

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 control knobs, shields, covers, grounds, and mounting hardware have been replaced. Be sure to replace all insulators and restore proper lead dress.

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

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

©1996 by Howard W. Sams & Company
A Bell Atlantic Company
2647 Waterfront Parkway East Drive, Suite 300
Indianapolis, IN 46214-2012

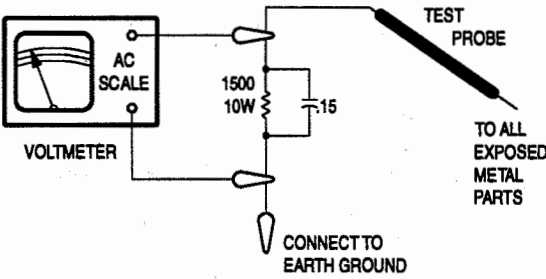
Printed in the United States of America 5 4 3 2 1

SAFETY CHECKS – FIRE AND SHOCK HAZARD
Cold Leakage Checks for Receivers with Isolated Ground

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

Hot Leakage Current Check

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



HIGH VOLTAGE SHUTDOWN TEST

Check for 21.3V to 24.3V at TP654. Refer to the "Miscellaneous Adjustments" and enter the service mode, select service number S32. Make sure data value changes by pressing the volume up / down buttons. Apply an external 28.4V to TP654, the receiver should shutdown. If the receiver fails to shutdown, the high voltage shutdown circuit requires repair. To return to normal operation, remove power for about 20 seconds.



96PF02898



0 81262 03647 1

PHOTOFACT® Technical Service Data

SET 3647

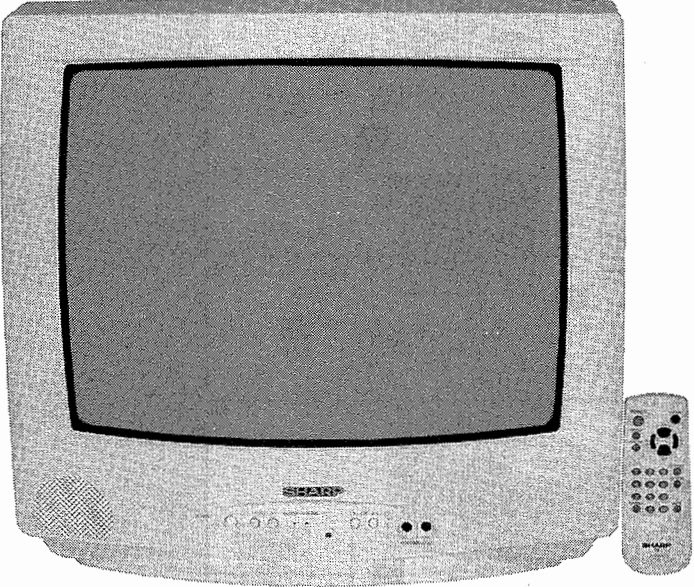
MODEL 19G-M150

SHARP

INDEX

GridTrace Location
A / V Board 4
Main Board 4
High Voltage Shutdown Test 1
IC Functions 2
Important Parts Information 1
Miscellaneous Adjustments 3
Parts List 1
Placement Chart 3
Safety Precautions 1
Schematics
Audio / Video 2
Power Supply 2
System Control 2
Television 2
Schematic Notes 1
Service Information 3
Service Mode Adjustment Chart 3
Test Equipment 1
Tuner Information 1

SHARP
Model 19G-M150



Essential coverage
for servicing a television receiver...

- Schematics
- Component locations
- Parts list

Coverage includes these additional models:

MODEL	MODEL
13G-M80	19G-M80
13G-M100	19G-M100
13G-M150	19G-M120

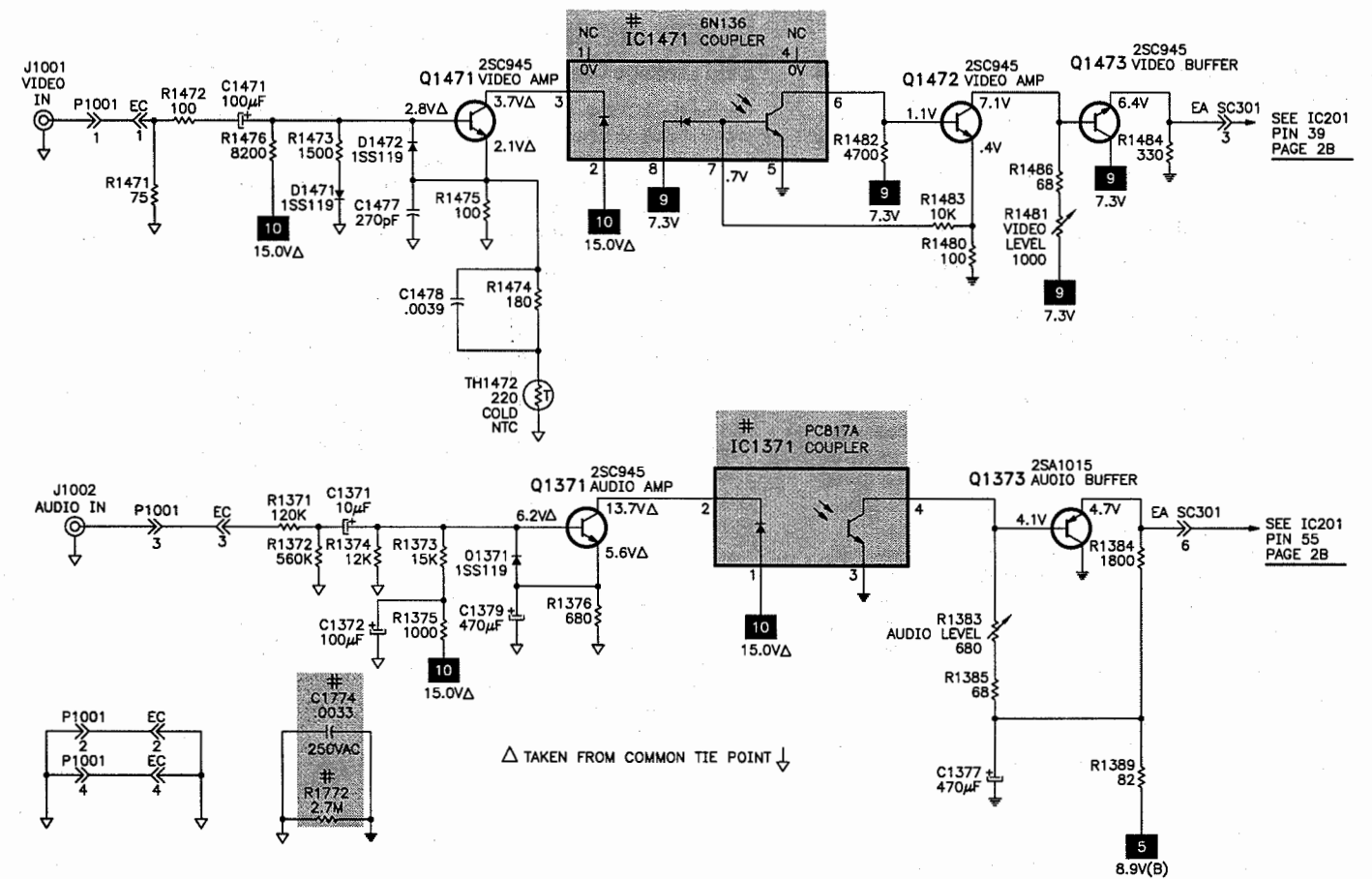
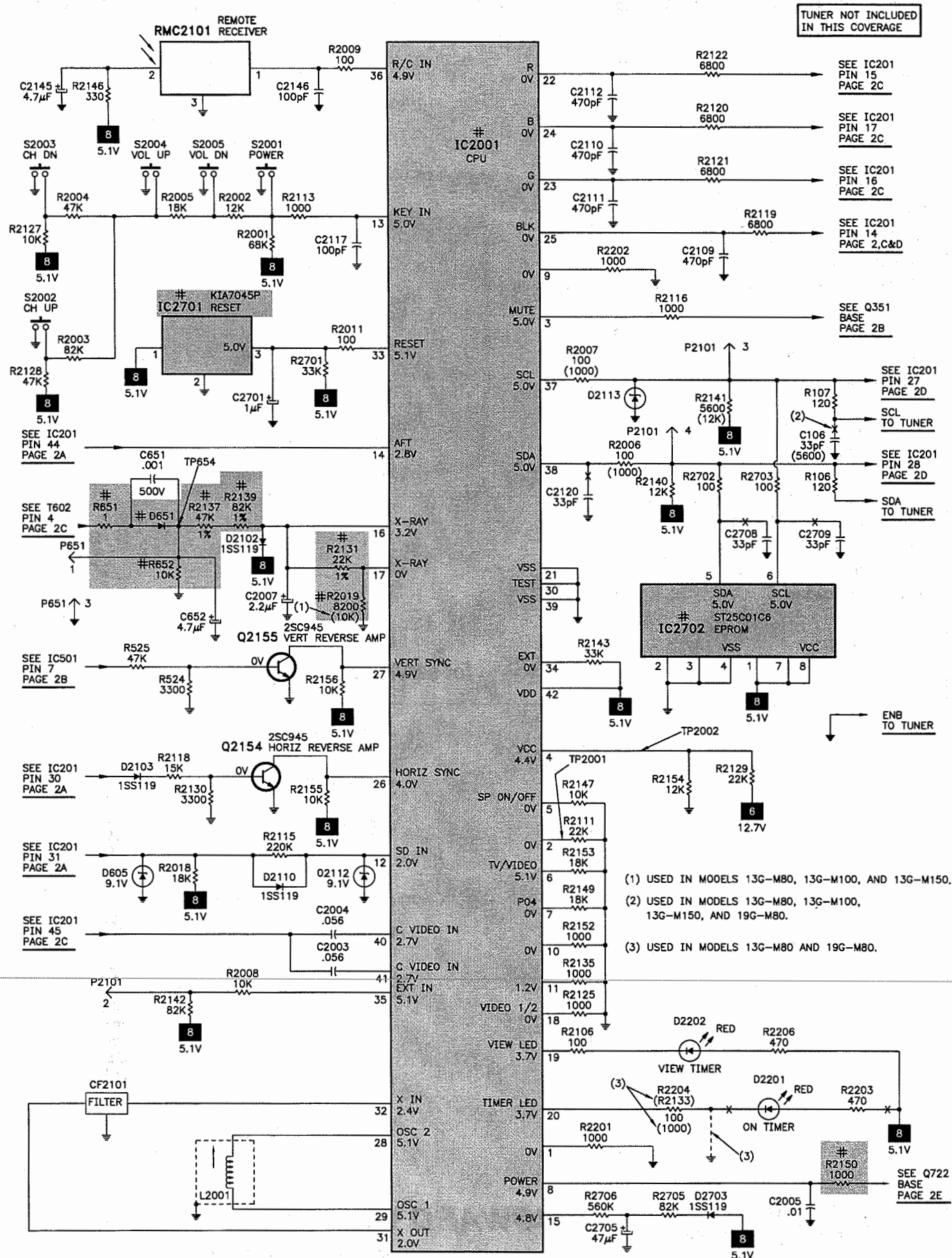


