

SAFETY PRECAUTIONS

- 1. Use an isolation transformer for servicing.
- 2. Maintain AC line voltage at rated input.
- 3. Remove AC power from the Computer system before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
- 4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
- 5. Use a grounded-tip, low voltage soldering iron.
- 6. Use an isolation (times 10) probe on scope.
- 7. Do not remove or install boards, floppy disk drives, printers, or other peripherals with Computer system AC power On.
- 8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
- 9. This Computer system is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
- 10. Periodically examine the AC power cord for damaged or cracked insulation.
- 11. The Computer system cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
- 12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
- 13. Never expose the Computer system to water. If exposed to water turn the unit Off. Do not place the Computer system near possible water sources.
- 14. Never leave the Computer system unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
- 15. Do not allow anything to rest on AC power cord.
- 16. Unplug AC power cord from outlet before cleaning Computer system.
- 17. Never use liquids or aerosols directly on the Computer system. Spray on cloth and then apply to the Computer system cabinet. Make sure the Computer system is disconnected from the AC power line.

SET 2524 FOLDER 1

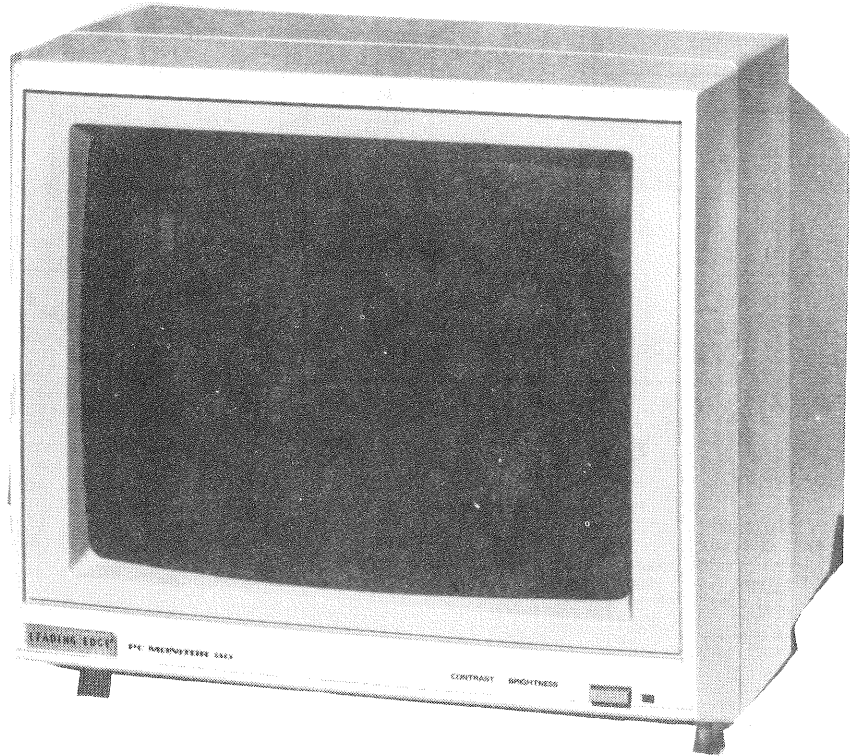


PHOTOFACT®

For Supplier Address See PHOTOFACT Index

LEADING EDGE
MODEL 7BM613074G

LEADING EDGE
MODEL 7BM613074G



LEADING EDGE
MODEL 7BM613074G

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SET 2524 FOLDER 1



Howard W. Sams & Co.
4300 West 62nd Street, P.O. Box 7092, Indianapolis, Indiana 46206 U.S.A.

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co. as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co. by the manufacturers of the particular type of replacement part listed. 87PB01465

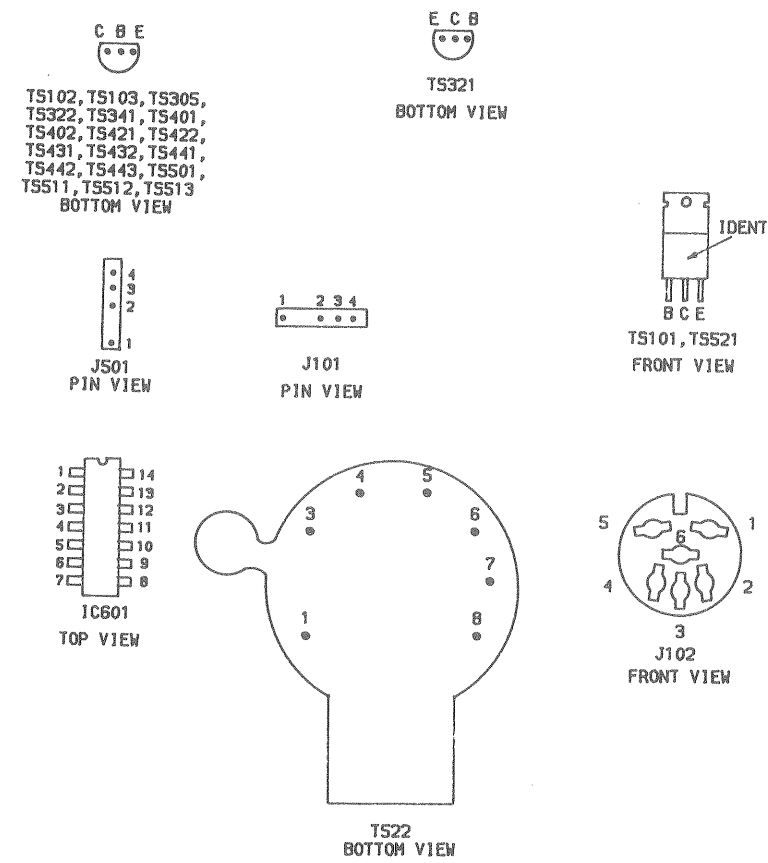
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DATE 10-87 SET 2524 FOLDER 1



