refer to the "Video" section of this Troubleshooting guide. Check for proper waveforms at pins 19, 20, and 21 of Q501. If the proper waveforms are missing, check pins 11 thru 21 of Q501. Check the 3.58MHz oscillator at pin 12 of Q501. If the proper waveforms are present at pins 19, 20, and 21 of Q501, refer to "Raster" section of this Troubleshooting guide.

MISCELLANEOUS ADJUSTMENTS

DESIGN MODE ADJUSTMENT CHART

Item	Adjustment Name	On Set Value	Item	Adjustment Name	On Set Value
RCUT	Red Cutoff	80H	PYD9	PIP Horizontal Centering	04H
GCUT	Green Cutoff	77H	WHP6	-	44H
BCUT	Blue Cutoff	49H	WHP9	PIP Horizontal Centering (Fine)	4DH
GDRV	Green Drive	74H	YCON	PIP Contrast (Fine)	29H
BDRV	Blue Drive	86H	PSYN	PIP Sync	19H
CNTX	Contrast Maximum	47H	WKY	Set Frame Background Brightness (Usual)	0AH
BRTC	Brightness Center	48H	WKYS	Set Frame Background Brightness (Still)	0AH
COLC	Color Center	30H	WKC	PIP Frame Color (Normal)	12H
TNTC	Tint Center	39H	WKCS	PIP Frame Color (Still)	32H
CNTC	Contrast Center	2EH	PBST	Burst Adjust In Displaying Background	57H
CNTN	Contrast Minimum	05H	PVU9	PIP Vertical Position 1/9 Top	0BH
BRTX	Brightness Maximum	1DH	PVD9	PIP Vertical Position 1/9 Bottom	8EH
BRTN	Brightness Minimum	1BH	PVU6	PIP Vertical Position 1/16 Top	0BH
COLX	Color Maximum	47H	PVD6	PIP Vertical Position 1/6 Bottom	A0H
COLN	Color Minimum	05H	PVW6	PIP Vertical Height 1/6	32H
TNTX	Tint Maximum	15H	PVW9	PIP Vertical Height 1/9	44H
TNTN	Tint Minimum	15H	PHL9	PIP Horizontal Position 1/9 Left	09H
SHPT	Sharpness Center (RF)	2BH	PHR9	PIP Horizontal Position 1/9 Right	6DH
SHPV	Sharpness Center (VIDEO)	27H	PHL6	PIP Horizontal Position 1/6 Left	09H
VM0	Vcd Bit Data	69H	PHR6	PIP Horizontal Position 1/6 Right	7AH
SAVC	SAP VCO	89H	PHW6	PIP Horizontal Width 1/6	27H
ATT	Attenuator	C7H	PHW9	PIP Horizontal Width 1/9	35H
STVC	Stereo VCO	19H	HADJ	PIP Frame Centering	84H
SAPF	SAP Filter	89H	PBRT	PIP Brightness	0DH
STRF	Stereo Filter	19H	BGST	PIP Brightness	4FH
SPEC	Spectral	2AH	PI28	-	83H
WBAN	Wide Band	1DH	CL2	PIP Color 2	37H
HPOS	Horizontal Position	18H	EXBG	-	1DH
VPOS	Vertical Position	02H	EXB2	-	7FH
HIT	Height	2EH	PVSS	-	2AH
LIN	Vertical Linearity	13H	PVSW	-	00H
VSC	V-S Correction	00H	ACCL	-	15H
VPS	Vertical Shift	1BH	PFGT	-	DFH
VCP	Vertical Compensation	03H	PRST	-	7FH
WID	Width	16H	ADJ6	-	04H
DPC	E-W Parabola	31H	PWR	Detection Number Of Overcurrent and Overvoltage Limiters	00H
CNR	E-W Corner	00H	BUS	Check Result Of Bus Line	00H
TRAP	Trapezium	0FH	MEM	Test Pattern Number	00H
HCP	Horizontal Compensation	00H	OPT0 (1)	Option Setting 0	00H
VFC	V-F Correction	0FH	OPT1 (1)	Option Setting 1	06H
PCOL	PIP Color	99H	BASC	-	08H
PHUE	PIP Tint	06H	TREC	-	08H
EXTP	PIP Tint Phase	E3H	OSD	OSD Horizontal Position	1DH
PYD6	-	04H			

(1) Need adjustment when replacing QA01, QA02, or Q501.

MISCELLANEOUS ADJUSTMENTS continued

HIGH VOLTAGE CHECK

Tune in a picture. Set brightness, contrast, and color to minimum. Connect a high voltage probe to the CRT anode. High voltage should read 27.5kV to 29kV.

PURITY/CONVERGENCE

CRT and yoke are bonded. Adjustment is not recommended.

ENTERING THE SERVICE AND DESIGN MODES

To enter the service mode, press the mute button on the remote. Press the mute button again and keep pressing while simultaneously pressing the menu button on the receiver. The letter S will appear on the screen indicating that the receiver is in the service mode.

To enter the design mode, enter the service mode and press the recall button on the remote and keep pressing while simultaneously pressing the menu button on the receiver. The letter D will appear on the screen indicating that the receiver is in the design mode.

When in the service mode or design mode, press the menu button on the receiver to display the adjustment menu. To select the item to be adjusted, press the channel up or down button. To adjust the reference value, press the volume up or down button. To exit from the service mode or the design mode, press the power button to turn off the receiver.

ITEM BUTTONS

While in service mode some buttons on the remote have a different function. The following is a list of the buttons that will go to an item or perform a different function:

1	RCUT	5	COLC
2	GCUT	6	TNTC
3	BCUT	8	Toggles sound on and off.
4	CNTX	9	Self Diagnostics

TEST PATTERN SELECTION

Enter the service mode. Press the TV/video button on the remote to display the built-in test patterns in the following order:

Normal picture, red raster, green raster, blue raster, black screen, white screen, black screen with white window, black crossbar, white crossbar, black crosshatch, white crosshatch, black crossdot, white crossdot, and back to normal picture.

NOTE: If a video cable is connected to the video input jack, the built-in test patterns will not be displayed on the screen.

SELF DIAGNOSTIC FUNCTION

Enter the service mode. Press the 9 button on the remote to check for proper execution of IC interfacing. The following is an explanation of what is displayed on screen:

Display	Explanation
[SELF CHECK]	Self diagnostic function.
No. 23905652	Part number of QA01
POWER : 000	Operation number of protecting circuit. "000" display is normal
BUS LINE : OK	BUS line check. "OK" is normal. "NG" indicates a short to ground of the SCL or SDA signal or a short between SCL and SDA.
BUS CONT : OK	Bus line acknowledge check. "OK" is normal. A location number is NG.
BLOCK : UV V1	Green display is normal. Cyan display is no check. Red display is NG.

INITIALIZATION OF QA02

NOTE: QA02 must be initialized after replacement.

Enter the service mode. Press the recall button on the remote and keep pressing while simultaneously pressing the channel up button on the receiver. The initialization of QA02 is complete. Perform service mode and design mode adjustments. Program channels into memory.

SUB COLOR (COLC) & SUB TINT (TNTC)

Tune in a color bar pattern. Press the reset button on the remote. Connect an oscilloscope to the red cathode. Enter the service mode. Select item COLC, adjust reference value to obtain 150Vp-p. Tune in an active channel. Select item TNTC, adjust reference value for proper flesh tones.

SUB BRIGHTNESS (BRTC)

Tune in a picture. Set contrast to minimum. Enter the service mode. Select item HIT and reduce the vertical size. Select item BRTC, adjust reference value until vertical retrace line at bottom of screen just disappears. Perform Height (HIT) adjustment. Adjust contrast for normal picture.

WIDTH (WID)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item WID, adjust reference value for slight underscan. Advance the reference value by 7 steps. Check for proper horizontal position of the picture.

E-W PARABOLA (DPC)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item DPC, adjust reference value for straight vertical lines on both sides of the pattern.

HORIZONTAL POSITION (HPOS) & VERTICAL POSITION (VPOS)

Enter the service mode. Press the TV/video button on remote until a crossbar pattern is displayed. Select item HPOS or VPOS, adjust reference value for the horizontal and vertical position alternately until the pattern is centered on the screen. Check the position of the picture with off-air signal.

HEIGHT (HIT)

Enter the service mode. Press the TV/video button on remote until a crosshatch pattern is displayed. Select item HIT, adjust reference value for slight underscan. Advance the data value by 9 steps. Check for proper vertical position of the picture.

WHITE BALANCE (RCUT, GCUT, BCUT, GDRV, BDRV)

Turn receiver on. Allow a 10 to 30 minute warm up time. Adjust contrast to center position, brightness to maximum. Enter the service mode. Press the TV/video button on remote until the white screen pattern is displayed. Select items RCUT, GCUT, and BCUT, set the reference value for each at 40H. Select items GDRV and BDRV, set the reference value for each at 80H. Press the TV/video button on the receiver, to obtain a single horizontal line. Advance the screen control until a faint line of one dominant color appears on the screen. Adjust the other two cutoffs to obtain a dim white line. Press the TV/video button on the receiver, to go to a normal picture. Select items GDRV and BDRV, adjust reference value of each for the best black and white picture on screen.

ATTENUATOR (ATT)

Connect an MTS TV/Stereo generator to antenna terminals. Select pilot, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to pin 12 of H002. Select item ATT, adjust reference value for 1.5Vp-p.

STEREO VCO (STVC)

With no signal applied to receiver, connect a frequency counter to pin 12 of H002. Select item STVC, connect pin 9 of H002 to ground, adjust reference value for a measurement close to 4fH (62.936kHz).

SAP VCO (SAVC)

Apply a signal of 78.670kHz 147mVrms to pin 9 of H002. Select item SAVC. Adjust reference value to the center of range during the condition when the on screen display is as follows; STA7 = 0 and STA8 = 1.

STEREO FILTER (STRF)

Apply a signal of 9.4kHz 600mVrms to pin 9 of H002. Select item STRF. Adjust reference value to the center of range during the condition when the on screen display is as follows; STA3 = 1.

SAP FILTER (SAPF)

Apply a signal of 88kHz 120mVrms to pin 9 of H002. Select item SAPF. Adjust reference value to the center of range during the condition when the on screen display is as follows; STA4 = 1.

STEREO SEPARATION (WBAN) & SPECTRAL (SPEC)

Connect an MTS TV/Stereo generator to antenna terminals. Select stereo mode on receiver. Select pilot, 300Hz audio frequency, and right modulating signal. Connect an oscilloscope to pin 14 of H002. Select item WBAN, adjust reference value for minimum amplitude of the waveform. Change audio frequency to 8kHz. Select item SPEC, adjust reference value for minimum amplitude the of waveform. Repeat until no further decrease of amplitude can be obtained.

DESIGN MODE

When QA02 is initialized, design mode items OPT0 and OPT1 are set to preset values. The reference value must be changed to match on set values. See "Design Mode Adjustment Chart".

