

MONOCHROME MAINFRAME & MONITOR

SERVICE ADDENDUM

This addendum is designed to be used with the *DAS 9100 Series Service Manual, Volume I (070-3625-01 and up and Volume II 070-3836-01 and up)*. The two volumes are packaged as 062-5848-01 and up). You can find your manual part number in the bottom left corner of the manual title page.

Note

Some manuals may already have this addendum inserted into their binders. Check your manual to see if this is a duplicate.

This addendum contains service information about the upgraded monochrome monitor for the DAS 9109 Mainframe (SN B020000 and up). Both the DAS 9109 Monochrome and 9129 Color Mainframe now use the same Main Interconnect circuit board, Capacitor Bracket circuit board, and Controller circuit board. For information not found in this addendum refer to the *DAS 9100 Series Service Manual 062-5845-01 and up*.

WARNING

Do not perform internal service or adjustment to this product unless you are a qualified Service person. Refer to the complete safety precautions listed in the DAS 9100 Series Service Manual. In particular observe the specific cautions for CRTs.

NOTE

Portions of this addendum were taken from the MD2000 Service Manual 1982 Motorola, Inc, by permission of Motorola, Inc.

How To Use This Addendum. This addendum is organized similarly to the *DAS 9100 Series Service Manual*. Although the addendum has been designed to allow incorporation of the various sections into the service manual, it is recommended that it be kept as a single piece for ease of use.

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SPECIFICATIONS

TABLE 1
DAS9109 Electrical Specifications: CRT Monochrome Display Monitor

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION
Display		90° deflection angle P4 phosphor
Video Performance		
Resolution		900 lines center, 650 lines corner
Bandwidth		3 dB, 22 MHz typical
Synchronization		
Horizontal		15.7 kHz standard
Vertical		47 to 63 Hz
Horizontal Blanking		11 μ sec min. at 15.7 kHz scanning frequency. Time includes retrace and video delay
Vertical Blanking		900 μ sec min. Time includes retrace and video delay
Power Input		+12 V dc \pm .25 V operating range (display setup and specified at 12.0 V dc \pm .1 V)
Input Signals		
Horizontal		4 to 40 μ sec, input TTL-compatible, positive-going, 2.5 V to 5.0 V p-p
Vertical		50 μ sec to 1.4 msec, input TTL-compatible, negative-going, 2.5 V to 5.0 V p-p
Video		Positive white, input termination 470 Ω 5%, 2.5 V to 5.0 V p-p

TABLE 1 (cont)

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION
Geometry (Pin & Barrel)		Sides equal less than 1.3% of height. Top and bottom equal less than 1.3% of width
Linearity		Character height or width will not vary more than 10% from the average character size Adjacent characters will not vary more than 10%
Controls		Internal brightness, focus, vertical size, vertical hold, vertical linearity, horizontal size, horizontal video centering (all controls adjustable from top of unit)

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

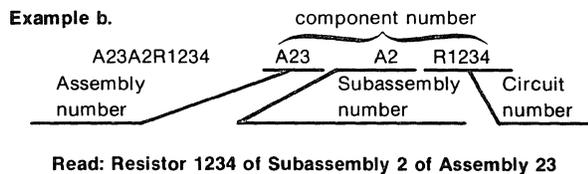
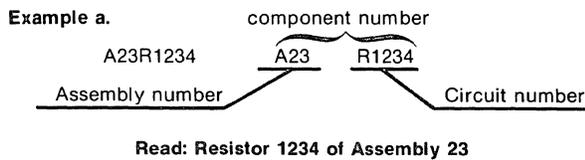
The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:



Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

**Replaceable Electrical Parts
Monochrome Monitor Addendum**

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
24546	CORNING GLASS WORKS, ELECTRONIC COMPONENTS DIVISION	550 HIGH STREET	BRADFORD, PA 16701
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

**Replaceable Electrical Parts
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Component No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
A34	119-1594-00		DISPLAY UNIT:9 INCH CHASSIS,TTL,SYNC OR DR	80009	119-1594-00
A34A1	118-2984-00		CKT BOARD ASSY:DISPLAY	80009	118-2984-00
A34A1C101	118-2383-00		CAP.,FXD,CER DI:0.01,20%,100V	80009	118-2383-00
A34A1C102	118-2393-00		CAP.,FXD,PLASTIC:0.15,10%,100V	80009	118-2393-00
A34A1C103	118-2381-00		CAPACITOR:0.1,+80-20%	80009	118-2381-00
A34A1C104	118-2392-00		CAP.,FXD,PLASTIC:0.1,10%,50V	80009	118-2392-00
A34A1C105	118-2392-00		CAP.,FXD,PLASTIC:0.1,10%,50V	80009	118-2392-00
A34A1C106	118-0678-00		ELECTRON TUBE:P4,9.0 DIAGONAL	80009	118-0678-00
A34A1C108	118-2384-00		CAP.,FXD,CER DI:	80009	118-2384-00
A34A1C109	118-2388-00		CAP.,FXD,CER DI:0.001,10%,500V	80009	118-2388-00
A34A1C110	118-0678-00		ELECTRON TUBE:P4,9.0 DIAGONAL	80009	118-0678-00
A34A1C111	118-2395-00		CAP.,FXD,PLASTIC:0.1,10%,200V	80009	118-2395-00
A34A1C112	118-0674-00		CAP.,FXD,ELCLTLT:1500UF,25V	80009	118-0674-00
A34A1C201	118-0672-00		CAP.,FXD,ELCLTLT:2200UF,16V	80009	118-0672-00
A34A1C203	118-2382-00		CAP.,FXD,CER DI:	80009	118-2382-00
A34A1C204	118-2395-00		CAP.,FXD,PLASTIC:0.1,10%,200V	80009	118-2395-00
A34A1C205	118-2383-00		CAP.,FXD,CER DI:0.01,20%,100V	80009	118-2383-00
A34A1C206	118-2388-00		CAP.,FXD,CER DI:0.001,10%,500V	80009	118-2388-00
A34A1C207	118-2854-00		CAP.,FXD,ELCLTLT:0.001UF,2.5%,100V	80009	118-2854-00
A34A1C208	118-2383-00		CAP.,FXD,CER DI:0.01,20%,100V	80009	118-2383-00
A34A1C209	118-2395-00		CAP.,FXD,PLASTIC:0.1,10%,200V	80009	118-2395-00
A34A1C210	118-2864-00		CAP.,FXD,ELCLTLT:0.001UF,2.5%,100V	80009	118-2864-00
A34A1C211	118-2394-00		CAP.,FXD,PLASTIC:0.47,10%,100V	80009	118-2394-00
A34A1C212	118-2855-00		CAP.,FXD,ELCLTLT:0.047UF,5%,200V	80009	118-2855-00
A34A1C213	118-0675-00		CAP.,FXD,PLASTIC:10UF,125V	80009	118-0675-00
A34A1C214	118-2389-00		CAP.,FXD,CER DI:0.001,10%,1KV	80009	118-2389-00
A34A1C215	118-2385-00		CAP.,FXD,CER DI:0.0027,10%,100V	80009	118-2385-00
A34A1C216	118-2390-00		CAP.,FXD,PLASTIC:0.047,10%,400V	80009	118-2390-00
A34A1C218	118-2856-00		CAP.,FXD,ELCLTLT:470UF,35V	80009	118-2856-00
A34A1C219	118-2391-00		CAP.,FXD,PLASTIC:0.01,10%,600V	80009	118-2391-00
A34A1C220	118-2391-00		CAP.,FXD,PLASTIC:0.01,10%,600V	80009	118-2391-00
A34A1C221	118-2386-00		CAP.,FXD,CER DI:0.005,20%,1KV	80009	118-2386-00
A34A1C225	118-2857-00		CAP.,FXD,CER DI:0.1UF,10%,100V	80009	118-2857-00
A34A1C226	118-2857-00		CAP.,FXD,CER DI:0.1UF,10%,100V	80009	118-2857-00
A34A1C227	118-2858-00		CAP.,FXD,CER DI:0.01UF,20%,100V	80009	118-2858-00
A34A1C301	118-2387-00		CAP.,FXD,CER DI:	80009	118-2387-00
A34A1C302	118-2395-00		CAP.,FXD,PLASTIC:0.1,10%,200V	80009	118-2395-00
A34A1C303	118-0676-00		CAP.,FXD,ELCLTLT:68UF,100V	80009	118-0676-00
A34A1C304	118-2395-00		CAP.,FXD,PLASTIC:0.1,10%,200V	80009	118-2395-00
A34A1C305	118-2396-00		CAP.,FXD,PLASTIC:0.047,10%,20V	80009	118-2396-00
A34A1D101	118-2376-00		SEMICON DVC,DI:	80009	118-2376-00
A34A1D102	118-2369-00		SEMICON DVC,DI:RECTIFIER	80009	118-2369-00
A34A1D201	118-2376-00		SEMICON DVC,DI:	80009	118-2376-00
A34A1D202	118-2376-00		SEMICON DVC,DI:	80009	118-2376-00
A34A1D203	118-2376-00		SEMICON DVC,DI:	80009	118-2376-00
A34A1D204	118-2368-00		SEMICON DVC,DI:RECTIFIER	80009	118-2368-00
A34A1D206	118-2859-00		SEMICON DVC,DI:100V,FAST RECOVERY	80009	118-2859-00
A34A1D207	118-2377-00		SEMICON DVC,DI:	80009	118-2377-00
A34A1D208	118-2374-00		SEMICON DVC,DI:	80009	118-2374-00
A34A1D209	118-2375-00		SEMICON DVC,DI:	80009	118-2375-00
A34A1IC101	118-0697-00		MICROCIRCUIT,LI:TDA,1170,VERT PROCESSOR	80009	118-0697-00
A34A1IC201	156-0402-02		MICROCIRCUIT,LI:TIMER,CHK	27014	LM555CN/A+
A34A1IC202	156-0402-02		MICROCIRCUIT,LI:TIMER,CHK	27014	LM555CN/A+
A34A1L1A/B	118-0677-00		COIL,TBUE DEFL:YOKE	80009	118-0677-00
A34A1L201	118-2378-00		COIL,LINEARITY:	80009	118-2378-00
A34A1L202	118-2366-00		COIL,TUBE DEFL:WIDTH	80009	118-2366-00
A34A1L301	118-2849-00		COIL,RF:FIXED,4.7UH	80009	118-2849-00