IC PINOUTS & TERMINAL GUIDES



SCHEMATIC NOTES

- Circuitry not used in some versions
- Circuitry used in some versions
- See parts list
- Ground
- Voltages measured with digital meter.
- Waveforms and voltages are taken from ground, unless noted otherwise.
- Supply voltage maintained as shown at input.
- Controls adjusted for normal operation.
- Terminal identification may not be found on unit.
- Capacitors are 50 volts or less, 5% unless noted.
- Electrolytic capacitors are 50 volts or less, 20% unless noted.
- Resistors are 1/2W or less, 5% unless noted.
- Value in () used in some versions.
- Item numbers in rectangles appear in adjustment instruction.
- Logic, waveforms and voltages taken with Monitor connected to a Computer in power up mode.
- Logic Probe Display
- L = Low
- H = High
- P = Pulse

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SET 2524 FOLDER 1
LEADING EDGE
MODEL 7BM613074G

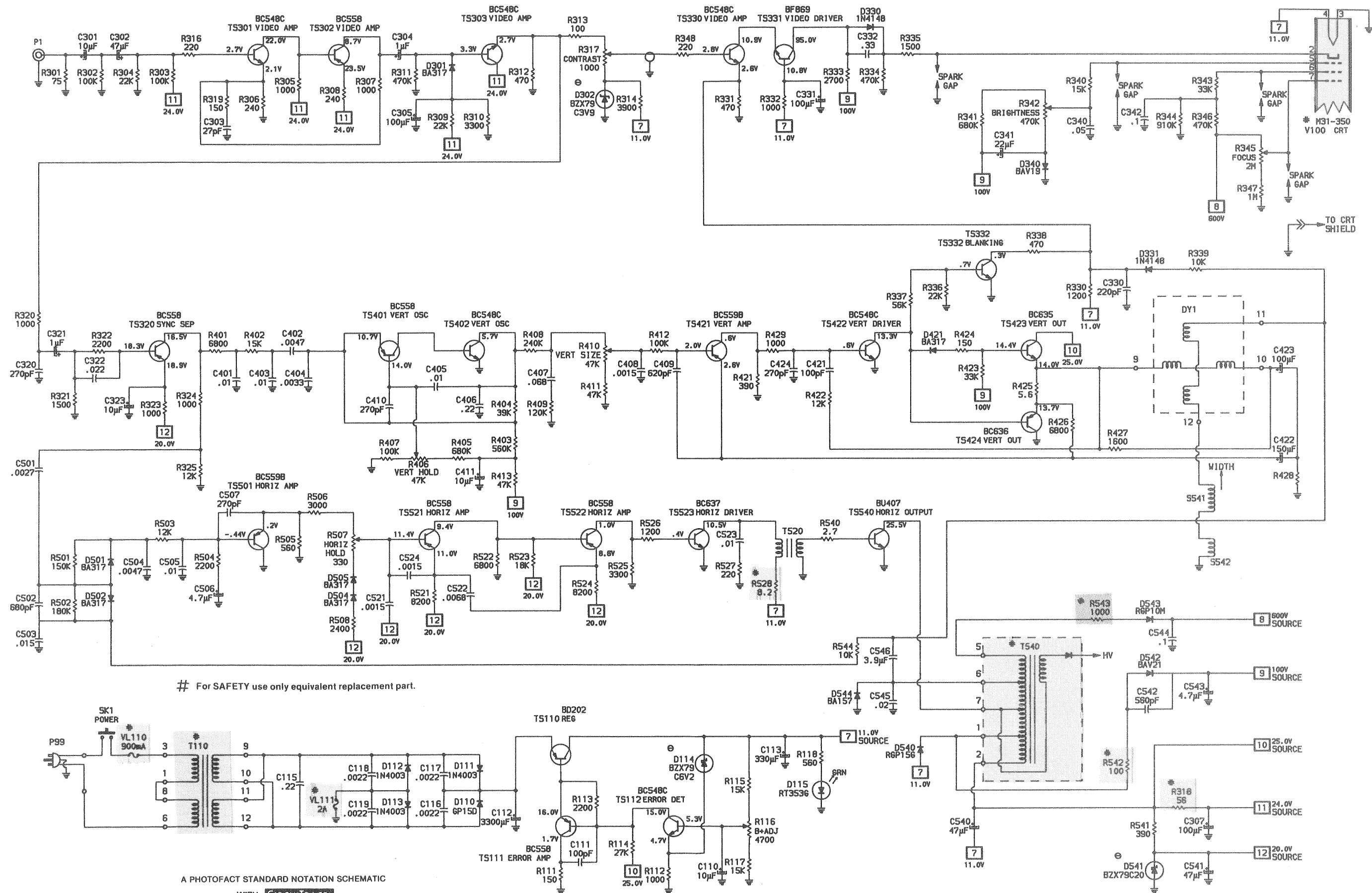
Disassembly Instr	
GridTrace Locatio	
CRT Board
Main Board
IC Pinouts and Ter	
Miscellaneous Adj	
Parts List



SAM
The listing of ar
constitute in any
by Howard W. S
such replaceme
compiled from ir
by the manufact
listed. 87PE







For SAFETY use only equivalent replacement part.