HOWARD W. SAMS & COMPANY

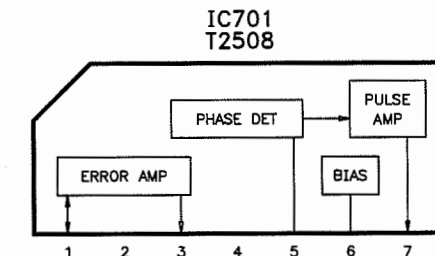
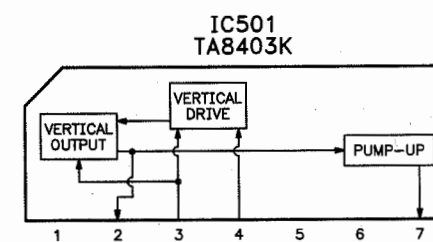
APRIL 1996 SET 3647

For Supplier Address,
See PHOTOFACT Annual Index

AUDIO / VIDEO SCHEMATIC



IC FUNCTIONS



VOLTAGES TAKEN WITH SIGNAL
ADDITIONAL SCHEMATIC
NOTES, SEE PAGE 1

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH **CIRCUITTRACE®**
© Howard W. Sams & Co. 1996

PARTS LIST continued

COILS & TRANSFORMERS

Item No.	Function/Rating	Mfr. Part No.
# DY601 (1)	Yoke Horiz 2.4mH Vert 31.1mH	RCiLH0053MEZZ
# DY601 (2)	Yoke	RCiLH0014PEZZ
# DY601 (3)	Yoke	RCiLH0014PEN1
# DY601 (4)	Yoke	RCiLH0008PEZZ
# DY601 (4)	Yoke	RCiLH0111PEZZ
# DY601 (5)	Yoke	RCiLH1606CEN5
# DY601 (5)	Yoke	RCiLH0094PEZZ
FB602, 03	Ferrite Bead	RBLN-0037CEZZ
FB701, 02	Ferrite Bead	RBLN-0037CEZZ
FB703	Ferrite Bead	RBLN-0020CEZZ
L203	.82μH	VP-XFR82K0000
L204	.68μH	VP-XFR68K0000
L206	VCO	RCiLi0588CEZZ
L207	10μH	VP-XF100K0000
L301	SIF Detector	RCiLi0605CEZZ
L401	12μH	VP-XF120K0000
L402	3.3μH	VP-XF3R3K0000
L403	10μH	VP-XF100K0000
L404, 05	8.2μH	VP-XF8R2K0000
L406, 07	68μH	VP-XF680K0000
# L701	Line Filter	RCiLF0254CEZZ
	Line Filter	RCiLF0003PEZZ
	Line Filter	RCiLF0087CEZZ
# L702 (6)	Degaussing	RCiLG0014MEZZ
# L702 (7)	Degaussing	RCiLG0386PEZZ
L851	150μH	VP-DF151K0000
L2001	Oscillator	RCiLB0131CEZZ
T601 (6)	Horizontal Driver	RTRNZ0367CEZZ
T601 (7)	Horizontal Driver	RTRNZ0073CEZZ
# T602 (6)(8)	Horizontal Output	RTRNF0058PEZZ
# T602 (7)(8)	Horizontal Output	RTRNF0057PEZZ
# T701	Power	RTRNP0416CEZZ
# T1771	Separator	RTRNZ0594CEZZ

- # For SAFETY use only equivalent replacement part.
- (1) Used with CRT A48AFS15X, A48AFS05X, and A48KZL90X.
- (2) Used with CRT A34JLN60X and A37GDA86X.
- (3) Used with CRT A34KPU02XX.
- (4) Used with CRT CPJ370BVBK1U.
- (5) Used with CRT A34JLL40X.
- (6) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
- (7) Used in models 13G-M80, 13G-M100, and 13G-M150.
- (8) Focus and screen controls are part of T602.

CABINET PARTS

Item	Mfr. Part No.
Model 13G-M80	
Button - Channel Up/Down	JBTN-0168PEKA
Button - Power, Volume Up/Down	JBTN-0167PEKA
Cabinet Complete Assembly	CCABA2281WEV0
Cabinet Rear	GCABB2240PEKA
Cover, LED	GCOVA0053PEKA
Decoration Plate LED	HDECQ0025PESB
Model 13G-M100	
Button - Channel Up/Down	JBTN-0170PEKA
Button - Power, Volume Up/Down	JBTN-0169PEKA
Cabinet Complete Assembly	CCABA2283WEV0
Cabinet Rear	GCABB2240PEKA
Cover, LED	HDECQ053PEKA
Model 13G-M150	
Button - Channel Up/Down	JBTN-0170PEKB
Button - Power, Volume Up/Down	JBTN-0169PEKB
Cabinet Complete Assembly	CCABA2283WEV2
Cabinet Rear	GCABB2240PEKB
Cover, LED	HDECQ0053PEKA
Model 19G-M80	
Badge, Sharp	HBDGB3009MESA
Button - Channel Up/Down	JBTN-1041MEKA
Button - Power, Volume Up/Down	JBTN-1040MEKA
Cabinet Complete Assembly	CCABA1209MES0
Cabinet Rear	GCABB1095MEKA
IR Window	GMADT0094MEKA
Model 19G-M100/150	
Badge, Sharp	HBDGB3009MESA
Button - Channel Up/Down	JBTN-1060MEKA
Button - Power, Volume Up/Down	JBTN-1059MEKA
Cabinet Complete Assembly	CCABA1211MES0
Cabinet Rear	GCABB1094MEKA
Cover, LED	GCOVA1012MEKA
Model 19G-M120	
Badge, Sharp	HBDGB3009MESA
Button - Channel Up/Down	JBTN-1062MEKA
Button - Power, Volume Up/Down	JBTN-1061MEKA
Cabinet Complete Assembly	CCABA1211MES0
Cabinet Rear	GCABB1094MEKA
Cover, LED	GCOVA1013MEKA

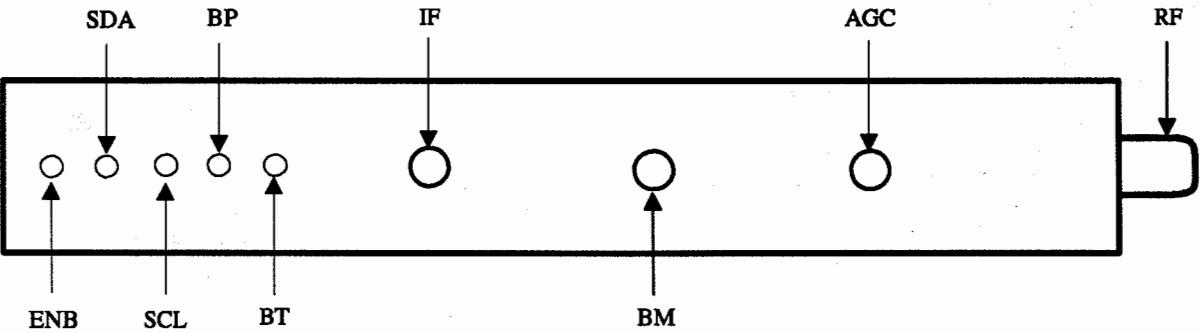
TUNER INFORMATION

TUNER VOLTAGE CHART

Pin	VHF Low Band	VHF High Band	UHF Band
AGC	4.4V	4.2V	4.5V
BM	8.9V	8.9V	8.9V
IF	0V	0V	0V
BT	32.5V	32.6V	32.7V
BP	5.2V	5.2V	5.2V
SCL	4.9V	4.9V	4.9V
SDA	4.9V	4.9V	4.9V
ENB	0V	0V	0V

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

TUNER TERMINAL GUIDE



SCHEMATIC NOTES

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

* Circuitry not used in some versions.

--- Circuitry used in some versions.