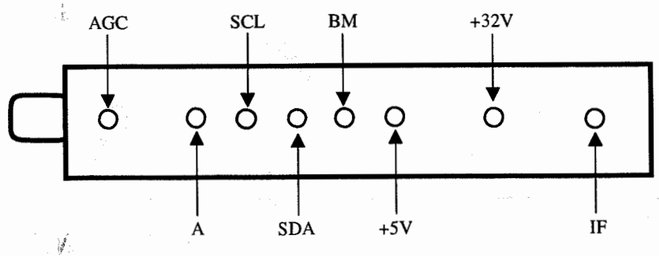
TUNER INFORMATION

TUNER VOLTAGE CHART

Pin	VHF Low Band	VHF High Band	UHF Band
AGC	3.7V	3.8V	3.9V
A	4.6V	4.6V	4.6V
SCL	4.3V	4.3V	4.3V
SDA	4.3V	4.3V	4.3V
BM	8.6V	8.6V	8.6V
+5V	5.0V	5.0V	5.0V
+32V	32.0V	32.0V	32.0V
IF	0V	0V	0V

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

TUNER TERMINAL GUIDE



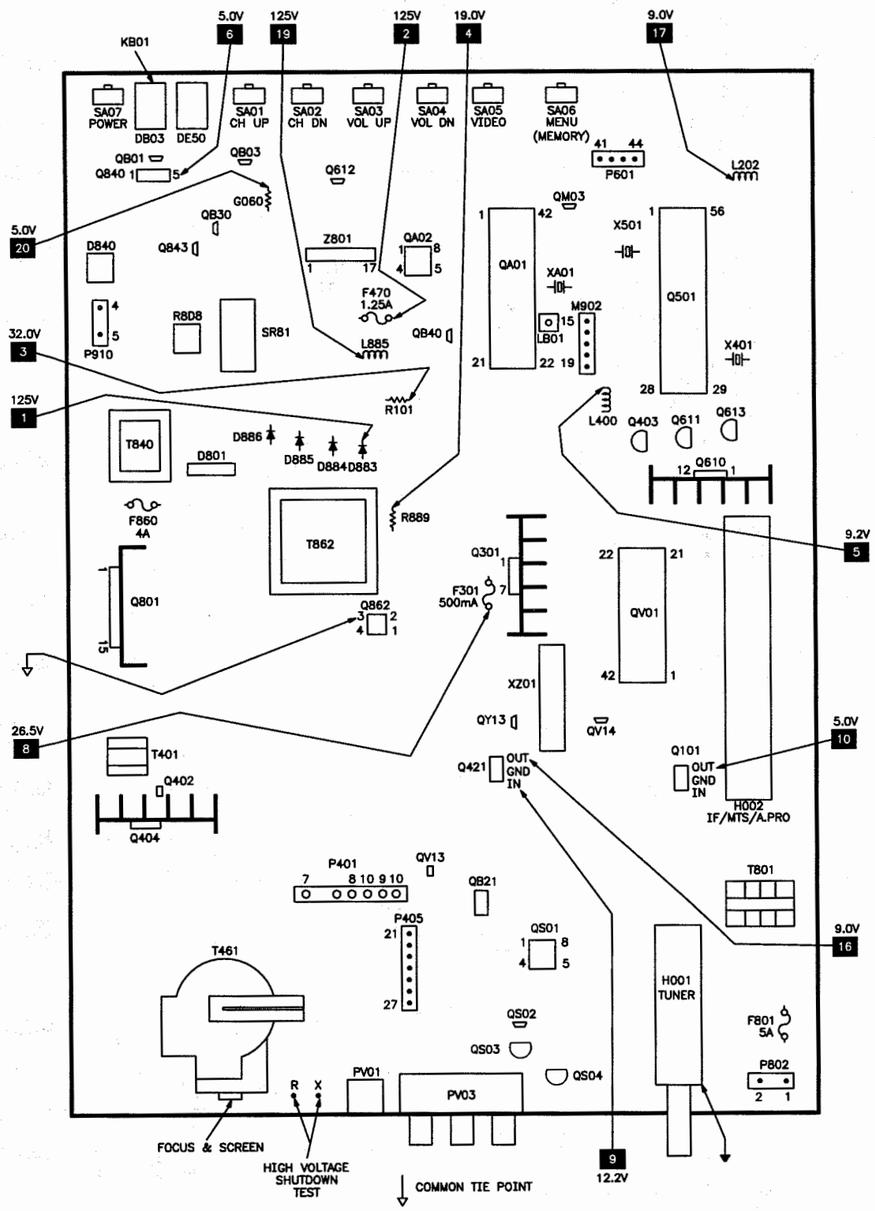
SERVICE MODE ADJUSTMENT CHART

Item	Adjustment Name	Reference Value	On Set Value
RCUT (1)	Red Cutoff	40H	80H
GCUT (1)	Green Cutoff	40H	77H
BCUT (1)	Blue Cutoff	40H	49H
GDRV (1)	Green Drive	80H	74H
BDRV (1)	Blue Drive	80H	86H
CNTX	Sub Contrast	58H	47H
BRTC (1)	Sub Brightness	40H	48H
COLC (1)	Sub Color	2CH	30H
TNTC (1)	Sub Tint	42H	39H
SAVC (1)	SAP VCO	88H	89H
ATT (1)	Attenuator	08H	C7H
STVC (1)	Stereo VCO	1CH	19H
SAPF (1)	SAP Filter	88H	89H
STRF (1)	Stereo Filter	16H	19H
SPEC (1)	Spectral	30H	2AH
WBAN (1)	Stereo Separation	22H	1DH
HPOS (1)	Horizontal Position	16H	18H
VPOS (1)	Vertical Position	02H	02H
HIT (1)	Height	20H	2EH
LIN	Vertical Linearity	13H	13H
VSC	V-S Correction	00H	00H
VPS	Vertical Shift	1BH	1BH
VCP	Vertical Compensation	03H	03H
WID (1)	Width	16H	16H
DPC (1)	E-W Parabola	31H	31H
CNR	E-W Corner	00H	00H
TRAP	Trapezium	0FH	0FH
HCP	Horizontal Compensation	00H	00H
VFC	V-F Correction	0FH	0FH
PCOL	PIP Color	BFH	99H
PHUE	PIP Tint	06H	06H
PBRT	PIP Brightness	-	0DH

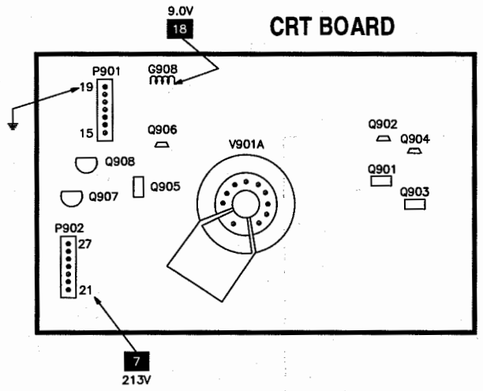
(1) May need adjustment when replacing QA01, QA02, or Q501.

PLACEMENT CHART

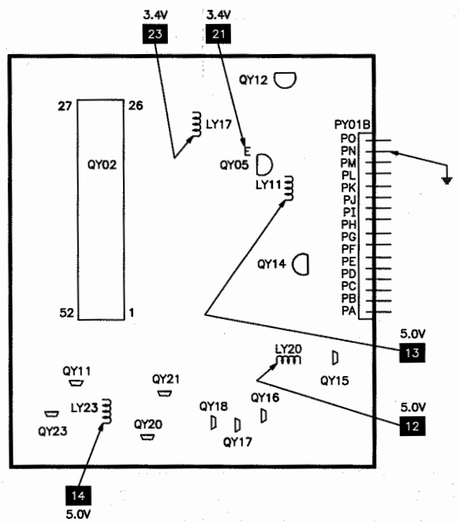
MAIN BOARD



CRT BOARD

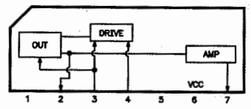


PIP BOARD

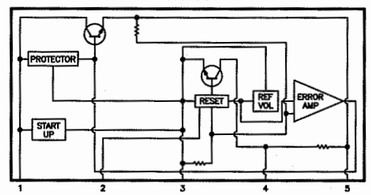


IC FUNCTIONS

Q301
TA8427K



Q840
L78MR05



SCHEMATIC 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 ground

⏚ Common tie point

△ Taken from common tie point

3 Schematic CIRCUITRACE ®: Voltage source tie point.

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

Waveforms and voltages are taken from ground, unless noted otherwise.
Waveforms taken with triggered scope and colorbar signal. Waveform voltage is peak to peak. Timebase is per division. Waveforms shown at 10 divisions.
Supply voltages maintained as seen at input.
Voltages measured with digital meter and a 1000μV RF signal, with colorbar pattern, applied to antenna terminal.
Controls adjusted for normal operation.
Capacitors are 50 volts or less, 5% or greater unless noted.
Electrolytic capacitors are 50 volts or less, 20% or greater unless noted.
Resistors are 1/2W or less, 5% or greater unless noted.
Value in ( ) used in some versions.
Measurements with switching as shown, unless noted.
Rated voltage shown on zener diodes.

TELEVISION SCHEMATIC

A

B

TUNER NOT INCLUDED IN THIS COVERAGE

SEE QA01 PIN 13 PAGE 3A
AFC 4.0V 6
DAC OUT 2 0V 15
+9V 27
16 9.0V
NC 17
NC 0V
GND 10
GND 11
SEE QA01 PIN 38 PAGE 3B
SDA 4.3V 21
SEE QA01 PIN 37 PAGE 3B
SCL 4.4V 20
IF TO TUNER
IF IN 0V 2
RF AGC RANGE 3.6V TO 6.9V
AGC TO TUNER
RF AGC 3.6V 5
C101 4.7µF
NC
DAC OUT 1 0V 13
INTERNAL SYNC

MVUS33T H002 IF/MTS/A.PRO MODULE

R IN 4.0V 16 ← SEE QV01 PIN 35 PAGE 2G
L IN 4.0V 18 ← SEE QV01 PIN 37 PAGE 2G
L OUT 4.0V 24 → SEE Q610 PIN 4 PAGE 2H
R OUT 4.0V 26 → SEE Q610 PIN 2 PAGE 2H
L OUT 4.0V 14 → SEE QV01 PIN 5 PAGE 2G
R OUT 4.0V 12 → SEE QV01 PIN 6 PAGE 2G
GND 19
GND 25
NC 0V 23 NC
VIDEO OUT 3.1V 7 → SEE QV01 PIN 7 PAGE 2G
GND 1
9V(IF) 4
MPX OUT 3.0V 9 NC
W OUT 0V 22 NC
NC 3
IF AGC 6.3V 8 NC
16 9.0V

TAKEN WITH BAR SWEEP GENERATOR
1.4V 10µs
1.2V 10µs
1.0V 10µs
SEE QY11 EMITTER PAGE 3D
PY01B PY01C
PC YC
C201 .1
37

SEE QY23 EMITTER PAGE 3D
PY01B PY01A
PE YE
G520 1000
.8V 10µs
G521 2200
.8V 10µs
TAKEN WITH CHROMA BAR SWEEP GENERATOR

SEE QA01 PIN 37 PAGE 3A
R236 100
SEE QA01 PIN 38 PAGE 3A
R237 100

C232 .1
43 4.6V Y IN
27 4.7V SCL
28 4.6V SDA
51 NC 0V O PORT
53 NC 2.8V TV AUDIO IN
2 NC 3.6V AUDIO OUT
47 NC 4.7V VM
49 NC 5.8V Yr
41 NC 3.5V VIDEO OUT

V–TV 3.2V
PART OF TA1223AN Q501 VIDEO/AUDIO/CHROMA/DEFL
C IN 1.2V 45
EXT VIDEO BGP 1.9V 39 4.2V 7
V BLK .1V 8
NC 1 NC 3 NC 56 NC 54 NC 52 NC 6
EXT AUDIO IN 2.8V 55 NC
AUDIO VCC 48 17 9.0V
VDDVCC 46 17 9.0V
B FIL 5.9V 4 NC
5.2V 40
C207 10µF
R235 120K (180K)
16 9.0V
B.SP 4.7V 44
WPL 6.0V 50
R246 4.7M
V.FL 1.2V 5 NC
GND 13
D VCC 3.3V 18
XTAL 4.6V 12
APC FIL 6.1V 11
X501 3.58MHz
C504 9pF NPO
C514 .022
C510 2.2µF
R504 3300
17 9.0V
R242 47K
R241 43K
17 9.0V
C211 .01
C210 47µF
D201 UZ3.3BSA 3.3V
R201 390
16 9.0V