A PHOTOFAC STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE

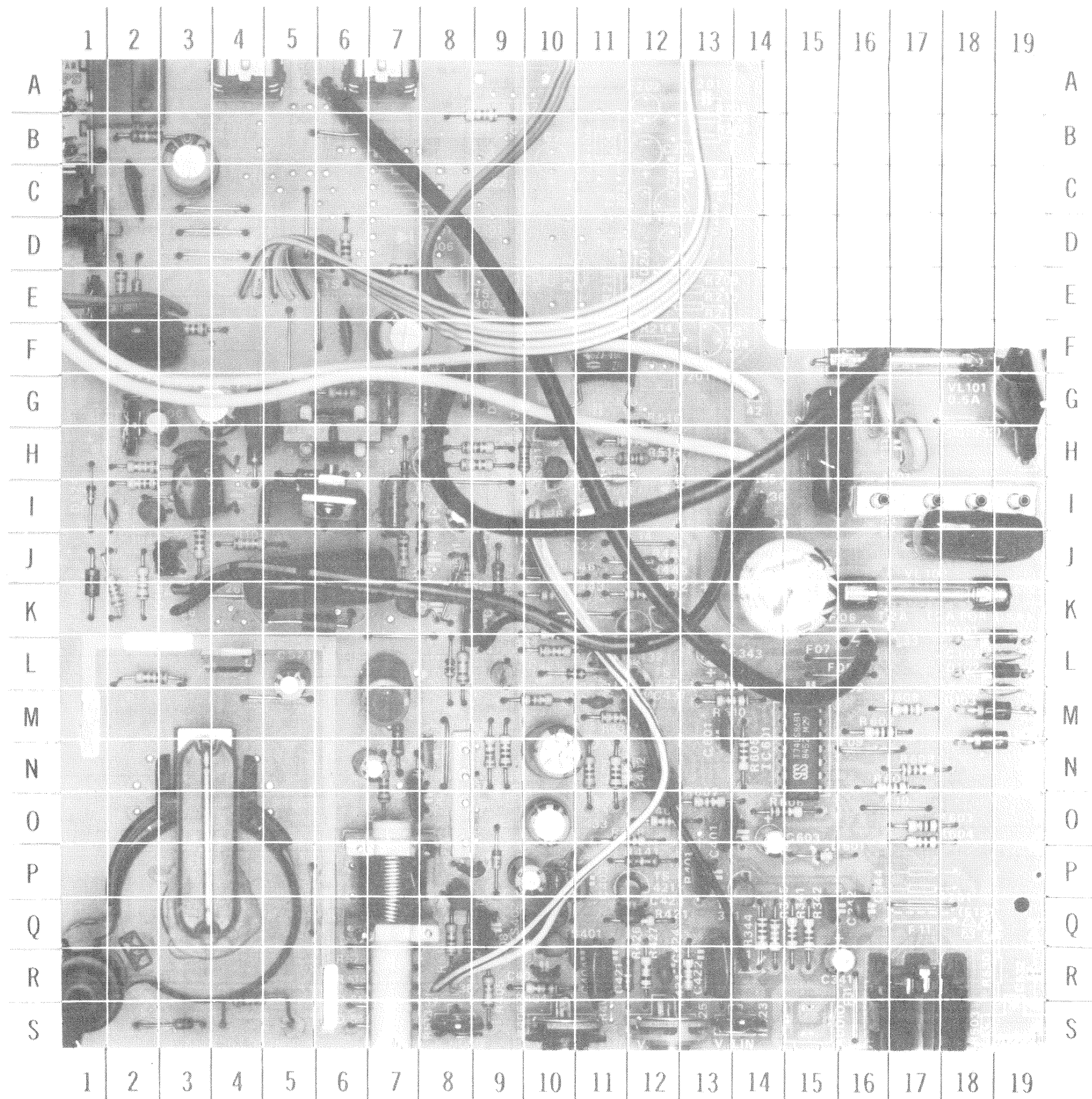
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ALTERNATE MONITOR

ALTERNATE MONITOR

LEADING EDGE
MODEL 7BM613074G

FOLDER 1



MAIN BOARD

A Howard W. Sams GRIDTRACE™ Photo

MAIN BOARD

LEADING EDGE
MODEL 7BM613074G

FOLDER 1

MISCELLANEOUS ADJUSTMENTS

Note: A crosshatch pattern is required for all adjustments unless noted. Run program below to receive a crosshatch pattern. Change number 7 in line 20 to number 15 for high intensity.

```
10 SCREEN 0,1:WIDTH 80
20 CLS:COLOR 7,0:KEY OFF
30 FOR X = 1 TO 1920
40 PRINT CHR$(197);
50 NEXT X
60 GOTO 60
```

BRIGHTNESS PRESET

Receive a crosshatch pattern. Set Brightness (R332) and Contrast (R303) to minimum. Adjust Brightness Preset (R331) until pattern just becomes visible. Set Brightness and Contrast to Maximum and readjust Brightness Preset if blooming occurs.

VERTICAL LINEARITY

Receive a crosshatch pattern. Adjust Vertical Linearity Control (R423) for proper linearity of pattern at top, bottom and center of screen.

B + ADJUSTMENT

Connect a DC voltmeter to TP1 (Cathode of D105). Adjust B + Adjust Control (R106) for 12.0V.