⚡ Ground

⏏ Chassis ground

⏏ Common tie point

△ Taken from common tie point

3 Schematic CIRCUITTRACE®: 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.



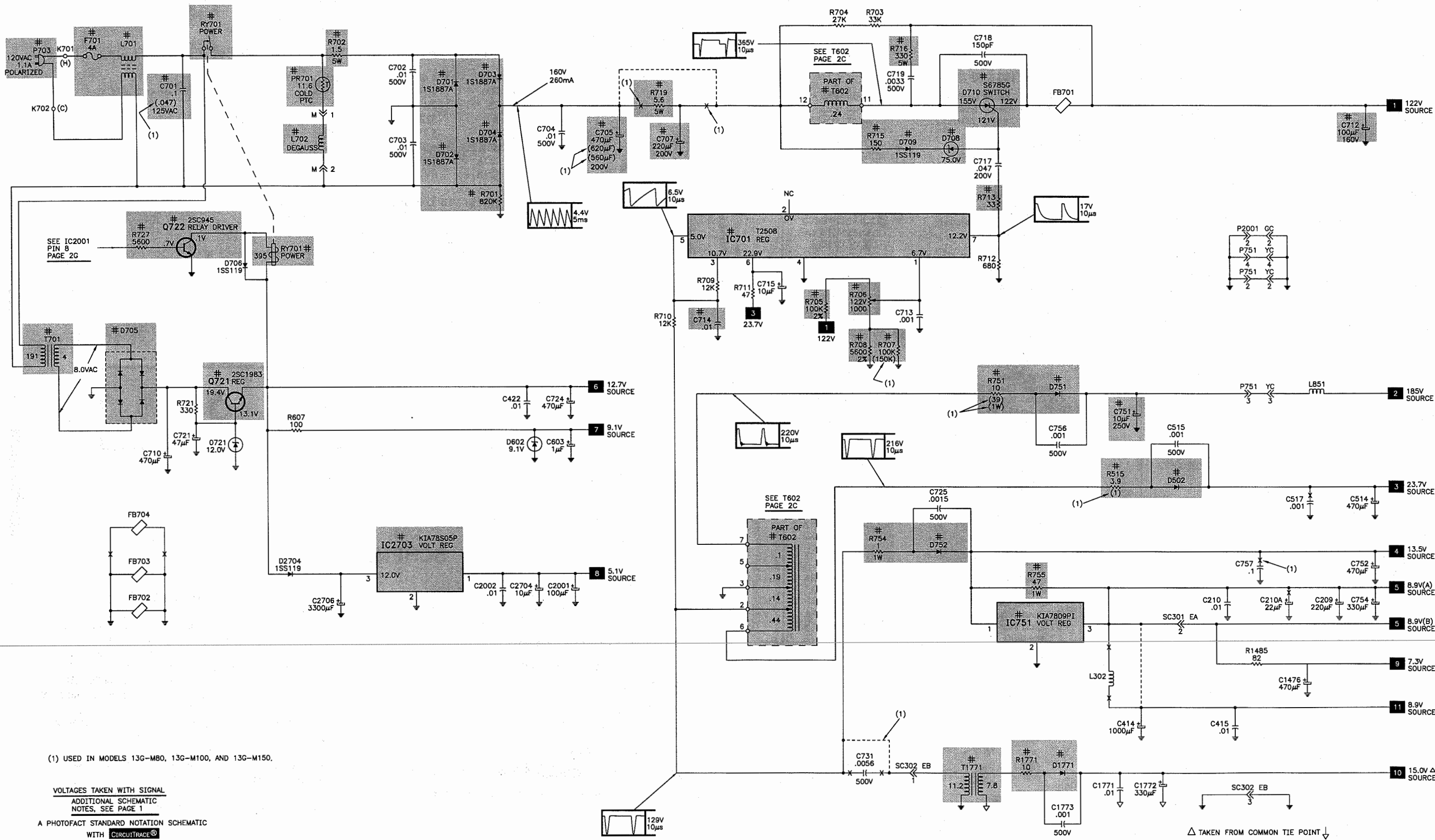
Created with pride by the
employees of Howard W. Sams
& Company.

J. Barker, N. Beck, B. Bryant,
B. Buchanan, T. Clensy,
G. Farrell, B. Fink,
M. Herkless, J. Kocha,
F. Malek, B. Medaris, R. Raus,
B. Skinner, D. Sullivan

SHARP

MODEL 19G-M150

POWER SUPPLY SCHEMATIC



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)
- PTS Electronics Corporation (PTS)
- Sencore, Inc.
- Thomson Consumer Electronics, Inc. (SK, TCE)

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	-	RH-EX0701GEZZ	-	-	-
D102	-	RH-EX0294CEZZ	-	-	-
D401	-	RH-EX0280CEZZ	-	-	-
D451	-	RH-EX0103CEZZ	NTE136A	ECG136A	SK5V6
D453, 54	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D455	-	RH-EX0092CEZZ	-	-	-
D501	-	RH-DX0441CEZZ	-	-	-
	-	RH-DX0110CEZZ	-	-	-
# D502	-	RH-DX0131CEZZ	NTE552	ECG552	SK9000
D602	-	RH-EX0312CEZZ	-	-	-
D605	-	RH-EX0312CEZZ	-	-	-
# D651	-	RH-DX0441CEZZ	-	-	-
	-	RH-DX0110CEZZ	-	-	-
D653	-	RH-EX0313CEZZ	-	-	-
# D701 Thru					
# D704	1S1887A	RH-DX0154CEZZ	NTE552	ECG552	SK9000
# D705	-	RH-DX0417CEZZ	NTE5332	ECG5332	SK9232
	-	RH-DX0200CEZZ	NTE5332	ECG5332	SK9232
D706	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
# D708	-	RH-EX0238CEZZ	-	-	-
# D709	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
# D710 (1)	S6785G	VHSS6785GLB2E	NTE5424%	ECG5424%	-
# D710 (2)	S6785G	VHS6785GLB1E	NTE5424%	ECG5424%	-
D721	-	RH-EX0019TAZZ	-	-	-
# D751	-	RH-DX-0131CEZZ	NTE552	ECG552	SK9000
# D752	-	RH-DX0226CEZZ	-	-	-
D881, 82	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D885	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D1371	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D1471, 72	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D1771	-	RH-DX0131CEZZ	NTE552	ECG552	SK9000
D2102, 03	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D2110	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
D2112	-	RH-EX0312CEZZ	-	-	-
D2201 (3)	-	RH-PX0378CEZZ	-	-	-
D2201 (4)	-	RH-PX0238CEZZ	-	-	-
D2202 (3)	-	RH-PX0378CEZZ	-	-	-
D2202 (5)	-	RH-PX0304CEZZ	-	-	-
D2202 (2)	-	RH-PX0238CEZZ	-	-	-
D2703, 04	1SS119	VHD1SS119/-1	NTE519	ECG519	SK3100
	-	RH-DX0045GEZZ	NTE519	ECG519	SK3100
# IC201	TA1201AN	RH-IX2573CEZZ	-	-	-
IC351	TDA7233	VHITDA7233/-1	-	-	-
# IC501	TA8403K	RH-IX1011CEZZ	-	-	-
# IC701	T2508	RH-IX0137CEZZ	NTE1751	ECG1751	-

For SAFETY use only equivalent replacement part.
% Use insulating hardware supplied with replacement.
(1) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(2) Used in models 13G-M80, 13G-M100, and 13G-M150.
(3) Used in models 19G-M100, 19G-M120, and 19G-M150.
(4) Used in models 13G-M100 and 13G-M150.
(5) Used in model 19G-M80.

SEMICONDUCTORS continued

(Select the replacement that gives the best results.)

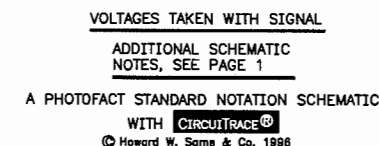
Item No.	Type No.	Mfr. Part No.	NTE Part No.	ECG Part No.	TCE Part No.
# IC751	KIA7809PI	VHKA7809PI-1	-	-	-
# IC751 (6)	-	VHITA7809S/-1	-	-	-
# IC1371	PC817A	RH-FX0011CEZZ	NTE3098	ECG3098	SK9763
# IC1471	6N136	RH-FX0014CEZZ	NTE3092	ECG3092	SK9770
# IC2001	-	RH-IX2552CEZZ	-	-	-
# IC2701	KIA7045P	VHKA7045P-1	-	-	-
	-	VHHPST529C2-1	-	-	-
# IC2702	ST25C01C6	RH-IX2447CEN1	-	-	-
# IC2703	KIA78S05P	VHKA78S05P-1	-	-	-
	-	VHITA78L05S-1	-	-	-
Q201	2SC1906	VS2SC1906//1E	NTE107	ECG107	SK3293
Q351	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q401	2SA1015(Y)	VS2SA1015Y/1E	NTE290A	ECG290A	SK9132
Q402	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q403	2SA1015(Y)	VS2SA1015Y/1E	NTE290A	ECG290A	SK9132
Q405	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q451	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q601	2SC2482	VS2SC2482/-1	NTE399	ECG399	SK9352
# Q602 (1)	2SD1555	-	NTE2331	ECG2331	SK9422
# Q602 (1)	2SD2095	VS2SD2095//1E	NTE2331	ECG2331	SK9422
# Q602 (2)	2SD1554	VS2SD1554//1E	NTE2302	ECG2302	SK9422
# Q721	2SC1983	VS2SC1983//2	NTE56	ECG56	SK3929
# Q722	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q852	2SC2229(O)	VS2SC2229O/1E	NTE399	ECG399	SK3244
Q854	2SC2229(O)	VS2SC2229O/1E	NTE399	ECG399	SK3244
Q856	2SC2229(O)	VS2SC2229O/1E	NTE399	ECG399	SK3244
Q881	2SA1015(Y)	VS2SA1015Y/1E	NTE290A	ECG290A	SK9132
Q1371	2SC945A(P)	VS2SC945AP/-1	NTE85	ECG85	SK3124A
Q1373	2SA1015(Y)	VS2SA1015Y/1E	NTE290A	ECG290A	SK9132
Q1471	2SC945A(P)	VS2SC945AP/-1	NTE85	ECG85	SK3124A
Q1472, 73	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A
Q2154, 55	2SC945A(Q)	VS2SC945AQ/-1	NTE85	ECG85	SK3124A

For SAFETY use only equivalent replacement part.
(1) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(2) Used in models 13G-M80, 13G-M100, and 13G-M150.
(6) Used in some versions of models 13G-M80, 13G-M100, and 13G-M150.