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Component No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
A34A1Q201	118-2850-00		TRANSISTOR:NPN	80009	118-2850-00
A34A1Q202	118-2851-00		TRANSISTOR:NPN	80009	118-2851-00
A34A1Q203	118-2852-00		TRANSISTOR:NPN	80009	118-2852-00
A34A1Q301	118-2866-00		TRANSISTOR:NPN	80009	118-2866-00
A34A1Q302	118-2867-00		TRANSISTOR:NPN	80009	118-2867-00
A34A1R1	118-2868-00		RES.,FXD,WW:HV LEADS & BLEEDER	80009	118-2868-00
A34A1R101	315-0682-00		RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A34A1R102	315-0682-00		RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A34A1R103	315-0222-00		RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A34A1R104	315-0183-00		RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
A34A1R105	315-0124-00		RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
A34A1R106	118-2372-00		RESISTOR,VAR:100K OHM	80009	118-2372-00
A34A1R107	315-0184-00		RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
A34A1R108	118-2373-00		RESISTOR,VAR:250K OHM	80009	118-2373-00
A34A1R109	315-0624-00		RES.,FXD,CMPSN:620K OHM,5%,0.25W	01121	CB6245
A34A1R110	315-0473-00		RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A34A1R111	118-2373-00		RESISTOR,VAR:250K OHM	80009	118-2373-00
A34A1R112	315-0563-00		RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
A34A1R113	315-0274-00		RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
A34A1R115	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A34A1R116	315-0182-00		RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
A34A1R117	315-0472-00		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A34A1R118	118-2379-00		RESISTOR:3.3 OHM	80009	118-2379-00
A34A1R119	118-2380-00		RESISTOR:1.0 OHM,0.5W	80009	118-2380-00
A34A1R201	315-0682-00		RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A34A1R203	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A34A1R204	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A34A1R205	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A34A1R206	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A34A1R207	315-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A34A1R208	118-2371-00		RESISTOR,VAR:50K OHM	80009	118-2371-00
A34A1R209	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A34A1R210	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A34A1R211	315-0561-00		RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
A34A1R212	322-0306-00		RES.,FXD,FILM:15K OHM,1%,0.25W	24546	NA60D1502F
A34A1R213	322-0335-00		RES.,FXD,FILM:30.1K OHM,1%,0.25W	91637	MFF1421G30101F
A34A1R214	301-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.50W	01121	EB4705
A34A1R215	301-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A34A1R216	315-0221-00		RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A34A1R217	301-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
A34A1R219	118-2869-00		RES.,FXD,WW:10K OHM,5%,1W	80009	118-2869-00
A34A1R220	315-0681-00		RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A34A1R222	315-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A34A1R223	118-2370-00		RESISTOR,VAR:2M OHM	80009	118-2370-00
A34A1R224	315-0564-00		RES.,FXD,CMPSN:560K OHM,5%,0.25W	01121	CB5645
A34A1R301	315-0471-00		RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A34A1R302	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A34A1R303	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A34A1R304	315-0270-00		RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
A34A1R305	315-0473-00		RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A34A1R306	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A34A1R307	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A34A1R310	315-0223-00		RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A34A1R311	118-2373-00		RESISTOR,VAR:250K OHM	80009	118-2373-00
A34A1R312	301-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.5W	01121	EB1045
A34A1R313	301-0274-00		RES.,FXD,CMPSN:270K OHM,5%,0.50W	01121	EB2745
A34A1T201	118-0680-00		TRANSFORMER:HORIZONTAL	80009	118-0680-00
A34A1V1	118-2974-00		ELECTRON TUBE:	80009	118-2974-00

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

- Y14.15, 1966 Drafting Practices.
- Y14.2, 1973 Line Conventions and Lettering.
- Y10.5, 1968 Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway
New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