FOCUS

Receive a crosshatch pattern. Adjust Focus Control (R336) to obtain a sharp clear picture.

PINCUSHION ADJUSTMENT

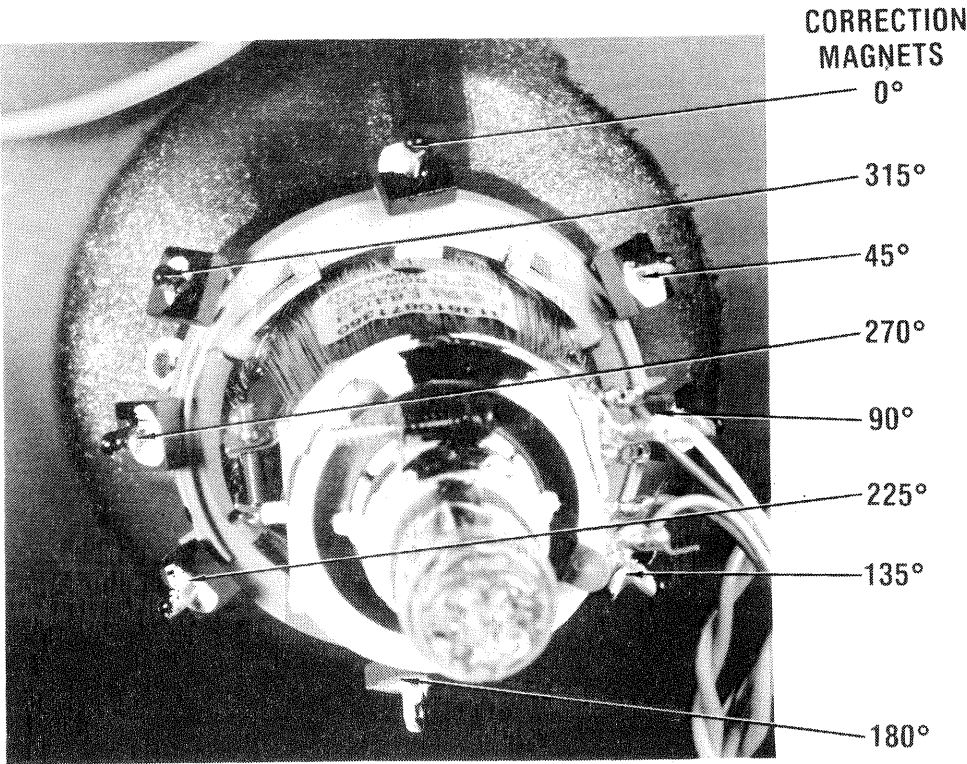
To correct Pincushion effect on the C.R.T. Raster place a magnet on the yoke mounting pin that corresponds with the affected area. Top Bow is corrected with a magnet at 0° (top center) pin. Left side Bow is corrected with a magnet at 90° clockwise pin. Bottom Bow is corrected with a magnet at 180° clockwise pin. Right side Bow is corrected with a magnet at 270° clockwise pin. Rotate magnets on pin to obtain desired raster.

Note: If a second magnet is needed on any one pin the poles of the magnets must be aligned and both magnets rotated simultaneously.

TRAPEZOIDAL ADJUSTMENT

To correct a trapezoidal effect on the C.R.T. raster place a magnet on the yoke mounting pin that corresponds to the affected area. Place a magnet on the pin 45° clockwise from top center to correct top left corner. Place a magnet on the pin 135° clockwise from top center to correct bottom left corner. Place a magnet on the pin 225° clockwise from top center to correct bottom right corner. Place a magnet on the pin 315° clockwise from top center to correct top right corner. Rotate magnets to obtain desired raster.