R522 1000
PY01A PY01B
YJ PJ
SEE QY02 PIN 33 PAGE 3D
SEE QA01 PIN 27 PAGE 3A
R337 22K
R338 22K
16 9.0V
SEE QA01 PIN 12 PAGE 3A
R406 33K
R407 22K
16 9.0V
3.7V 10µs

27.0V 5ms
30.0V 5ms
50.0V 5ms

31 .7V SYNC OUT
29 3.8V VP OUT
PART OF TA1223AN Q501 VIDEO/AUDIO/CHROMA/DEFL
VERT OUT .98V 22
AFC FIL 7.8V 33
H VCC 26
FBP 1.7V 30
FGND 35
32fH 6.1V 34
HORIZ OUT 1.3V 32
VERT SEP 6.6V 25
VERT RAMP 4.8V 24
NFB 4.8V 23

R301 1000
C314 .056
4 .9V
1.4V 5ms
TA8427K Q301 VERT OUT
VCC 1 6 8 26.5V
27.6V 3
C308 220µF
D301 EU2A
D308 ERB12-02
R309 220 1W
D309 ERB12-02
8 26.5V
8 26.5V
2.2V 7
.8V 5
11.2V 2
C309 .001

L301
C313 .22 100V
R303
C307 .047 100V
R307 100K
R306 15K
R304 12K
C305 2.2µF
C306 3300µF
R305 1W
R308 560 2W
8 26.5V
R336 330 2W
P/J401 10
P/J401 9
P/J401 7
P/J401 8
L482 YOKE
1.5
7.5
L441 MAGNET
R442 1000 FUSIBLE 1W
2 125V
C442 .47 (400V) (315V)

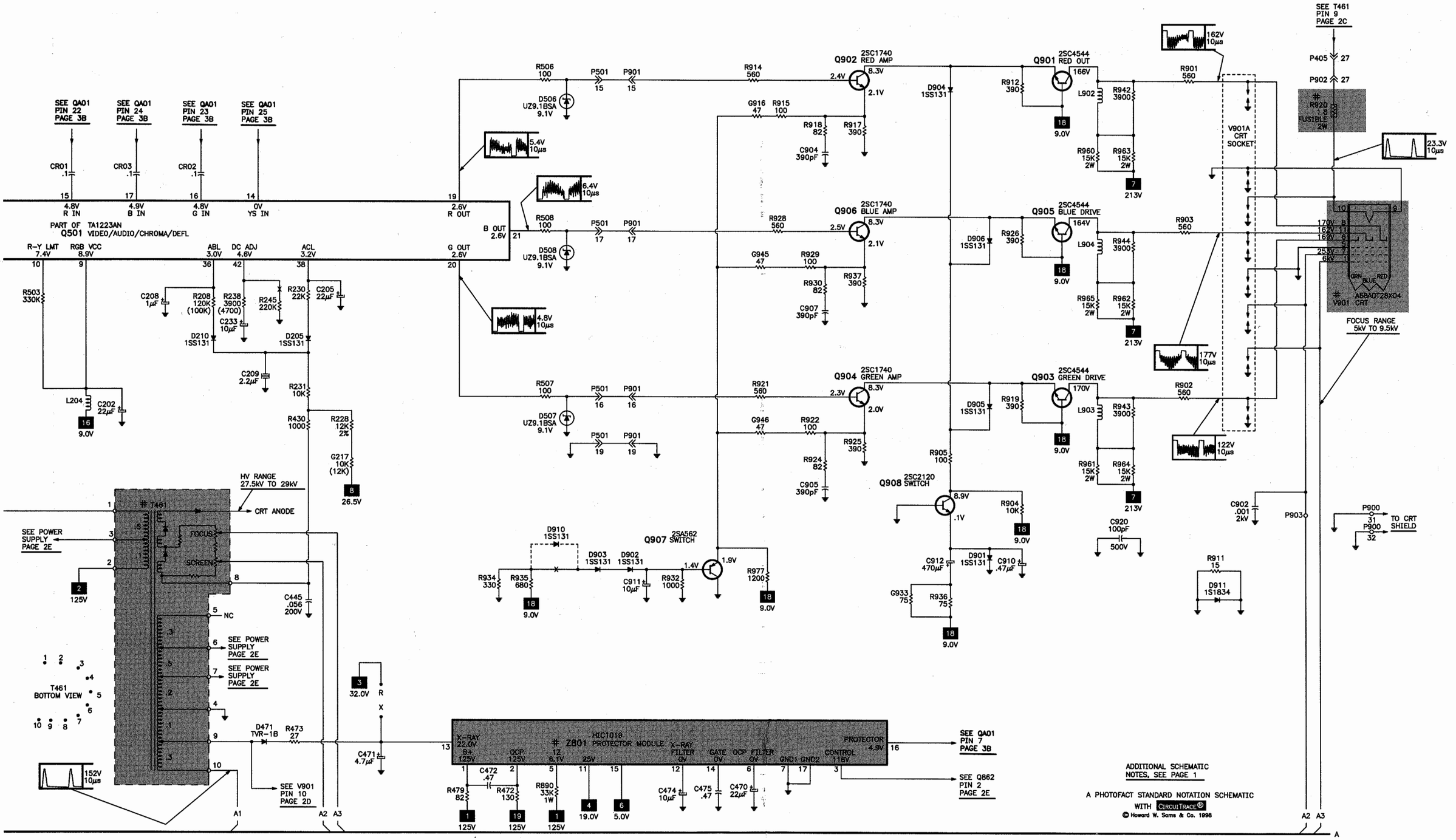
C403 .02
R403 3300
C404 2.2µF
5 9.2V
X401 503kHz
R401 390
C315 2.2µF
5 9.2V
G303 1000
C302 .0015
C301 2.2µF
R317 22K
R411 330
9.0V 10µs
D407 1SS131
R400 16K
R404 3300
R402 10K
D441 MTZJ9.1B 9.1V
R405 6800 1W
RB28 100K
CB20 100pF
.89V
QB21 2SC1740 HORIZ SYNC
3.6V
RB27 10K
SEE QA01 PIN 26 PAGE 3A
SEE QY13 BASE PAGE 3C
A1

89.3V 10µs
15.7V 10µs
Q402 2SC1569 HORIZ DRIVE
.33V
42.5V
R410 200 (270)
R415 2700 1W
C413 820pF 500V
C417 390pF 500V
T401
41 .4
R416 6800 5W
2 125V
C416 1µF 200V
C463 .0015
Q404 2SD1556 HORIZ OUT
2.4V
124V
2.5V
C440 .007 1.5kV 3%
C444 .0072 1.5kV 3%
R498 5.6 5W
R499 15 2W