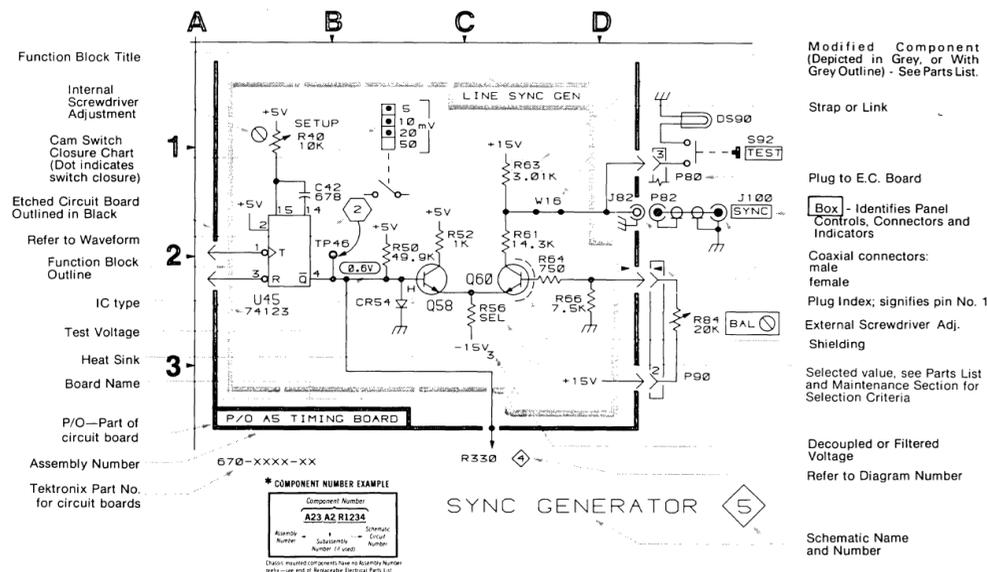
- Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω).

———— The information and special symbols below may appear in this manual. ————

Assembly Numbers and Grid Coordinates

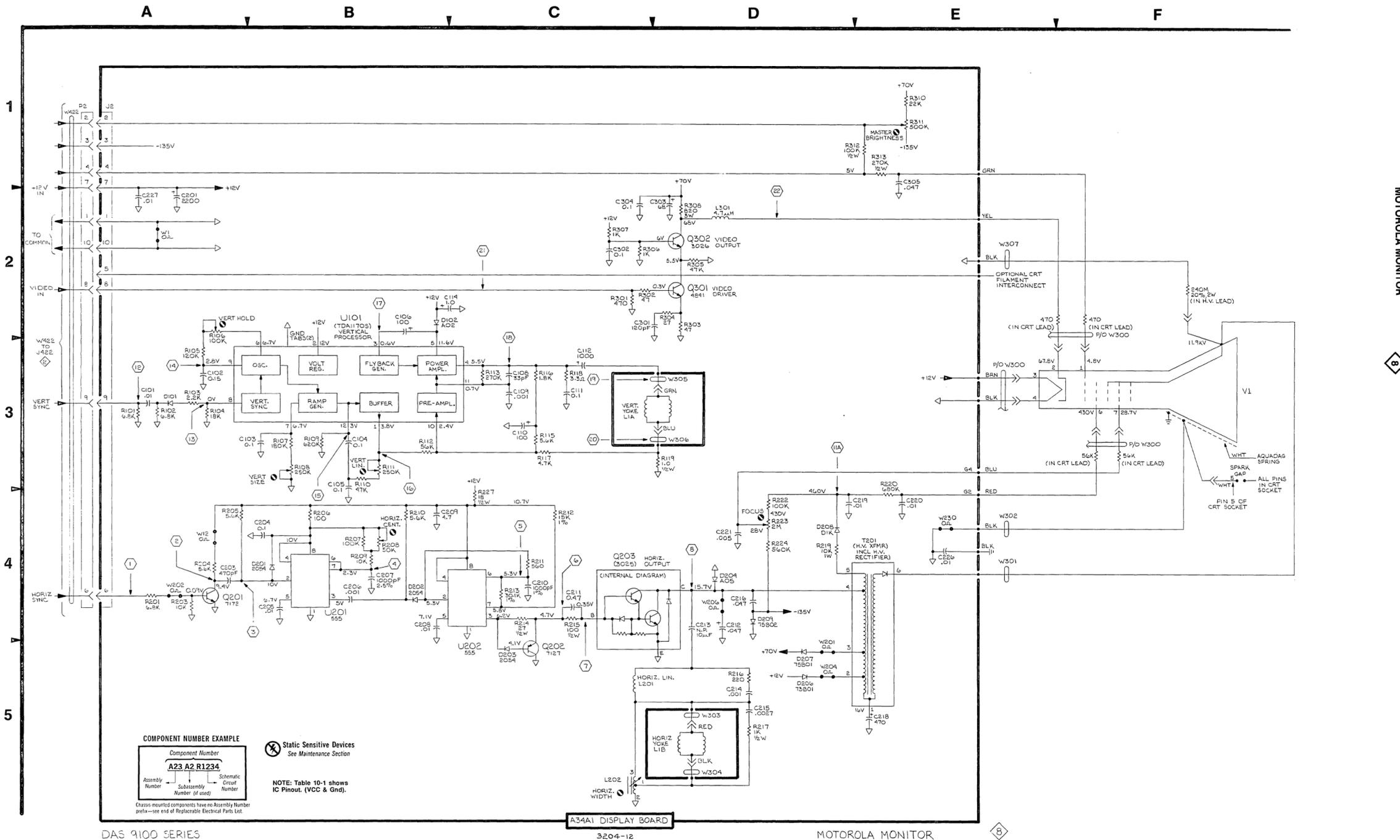
Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number *(see following illustration for constructing a component number).

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.



ASSEMBLY A34A1

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C101	A3	C3	R101	A3	C3	T201	E4	B3
C102	A3	D1	R102	A3	D2	U101	B3	C2
C103	B3	D1	R103	A3	D2	U201	B4	B2
C104	B3	C1	R104	A3	C1	U202	C4	B1
C105	B3	C1	R105	A3	D2	W1	A2	C1
C106	B2	D2	R106	A2	D2	W12	A4	C3
C108	C3	C1	R107	B3	D2	W201	D5	A4
C109	C3	C1	R108	B3	D2	W202	A4	C2
C110	C3	D1	R109	B3	C1	W204	D5	A4
C111	C3	D1	R110	B3	C2	W206	D4	A3
C112	C3	D2	R111	B3	C2	W230	E4	B3
C114	B2	C2	R112	B3	C2	W300 BRN	E3	C2
C201	A2	D4	R113	C3	C1	W300 BLK	E3	D4
C203	A4	C1	R115	C3	C1	W300 GRN	F2	D3
C204	B4	B2	R116	C3	D1	W300 YEL	F2	D1
C205	B4	B2	R117	C3	C1	W300 BLU	F3	B4
C206	B4	B2	R118	C3	D1	W300 RED	F3	B4
C207	B4	B2	R119	D3	D1	W301	E4	off board
C208	B4	B1	R201	A4	C3	W302	E4	C3
C209	B4	B2	R203	A4	C2	W303	D5	A2
C210	C4	B1	R204	A4	C1	W304	D5	A2
C211	C4	B1	R205	A4	C1	W305	D3	D2
C212	D4	A2	R206	B4	B2	W306	D3	D1
C213	D4	C3	R207	B4	B2	W307	E2	A3
C214	D5	A1	R208	B4	B2	W422	A1	F3
C215	D5	A1	R209	B4	B2	V1		
C216	D4	B3	R210	B4	B2			
C218	E5	C2	R211	C4	B1			
C219	D4	B4	R212	C4	B1			
C220	E4	B4	R213	C4	B1			
C221	D4	B3	R214	C4	B1			
C226	E4	D4	R215	C4	A1			
C227	A2	C3	R216	D5	B2			
C301	D2	D2	R217	D5	A1			
C302	C2	D3	R219	D4	B3			
C303	D2	D3	R220	E4	B4			
C304	C2	D4	R222	D4	B4			
C305	E1	D3	R223	D4	B3			
D101	A3	D2	R224	D4	B3			
D102	B2	C2	R227	C4	C1			
D201	B4	B2	R301	C2	C3			
D202	B4	B1	R302	C2	C3			
D203	C5	B1	R303	D2	D3			
D204	D4	A2	R304	D2	D2			
D206	D5	C3	R305	D2	D3			
D207	D5	A4	R306	C2	D3			
D208	D4	B4	R307	C2	D3			
D209	D4	A4	R308	D2	D2			
J2	A1	C4	R310	E1	D3			
L201	C5	B2	R311	E1	D4			
L202	C5	A1	R312	E1	C3			
L301	D2	D2	R313	E1	D2			
P2	A1							
Q201	A4	C2						
Q202	C5	B1						
Q203	C4	A2						
Q301	D2	D2						
Q302	D2	D3						