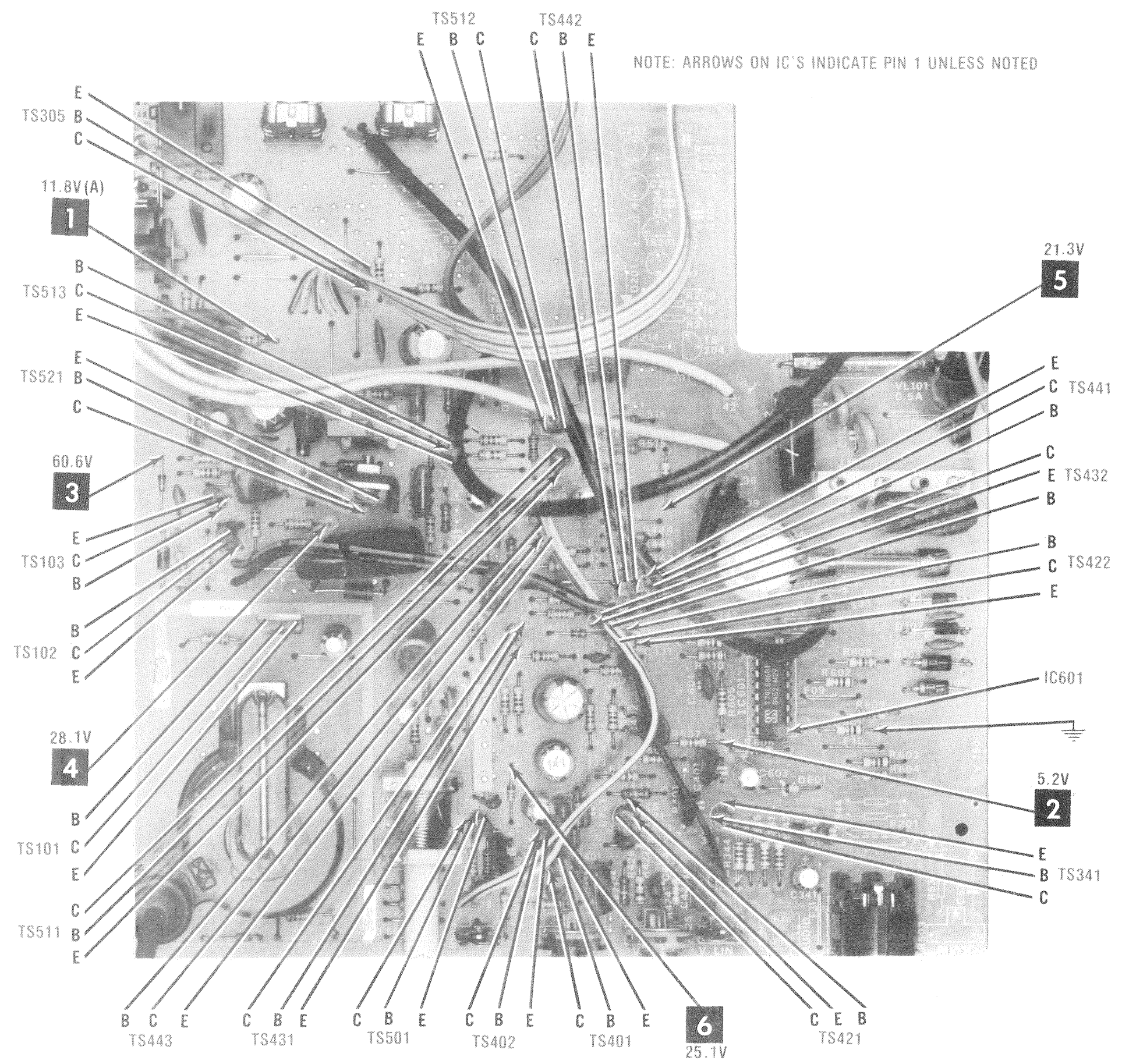
Note: If a second magnet is needed on any one pin the poles of the magnet must be aligned and both magnets rotated simultaneously.



CRT NECK ASSEMBLY

MAIN BOARD GridTrace LOCATION GUIDE

C101	J-18	D511	S-7	R514	R-7
C102	L-19	D512	S-7	R515	H-12
C103	M-19	D513	H-7	R516	G-12
C104	K-16	D521	K-6	R517	H-9
C105	J-3	D523	K-1	R518	H-12
C106	G-2	D524	I-1	R519	H-9
C107	G-4	D525	S-3	R520	H-9
C108	H-3	D526	H-4	R521	J-7
C109	I-14	D601	P-15	R522	G-6
C110	H-15	IC601	N-15	R523	G-6
C111	G-16	J101	I-17	R524	H-5
C112	H-17	J102	S-17	R525	R-7
C305	E-7	J501	O-8	R526	L-2
C341	R-16	R101	J-2	R527	K-2
C342	Q-15	R102	I-2	R528	S-4
C343	L-13	R103	J-3	R529	N-7
C344	Q-16	R104	J-4	R601	N-17
C401	P-13	R105	G-2	R602	M-16
C402	N-12	R106	G-2	R603	O-17
C403	P-11	R107	H-2	R604	O-17
C404	R-10	R108	F-3	R605	N-14
C405	R-10	R303	A-7	R606	O-15
C406	Q-10	R304	B-9	R607	O-13
C407	P-10	R316	E-7	R608	M-17
C408	Q-9	R317	D-6	R609	N-17
C421	R-11	R331	E-1	R610	M-13
C422	R-13	R332	A-4	S521	H-6
C423	O-12	R333	B-2	S523	P-7
C424	R-12	R335	E-2	S524	M-7
C431	M-12	R336	D-1	SW101	A-1
C432	M-11	R341	Q-15	T522	Q-3
C433	O-10	R342	Q-15	TS101	L-4
C434	N-10	R343	I-12	TS102	J-3
C435	I-8	R344	Q-14	TS103	I-2
C436	J-9	R345	Q-14	TS305	D-6
C501	K-9	R401	L-13	TS341	P-14
C502	K-7	R402	O-12	TS401	Q-10
C503	I-7	R403	P-10	TS402	Q-10
C505	N-7	R404	R-10	TS421	P-12
C506	O-7	R405	R-9	TS422	L-12
C507	N-7	R406	S-10	TS431	L-9
C508	P-9	R407	R-11	TS432	L-11
C511	I-11	R408	N-9	TS441	K-12
C512	H-11	R421	Q-12	TS442	K-12
C513	F-11	R422	R-13	TS443	J-10
C514	G-7	R423	S-14	TS501	P-8
C515	G-5	R424	R-13	TS512	H-10
C521	L-5	R425	S-12	TS513	H-10
C522	I-11	R426	R-11	TS521	I-6
C523	I-11	R427	R-12	VL101	F-17
C524	F-2	R428	O-12	VL102	K-17
C525	F-7	R429	N-11		
C526	I-2	R431	M-10		
C527	B-3	R432	J-9		
C528	I-3	R433	K-10		
C529	K-5	R434	L-10		
C530	F-6	R435	N-11		
C531	C-2	R436	N-9		
C601	M-13	R437	M-11		
C602	M-15	R438	G-8		
C603	O-14	R441	P-12		
C604	O-13	R442	K-12		
D101	L-19	R443	K-10		
D102	L-19	R444	J-12		
D103	M-19	R445	J-12		
D104	N-19	R446	J-10		
D105	I-3	R501	K-8		
D331	E-2	R502	L-8		
D401	P-9	R504	J-8		
D431	L-10	R505	O-7		
D432	G-8	R506	N-7		
D441	F-9	R511	Q-8		
D501	K-8	R512	Q-8		
D502	L-8	R513	S-8		