TEST EQUIPMENT

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

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



PARTS LIST continued

CONTROLS & RESISTORS

Item No.	Function/Rating	Mfr. Part No.	NTE Part No.
# PR701	11.6 Cold PTC	RMPTP0026CEZZ	-
# PR701 (1)	-	RMPTP0075CEZZ	-
# R103	150 5% 2W	VRS-VV3DB151J	2W151
# R104	15K 5% 2W	VRS-VV3DB153J	2W315
# R452	5600 5% 1/2W	VRC-MA2HG562K	HW256
# R454	10K 5% 1/2W	VRS-SV2HC103J	HW310
R506	68K 2% 1/8W	VRD-RA2BE683G	EW368
R507	100K 2% 1/8W	VRD-RA2BE104G	EW410
# R515 (2)	3.9 5% 1/2W	VRN-SV2HB3R9J	HW3D9
# R515 (3)	1 5% 1/2W	VRN-SV2HB1R0J	HW1D0
R516 (2)	68K 2% 1/8W	VRD-RA2BE683G	EW368
R516 (3)	22K 2% 1/8W	VRD-RA2BE223G	EW322
R518 (2)	10K 2% 1/8W	VRD-RA2BE103G	EW310
R518 (3)	12K 2% 1/8W	VRD-RA2BE123G	EW312
# R611 (2)	2200 5% 3W	VRS-SV3LB222J	3W222
# R611 (3)	1500 5% 3W	VRS-SV3LB152J	3W215
# R612	.22 5% 1W	VRN-VV3ABR22J	1WD22
# R651	1 5% 1/2W	VRD-RM2HD1R0J	HW1D0
# R652	10K 5% 1/8W	VRD-MN2BE103J	EW310
# R655	6800 5% 1W	VRS-VV3AB682J	1W268
# R701	820K 5% 1/2W	VRD-RM2HD824J	HW482
# R702	1.5 10% 5W	VRW-KQ3HC1R5K	5W1D5
# R705	100K 2% 1/4W	VRD-RA2EE104G	QW410
# R706	1000 122V	RVR-M4328CEZZ	-
# R707 (2)	100K 5% 1/8W	VRD-RA2BE104J	EW410
# R707 (3)	150K 5% 1/8W	VRD-RA2BE154J	EW415
# R708	5600 2% 1/4W	VRD-RA2EE562G	QW256
# R713	33 5% 1/2W	VRD-RM2HD330J	HW033
# R715	150 5% 1/2W	VRS-SV2HC151J	HW151
# R716	330 10% 5W	VRW-KQ3HC331K	5W133
# R717	6.8 10% 10W	VRW-KQ4AC6R8K	10W6D8
# R719 (2)	5.6 10% 5W	VRW-KQ3HC5R6K	-
# R727	5600 5% 1/8W	VRD-MN2BE562J	EW256
# R729 (2)	10 5% 1W	VRS-VV3AB100J	1W010
# R729 (3)	22 5% 2W	VRS-VV3DB220J	2W022
# R751 (2)	10 5% 1/2W	VRS-SV2HC100J	HW010
# R751 (3)	39 5% 1W	VRS-VV3AB390J	1W039
# R752 (2)	1.8 5% 1/2W	VRN-SV2HB1R8J	HW1D8
# R752 (3)	1.8 5% 1W	VRN-VV3AB1R8J	1W1D8
# R753 (2)	2.7 5% 1/2W	VRN-SV2HB2R7J	HW2D7
# R754	1 5% 1W	VRN-RV3AB1R0J	1W1D0
# R755	47 5% 1W	VRS-VV3AB470J	1W047
# R857	12K 5% 1W	VRS-VV3AB123J	1W312
# R865	12K 5% 1W	VRS-VV3AB123J	1W312
# R873	12K 5% 1W	VRS-VV3AB123J	1W312
R1383	680 Audio Level	RVR-M4327CEZZ	-
R1481	680 Video Level	RVR-M4328CEZZ	-
# R1771	10 5% 1/2W	VRS-SV2HC100J	HW010
# R1772	2.7M 10% 1/2W	VRC-UA2HG275K	HW527
# R2019 (2)	8200 5% 1/8W	VRD-MN2BE822J	EW282
# R2019 (3)	10K 5% 1/8W	VRD-MN2BE103J	EW310
# R2131	22K 1% 1/8W	VRN-RA2BK223F	-
# R2137	47K 1% 1/8W	VRN-RA2BK473F	-
# R2139	82K 1% 1/8W	VRN-RA2BK823F	-
# R2150	1000 5% 1/8W	VRD-MN2BE102J	EW210
TH1472	220 Cold NTC	RH-HZ00006CEZZ	-

For SAFETY use only equivalent replacement parts.
(1) Used in some version of models 13G-M80, 13G-M100, and 13G-M150.
(2) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(3) Used in models 13G-M80, 13G-M100, and 13G-M150.

MISCELLANEOUS

Item No.	Description	Mfr. Part No.	Notes
CF301	Filter	RFILC0029TAZZ	4.5MHz
CF302	Filter	RFILC0267CEZZ	4.5MHz
CF401	Trap	RFILC0013CEZZ	4.5MHz
CF601	Crystal	RFILA0034CEZZ	503kHz
CF2101	Filter	RFILC0121GEZZ	-
# F701	Fuse	QFS-B4023CEZZ	4Amp, 125VAC, Slow Blow
	Fuse	QFS-B4021GEZZ	4Amp, 125VAC, Slow Blow
FH701	Fuse Holder	QFSHD1013CEZZ	For F701
FH702	Fuse Holder	QFSHD1014CEZZ	For F701
J1001	Jack	QJAKE0149CEZZ	Video Input
J1002	Jack	QJAKE0149CEZZ	Audio Input
# M001	Terminal Board	RUNTK0476CEZZ	Antenna
# P703 (1)	Line Cord	QACCD3037CESB	AC, Polarized
# P703 (2)	Line Cord	QACCD3038CESA	AC, Polarized
# P703 (3)	Line Cord	QACCD3030CESA	AC, Polarized
# P703 (3)	Line Cord	QACCD3014CESA	AC, Polarized
# P703 (4)	Line Cord	QACCD3030CESB	AC, Polarized
# P703 (4)	Line Cord	QACCD3014CESB	AC, Polarized
RMC2101	Receiver	RRMCU0216CEZZ	Remote
# RY701	Relay	RRLYU0022CEZZ	Power
	Relay	RRLYU0031CEZZ	Power
S2001 (5)	Switch	QSW-K0002AJZZ	Power
S2001 (6)	Switch	QSW-K0079GEZZ	Power
S2002 (5)	Switch	QSW-K0002AJZZ	Channel Up
S2002 (6)	Switch	QSW-K0079GEZZ	Channel Up
S2003 (5)	Switch	QSW-K0002AJZZ	Channel Down
S2003 (6)	Switch	QSW-K0079GEZZ	Channel Down
S2004 (5)	Switch	QSW-K0002AJZZ	Volume Up
S2004 (6)	Switch	QSW-K0079GEZZ	Volume Up
S2005 (5)	Switch	QSW-K0002AJZZ	Volume Down
S2005 (6)	Switch	QSW-K0079GEZZ	Volume Down
SC851 (7)	Socket	QSOCV0826CEZZ	CRT
SC851 (8)	Socket	QSOCV0829CEZZ	CRT
SF201	Filter	RCILC0137CEZZ	SAW
SP1 (7)	Speaker	VSP0080P-E98S	3" Round, 8 Ohms, 2 W
SP1 (8)	Speaker	VSP0080P-H28A	-
# TU101 (9)	Tuner	VTUVTSH6UZ78/	UHF/VHF
# V101 (7)	CRT	-	A48AFS15X
# V101 (7)	CRT	VB48AFS05X/*S	A48AFS05X
# V101 (7)	CRT	VB48KZL90X/*S	A48KZL90X
# V101 (8)	CRT	VBA34JLN60X-S	A34JLN60X
# V101 (8)	CRT	VB34KPU02X/*S	A34KPU02XX
# V101 (8)	CRT	VB370BVBK1U-S	CPJ370BVBK1U
# V101 (8)	CRT	VB34JLL40X/*S	A34JLL40X
# V101 (8)	CRT	VB37GDA86X/IE	A37GDA86X
X801	Crystal	RCRSB0001PEZZ	3.58MHz
X801 (10)	Crystal	RCRSB0205CEZZ	3.58MHz
	Magnet	PMAGF3006CEZZ	Purity/Convergence

For SAFETY use only equivalent replacement part.
(1) Used in model 19G-M150.
(2) Used in models 19G-M80, 19G-M100, and 19G-M120.
(3) Used in models 13G-M80 and 13G-M100.
(4) Used in model 13G-M150.
(5) Used in models 13G-M80, 13G-M100, 13G-M150, 19G-M100, 19G-M120, and 19G-M150.
(6) Used in model 19G-M80.
(7) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(8) Used in models 13G-M80, 13G-M100, and 13G-M150.
(9) Contact PTS Electronics Corporation for replacement; order by manufacturer's part number.
(10) Used in some versions of models 13G-M80, 13G-M100, and 13G-M150.

MISCELLANEOUS continued

Item No.	Description	Mfr. Part No.	Notes
	PC Board (9)(11)	DUNTK8605WEV5	Main
	PC Board (9)(12)	DUNTK8605WEV4	Main
	PC Board (9)(13)	DUNTK8605WEV1	Main
	PC Board (9)(14)	DUNTK8605WEV2	Main
	PC Board (7)(9)	DUNTK8606WEV1	CRT
	PC Board (8)(9)	DUNTK8606WEV0	CRT
	PC Board (9)	DUNTK8607WEV1	A/V
	Transmitter (15)	RRMCG1125CESB	Remote
	Transmitter (16)	RRMCG1125CESA	Remote
	Wedge (7)	PSPAG00012MEZZ	Yoke Positioning (3 Used)
	Wedge (8)	PSPAG0004PEZZ	Yoke Positioning (3 Used)

For SAFETY use only equivalent replacement part.
(7) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(8) Used in models 13G-M80, 13G-M100, and 13G-M150.
(9) Contact PTS Electronics Corporation for replacement; order by manufacturer's part number.
(11) Used in models 19G-M100, 19G-M120, and 19G-M150.
(12) Used in model 19G-M80.
(13) Used in model 13G-M80.
(14) Used in models 13G-M100 and 13G-M150.
(15) Used in models 13G-M150 and 19G-M150.
(16) Used in models 13G-M80, 13G-M100, 19G-M80, 19G-M100, and 19G-M120.