COMPONENT NUMBER EXAMPLE
 Component Number
A23 A2 R1234
 Assembly Number Subassembly Number (if used) Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

⊗ Static Sensitive Devices
 See Maintenance Section

NOTE: Table 10-1 shows IC Pinout. (VCC & Gnd).

MOTOROLA MONITOR

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 *Name & Description*

Assembly and/or Component

Attaching parts for Assembly and/or Component

---*---

Detail Part of Assembly and/or Component

Attaching parts for Detail Part

---*---

Parts of Detail Part

Attaching parts for Parts of Detail Part

---*---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol ---*--- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDNT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

**Replaceable Mechanical Parts
Monochrome Monitor Addendum**

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD.	CHICAGO, IL 60650
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153

**Replaceable Mechanical Parts
Monochrome Monitor Addendum**

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	386-4971-00		2		SUPPORT,CRT:CORNER,PLASTIC (ATTACHING PARTS)	80009	386-4971-00
-2	211-0511-00		2		SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	OBD
-3	210-0006-00		2		WASHER,LOCK:#6 INTL,0.018THK,STL CD PL - - - * - - -	78189	1206-00-00-0541C
-4	118-2861-00		2		BRACKET,SIDE:RIGHT (ATTACHING PARTS)	80009	118-2861-00
-5	211-0507-00		4		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-6	118-2860-00		1		BRACKET,MTG:CRT (ATTACHING PARTS)	80009	118-2860-00
-7	212-0507-00		2		SCREW,MACHINE:10-32 X 0.375 INCH,PNH STL	83385	OBD
-8	210-0010-00		2		WASHER,LOCK:INT,0.20 ID X0.376" OD,STL	78189	1210-00-00-0541C
-9	211-0504-00		2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-10	118-2862-00		1		BRACKET,SIDE:LEFT (ATTACHING PARTS)	80009	118-2862-00
-11	212-0507-00		2		SCREW,MACHINE:10-32 X 0.375 INCH,PNH STL	83385	OBD
-12	210-0010-00		2		WASHER,LOCK:INT,0.20 ID X0.376" OD,STL	78189	1210-00-00-0541C
-13	211-0504-00		2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-14	200-2825-00		1		COVER,CRT SHLD: (ATTACHING PARTS)	80009	200-2825-00
-15	211-0504-00		6		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-16	337-3071-00		1		SHIELD,CRT:	80009	337-3071-00
-17	-----		1		DISPLAY ASSY:(SEE A34 REPL)		
-18	-----		1		. CKT BOARD SSSY:DISPLAY(SEE A34A1 REPL) (ATTACHING PARTS)		
-19	211-0658-00		4		. SCR,ASSEM WSHR:6-32 X 0.312 L,PNH,STL - - - * - - -	78189	OBD
-20	-----		-		. CKT BOARD ASSY INCLUDES:		
-21	210-0586-00		1		. . TRANSISTOR:(SEE A34A1Q203 REPL) (ATTACHING PARTS)		
-22	211-0097-00		1		. . NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
-23	118-0699-00		1		. . SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-24	118-0694-00		1		. . HEAT SINK,ELEC:	80009	118-0699-00
-25	118-2363-00		1		SPRING,CONN:	80009	118-0694-00
-26	118-2973-00		1		MICROCIRCUIT,DI:	80009	118-2363-00
-27	118-2993-00		1		MAGNET:YOKE,FLEX	80009	118-2973-00
-28	118-2972-00		1		MAGNET,YOKE:NON-FLEX	80009	118-2993-00
-29	118-2870-00		1		YOKE,DEFLECTION:	80009	118-2972-00
-30	118-0689-00		1		CRT ASSEMBLY:SOCKET & WIRE	80009	118-2870-00
	118-0690-00		1		LEAD,ELECTRICAL:W/LUG,RED	80009	118-0689-00
	118-0691-00		1		LEAD,ELECTRICAL:W/LUG,BLACK	80009	118-0690-00
	118-0692-00		1		LEAD,ELECTRICAL:W/LUG,BLUE	80009	118-0691-00
-31	348-0048-00		2		LEAD,ELECTRICAL:W/LUG,GREEN	80009	118-0692-00
-32	210-0457-00		2		FOOT,CAMERA:BLACK VINYL,W/6-32 STUD (ATTACHING PARTS)	80009	348-0048-00
-33	385-0079-00		4		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL - - - * - - -	83385	OBD
-34	386-5042-00		2		SPACER,POST:0.375 L W/6-32 THD THRU,AL	80009	385-0079-00
-35	175-4522-00		1		SUPPORT,CKT BD:	80009	386-5042-00
-36	407-2706-00		1		CA ASSY,SP,ELEC:10,22 AWG,8.OL,RIBBON	80009	175-4522-00
-37	211-0198-00		1		. BRACKET,CONN: (ATTACHING PARTS)	80009	407-2706-00
-38	211-0022-00		2		. SCREW,MACHINE:4-40 X 0.438 PNH,STL,POZ	77250	OBD
-39	343-0400-00		2		. SCREW,MACHINE:2-56 X 0.188 INCH,PNH STL - - - * - - -	83385	OBD
	118-0679-00		1		. CLAMP,CABLE:1.250 INCH LONG,PLASTIC	80009	343-0400-00
	118-0696-00		1		BRACKET,HEAT SK:	80009	118-0679-00
			1		CLIP,SP LICING:	80009	118-0696-00

**Replaceable Mechanical Parts
Monochrome Monitor Addendum**

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
STANDARD ACCESSORIES											
070-3204-00			1						MANUAL, TECH:	80009	070-3204-00