TROUBLESHOOTING

POWER SUPPLY

Check AC Line Fuse (VL101) and DC Fuse (VL102). If Fuse VL101 is open, check Power Transformer (T101). Also check for possible shorts in Capacitors C110, C111, and C112. If Fuse VL102 is open check Horizontal Output Transistor (TS521) and associated components for shorts. Also check Bridge Rectifier Diodes (D101 thru D104) and Electrolytic (C104) for possible shorts. Check for 15.9V at the cathode of D103. If voltage is incorrect check Diodes D101 thru D104. Check for 15.9V at the emitter of Regulator Transistor (TS101). If voltage is missing check Power Switch (SW101). Check for 11.8V at TP1 (cathode of D105). If voltage is incorrect or missing check for proper adjustment of B+ Adjust (R106), refer to "Miscellaneous Adjustments" section. Also check voltages and components associated with Regulator Transistor (TS101), Error Amp Transistor (TS102) and the Error Detector Transistor (TS103).

HORIZONTAL

Inject a horizontal drive signal at the base of Horizontal Output Transistor (TS521). If horizontal deflection returns, check voltages, waveforms and components associated with Horizontal Oscillator Transistors (TS511 and TS512) and Horizontal Driver Transistor (TS513). If horizontal sweep does not return, check voltages, waveforms and components associated with Transistor TS521 and Transformer T522. The High Voltage Rectifier is part of Transformer T522, and if defective will affect the operation of the horizontal circuits. Check Diodes D524, D523, D525, D522, D401 and associated components for defects. Linearity or width problems may be caused by defective Capacitors C528 and C529, and Horizontal Size Coil (S523) and Coil S524.

VIDEO

Check waveform at pin 2 of CRT. If waveform is present, check voltages and components associated with pins 2, 3, 4, 5, 6, 7 of CRT and check condition of CRT. If waveform at pin 2 of CRT is missing, check waveform at emitter of Video

Output Transistor (TS321). If waveform is present, check Transistor TS321 and associated components. If waveform at Transistor TS321 is missing check waveform at base of Video Amp Transistor (TS305). If waveform at Transistor TS305 is present, check Transistor TS305 and associated components. If waveform is missing check Contrast Control (R303) and associated components. Also check logic and voltage readings at pins 1, 2, 3, 4, 5, 6, 7 and 14 of IC601. If logic readings are incorrect check IC601 and Connector J102. If there is no vertical blanking, check voltages, waveforms and components associated with Vertical Blanking Transistors (TS441, TS442, TS443). If horizontal blanking is missing, check Diodes D513 and D322. If both horizontal and vertical blanking are missing check Horizontal/Vertical Blanking Transistor (TS322).

VERTICAL

If there is no vertical sweep, inject a vertical signal at base of Vertical Amplifier (TS421). If vertical deflection returns, check voltages, waveforms, and components associated with Vertical Oscillator Transistors (TS401, TS402). If vertical deflection does not return, check voltages, waveforms and components associated with Vertical Driver Transistor (TS422), Vertical Output Transistors (TS431, TS432) and Vertical Amp (TS421). Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits. Also check the vertical winding of the Deflection Yoke (DY1) and associated circuitry.

SYNC

If vertical sync is missing check logic readings, voltages and components associated with pins 7, 8, 9, 10 and 14 of IC601. If the logic readings are incorrect check IC601 and Connector J102. If horizontal sync is missing, check logic readings, voltages and components associated with pins 7, 11, 12, 13, 14 of IC601. If logic readings are incorrect check IC601 and Connector J102. If logic readings are correct check Electrolytic C341 and Diodes D501 and D502. Also check voltages, waveforms and components associated with Sync Amp Transistors (TS501, TS341).

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove four screws holding cabinet back and remove back. Disconnect HV anode, CRT socket, ground leads J501 and J101. Slide chassis out of cabinet.