CAPACITORS & ELECTROLYTICS

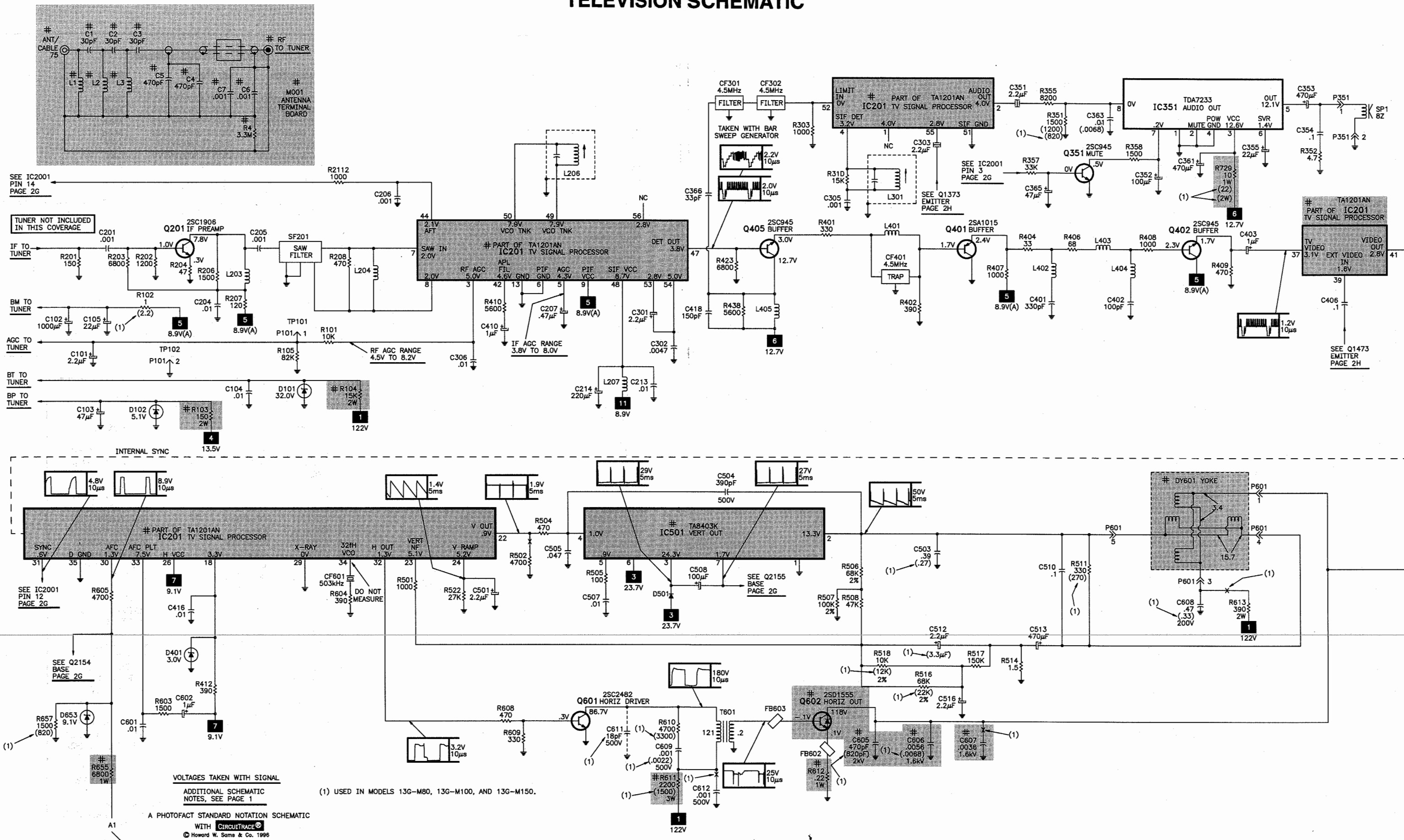
Item No.	Rating	Mfr. Part No.
C105	22µF 16V Tantalum	VCSATA1CE226K
C210A	22µF 16V Tantalum	VCSATA1CE226K
C303	2.2µF 5% 50V NP	VCE9GA1HW225M
C351	2.2µF 5% 50V NP	VCE9GA1HW225M
C501	2.2µF 16V Tantalum	VCSATA1CE225K
# C605 (1)	470pF 2kV	RC-KZ0337CEZZ
# C605 (1)	470pF 2kV	RC-KZ0038CEZZ
# C605 (2)	820pF 2kV	RC-KZ0340CEZZ
# C605 (2)	820pF 2kV	RC-KZ0040CEZZ
# C606 (1)	.0056 5% 1.6kV	VCFFPD3CA562J
# C606 (2)	.0068 5% 1.6kV	VCFFPD3CA682J
# C607 (1)	.0036 5% 1.6kV	VCFFPD3CA362J
# C701 (1)	.1 125VAC	RC-FZ003SCEZZ
# C701 (1)	.1 125VAC	RC-FZ008SGEZZ
# C701 (1)	.1 125VAC	RC-QZ002SCEZZ
# C701 (2)	.047 125VAC	RC-FZ002SCEZZ
# C701 (2)	.047 125VAC	RC-FZ004SGEZZ
# C701 (2)	.047 125VAC	RC-QZ005SCEZZ
# C705 (1)	470µF 200V	RC-EZ0422CEZZ
# C705 (1)	470µF 200V	RC-EZ0082CEZZ
# C705 (2)	620µF 200V	RC-EZ0423CEZZ
# C705 (2)	620µF 200V	RC-EZ0183CEZZ
# C705 (2)	560µF 200V	RC-EZ0523CEZZ
# C707 (1)	220µF 20% 200V	VCEAGH2DW227M
# C712	100µF 160V	RC-EZ0378CEZZ
# C714	.01 10% 50V	VCQYTA1HM103K
# C751	10µF 20% 250V	VCEAGA2EW106M
C854	.01 1.4kV	RC-KZ0016CEZZ
# C1774	.0033 250VAC	RC-KZ0311CEZZ
	.0033 250VAC	RC-KZ0030CEZZ

For SAFETY use only equivalent replacement part.
(1) Used in models 19G-M80, 19G-M100, 19G-M120, and 19G-M150.
(2) Used in models 13G-M80, 13G-M100, and 13G-M150.

A

TELEVISION SCHEMATIC

B



SERVICE MODE ADJUSTMENT CHART

Service No.	Adjustment	Data Range	Data Value	Notes
S1	Sub Picture	0-127	75	-
S2	Sub Tint	0-127	70	-
S3	Sub Color	0-127	52	-
S4	Sub Brightness	0-127	68	-
S5	Sharpness	0-63	36	Must be set to "36"
S6	Vertical Phase	0-7	0	Must be set to "0"
S7	Horizontal Phase	0-31	21	-
S8	RF AGC	0-63	41	"0" produces black raster
S9	Vertical Size	0-63	30	-
S10	VCO	0-127	32	-
S11	Red Cutoff	0-255	0	-
S12	Green Cutoff	0-255	0	-
S13	Blue Cutoff	0-255	0	-
S14	Green Gain	0-255	127	-
S15	Blue Gain	0-255	127	-
S16	3.58MHz Trap	0-1	0	"0"= On, "1"= Off. Must be set to "0"
S17 (1)	Bandpass Filter (BPF)	0-1	1	"0"= On, "1"= Off
S18 (1)	Blanking	0-1	0	"0"= On, "1"= Off
S19	Y-Mute/Vertical, Collapse	0-3	0	"0"= Normal Raster, "1"= No Y, "2"= Test Mode, "3"= No Vertical Must be set to "0"
S20 (1)	Horizontal AFC	0-1	1	"0"= X2 Gain, "1"= Normal Gain
S21	White Peak Limiter (WPL)	0-1	1	"0"= Off, "1"= On. Must be set to "1"
S22 (1)	60Hz	0-1	0	"0"= Normal Viewing, "1"= Not available
S23	Volume	8-58	26	Adjust for normal listening volume.
S24	Audio Balance	0-63	32	Adjust for center of data range.
S25	Caption Position	0-63	23	-
S32	X-Ray Protector	0-255	40	Normal range 38 to 45
S33	Option (set to each model)	00-FF	00	Must be set to "00"