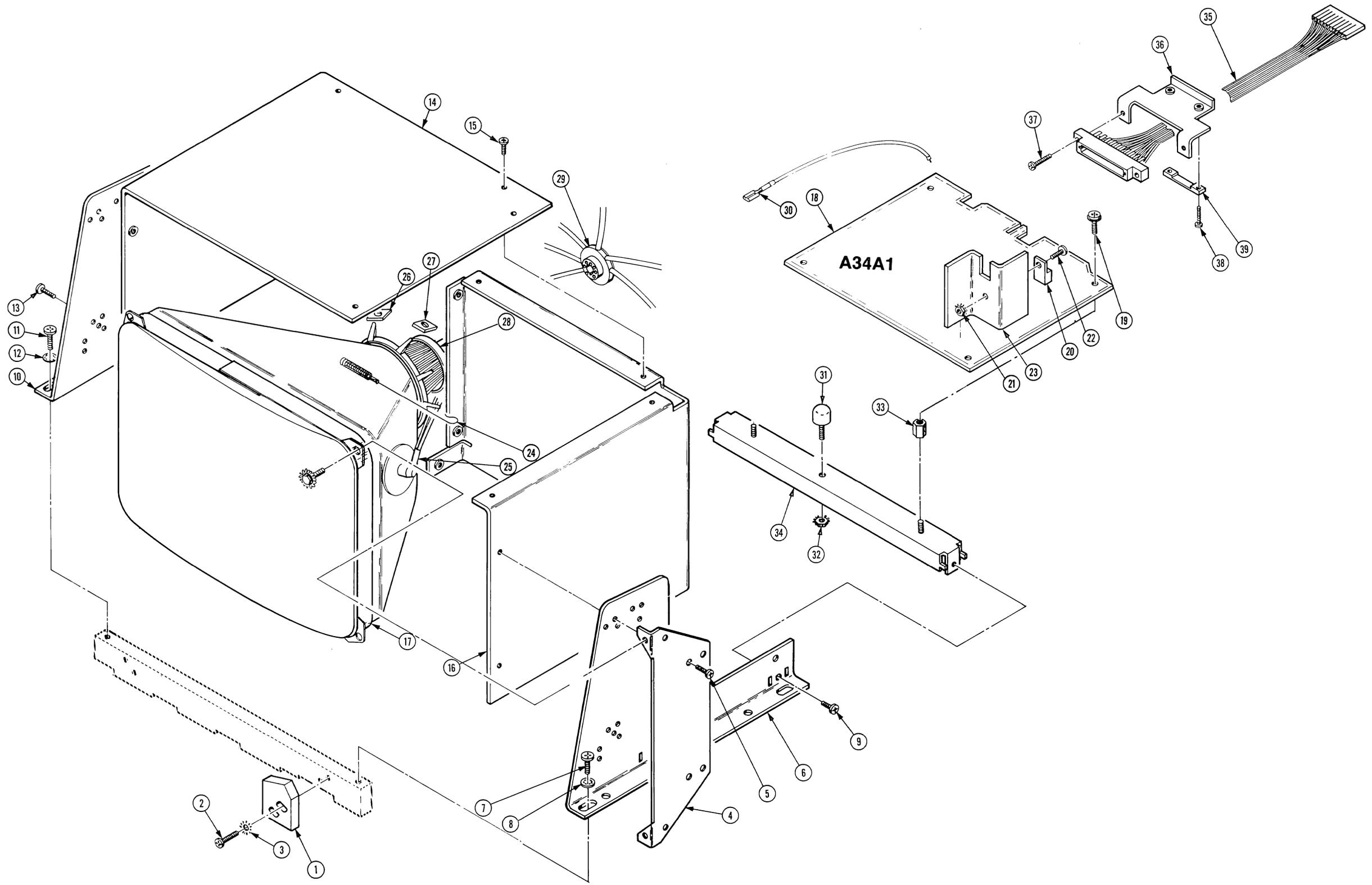


FIG. 1 EXPLODED

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MONOCHROME MONITOR ADDENDUM

THEORY OF OPERATION

GENERAL

The Motorola CRT Monitor is a direct drive unit requiring separate video, horizontal drive, and vertical drive inputs. All are TTL compatible. Voltage required by the monitor is +12 V DC@ 1.2 A (nominal).

The monitor consists of a two-stage video amplifier, and integrated circuit vertical processing stage, and five stages of horizontal deflection.

VIDEO AMPLIFIER CIRCUITRY

The linear video amplifier consists of two stages, Q301 and Q302, which connect in a cascade configuration. This common emitter-common base arrangement greatly reduces the effect of Miller or input capacity (when compared to a conventional single transistor video amplifier/output stage).

A TTL-compatible (non-composite) video signal, approximately 3.0 V P-P, is DC coupled to the base of Q301 via R302, which serves as a current limiter and provides arc protection. R304 and C301 provide high-frequency compensation to maintain a flat response.

During a no-signal condition, video driver transistor Q301 is off. At the same time, video output transistor, Q302, is base biased at 6 V by voltage divider R306 and R307. When a video signal is applied to the base of Q301, it turns on allowing Q302 to conduct. The resultant output is developed across collector load resistor R308 and DC coupled to the CRT cathode via video peaking coil L301. Q302 is protected from CRT arcing by a spark gap built into the CRT socket, and R309 further isolates Q302 from transients. Capacitor C302 shorts video frequency signals from the base of Q302 to ground. Capacitors C303 and C304 provide additional filtering of the +70 V supply. Resistor R305 serves to stabilize the DC return for the collector and emitter circuit of Q301 and Q302, respectively.

VERTICAL INPUT/DEFLECTION CIRCUITRY

The vertical deflection circuit consists of one stage, U101, which accomplishes all active vertical drive function. Vertical input pulses are differentiated by C101 and R102, which allow U101 to be edge sensitive. R101 provides proper input loading. Diode D101 couples positive-going spikes from the differentiator circuit to the sync input of U101 (pin 8). R103 and R104 provide input current limiting. The sync input (pin 8) performs several functions. It strips away any random noise that may be present on the input line and conditions the vertical pulses for processing. It also converts the input voltage pulses to current to control the internal oscillator. The oscillator generates a non-symmetrical square wave with a short duty cycle of approximately 60 Hz. Components R105, R106, and C102 determine the frequency. This square wave signal is applied to an internal ramp generator (U101) whose slope and amplitude is determined by R107, R108, and C103. The ramp voltage signal is applied to an internal buffer stage (U101), which isolates the ramp generator from the output stages and reduces any loading effect on the previous stages. Components R109, R110, R111, C104, and C105 reshape the ramp voltage to make it extremely linear.

The output signal from the (internal) buffer stage is applied via signal coupling resistor R112 to an (internal) preamp stage (U101) and power amp stage (U101), for amplification, which in turn drives the vertical deflection coils directly via coupling capacitor C112. Components R118 and C111 provide damping to prevent any oscillation in the output circuit. R115, R116, R113, R117, R119, C110, and C108 provide AC and DC feedback for the output stage to maintain proper gain and linearity. Capacitor C109 is an RF bypass component to improve interlace. When the scan reaches the bottom of the screen a sync pulse initiates retrace. To insure a quick return to the top of the screen, the supply voltage to the yoke is doubled during retrace to quickly discharge the yoke inductance. This voltage-doubling circuit consists of diode D102, capacitor C106, and a transistor network in U101.

HORIZONTAL INPUT/SYNC REGEN./OSCILLATOR DRIVER CIRCUITRY

Transistor Q201 is a single stage buffer/inverter that operates as a switch. During a no-signal condition, Q201 is biased at cut-off. The horizontal drive input is DC coupled to the base of Q201. Positive-going horizontal drive pulses of 2.5 V P-P will turn Q201 on and cause it to saturate. The inverted output of Q201 is developed across resistor R204. These inverted pulses of approximately 11 V P-P pass through a differentiator circuit consisting of C203 and R205, which shapes the pulses into sharp spikes and are applied to the input (pin 2) of U201. Resistor R201 serves as a current limiter and provides arc protection. Resistor R203 provides an input load.

Diode D201 clamps the input signal to U201 at +10 V. U201 is a timer connected as a monostable multivibrator to delay the incoming drive pulse approximately one horizontal scan line. This delay is adjustable by R208, which is required to center the video information on the CRT. Components R207, R208, R209, and C207 form an RC network that determine the amount of delay. This delay has a range of 1/2 to 1-1/2 horizontal scan lines. Capacitor C204 provides additional local filtering for U201, and C205 is a bypass capacitor for U201 to eliminate stray pickup and prevent jitter. Resistor R206 is for B+ decoupling.