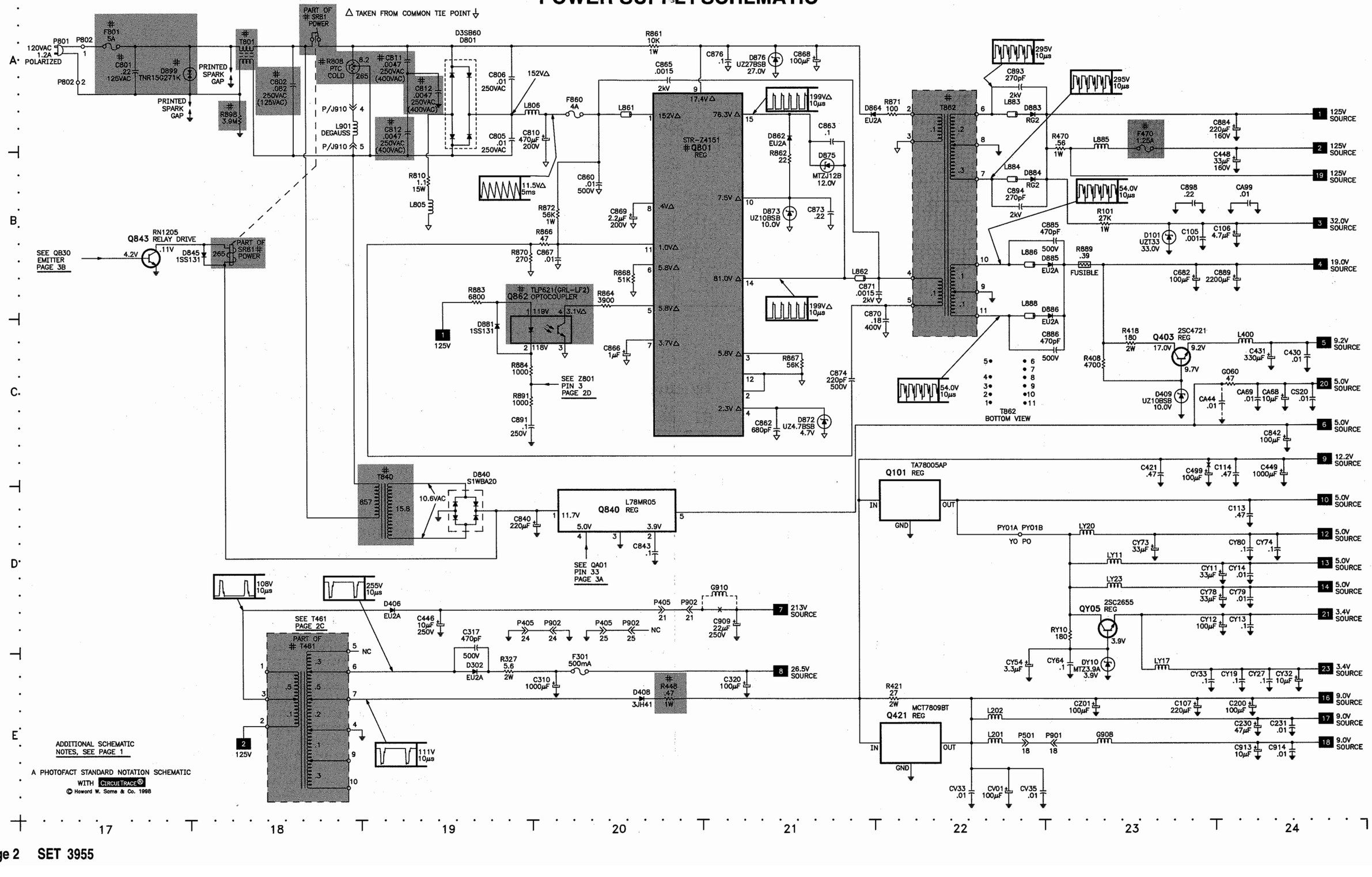
ADDITIONAL SCHEMATIC NOTES, SEE PAGE 1

A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE®

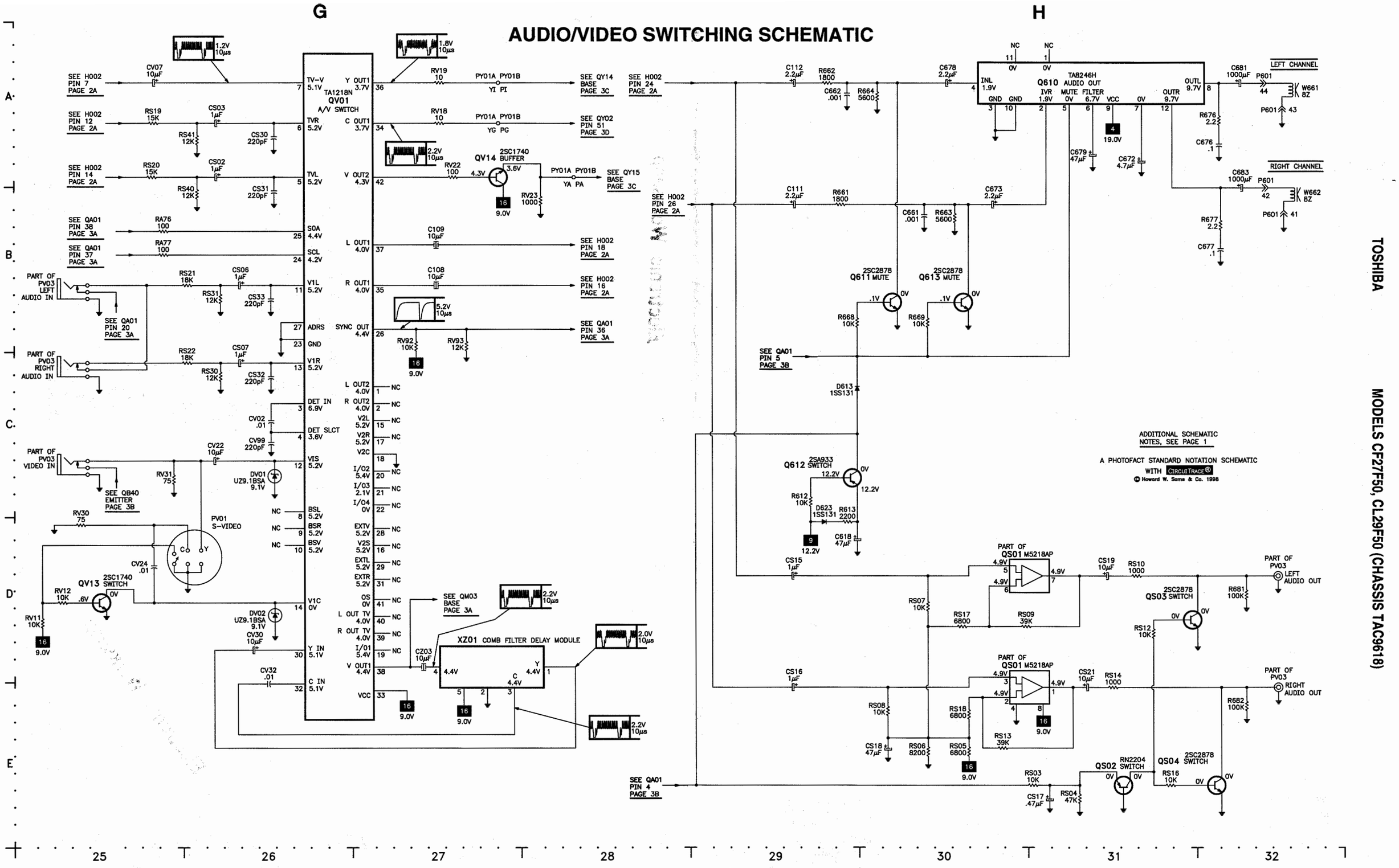
TELEVISION SCHEMATIC continued



POWER SUPPLY SCHEMATIC

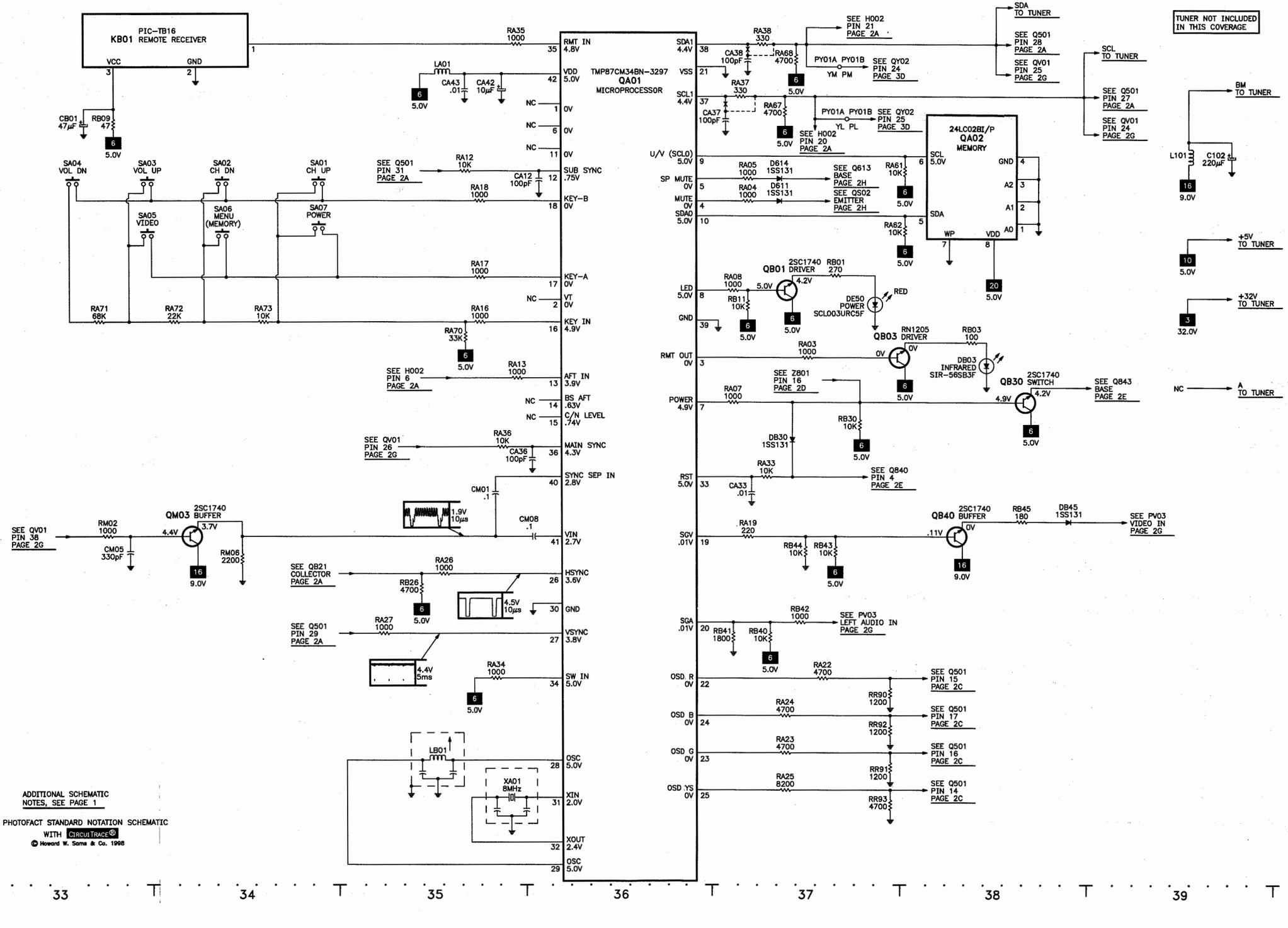


AUDIO/VIDEO SWITCHING SCHEMATIC

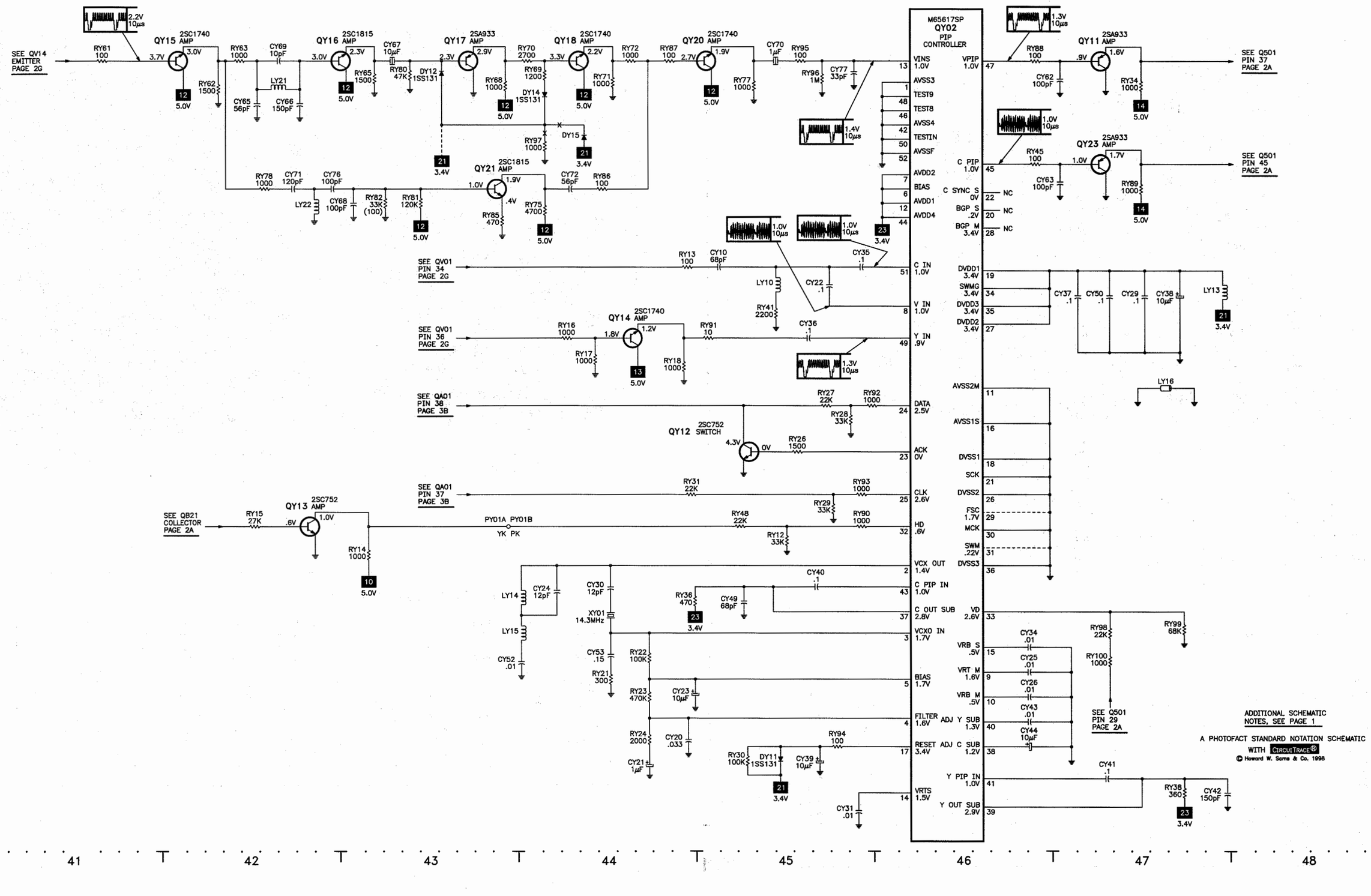


TOSHIBA MODELS CF27F50, CL29F50 (CHASSIS TAC9618)