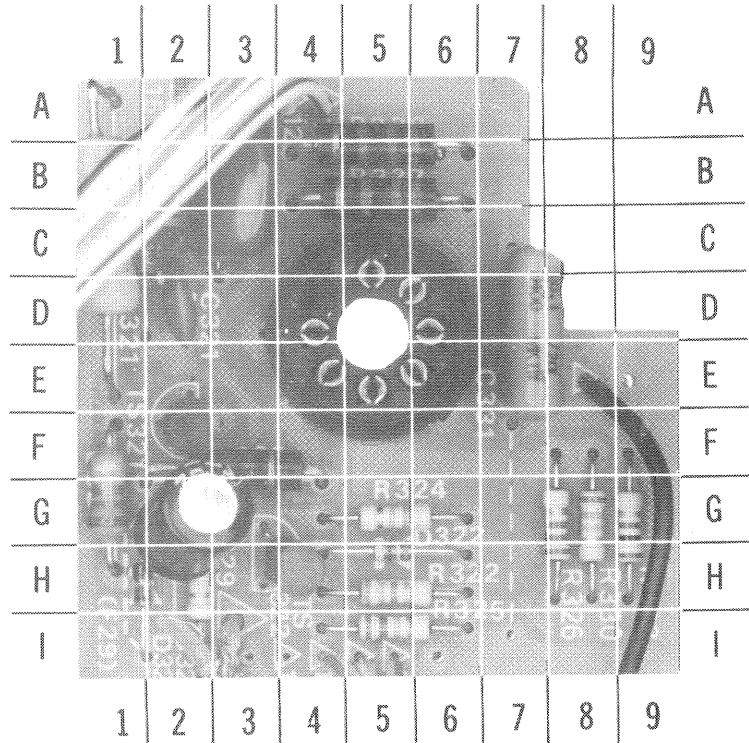
CRT REMOVAL

Follow "Chassis Removal" and lay set face down on a soft protective surface. Remove four screws holding CRT to cabinet front and lift CRT out of cabinet. **Do not** lift CRT by neck.

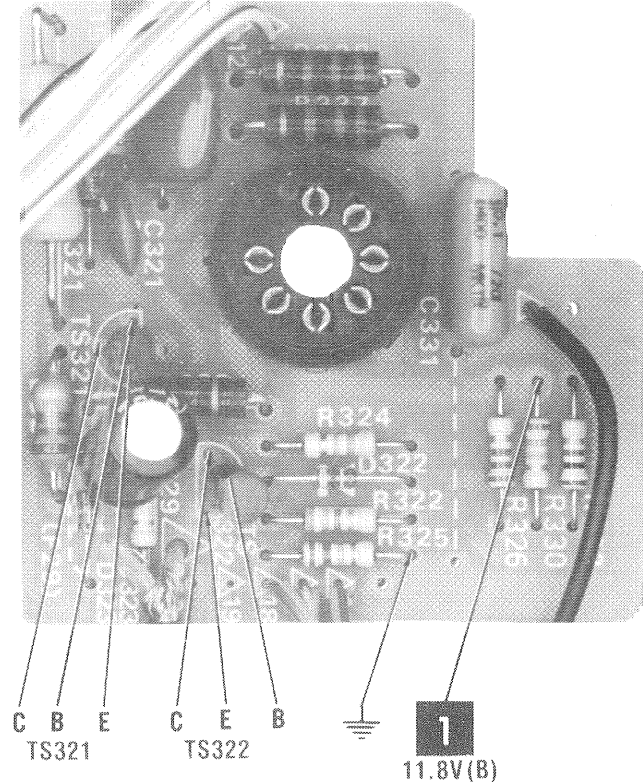
CRT BOARD

GridTrace LOCATION GUIDE

C321	D-2
C322	B-3
C323	G-2
C331	E-7
D321	C-2
D322	H-5
D323	H-1
L321	G-1
R321	B-3
R322	H-5
R323	G-9
R324	G-5
R325	I-5
R326	G-8
R327	C-1
R328	F-3
R329	H-2
R330	G-8
R337	B-5
R338	B-5
TS321	F-2
TS322	H-4



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A Howard W. Sams **CIRCUITRACE** Photo

CRT BOARD

LEADING EDGE
MODEL 7BM613074G

FOLDER 1

8 PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
D101,2 D103,4 D105 D321 D322	1N4003 GP150 BZX79C6V2 BZX79C2V5		NTE116 NTE125 NTE5013A	ECG116 ECG125 ECG5013A	SK3311 SK3081/125 SK6A2/5013A	212-76-02 212-Z9000 103-Z9008	
D323 D331 D401 D431 D432	BZX79C12 BZX79C24 BZV85C51		NTE5021A NTE5081A NTE5089A	ECG5021A ECG5081A ECG5089A	SK12A/5021A SK24V/5081A SK51V/5089A	103-279-21 103-Z9000 103-Z9025	
D441 D501 D502 D511,12 D513	 		NTE177 NTE177 NTE519	ECG177 ECG177 ECG519	SK9091/177 SK9091/177 SK3100/519	103-131 103-131 103-131	
D521 D522 D523 D524 D525 D526	GP15G BZX83C20 GP10M BA157		NTE125 NTE5079A NTE125	ECG125 ECG5079A ECG125	SK3081/125 SK20V/5079A SK3081/125	212-Z9000 103-Z9023 212-Z9000	
D601 IC601 TS101 TS102 TS103	BZX79C5V1 T74LS86B1 BD534L (B)C558B (B)C548C		NTE5010A NTE74LS86 NTE153 NTE159+ NTE123AP+	ECG5010A ECG74LS86 ECG153 ECG159+ ECG123AP+	SK5A1/5010A SK74LS86 SK3274/153 SK3466/159+ SK3854/123AP+	103-279-10 HE-443-891 121-988-03 121-Z9003+ 121-Z9000A+	
TS305 TS321 TS322 TS341 TS401	(B)C549C (2S)C1473Q (B)C549C (B)C558B (B)C558B		NTE199* NTE399 NTE199* NTE159+ NTE159+	ECG199* ECG399 ECG199* ECG159+ ECG159+	SK3245/199* SK9352/399 SK3245/199* SK3466/159+ SK3466/159+	121-972* 121-Z9045* 121-972* 121-Z9003+ 121-Z9003+	

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
D106 SW101 V101	LED Swit+ch CRT	M31-344GR/PD	Power, Grn Power

TEST EQUIPMENT

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

TEST EQUIPMENT (COMPUTERFACTS)