The 12 V P-P non-symmetrical square wave output of U201 (pin 3) passes through a differentiator circuit consisting of C206 and R210. The differentiator produces positive- and negative-going spikes and are applied to diode D202; however, only the negative-going spikes are allowed to pass through to the input of U202 (pin 2).

U202 is used as a free-running oscillator operating above the horizontal synchronized input frequency. If loss of the horizontal drive signal occurs, the oscillator will free-run at a higher frequency reducing the high voltage developed by the flyback transformer. This prevents any damage to components in the horizontal output circuitry. Components R211, R212, R213, and C210 determine the free-running frequency of the oscillator. The output of U202 (pin 3) is a 6 V P-P non-symmetrical square wave. Resistor R277 is for B+ decoupling, and C208 is a bypass capacitor to eliminate stray pickup and prevent jitter.

HORIZONTAL OUTPUT CIRCUITRY

When the output of U202 goes high, Q202 turns off. Q203 is then forward biased via R214, R215, and C211 causing it to turn-on. At this time, transistor Q202 is reverse biased and cut off. Diode D203 protects Q202 from reverse base-emitter voltage.

When the output of U202 goes low, Q202 turns on drawing current through R215 and C211 to turn off Q203. RC network R215 and C211 is a speed-up network used to decrease the collector switching time of Q203.

Capacitor C213 serves two functions. First, it blocks DC from the horizontal yoke winding, and secondly, it improves linearity at the extreme left and right sides of the horizontal scan. Two RC networks, consisting of R216/C214 and C215/R217, are used to dampen ringing in the horizontal linearity (L201) and horizontal width (L202) coils.

HORIZONTAL OUTPUT TRANSFORMER AND ASSOCIATED CIRCUITRY

The horizontal output transistor, Q203, is simply a switch that is turned on and off at the horizontal scan rate by the driving signal applied to its base. A sawtooth current through the deflection coils is required to sweep the beam linearly across the CRT screen. The sweep begins at the center of the CRT and sweeps to the right. This happens when Q203 is turned on and its collector voltage drops near zero. C213 begins discharging through the deflection coils, which deflects the beam to the right of the CRT. At this time, Q203 cuts off and C213 ceases to supply current to the deflection coils. However, an induced voltage appears across the deflection coil as the magnetic field collapses; then oscillations occur between the deflection coils and C212.

During the first half-cycle of the oscillation, the induced voltage is felt across the collector of now cut-off Q203, C212, and the primary of T201—the flyback transformer. This voltage is stepped up by T201 and rectified to produce the required high voltage applied to the second anode of the CRT. The electron beam is also deflected to the left edge of the CRT due to the collapsing magnetic field of the deflection coils.

During the second half-cycle of the oscillation, Q203 is still cut off. At this time, damper diode D204 becomes forward biased and begins conduction. The deflection coil current gradually decreases to zero during damper conduction allowing the beam to sweep linearly to the center of the screen.

FOCUS CIRCUIT

Focus voltage for the CRT is derived from the autotransformer action of T201 (pin 5 output). Components R219, D208, and C219 form the necessary positive voltage source. This same voltage source is reduced by R220 and filtered by C220 to supply the second grid of the CRT. In addition, during autotransformer action time, D209 conducts to charge C216 negative to positive; then, when the yoke field collapses, C216 discharges to create the -135 V source for the focus and brightness circuits. Resistors R222 and R224 are a voltage divider used in conjunction with the focus control R223.

MISCELLANEOUS COMPONENTS

Diode D206 in conjunction with C218, boosts the incoming +12 V to T201 for proper horizontal output operation. Diode D207 is the output source for the distributed +70 V; capacitors C303 and C304 provide filtering. Capacitors C201 and C227 are for RFI suppression on the incoming +12 V source, while C226 provides RFI suppression for the common return circuit card foil to metal chassis ground. Resistor R1 provides some regulation of the CRT H. V. anode voltage source during normal operation; R1 also serves as a H. V. bleeder after shutdown.

ADJUSTMENT PROCEDURES

MOTOROLA DISPLAY MONITOR ADJUSTMENT

PRE-ADJUSTMENT TEST

Under normal circumstances the Motorola Display Monitor does not require adjustment. Do not adjust the monitor unless the screen has become difficult to read and the contrast control on the Controller does not increase legibility to an acceptable level.

ADJUSTMENT SETUP PROCEDURE

You will need the following equipment to perform the adjustment procedures:

- DAS Mainframe
- small plastic-bladed, slotted screwdriver
- a plastic alignment tool for tuning inductors



Do not install or remove any electrical module or sub-assembly in a DAS mainframe while the power is on. Doing so will probably damage the module or sub-assembly.

1. Turn off the DAS Mainframe and wait five minutes before proceeding to the next step.
2. Remove the top panel, the left side panel, the power supply cover, and the instrument module cover.
3. Remove the left top side of the monitor cover.
4. Remove the Controller module from slot 0 of the mainframe.
5. Install the Main Extender Board in slot 0 of the mainframe. Connect the Controller to the top of the extender board.
6. Turn on the mainframe while holding down the STOP key on the keyboard. This will cause the power-up self-test to fail.
7. Press START SYSTEM to enter the Diagnostics menu. Select to run tests on slot 0 (the Controller).
8. Select single mode, then select to run function 1 (the display function). Start the test by pressing START SYSTEM. The screen will display a border and cross hairs using the number 8.

WARNING

The Display monitor contains very high voltages. Do not use metal-bladed tools when making the following adjustments. Do not touch any circuitry other than adjustment points. In particular, be careful of the CRT; it may have over 12 kV on the anode.

BRIGHTNESS ADJUSTMENT

1. Adjust video level (R121) on the controller module for maximum brightness (full clockwise), then back one-eighth of a turn.
2. Adjust the master brightness control on the Display Board (R311) until the display characters just begin to bleed together. There should be a distinction between the shaded video fields and other fields. The characters should be as bright as possible without bleeding out of focus.

VERTICAL HOLD ADJUSTMENT

If video display is rolling, adjust the vertical hold control (R106) until the video display remains locked in.

FOCUS ADJUSTMENT

The optimum focus of the display is near the center and approximately one-third down from the top of the display. To focus adjust the focus control (R223).

VERTICAL SIZE/LINEARITY ADJUSTMENT

1. Adjust the vertical size control (R108) until the display is approximately four inches (10.2 cm) high.
2. Adjust the vertical linearity control (R111) until the extreme top and bottom characters (designated 'A' and 'B' in Figure 5-1) are equal in height to the center characters (designated 'C').
3. Readjust the vertical size control (R108), if necessary, for the correct size display.