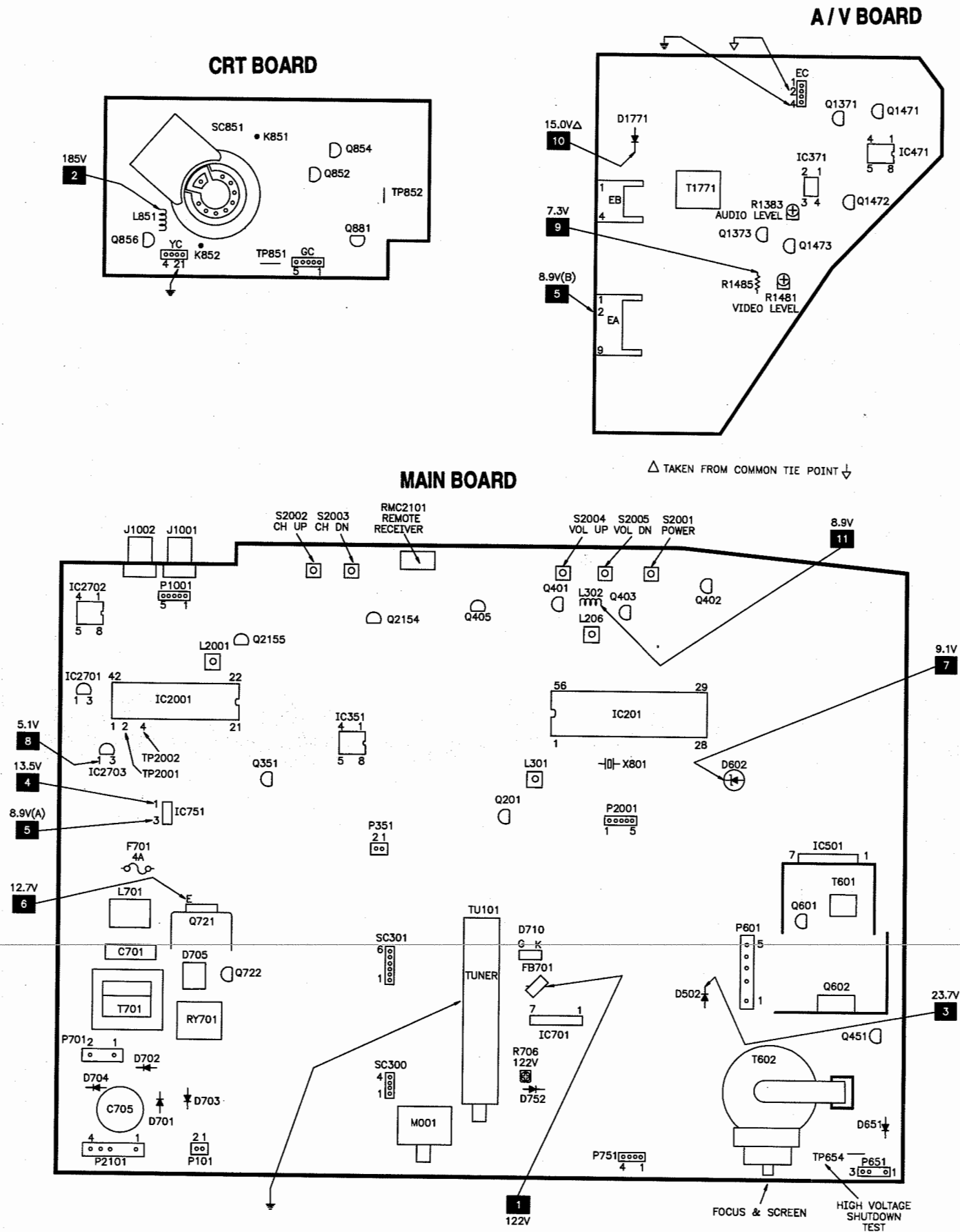
(1) No adjustment is required, proper setting is automatic.

SERVICE INFORMATION

Service mode adjustments are required if IC2001, IC2702, or CRT is replaced. CRT replacement requires CRT adjustments only. Service mode adjustments should not be required if only IC2001 is replaced.

NOTE: If IC2001 or IC2702 is replaced, perform "High Voltage Shutdown Test".