SYSTEM CONTROL SCHEMATIC



PIP SCHEMATIC



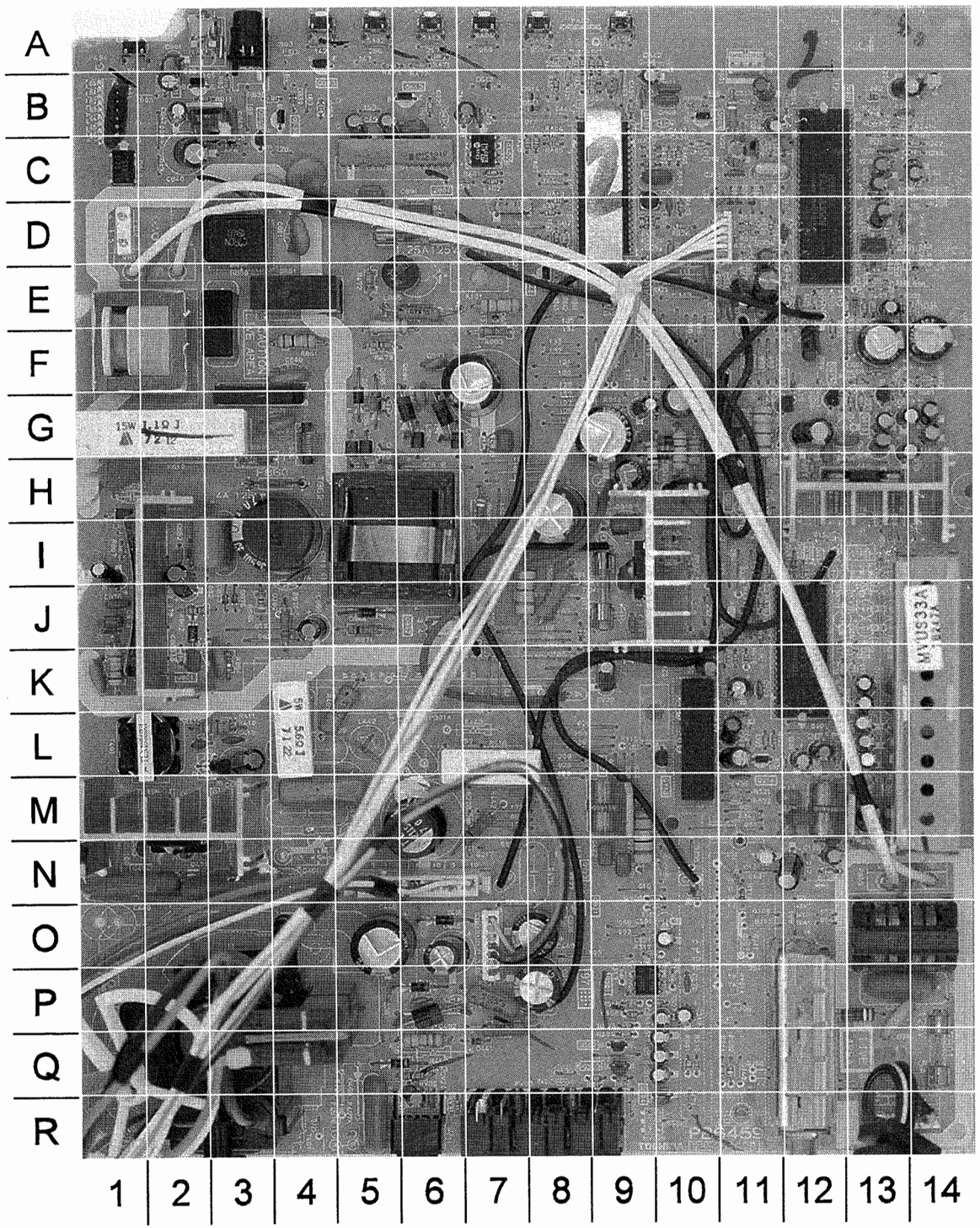
SCHEMATIC COMPONENT LOCATION GUIDE

C101	C-1	C514	C-8	CA42	A-35	CY37	B-47	D875	B-21	L901	A-18	QV01	A-26	R448	E-20	R929	B-13	RB43	D-37	RY41	B-45
C102	B-39	C618	D-29	CA43	A-35	CY38	B-47	D876	A-21	L902	A-15	QV13	D-25	R470	B-22	R930	B-13	RB44	D-37	RY45	B-46
C105	B-23	C661	B-30	CA44	C-23	CY39	E-45	D881	C-19	L903	C-15	QV14	B-27	R472	E-11	R932	D-12	RB45	D-38	RY48	D-45
C106	B-24	C662	A-29	CA68	C-24	CY40	D-45	D883	A-22	L904	B-15	QY02	A-46	R473	E-10	R934	D-11	RM02	D-33	RY61	A-41
C107	E-23	C672	A-31	CA69	C-24	CY41	E-47	D884	B-22	LA01	A-35	QY05	D-23	R479	E-11	R935	D-11	RM06	D-34	RY62	A-42
C108	B-27	C673	B-30	CA99	B-24	CY42	E-47	D885	B-22	LB01	E-35	QY11	A-47	R498	E-7	R936	D-14	RR92	E-37	RY63	A-42
C109	B-27	C676	A-32	CB01	A-33	CY43	E-46	D886	C-22	LY10	B-45	QY12	C-45	R499	E-8	R937	B-13	RR93	E-37	RY65	A-43
C111	B-29	C677	B-32	CB20	E-2	CY44	E-46	D899	A-17	LY11	D-23	QY13	D-42	R503	B-9	R942	A-15	RS03	E-30	RY68	A-43
C112	A-29	C678	A-30	CM01	C-35	CY49	D-45	D901	D-14	LY13	B-47	QY14	C-44	R504	B-8	R943	C-15	RS04	E-31	RY69	A-44
C113	D-24	C679	A-31	CM05	D-33	CY50	B-47	D902	D-12	LY14	D-43	QY15	A-42	R506	A-11	R944	B-15	RS05	E-30	RY70	A-43
C114	C-24	C681	A-32	CM08	D-35	CY52	D-43	D903	D-12	LY15	D-43	QY16	A-42	R507	C-11	R960	B-15	RS06	E-30	RY71	A-44
C200	E-24	C682	B-23	CR01	B-9	CY53	D-44	D904	A-14	LY16	C-47	QY17	A-43	R508	B-11	R961	C-15	RS07	D-30	RY72	A-44
C201	B-3	C683	B-32	CR02	B-10	CY54	E-22	D905	C-14	LY17	E-23	QY18	A-44	R522	C-4	R962	C-15	RS08	E-30	RY75	B-44
C202	C-9	C801	A-17	CR03	B-9	CY62	A-46	D906	B-14	LY20	D-23	QY20	A-44	R612	C-29	R963	B-15	RS09	D-30	RY77	A-45
C205	B-10	C802	A-18	CS02	B-26	CY63	B-46	D910	D-12	LY21	A-42	QY21	B-43	R613	D-29	R964	C-15	RS10	D-31	RY78	B-42
C207	B-6	C805	B-19	CS03	A-26	CY64	E-23	D911	D-15	LY22	B-42	QY23	B-47	R661	B-29	R965	C-15	RS12	D-31	RY80	A-43
C208	C-9	C806	A-19	CS06	B-26	CY65	A-42	DB03	C-38	LY23	D-23	R101	B-23	R662	A-29	R977	D-13	RS13	E-30	RY81	B-43
C209	C-10	C810	B-20	CS07	C-26	CY66	A-42	DB30	C-37	P801	A-17	R201	C-8	R663	B-30	RA03	C-37	RS14	E-31	RY82	B-43
C210	C-7	C811	A-19	CS15	D-29	CY67	A-43	DB45	D-38	PV03	B-25	R208	C-10	R664	A-30	RA04	B-37	RS16	E-31	RY85	B-43
C211	C-7	C812	A-19	CS16	E-29	CY68	B-43	DE50	B-37	PV03	C-25	R228	C-10	R668	B-29	RA05	B-37	RS17	D-30	RY86	B-44
C230	E-24	C812	A-19	CS17	E-31	CY69	A-42	DV01	C-26	PV03	C-25	R230	B-10	R669	B-30	RA07	C-37	RS18	E-30	RY87	A-44
C231	E-24	C840	D-19	CS18	E-30	CY70	A-45	DV02	D-26	PV03	D-32	R231	C-10	R676	A-32	RA08	B-37	RS19	A-25	RY88	A-46
C232	B-3	C842	C-24	CS19	D-31	CY71	B-42	DY10	E-23	PV03	E-32	R235	B-6	R677	B-32	RA12	B-35	RS20	B-25	RY89	B-47
C233	C-10	C843	D-20	CS20	C-24	CY72	B-44	DY11	E-45	Q101	D-21	R236	B-4	R681	D-32	RA13	C-35	RS21	B-25	RY90	D-45
C301	D-4	C860	B-20	CS21	E-31	CY73	D-23	DY12	A-43	Q301	D-5	R237	B-4	R682	E-32	RA16	C-35	RS22	C-25	RY91	C-44
C302	D-4	C862	C-21	CS30	A-26	CY74	D-24	DY14	A-44	Q402	E-3	R238	C-10	R808	A-18	RA17	B-35	RS30	C-26	RY92	C-45
C305	D-7	C863	B-21	CS31	B-26	CY76	B-42	DY15	B-44	Q403	C-23	R241	C-7	R810	B-19	RA18	B-35	RS31	B-26	RY93	D-45
C306	E-7	C865	A-20	CS32	C-26	CY77	A-45	F301	E-20	Q404	E-5	R242	C-7	R861	A-20	RA19	D-37	RS40	B-26	RY94	E-45
C307	D-7	C866	C-20	CS33	B-26	CY78	D-23	F470	B-23	Q421	E-21	R245	C-10	R862	B-21	RA22	D-37	RS41	A-26	RY95	A-45
C308	D-6	C867	B-20	CV01	E-22	CY79	D-24	F801	A-17	Q501	B-3	R246	B-7	R864	C-20	RA23	E-37	RV11	D-25	RY96	A-45
C309	D-6	C868	A-21	CV02	C-26	CY80	D-24	F860	A-20	Q501	B-9	R301	D-5	R866	B-19	RA24	E-37	RV12	D-25	RY97	B-44
C310	E-20	C869	B-20	CV07	A-25	CZ01	E-23	G060	C-23	Q501	D-2	R303	D-7	R867	C-21	RA25	E-37	RV18	A-27	RY98	D-47
C313	D-7	C870	C-22	CV22	C-26	CZ03	D-27	G217	C-10	Q610	A-31	R304	D-7	R868	B-20	RA26	D-35	RV19	A-27	RY99	D-47
C314	D-5	C871	B-21	CV24	D-25	D101	B-23	G303	D-4	Q611	B-30	R305	E-7	R870	B-19	RA27	D-35	RV22	B-27	SA01	B-34
C315	D-4	C873	B-21	CV30	D-26	D201	C-7	G520	C-3	Q612	C-29	R306	D-7	R871	A-22	RA33	C-37	RV23	B-28	SA02	B-34
C317	E-19	C874	C-21	CV32	E-26	D205	C-10	G521	C-3	Q613	B-30	R307	D-7	R872	B-20	RA34	D-35	RV30	D-25	SA03	B-33
C320	E-21	C876	A-21	CV33	E-22	D210	C-10	G908	E-23	Q801	B-20	R308	E-7	R883	C-19	RA35	A-35	RV31	C-25	SA04	B-33
C403	D-1	C884	A-24	CV35	E-22	D301	D-5	G910	D-21	Q840	D-20	R309	D-6	R884	C-19	RA36	C-35	RV92	C-27	SA05	B-33
C404	D-2	C885	B-22	CV99	C-26	D302	E-19	G916	B-13	Q843	B-17	R313	D-7	R889	B-23	RA37	A-37	RV93	C-27	SA06	B-34
C413	E-4	C886	C-22	CY10	B-45	D308	D-6	G933	D-13	Q862	C-19	R317	D-4	R890	E-12	RA38	A-37	RY10	D-23	SA07	B-34
C416	E-4	C889	B-24	CY11	D-23	D309	D-6	G945	B-13	Q901	A-14	R327	E-19	R891	C-19	RA61	B-37	RY100	D-47	SR81	A-18
C417	E-4	C891	C-19	CY12	D-23	D406	D-19	G946	C-13	Q902	A-13	R336	D-7	R898	A-18	RA62	B-37	RY12	D-45	SR81	B-18
C421	C-23	C893	A-22	CY13	D-24	D407	E-2	H002	B-1	Q903	C-14	R337	C-4	R901	A-15	RA67	A-37	RY13	B-44	T401	E-4
C430	C-24	C894	B-22	CY14	D-24	D408	E-20	KB01	A-33	Q904	C-13	R338	C-4	R902	C-15	RA68	A-37	RY14	D-43	T461	D-9
C431	C-24	C898	B-23	CY19	E-24	D409	C-23	L101	B-39	Q905	B-14	R400	E-2	R903	B-15	RA70	C-35	RY15	D-42	T461	E-18
C440	E-6	C902	D-15	CY20	E-44	D441	E-2	L201	E-22	Q906	B-13	R401	D-3	R904	D-14	RA71	C-33	RY16	C-44	T801	A-18
C442	D-8	C904	B-13	CY21	E-44	D471	E-10	L202	E-22	Q907	D-12	R402	E-2	R905	C-14	RA72	C-34	RY17	C-44	T840	D-19
C444	E-6	C905	D-13	CY22	B-45	D506	A-12	L204	C-9	Q908	D-14	R403	D-2	R911	D-15	RA73	C-34	RY18	C-44	T862	A-22
C445	D-10	C907	C-13	CY23	E-44	D507	C-12	L301	D-7	QA01	A-36	R404	E-2	R912	A-14	RA76	B-25	RY21	E-44	V901	B-16
C446	D-19	C909	D-21	CY24	D-44	D508	B-12	L400	C-24	QA02	B-38	R405	E-2	R914	A-13	RA77	B-25	RY22	D-44	W661	A-32
C448	B-24	C910	D-14	CY25	E-46	D611	B-37	L441	D-8	QB01	B-37	R406	C-2	R915	B-13	RB01	B-37	RY23	E-44	W662	B-32
C449	C-24	C911	D-12	CY26	E-46	D613	C-29	L462	D-8	QB03	C-37	R407	C-2	R917	B-13	RB03	C-38	RY24	E-44	X401	D-3
C463	E-5	C912	D-14	CY27	E-24	D614	B-37	L805	B-19	QB21	E-2	R408	C-23	R918	B-13	RB09	A-33	RY26	C-45	X501	B-8
C470	E-13	C913	E-24	CY29	B-47	D623	D-29	L806	A-19	QB30	C-38	R410	E-3	R919	C-14	RB11	B-37	RY27	C-45	XA01	E-35
C471	E-11	C914	E-24	CY30	D-44	D801	A-19	L861	A-20	QB40	D-38	R411	D-3	R920	A-16	RB26	D-35	RY28	C-45	XY01	D-44
C472	E-11	C920	D-15	CY31	E-45	D840	D-19	L862	B-21	QM03	D-34	R415	E-4	R921	C-13	RB27	E-2	RY29	D-45	XZ01	D-27
C474	E-12	CA12	B-36	CY32	E-24	D845	B-18	L883	A-22	QS01	D-30	R416	E-4	R922	C-13	RB28	E-2	RY30	E-45	Z801	E-12
C475	E-12	CA33	C-37	CY33	E-23	D862	B-21	L884	B-22	QS01	D-30	R418	C-23	R924	C-13	RB30	C-37	RY31	D-44		
C499	C-23	CA36	C-35	CY34	D-46	D864	A-21	L885	B-23	QS02	E-31	R421	E-22	R925	C-13	RB40	D-37	RY34	A-47		
C504	C-8	CA37	A-37	CY35	B-45	D872	C-21	L886	B-22	QS03	D-31	R430	C-10	R926	B-14	RB41	D-37	RY36	D-44		
C510	C-8	CA38	A-37	CY36	C-45	D873	B-21	L888	C-22	QS04	E-31	R442	D-8	R928	B-13	RB42	D-37	RY38	E-47		