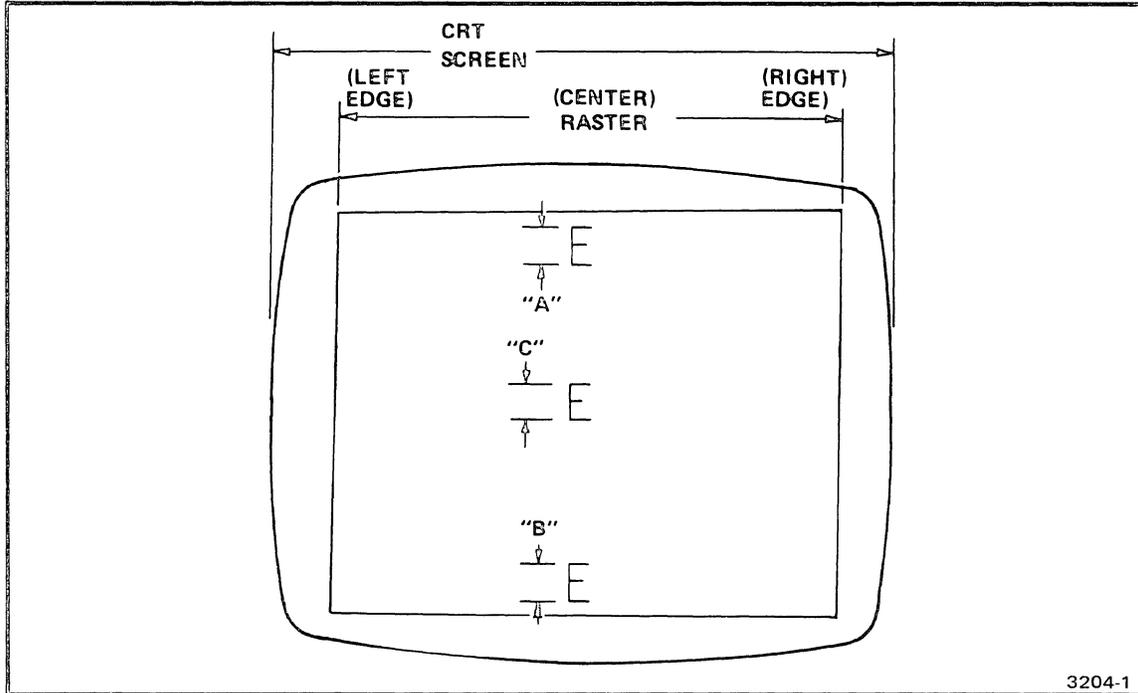


Figure 5-1. Partial CRT Display of Characters for Vertical Linearity Adjustment.

HORIZONTAL SIZE ADJUSTMENT

1. Turn the slug of the horizontal width coil (L202) clockwise (into the circuit card) to decrease width, and counterclockwise to increase width (away from the circuit card).
2. Adjust the horizontal width coil (L202) for a display approximately 6.5 inches (16.5 cm) wide.

VIDEO/RASTER CENTERING ADJUSTMENT

(Applicable only if the CRT and/or deflection yoke have been changed.)

This procedure should be performed while the monitor is free-standing on a bench, and in the correct sequence (preceding the Raster Geometry Adjustment procedures). Do not readjust after the monitor has been installed in the DAS mainframe. For instructions on how to remove the monitor from the mainframe refer to the *maintenance section* of this addendum.

1. Reconnect the Motorola Display Monitor to the DAS mainframe using the Display Monitor Extender cable. Turn on the mainframe while holding down the STOP key on the keyboard. This will cause the power-up self-test to fail.

Adjustment Procedures—Monochrome Monitor Addendum

2. Press START SYSTEM to enter the Diagonstics menu. Select to run tests on slot 0 (the Controller).
3. Select single mode, then select to run function 1, the Display function. Start the test by pressing START SYSTEM. The screen should now display a border and cross hairs using the number 8 increase the Brightness control until the raster becomes visible.
4. If necessary, adjust Vertical Size, R108, and Horizontal Width, L202, so that all edges of the raster are visible.
5. Adjust Horizontal Centering control, R208, to position the video display equidistant from the left and right edges of the illuminated raster.
6. Position the centering magnets for best overall centering of the raster within the active phosphor area of the CRT. (Reference Figure 5-2 for location of centering magnets.)
7. Readjust the Vertical Size, R108, and Horizontal Width, L202 to specified dimensions.

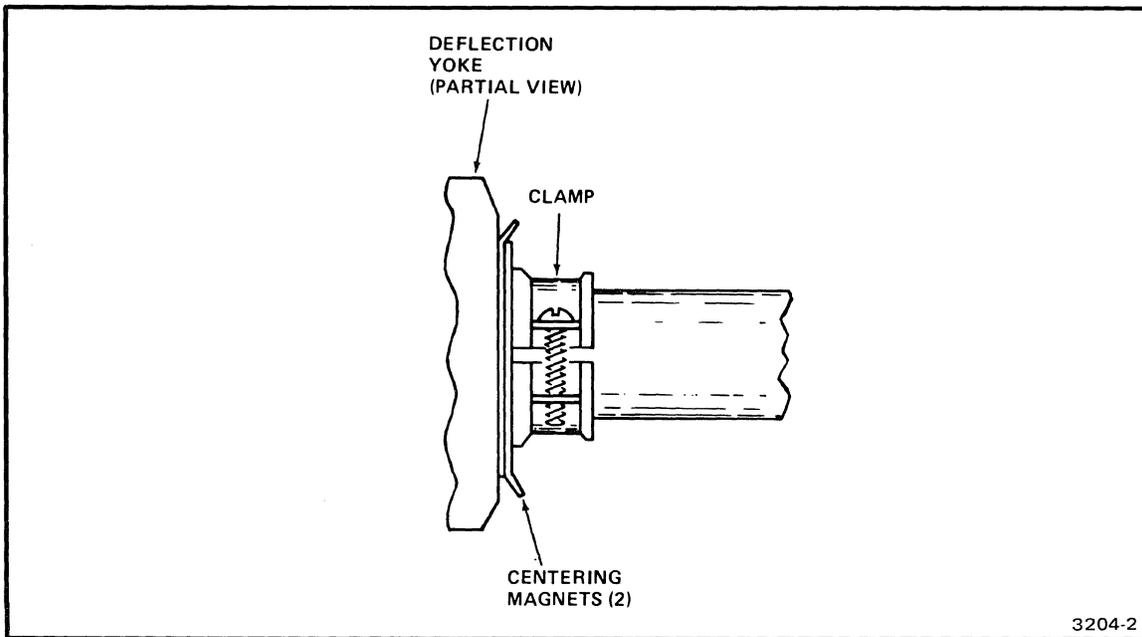


Figure 5-2. Partical View of CRT Neck/Deflection Yoke Centering Magnets.

RASTER GEOMETRY ADJUSTMENTS

(Applicable only if the CRT and/or deflection yoke have been changed.)

Upon completion of the geometry adjustments, there may not be a yoke magnet installed on every yoke mounting pin. Normal installation ranges from one to four yoke magnets per deflection yoke. In addition, there will be some interaction between yoke magnets on the deflection yoke mounting pins. As the geometry adjustment proceeds, it may be necessary to remove an earlier positioned magnet from one pin when a new magnet is positioned (or added) on a different pin.

There are two different strengths of yoke magnet available for correcting CRT geometry. (Refer to the Replaceable Mechanical Parts section of this addendum for the part number of each magnet.) The soft core (or flexible) magnet is the stronger of the two. (Refer to Figure 5-3 for identification of their north poles.) Pincushion and trapezoidal correction generally require high-strength magnets; barrel correction requires a lower strength.