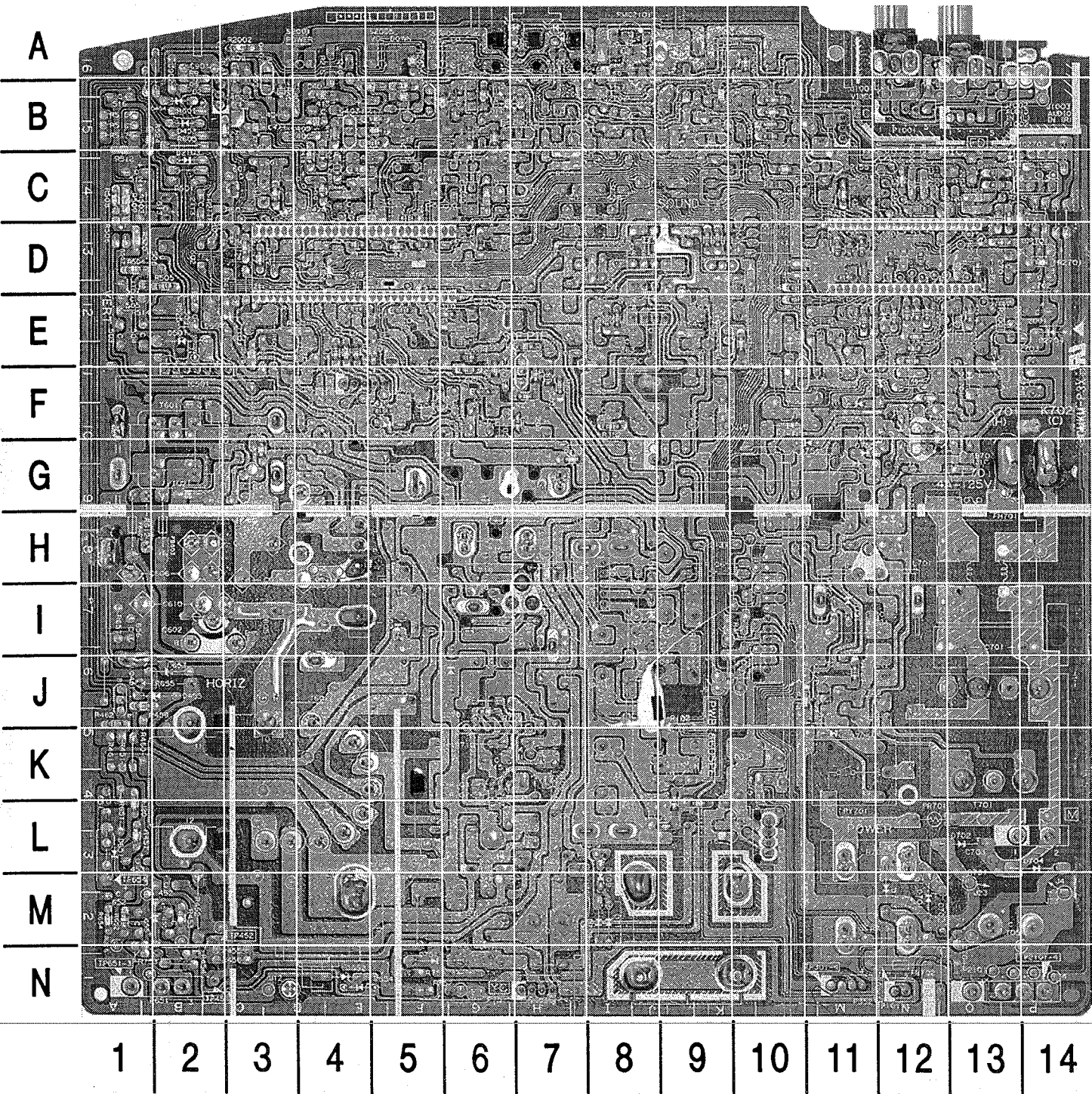
PLACEMENT CHART



SHARP

MODEL 19G-M150

MAIN BOARD - BOTTOM VIEW

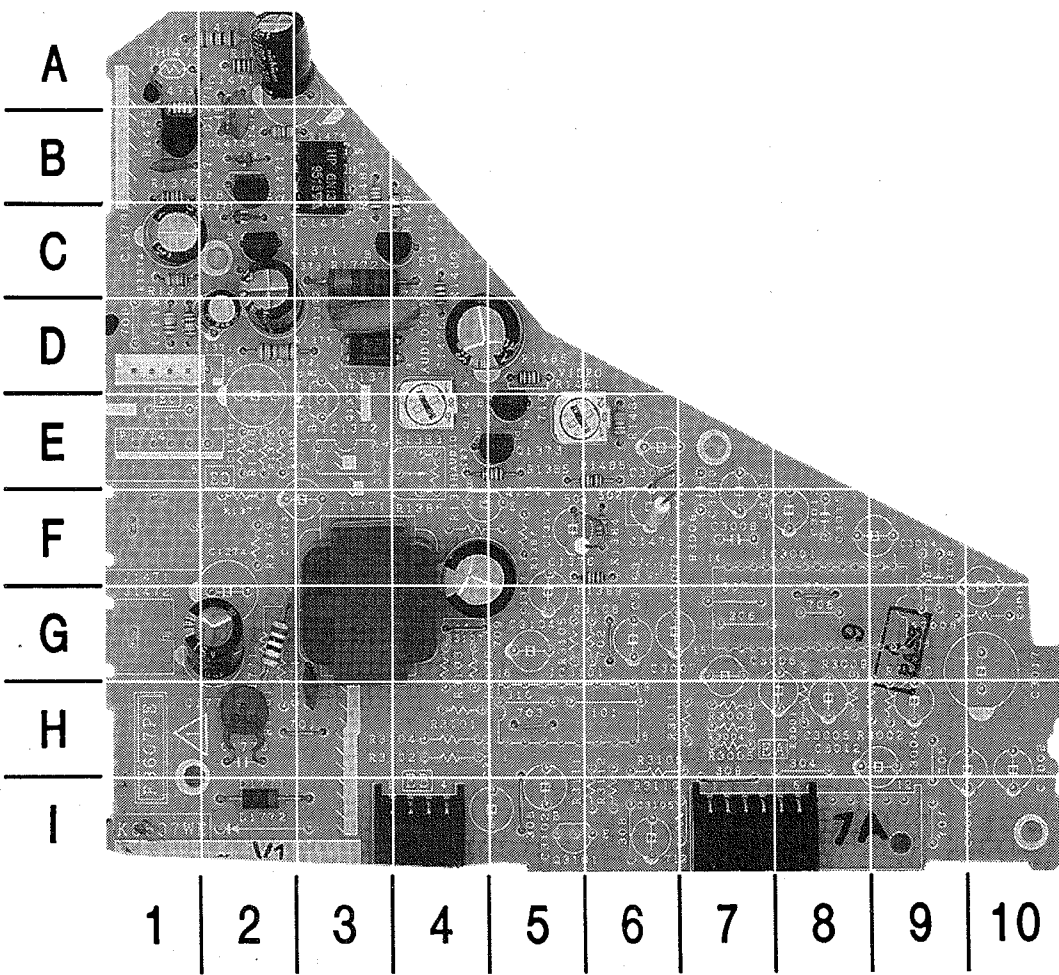


A HOWARD W. SAMS GRIDTRACE™ PHOTO

MAIN BOARD - BOTTOM
VIEW, GRIDTRACE
LOCATION GUIDE

C201	F-7	R505	D-2
C204	E-6	R508	C-1
C205	F-6	R524	B-1
C206	D-6	R604	C-3
C210	F-7	R609	G-3
C212	F-6	R652	M-1
C213	C-5	R709	J-6
C305	E-6	R727	J-11
C401	B-4	R2001	B-10
C402	B-3	R2002	A-3
C415	D-5	R2003	B-10
C416	F-5	R2004	A-10
C418	B-7	R2005	A-5
C419	C-4	R2008	C-13
C421	C-4	R2009	C-12
C713	K-6	R2011	D-13
C803	E-4	R2012	D-9
C2005	D-12	R2014	D-10
C2109	D-12	R2015	D-9
C2110	D-11	R2019	D-11
C2111	D-11	R2106	E-10
C2112	D-11	R2112	E-11
C2117	D-12	R2113	E-12
C2146	A-8	R2115	E-12
FB704	J-4	R2116	E-13
R101	L-9	R2125	D-11
R102	K-9	R2128	B-10
R105	L-9	R2130	D-3
R201	F-7	R2135	E-12
R202	F-7	R2142	C-13
R203	E-7	R2143	C-14
R204	F-7	R2146	B-8
R206	F-6	R2147	E-12
R208	E-5	R2149	E-12
R303	C-6	R2150	E-12
R310	E-6	R2152	E-12
R351	E-8	R2201	D-13
R352	F-8	R2202	E-12
R355	E-8	R2701	D-14
R401	B-6	R2702	C-13
R402	B-6	R2703	C-13
R404	B-5		
R407	B-5		
R408	B-3		
R409	A-3		
R410	C-4		
R411	D-4		
R413	E-4		
R414	E-4		
R415	E-4		
R416	B-5		
R417	B-5		
R418	C-4		
R419	B-4		
R423	B-6		
R438	B-6		
R439	D-5		
R441	C-4		
R453	M-2		
R457	L-1		
R459	J-1		
R462	J-1		
R504	D-1		

A / V BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

A / V BOARD, GRIDTRACE LOCATION GUIDE

C1371	D-2	D1472	B-2	R1373	C-2	R1480	C-4
C1372	C-2	D1771	I-2	R1374	C-1	R1481	E-5
C1377	F-4	EA	I-7	R1375	D-2	R1482	C-4
C1379	C-1	EB	I-4	R1376	B-1	R1483	B-3
C1471	A-2	EC	D-1	R1383	E-4	R1484	E-6
C1476	D-4	IC1371	D-3	R1384	F-6	R1485	E-6
C1477	B-1	IC1471	B-3	R1385	E-5	R1486	D-5
C1478	B-2	Q1371	C-2	R1389	F-6	R1771	G-2
C1771	H-2	Q1373	E-5	R1471	A-2	R1772	C-3
C1772	G-2	Q1471	B-2	R1472	A-2	T1771	G-3
C1773	H-2	Q1472	C-4	R1473	B-1	TH1472	B-1
C1774	D-3	Q1473	E-5	R1474	B-2		
D1371	C-2	R1371	D-1	R1475	B-1		
D1471	B-1	R1372	D-1	R1476	B-2		

SHARP

MODEL 19G-M150

MISCELLANEOUS ADJUSTMENTS

122V

Adjust R706 for 122V ±1.0V at FB701.

HIGH VOLTAGE CHECK

Tune in a picture. Set brightness, color, picture, and screen control to minimum. Connect a high voltage probe to CRT anode. High voltage should measure 24kV to 26kV.

ENTERING SERVICE MODE

Turn receiver on and use reset function in the video adjustment menu to ensure that customer controls are in their proper reset position. Short test points TP2001 and TP2002 to enter the service mode.

When in the service mode a letter S with a number is displayed in the lower left part of the screen and a letter D with a number is displayed in the lower right part of the screen. The S number is the service adjustment and it is changed by pressing the channel up / down buttons on the receiver or remote transmitter. The D number is the present data value of the service adjustment and it can be changed by pressing the volume up / down buttons on the receiver or remote transmitter. For a complete listing of the service adjustments, refer to the "Service Mode Adjustment Chart".

EXIT SERVICE MODE

To exit service mode when finished making adjustments, remove the short from test points TP2001 and TP2002.

RF AGC

Tune in a picture. Enter the service mode, select service number S8. Set the data value to a point where no snow (noise) appears in picture. Exit the service mode to select another channel. Check all channels for proper operation.

VCO

Connect a digital voltmeter to pin 44 of IC201 and ground. Tune in a local channel. Enter the service mode, select service number S10. Set the data value to obtain 2.2V on the digital voltmeter.

SUB PICTURE

Tune in a picture. Set brightness to minimum. Set picture to maximum. Enter the service mode, select service number S1. Set the data value to achieve normal contrast range.

SUB TINT

Tune in a picture. Set tint at center of its range level. Enter the service mode, select service number S2. Set the data value to achieve normal flesh tones.

SUB COLOR

Tune in a picture. Set color at center of its range level. Enter the service mode, select service number S3. Set the data value to achieve normal color level.

SUB BRIGHTNESS

Tune in a picture. Set brightness at center of its range level. Enter the service mode, select service number S4. Set the data value to achieve normal brightness level.

VERTICAL SIZE

Tune in a crosshatch pattern. Enter the service mode, select service number S9. Set the data value to achieve proper vertical size and best vertical linearity.

VERTICAL PHASE

Tune in a crosshatch pattern. Enter the service mode, select service number S6. Set the data value to 0.

HORIZONTAL POSITION

Tune in a crosshatch pattern. Enter the service mode, select service number S7. Set the data value for the best centering on screen.

CAPTION POSITION

Tune in a local channel. Enter the service mode, select service number S25. A black box will appear on the screen. Set the data value to center the black box on the screen.

WHITE BALANCE

Operate the receiver for 15 minutes. Enter the service mode, select service number S3. Set the data value to 0. Set brightness for a visible raster. Alternately adjust data value of S14 and S15 until a good gray scale with normal white is obtained. Select service number S3. Set the data value to achieve normal color level.

GRAY SCALE

Connect a digital voltmeter to TP851 and TP852 on the CRT board. Tune in an active channel. Set color, brightness, and picture to minimum. Enter the service mode, select service number S3. Set the data value to 0. Select service number S19, adjust the data value to 1, this turns off the luminance signal (no Y). Select service number S4, adjust the data value to obtain .26V on the digital voltmeter. Adjust screen control, if necessary, to obtain a barely visible raster. Adjust service numbers S11, S12, and S13 for a good gray scale with normal white at high and low brightness. Select service number S19 and adjust the data value to 0. Select service number S3 and adjust the data value to achieve normal color level. Adjust screen control for normal brightness.

HORIZONTAL AFC

Tune in a local channel. Enter the service mode, select service number S20. Set data value to 1, which is normal horizontal AFC gain. If increased horizontal gain is required, adjust data value to 0.

BLANKING

Tune in a local channel. Enter the service mode, select service number S18. Set data value to 0, which is normal blanking. If data value is set to 1, blanking will be turned off.

WHITE PEAK LIMITER (WPL)

Tune in a local channel. Enter the service mode, select service number S21. Set data value to 1 to turn on WPL or to 0 to turn it off.

3.58MHz TRAP

Tune in a local channel. Enter the service mode, select service number S16. Set data value to 0 to turn on 3.58MHz trap or to 1 to turn it off.

BANDPASS FILTER (BPF)

Tune in a local channel. Enter the service mode, select service number S17. Set data value to 0 to turn on bandpass filter or to 1 to turn it off.

SHARPNESS

Tune in a local channel. Enter the service mode, select service number S5. Set data value to 36.

VOLUME / AUDIO BALANCE

Tune in a local channel. Enter the service mode and select service number S23. Set data value to 26. Select service number S24. Set data value to 32.

60Hz

Tune in a local channel. Enter the service mode, select service number S22. Set data value to 0 which is normal viewing.

OPTION

Tune in a local channel. Enter the service mode and select service number S33. Set data value to 00.

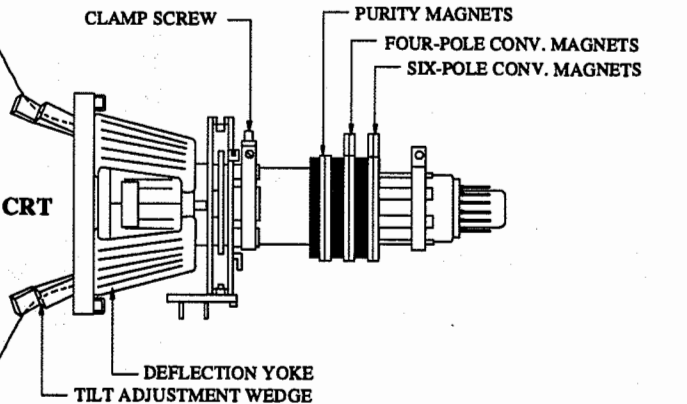
CONVERGENCE

Operate the receiver for 15 minutes. Connect a color bar generator to the antenna terminals and tune in a dot pattern. Adjust the 4-pole magnet tabs to converge the red and blue dots at the center of the screen. Adjust the 6-pole magnet tabs to converge the red/blue dots over the green dots at the center of the screen.