SET 3955 Page 3

A HOWARD W. SAMS GRIDTRACE™ PHOTO

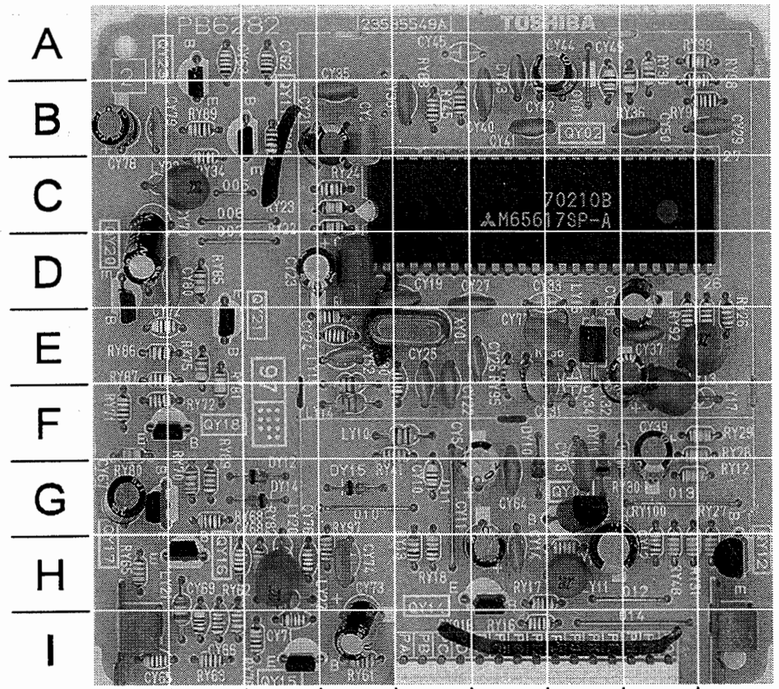
MAIN BOARD



MAIN BOARD, GRIDTRACE LOCATION GUIDE

C101	N-11	C672	G-13	CS18	P-10	G060	B-4	R101	E-7	R676	H-13	RB44	E-8
C102	N-12	C673	G-14	CS19	P-10	G217	N-7	R201	B-11	R677	H-12	RB45	E-8
C105	N-12	C676	G-13	CS20	P-10	G303	D-12	R208	D-13	R681	Q-10	RM02	I-10
C106	N-12	C677	G-12	CS21	O-10	G520	C-13	R228	M-7	R682	Q-11	RM06	B-10
C107	M-13	C678	G-14	CS30	K-12	G521	C-13	R230	D-13	R808	D-3	RR90	E-9
C108	K-13	C679	G-13	CS31	K-13	H001	Q-12	R231	E-14	R810	G-2	RR91	E-9
C109	K-13	C681	F-13	CS32	J-13	H002	K-14	R235	D-14	R861	F-4	RR92	E-9
C111	G-14	C682	G-12	CS33	K-13	KB01	A-3	R236	E-11	R862	J-2	RR93	D-10
C112	G-14	C683	F-14	CV01	K-11	L101	M-12	R237	E-12	R864	K-3	RS03	P-9
C113	M-12	C801	P-13	CV02	L-12	L201	C-11	R238	C-13	R866	J-3	RS04	Q-9
C114	M-12	C802	E-3	CV07	L-13	L202	B-13	R241	B-13	R867	I-1	RS05	O-10
C200	B-14	C805	G-4	CV22	K-9	L204	C-12	R242	C-14	R868	I-2	RS06	N-10
C201	D-13	C806	F-4	CV24	R-6	L301	I-9	R245	C-14	R870	J-4	RS07	P-10
C202	B-11	C810	I-4	CV30	K-10	L400	E-11	R246	B-13	R871	J-5	RS08	P-9
C205	C-13	C811	D-4	CV32	L-11	L441	M-6	R301	I-9	R872	K-1	RS09	P-10
C207	C-13	C812	C-4	CV33	K-11	L805	H-3	R303	H-10	R883	F-7	RS10	Q-10
C208	D-13	C813	C-4	CV35	M-11	L806	G-4	R304	G-9	R884	D-6	RS12	Q-9
C209	E-13	C840	C-2	CV99	L-13	L861	H-1	R305	G-10	R889	H-7	RS13	P-9
C210	C-11	C842	B-2	CZ01	L-11	L862	K-1	R306	J-8	R890	E-5	RS14	Q-11
C211	C-11	C843	B-3	CZ03	L-11	L883	G-6	R307	K-9	R891	D-6	RS16	Q-9
C230	B-14	C860	H-1	D101	N-12	L884	G-6	R308	J-8	R898	P-13	RS17	O-9
C231	B-14	C862	I-2	D201	C-11	L885	E-6	R309	G-10	RA03	B-8	RS18	P-9
C232	C-13	C863	K-2	D205	E-14	L886	G-5	R313	G-10	RA04	C-8	RS19	L-14
C233	C-14	C865	K-1	D210	E-13	L888	G-5	R317	D-11	RA05	C-8	RS20	L-14
C301	E-11	C866	I-1	D301	H-10	LA01	B-9	R327	P-7	RA07	C-8	RS21	M-11
C302	D-12	C867	J-1	D302	P-6	LB01	D-9	R336	J-8	RA08	C-8	RS22	M-11
C305	G-9	C868	J-4	D308	G-10	P401	N-6	R337	E-13	RA12	D-8	RS30	M-12
C306	G-9	C869	I-2	D309	G-11	P405	O-7	R338	F-12	RA13	D-8	RS31	L-12
C307	H-9	C870	I-3	D406	O-6	P501	D-11	R400	G-11	RA16	A-8	RS40	K-14
C308	G-10	C871	K-3	D407	E-13	P601	A-11	R401	D-13	RA17	A-9	RS41	L-14
C309	J-9	C873	J-1	D408	P-6	P802	R-13	R402	E-13	RA18	A-9	RV11	M-8
C310	P-8	C874	I-4	D409	F-12	P910	D-1	R403	E-12	RA19	D-8	RV12	M-8
C313	I-9	C876	J-1	D441	Q-7	PV03	R-8	R404	E-13	RA22	E-9	RV18	K-11
C314	I-9	C884	F-7	D471	Q-5	PY01A	O-10	R405	Q-6	RA23	E-9	RV19	K-11
C315	D-11	C885	H-6	D506	D-11	Q101	M-12	R406	E-13	RA24	E-9	RV22	L-11
C317	P-6	C886	G-5	D507	D-11	Q301	I-9	R407	E-13	RA25	D-10	RV23	L-11
C320	H-9	C889	H-8	D508	D-11	Q402	L-3	R408	G-11	RA26	D-9	RV30	R-6
C403	E-13	C891	D-6	D611	B-8	Q403	G-12	R410	L-3	RA27	D-9	RV31	R-6
C404	F-12	C893	F-6	D613	B-7	Q404	N-2	R411	L-3	RA33	D-10	RV92	J-11
C413	L-3	C894	G-6	D614	B-8	Q421	M-9	R415	L-3	RA34	B-9	RV93	J-11
C416	L-3	C898	G-7	D623	D-7	Q501	C-12	R416	L-7	RA35	B-9	RY14	N-11
C417	L-2	CA12	D-8	D801	G-3	Q610	H-13	R418	G-11	RA36	C-10	RY15	L-9
C421	N-9	CA33	D-10	D840	C-1	Q611	G-12	R421	M-9	RA37	C-10	SA01	A-4
C422	N-9	CA36	B-9	D845	C-3	Q612	B-6	R430	R-5	RA38	C-10	SA02	A-5
C430	E-12	CA37*	B-10	D862	J-2	Q613	G-13	R442	M-7	RA61	C-7	SA03	A-6
C431	E-11	CA38*	B-10	D864	J-5	Q801	J-1	R448	P-7	RA62	C-7	SA04	A-7
C440	N-1	CA42	B-10	D872	I-2	Q840	B-3	R470	E-6	RA67	C-10	SA05	A-8
C442	M-4	CA43	B-9	D873	J-3	Q843	C-3	R472	E-5	RA68	C-10	SA06	A-9
C444	N-3	CA68	B-7	D875	K-2	Q862	J-6	R473	Q-6	RA70	B-8	SA07	A-1
C445	R-5	CA69	B-7	D876	J-3	QA01	C-9	R479	F-5	RA71	A-6	SR81	E-4
C446	O-6	CA99	E-9	D881	E-7	QA02	C-7	R498	L-4	RA72	A-6	T401	L-2
C448	O-5	CB01	A-2	D883	G-6	QB01	B-2	R499	K-5	RA73	A-5	T461	P-3
C449	O-8	CB20	O-8	D884	G-6	QB03	A-4	R503	C-11	RA76	J-11	T801	O-13
C463	N-1	CM01	B-10	D885	G-5	QB21	O-8	R504	B-12	RA77	J-11	T840	F-2
C470	B-5	CM05	C-10	D886	G-5	QB30	B-4	R506	D-11	RB01	B-3	T862	I-5
C471	R-6	CM08	B-10	D899	P-13	QB40	E-8	R507	D-11	RB03	A-4	X	R-5
C472	C-5	CR01	E-11	DB03	A-3	QM03	B-10	R508	D-11	RB09	B-2	X401	D-13
C474	B-5	CR02	E-10	DB30	B-4	QS01	P-9	R522	N-10	RB11	B-3	X501	C-11
C475	B-6	CR03	E-11	DB45	I-10	QS02	Q-9	R612	B-6	RB26	D-10	XA01	C-11
C499*	N-9	CS02	L-13	DE50	A-3	QS03	Q-9	R613	D-8	RB27	N-8	XZ01	L-10
C504	C-11	CS03	L-13	DV01	I-12	QS04	R-10	R661	F-14	RB28	Q-6	Z801	C-6
C510	B-11	CS06	L-12	DV02	I-12	QV01	J-12	R662	F-14	RB30	B-4		
C514	B-11	CS07	L-12	F301	J-9	QV13	N-8	R663	G-13	RB40	D-8	* Located on bottom of board.	
C618	D-7	CS15	Q-10	F470	D-6	QV14	L-11	R664	G-13	RB41	E-8		
C661	F-13	CS16	Q-10	F801	Q-14	QY13	L-10	R668	F-13	RB42	E-8		
C662	G-13	CS17	Q-10	F860	H-4	R	R-4	R669	F-13	RB43	D-8		