Equipment	B & K Precision Equipment No.	Sencore Equipment No.	Notes
OSCILLOSCOPE	1570A,1590A,1596	SC61	
LOGIC PROBE	DP51,DP21		
LOGIC PULSER	DP101,DP31		
DIGITAL VOM	2830,2806	DVM37,DVM56,SC61	
ANALOG VOM	277,111,116		
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	
COLOR BAR GENERATOR	1211A,1251,1260,1249	CG25,VA62	
RGB GENERATOR	1260,1249		
FUNCTION GENERATOR	3020,3011,3030		
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44 PR-28(HV)	HP200	
TEMPERATURE PROBE	TP-28,TP-30		
CRT ANALYZER	467,470	CR70	
DIGITAL IC TESTER	560,550,552		
CAPACITANCE ANALYZER		LC53,LC75,LC76 LC77	
INDUCTANCE ANALYZER		LC53,LC75,LC76 LC77	

LEADING EDGE
MODEL 7BM613074G

PARTS LIST AND DESCRIPTION (Continued)

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

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C305	82 NPO 50V 5%	

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
R444	15.03K 1% 1/2W Metal Film			
R445	11.02K 1% 1/2W Metal Film			
R512	2700 1% 1/2W Metal Film			
R515	8200 1% 1/2W Metal Film			
R516	8200 1% 1/2W Metal Film			
R517	6800 1% 1/2W Metal Film			

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
R106	+B Adjust	4000		
R303	Contrast	500		
R331	Bright Preset			
R332	Brightness	470K		
R336	Focus	2 M		
R406	Vertical Hold	10K		
R423	Vertical Linearity	4700		
R425	Vertical Size	330K		
R513	Horizontal Hold	330		

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.	ITEM No.	FUNCTION	MFGR. PART No.
L321	RF Choke		S524	Linearity	
S523	Horizontal Size				

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
DY1	Yoke Horiz .334mH		3138 108 71360	(1) Number on unit.
S521	90° Vert 25.3mH			
T101	Horiz Drive		3138 108 30740(1)	
T522	Power		3138 108 30670(1)	
	Horiz Output			

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
VL101	.5 Amp @ 250V			
VL102	Slow Blow			
	2 Amp @ 250V			
	Fast Blow			

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
TS402	(B)C548C		NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
TS421	(B)C559B		NTE159+	ECG159+	SK3466/159+	121-Z9003+	
TS422	(B)C548C		NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
TS431	(B)C635		NTE382*	ECG382*	SK9137/382*	921-1114*	
TS432	(B)C636		NTE383*	ECG383*	SK9138/383*	921-1115*	
TS441,2	(B)C548C		NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
TS443	(B)C558B		NTE159+	ECG159+	SK3466/159+	121-Z9003+	
TS501	(B)C559B		NTE159+	ECG159+	SK3466/159+	121-Z9003+	
TS511,2	(B)C558B		NTE159+	ECG159+	SK3466/159+	121-Z9003+	
TS513	(B)C637		NTE297*	ECG297*	SK3449/297*	921-340*	
TS521	(ZS)C3175		NTE379	ECG379	SK9085/379	121-Z9111	

For SAFETY use only equivalent replacement part.
+ Rotate 180° to conform with original lead configuration.
* Lead configuration may vary from original.

6 PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
D110 Thru D113	ALTERNATE MONITOR		NTE125	ECG125	SK3081/125	212-Z9000	
			NTE116	ECG116	SK3311	212-76-02	
			NTE5013A	ECG5013A	SK6A2/5013A	103-Z9008	
			NTE519	ECG519	SK3100/519	103-131	
			NTE5007A	ECG5007A	SK3A9/5007A		
			NTE519	ECG519	SK3100/519	103-131	
			NTE519	ECG519	SK3100/519	103-131	
			NTE519	ECG519	SK3100/519	103-131	
			NTE519	ECG519	SK3100/519	103-131	
			NTE580	ECG580	SK5036/580	212-Z9000	
D541 D542 D543 D544			NTE5079A	ECG5079A	SK20V/5079A	103-Z9023	
			NTE177	ECG177	SK9091/177	103-131	
			NTE558	ECG558	SK3998/558		
			NTE558	ECG558	SK3998/558		
			NTE332	ECG332	SK9236/332		
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
TS110 TS111			NTE157	ECG157	SK3747/157	121-Z9016	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE157	ECG157	SK3747/157	121-Z9016	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE123AP+	ECG123AP+	SK3854/123AP+	121-Z9000A+	
TS402 TS421			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	
			NTE159+	ECG159+	SK3466/159+	121-Z9003+	

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
TS422 TS423 TS424 TS501	BC548C BC635 BC636 BC559B		NTE123AP+ NTE382* NTE383* NTE159+	ECG123AP+ ECG382* ECG383* ECG159+	SK3854/123AP+ SK9137/382* SK9138/383* SK3466/159+	121-Z9000A+ 921-1114* 921-1115* 121-Z9003+	
TS521,2 TS523 TS540	BC558 BC637 BU407		NTE159+ NTE297* NTE379	ECG159+ ECG297* ECG379	SK3466/159+ SK3449/297* SK9085/379	121-Z9003+ 921-340* 121-Z9111	

* Lead configuration may vary from original.
+ Rotate 180° to conform with original lead configuration.

WIRING DATA

High Voltage Lead	Use BELDEN No. 9867 (30 KV)
Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor)
General-use Unshielded Hook-up Wire	8208 (Two-Conductor)
	8529 (Solid) Available in 13 Colors
	8522 (Stranded) Available in 13 Colors