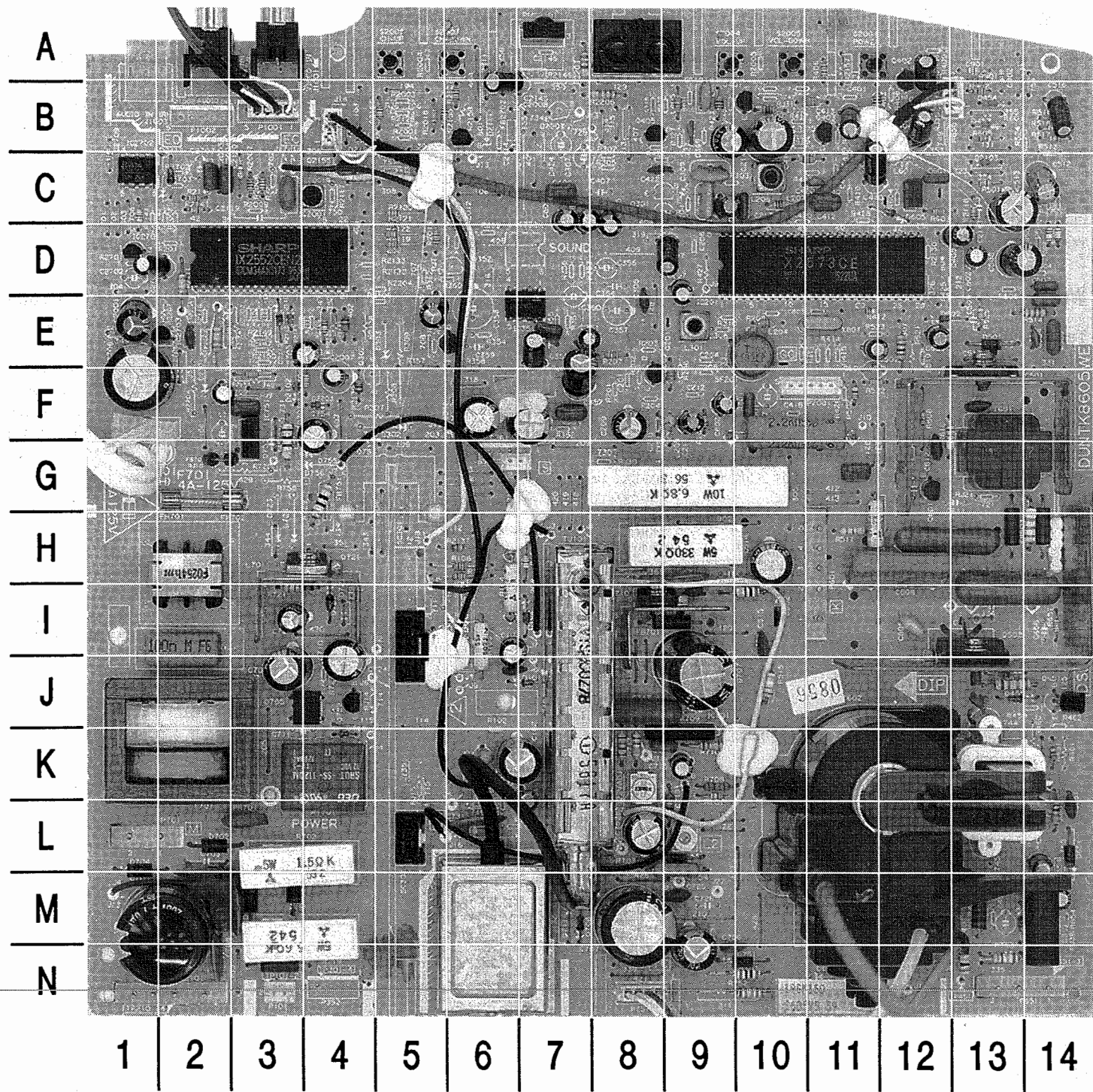
NOTE: Rotate the two tabs of each set of magnets equally and opposite to converge vertically and rotate both tabs in the same direction to converge horizontally. The 4-pole and 6-pole magnets interact, repeat adjustment until center convergence is correct.

Tune in a crosshatch pattern and remove the rubber wedges between the deflection yoke and the CRT. Tilt the deflection yoke up or down to converge the vertical lines at top and bottom of screen and the horizontal lines at the right and left sides of the screen. Tilt the deflection yoke right or left to converge horizontal lines at top and bottom of screen and the vertical lines at the right and left sides of the screen. Repeat convergence procedure if necessary to obtain best overall convergence. Apply adhesive to wedges and carefully replace on the CRT.

CRT NECK ASSEMBLY



MAIN BOARD - TOP VIEW



A HOWARD W. SAMS GRIDTRACE™ PHOTO

MAIN BOARD - TOP VIEW, GRIDTRACE LOCATION GUIDE

C101	L-7	C710	J-3	D2102	F-3	R106	H-6	R2018	B-5
C102	K-7	C712	J-9	D2103	C-13	R107	H-6	R2111	D-2
C103	I-6	C714	K-9	D2110	E-3	R207	E-8	R2118	C-13
C104	J-6	C715	K-9	D2112	E-3	R209	F-9	R2119	D-5
C105	K-6	C717	J-8	D2113	C-2	R357	E-5	R2120	C-5
C207	D-9	C718	I-9	D2201	A-8	R358	E-6	R2121	C-5
C209	F-8	C719	H-9	D2202	A-8	R406	A-11	R2122	D-5
C210A	F-9	C721	I-3	D2703	F-4	R412	E-11	R2127	B-6
C211	F-9	C724	J-4	D2704	E-1	R440	C-11	R2129	E-2
C214	B-9	C725	M-9	F701	G-2	R451	K-14	R2131	E-4
C301	C-9	C731	L-6	FB602	H-14	R452	M-13	R2137	H-6
C302	C-10	C751	N-9	FB603	H-13	R454	N-13	R2139	F-4
C303	D-9	C752	L-8	FB701	I-9	R455	N-12	R2140	C-2
C306	E-8	C754	F-4	FB702	N-3	R456	N-12	R2141	C-2
C351	E-7	C756	N-9	FB703	G-3	R501	C-13	R2153	F-3
C352	E-7	C757	F-3	IC201	D-11	R502	F-11	R2154	E-2
C353	F-7	C801	F-10	IC351	E-7	R506	D-14	R2155	B-6
C354	F-7	C802	F-9	IC501	F-13	R507	D-14	R2156	B-5
C355	E-7	C805	C-8	IC701	K-9	R511	H-11	R2203	A-7
C361	F-6	C806	C-7	IC751	F-3	R514	E-14	R2204	D-10
C363	E-7	C807	C-7	IC2001	D-3	R515	J-10	R2206	B-8
C365	E-5	C901	A-13	IC2701	D-1	R516	B-14	R2705	F-4
C366	B-9	C902	A-13	IC2702	C-1	R517	B-14	R2706	E-4
C403	A-12	C2001	E-1	IC2703	E-2	R518	B-14	RMC2101	A-7
C404	B-12	C2002	E-2	J1001	A-3	R522	F-11	P2101	N-2
C405	D-13	C2003	C-2	J1002	A-2	R525	E-13	RY701	K-4
C406	C-7	C2004	C-2	L203	F-9	R603	C-12	S2001	A-11
C410	C-11	C2007	F-4	L204	E-10	R605	B-13	S2002	A-5
C412	C-11	C2120	C-3	L206	C-10	R607	E-12	S2003	A-6
C413	B-11	C2145	B-6	L207	C-10	R608	F-12	S2004	A-9
C414	B-10	C2701	D-1	L301	E-9	R610	F-13	S2005	A-10
C420	C-11	C2704	F-2	L302	B-10	R611	F-10	SC301	I-5
C422	C-8	C2705	E-4	L401	B-9	R612	H-14	SC302	L-5
C452	M-14	C2706	F-1	L402	B-11	R613	H-11	SF201	E-10
C453	L-14	C2708	C-1	L403	B-12	R651	L-14	T601	G-13
C501	E-11	C2709	C-1	L404	B-12	R655	J-13	T602	L-12
C502	E-12	CF301	C-9	L405	B-9	R657	I-14	T701	J-2
C503	E-14	CF302	C-9	L406	B-12	R701	M-2	TP451	N-13
C504	E-14	CF401	B-9	L407	C-11	R702	L-3	TP452	M-13
C505	E-14	CF601	C-12	L701	H-2	R703	L-8	TP654	L-14
C507	D-14	CF2101	C-3	L2001	C-4	R704	M-8	TP2001	E-2
C508	D-14	D101	J-7	M001	M-6	R705	L-9	TP2002	E-2
C510	G-11	D102	I-7	P351	G-6	R706	K-8	TU101	J-7
C512	C-14	D401	F-10	P601	H-11	R707	K-9	X801	E-11
C513	C-13	D451	M-13	P651	N-13	R708	K-9		
C514	H-10	D453	B-13	P701	L-1	R710	K-9		
C515	I-10	D454	B-13	P751	N-8	R711	I-10		
C516	B-14	D455	J-13	P1001	B-3	R712	K-8		
C517	E-13	D501	E-13	P2001	F-11	R713	K-8		
C601	C-12	D502	I-10	P2101	N-2	R715	L-7		
C602	D-13	D602	E-12	PR701	L-3	R716	H-9		
C603	E-12	D605	C-12	Q201	F-8	R717	G-9		
C605	I-12	D651	L-14	Q351	E-6	R719	M-3		
C606	I-13	D653	J-13	Q401	B-10	R721	I-3		
C607	H-12	D701	M-3	Q402	A-12	R729	G-4		
C608	H-12	D702	L-2	Q403	B-11	R751	N-10		
C609	F-13	D703	M-3	Q405	B-8	R752	N-10		
C612	G-12	D704	L-1	Q451	J-14	R753	N-13		
C651	L-14	D705	J-4	Q601	G-12	R754	L-9		
C652	M-14	D706	K-4	Q602	I-13	R755	G-3		
C701	I-2	D708	M-7	Q721	H-4	R801	F-6		
C702	M-3	D709	L-7	Q722	J-4	R901	A-13		
C703	L-2	D710	I-8	Q2154	B-6	R902	B-13		
C704	N-2	D721	I-4	Q2155	C-4	R2006	C-3		
C705	M-2	D751	N-10	R103	I-6	R2007	C-3		
C707	M-8	D752	L-9	R104	I-6	R2013	D-5		