PIP BOARD

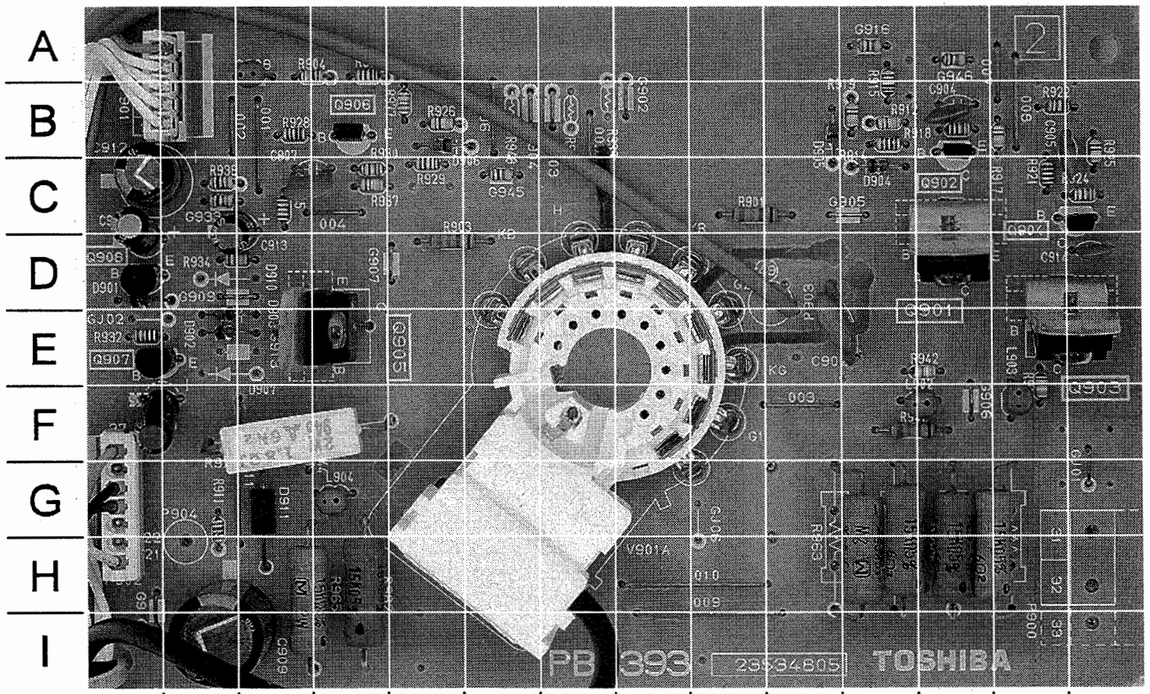


A HOWARD W. SAMS GRIDTRACE™ PHOTO

PIP BOARD, GRIDTRACE LOCATION GUIDE

CY10	G-5	CY38	D-8	CY73	I-4	PY01B	I-7	RY26	E-9	RY78	I-3
CY11	H-6	CY39	F-8	CY74	H-4	QY02	C-6	RY27	H-9	RY80	F-1
CY12	H-7	CY40	B-6	CY76	H-3	QY05	G-7	RY28	F-9	RY81	F-2
CY13	G-7	CY41	B-6	CY77	E-7	QY11	B-3	RY29	F-9	RY82	H-3
CY14	H-6	CY42	B-6	CY78	B-1	QY12	H-9	RY30	F-8	RY85	D-2
CY19	D-5	CY43	A-6	CY79	B-1	QY14	H-6	RY31	H-8	RY86	E-1
CY20	B-4	CY44	A-7	CY80	D-2	QY15	I-3	RY34	C-2	RY87	E-1
CY21	B-4	CY49	A-7	DY10	G-6	QY16	H-2	RY36	A-8	RY88	B-5
CY22	F-5	CY50	B-8	DY11	G-7	QY17	G-1	RY38	A-8	RY89	B-2
CY23	D-3	CY52	E-4	DY12	G-3	QY18	F-2	RY41	F-5	RY90	B-9
CY24	E-4	CY53	D-4	DY14	G-3	QY20	D-1	RY45	B-5	RY91	B-3
CY25	E-5	CY54	G-6	DY15	G-4	QY21	E-2	RY48	H-8	RY92	E-8
CY26	E-6	CY62	A-3	LY10	F-5	QY23	B-2	RY61	I-4	RY93	E-9
CY27	D-6	CY63	A-2	LY11	H-7	RY10	H-7	RY62	I-2	RY94	E-8
CY29	B-9	CY64	G-6	LY13	E-9	RY12	G-8	RY63	I-2	RY95	E-6
CY30	F-5	CY65	I-1	LY14	F-4	RY13	H-5	RY65	H-1	RY96	E-6
CY31	E-6	CY66	I-2	LY15	F-4	RY16	I-6	RY68	G-2	RY97	H-4
CY32	E-8	CY67	G-1	LY16	E-7	RY17	H-6	RY69	G-2	RY98	A-9
CY33	E-7	CY68	H-2	LY17	F-8	RY18	H-5	RY70	G-2	RY99	A-9
CY34	E-6	CY69	I-2	LY20	H-3	RY21	E-4	RY71	F-1	RY100	H-8
CY35	B-4	CY70	D-1	LY21	I-2	RY22	C-4	RY72	F-1	XY01	E-5
CY36	B-5	CY71	I-3	LY22	H-3	RY23	C-4	RY75	E-2		
CY37	E-8	CY72	E-1	LY23	C-2	RY24	C-4	RY77	D-1		

CRT BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

CRT BOARD, GRIDTRACE LOCATION GUIDE

C902	E-10	D903	E-2	P901	B-1	R904	A-4	R925	B-14	R960	H-11
C904	B-12	D904	C-11	P902	G-1	R905	A-4	R926	B-5	R961	H-13
C905	B-14	D905	B-10	Q901	D-12	R911	G-2	R928	B-3	R962	H-4
C907	C-3	D906	B-5	Q902	B-12	R912	B-11	R929	C-5	R963	H-11
C909	I-2	D911	G-3	Q903	E-14	R914	B-11	R930	C-4	R964	H-12
C910	C-1	G908	A-3	Q904	C-14	R915	B-11	R932	E-1	R965	H-3
C911	F-1	G916	A-11	Q905	E-4	R917	B-13	R934	D-3	R977	B-5
C912	C-1	G933	C-2	Q906	B-4	R918	B-12	R935	C-3		
C913	D-2	G945	C-6	Q907	E-1	R919	B-11	R936	C-2	* Located on bottom of board.	
C914	D-14	G946	A-12	Q908	D-1	R920	F-3	R937	C-4		
C920 *	G-9	L902	F-12	R901	C-9	R921	C-13	R942	E-12		
D901	D-1	L903	F-13	R902	F-11	R922	B-13	R943	F-13		
D902	E-2	L904	G-4	R903	D-5	R924	C-14	R944	F-3		

PARTS LIST

Important Parts Information

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

Obtaining Parts

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

800-428-7267

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

Participating Vendors

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

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

TEST EQUIPMENT

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

Equipment	Sencore No.	Equipment	Sencore No.
Oscilloscope	SC3100	Isolation Transformer	PR570
Generators		Capacitance Analyzer	LC102
RGB	CM2125	CRT Analyzer	CR7000
Multiburst Signal	VG91	AC Leakage Tester	PR570
Color Bar	VG91	Inductance Analyzer	LC102
TV Stereo	VG91	Flyback Yoke Tester	TVA92
Digital VOM	SC3100	Field Strength Meter	SL753
Frequency Meter	SC3100	Transistor Tester	TF46
Hi-Voltage Probe	HP200	Horizontal Analyzer	HA-2500
Accessory Probes	TP212	Video Analyzer	VG91, TVA92

SEMICONDUCTORS

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
D101	UZT33	23316694	-	-	-
	HTZ33-12	-	-	-	-
D201	UZ3.3BSA	23316292	-	-	-
	MTZJ3.3A	-	-	-	-
	RD3.3ESAB1	-	-	-	-
D205, 10	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D301	EU2A	23118094	NTE552	ECG552	SK9000
	ERB44-06	-	NTE552	ECG552	SK9000
D302	EU2A	23118094	NTE552	ECG552	SK9000
	EU2ALF-F10	-	-	-	-
D308, 09	ERB12-02	23118822	NTE552	ECG552	SK9000
D406	EU2A	23118094	NTE552	ECG552	SK9000
	EU2ALF-F10	-	-	-	-
D407	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D408	3JH41	A7580658	-	-	-
	RU4Z	-	NTE580	ECG580	SK5036
D409	UZ10BSB	23316327	-	-	-
	MTZJ10B	-	-	-	-
D441	MTZJ9.1B	23316687	-	-	-
	UZ9.1BSB	-	-	-	-
D471	TVR-1B	A7568460	NTE552	ECG552	SK9000
D506, 07, 08	UZ9.1BSA	23316323	-	-	-
	MTZJ9.1A	-	-	-	-
	RD9.1ESAB1	-	-	-	-
D611, 13	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D614, 23	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D801	D3SB60	23316391	NTE5310	ECG5310	SK5030
	RBV-406M	-	NTE5330	ECG5330	SK9972
D840	S1WBA20	23316962	-	-	-
	S1WBA60	-	NTE5332	ECG5332	SK9232
D845	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D862, 64	EU2A	23118094	NTE552	ECG552	SK9000
D872	UZ4.7BSB	23316302	NTE5009A	ECG5009A	SK4A7
	MTZJ4.7B	-	-	-	-
	RD4.7ESAB2	-	NTE5009A	ECG5009A	SK4A7
D873	UZ10BSB	23316327	-	-	-
	MTZJ10B	-	-	-	-
	RD10ESAB2	-	-	-	-
D875	UZ12BSB	23316333	-	-	-
	MTZJ12B	-	-	-	-
	RD12ESAB2	-	-	-	-
D876	UZ27BSB	23316359	-	-	-
	MTZJ27B	-	-	-	-
	RD27ESAB2	-	-	-	-
D881	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D883, 84	RG2	23115530	NTE580	ECG580	SK5036
D885, 86	EU2A	23118094	NTE552	ECG552	SK9000
D901 Thru					
D906	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D910	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
D911	1S1834	A7568250	NTE552	ECG552	SK9000
DB03	SIR-56SB3F	23358522	-	-	-
DB30, 45	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-

SEMICONDUCTORS continued

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
DE50	SCL003URC5F	23358501	-	-	-
DV01, 02	UZ9.1BSA	23316323	-	-	-
	MTZJ9.1A	-	-	-	-
	RD9.1ESAB1	-	-	-	-
DY10	MTZ3.9A	23316296	-	-	-
	UZ3.9BSA	-	-	-	-
DY11, 12	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
DY14, 15	1SS131	23115537	NTE519	ECG519	SK3100
	1SS120-7	-	-	-	-
Q101	MCT7805BT	23904841	-	-	-
	AN7805	-	NTE960	ECG960	SK3591
	MC7805CT	-	NTE960	ECG960	SK3591
	TA78005AP	-	NTE960	ECG960	SK3591
	UPC7805H	-	NTE960	ECG960	SK3591
Q301	TA8427K	B0378560	-	-	-
Q402	2SC1569FA-5	A678971D	NTE376	ECG376	SK3219
	2SC2482FA-1	A6330069	NTE399	ECG399	SK9352
Q403	2SC4721P	23314444	-	-	-
	2SC2655Y	-	NTE293	ECG293	SK3849
# **Q404**	2SD1556(E)	A6871313	NTE2302	ECG2302	SK9422
Q421	MCT7809BT	23904844	-	-	-
	AN7809	-	NTE1910	ECG1910	-
	MC7809CT	-	NTE1910	ECG1910	-
	TA78009AP	-	-	-	-
Q501	TA1223AN	B0385424	-	-	-
Q610	TA8246H	B0377324	-	-	-
Q611	2SC2878-A(TE)	A6342206	-	-	-
Q612	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
	2SA564A-Q	-	NTE290A	ECG290A	SK3932
	2SA1015Y	-	NTE290A	ECG290A	SK9132
Q613	2SC2878-A(TE)	A6342206	-	-	-
# **Q801**	STR-Z4151	23905513	-	-	-
Q840	L78MR05	23318299	-	-	-
Q843	RN1205	A6002050	-	-	-
# **Q862**	TLP621(GRL-LF2)	A8643112	NTE3098	ECG3098	SK10178
Q901	2SC4544	A6368700	NTE376%	ECG376%	SK9362A%
Q902	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
Q903	2SC4544	A6368700	NTE376%	ECG376%	SK9362A%
Q904	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
Q905	2SC4544	A6368700	NTE376%	ECG376%	SK9362A%
Q906	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
Q907	2SA562TM-Y(T)	A6509154	NTE290A	ECG290A	SK3114A
Q908	2SC2120-Y(TE)	A6321265	-	-	-
QA01	TMP87CM34BN-3297	23905652	-	-	-
	TMP87CM34BN-3287	-	-	-	-
QA02	24LC02BI/P	23904941	-	-	-
	ST24C02CB6	-	-	-	-
QB01	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1815Y	-	NTE85	ECG85	SK3124A
QB03	RN1205	A6002050	-	-	-
QB21, 30, 40	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QM03	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QS01	M5218AP	23319808	-	-	-
QS02	RN2204	A6012040	NTE2360	ECG2360	SK9960

 # For SAFETY use only equivalent replacement part.
% Use insulating hardware supplied with replacement.

SEMICONDUCTORS continued

(Select the replacement that gives the best results.)

Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
QS03, 04	2SC2878A(TE)	A6342206	NTE85	ECG85	SK3124A
QV01	TA1218N	B0385650	-	-	-
QV13, 14	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QY02	M65617SP	23905511	-	-	-
QY05	2SC2655-Y(C)	A6333346	NTE293	ECG293	SK3849
QY11	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
QY12, 13	2SC752(G)TM-Y	A6734590	NTE188	ECG188	SK3199
QY14	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
QY15, 16	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QY17	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132
QY18, 20, 21	2SC1740S-Q	23114528	NTE85	ECG85	SK3122
	2SC1685Q	-	NTE85	ECG85	SK9229
	2SC1815Y	-	NTE85	ECG85	SK3124A
QY23	2SA933S-Q	23114530	NTE290A	ECG290A	SK9132

CAPACITORS & ELECTROLYTICS

Item No.	Rating	Mfr. Part No.
C108, 09	10µF 20% 16V NP	24085981
C209	2.2µF 20% 50V	24085944
# **C440**	.007 3% 1.5kV	24082581
# **C442**	.47 5% 400V	-
	.47 315V	24082922
# **C444**	.0072 3% 1.5kV	24082583
C504	9pF ±.25pF NPO	24353090
# **C801**	.22 20% 125VAC	24095670
# **C802**	.082 250VAC	-
	.082 20% 125VAC	24095852
C805, 06	.01 +80% -20% 250VAC	24092300
# **C811, 12, 13**	.0047 20% 250VAC	-
	.0047 20% 400VAC	24092270
C865	.0015 10% 2kV	24092347
C871	.0015 10% 2kV	24092347
C893, 94	270pF 10% 2kV	24092338
C902	.001 10% 2kV	24092345
CY67	10µF 20% 16V NP	24085981
CY70	1µF 20% 50V NP	24085958
CZ03	10µF 20% 16V NP	24085981

 # For SAFETY use only equivalent replacement part.

CONTROLS & RESISTORS

	Item No.	Function/Rating	Mfr. Part No.	NTE Part No.
	D899	Varistor (ENC271D-14A)	24000268	-
		Varistor (TNR15G271K)	-	-
	R228	12K 2% 1/6W	24367123	-
#	**R416**	6800 5% 5W Wirewound	24510682	5W268
	R442	1000 5% 1W Fusible	24532102	F1W210
#	**R448**	.47 5% 1W	24338478	1WD47
	R498	5.6 5% 5W Wirewound	24510569	5W5D6
	R808	8.2/265 PTC Cold	24000862	-
	R810	1.1 5% 15W Wirewound	24007873	-
	R889	.39 5% 1/2W Fusible	24546398	-
#	**R898**	3.9M 5% 1/2W	24002994	HW539
#	**R920**	1.8 5% 2W Fusible	24000945	F2W1D8

 # For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS

	Item No.	Function/Rating	Mfr. Part No.
	G908	-	23289100
	L101	-	23289101
	L201	-	23289100
	L202	-	23238562
	L204	-	23289100
	L301	Ferrite Bead	23103859
	L400	-	23289100
#	**L441**	Horizontal Linearity	23233072
#	**L462** (1)	Yoke Horiz 1.1mH Vert 23.5mH	-
	L805	-	23248150
	L806	-	23221747
	L861, 62	Ferrite Bead	23103880
	L883, 84	Ferrite Bead	23103880
	L885	-	23248073
	L886, 88	Ferrite Bead	23103880
	L901	Degaussing	23200789
	L902, 03, 04	-	23289101
	LA01	-	23289100
	LB01	Oscillator	23262682
	LY10	-	23238705
	LY11, 13	-	23239759
	LY14	-	23238506
	LY15	-	23238504
	LY16	Ferrite Bead	23103880
	LY17, 20	-	23239759
	LY21	-	23238509
	LY22	-	23238709
	LY23	-	23239759
	T401	Horizontal Drive	23224369
#	**T461** (2)	Horizontal Output	23236483
#	**T801**	Line Filter	23211671
#	**T840**	Power	23213513
#	**T862**	Converter	23217345

 # For SAFETY use only equivalent replacement part.
(1) Part of CRT V901.
(2) Focus and screen controls are part of T461.

MISCELLANEOUS

	Item No.	Description	Mfr. Part No.	Notes
	F301	Fuse	23144908	500mA, 125V, Fast Acting
	F301A	Fuse Holder	23165433	For F301 (2 Used)
#	**F470**	Fuse	23144785	1.25A, 125V, Fast Acting
	F470A	Fuse Holder	23165433	For F470 (2 Used)
#	**F801**	Fuse	23144888	5 Amp, 125V, Slow Blow
	F801A	Fuse Holder	23165433	For F801 (2 Used)
	F860	Fuse	23144511	4Amp, 125V
	H001 (1)	Tuner	23321222	UHF/VHF (ELA11L1)
	H002	Module	23148251	IF/MTS/A.PRO (MVUS33T)
	K912	Transmitter	23306171	Remote (CT-9854)
	KB01	Receiver	23905177	Remote (PIC-TB16)
	P801	Line Cord	23176006	AC, Polarized
	PV03	Jack	23365825	Assembly
	SA01	Switch	23145227	Channel Up
	SA02	Switch	23145227	Channel Down
	SA03	Switch	23145227	Volume Up
	SA04	Switch	23145227	Volume Down
	SA05	Switch	23145227	Video
	SA06	Switch	23145227	Menu (Memory)
	SA07	Switch	23145227	Power
#	**SR81**	Relay	23146916	Power
	U901	PC Board	-	CRT (PB5393)
	U902	PC Board	-	Main (PB6459)
	UY01	PC Board	-	PIP (PB6282)
#	**V901**	CRT	23312649	A68ADT28X04
	V901A	Socket	23902068	CRT
	W661, 62	Speaker	23351088	2 1/2" X 5", 8 Ohms, 5W
	X401	Crystal	23153721	503kHz
	X501	Crystal	23153961	3.58MHz
	XA01	Crystal	23153325	8MHz
	XY01	Crystal	23153899	14.3MHz
	XZ01	Module	23303193	Comb Filter Delay
	Y107	Adapter	23142003	Antenna 75 To 300 Ohms
#	**Z801**	Module	23905010	Protector, HIC1019

 # For SAFETY use only equivalent replacement part.
(1) Contact TNI Electronics for replacement; order by part number on tuner.

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

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CABINET PARTS

Item	Mfr. Part No.
Cabinet Front	23410575
Cabinet Rear	23426456
Knob - Control	23443957
Knob - Power	3443956
Remote Filter	23450023
Spring - Power Knob	23836492