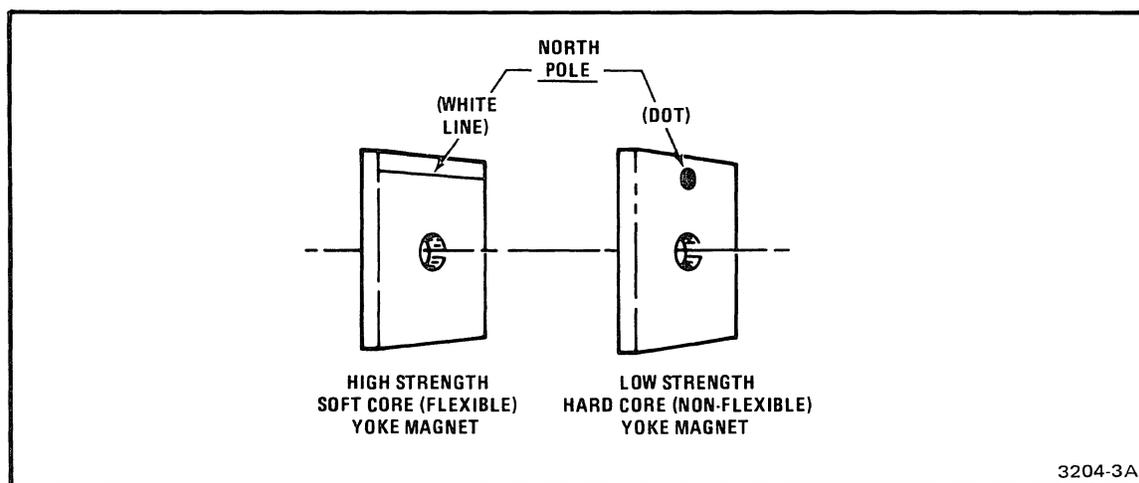


Figure 5-3. Yoke Magnet North Pole Identification.

WARNING

High voltages are present at the deflection yoke and are a potential shock hazard. Exercise caution when performing the following adjustment procedures.

PINCUSHION/BARREL CORRECTION (top, bottom, and sides)

Perform this adjustment if the raster exhibits the abnormal effects shown in Figure 5-4.

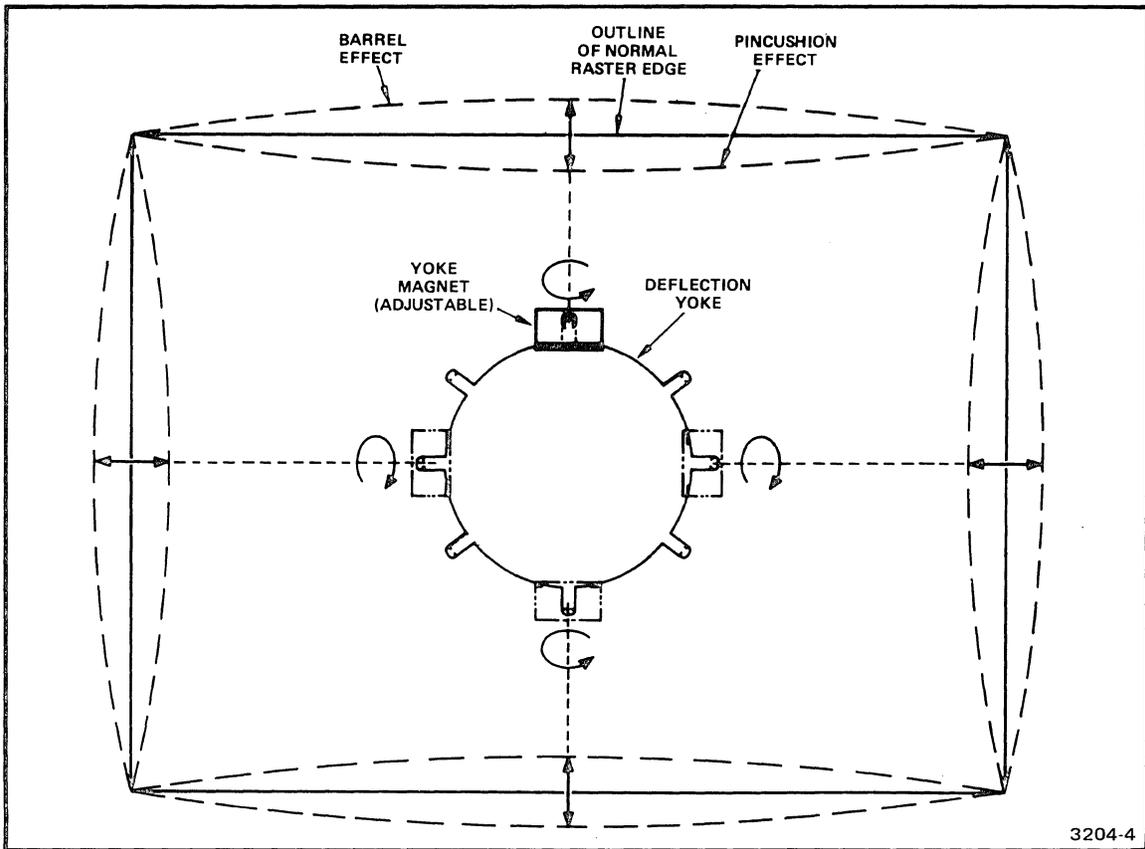


Figure 5-4. Pincushion/Barrel Effects and Adjustment.

1. Push a magnet on the yoke mounting pin as shown in Figure 5-4. A magnet should be placed only on the pin that corresponds to the affected area.
2. Rotate the magnet to obtain the desired raster, labeled 'NORMAL' on Figure 5-4.
3. If the desired raster cannot be obtained, add a second magnet to the yoke mounting pin. Both magnets must be aligned as shown in Figure 5-5, then rotated simultaneously.

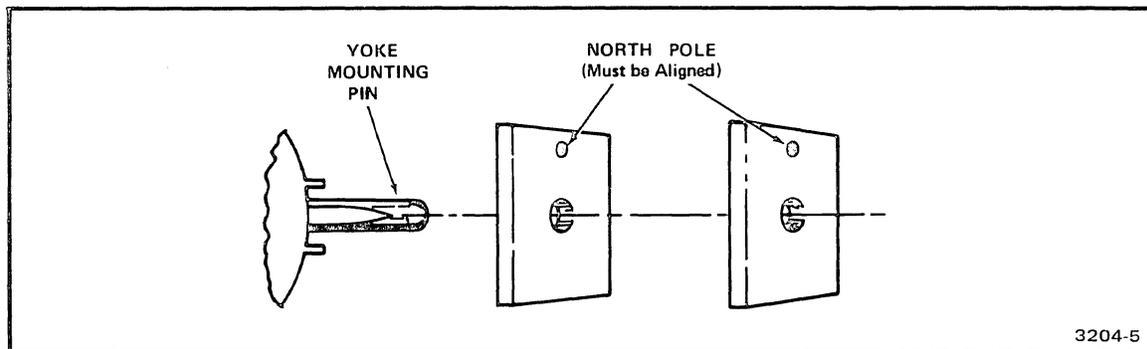


Figure 5-5. Installing a Second Yoke Magnet.

TRAPEZOIDAL CORRECTION (corners)

Perform this adjustment if the raster exhibits the abnormal effects shown in Figure 5-6.

1. Push a magnet onto the yoke mounting pin as shown in Figure 5-6. The magnet should be placed only on the pin that corresponds to the affected area.
2. Rotate the magnet to obtain the desired raster, labeled 'NORMAL' in Figure 5-6.
3. If the desired raster cannot be obtained, add a second magnet to the yoke mounting pin. Both magnets must be aligned as shown in Figure 5-5, then rotated simultaneously.

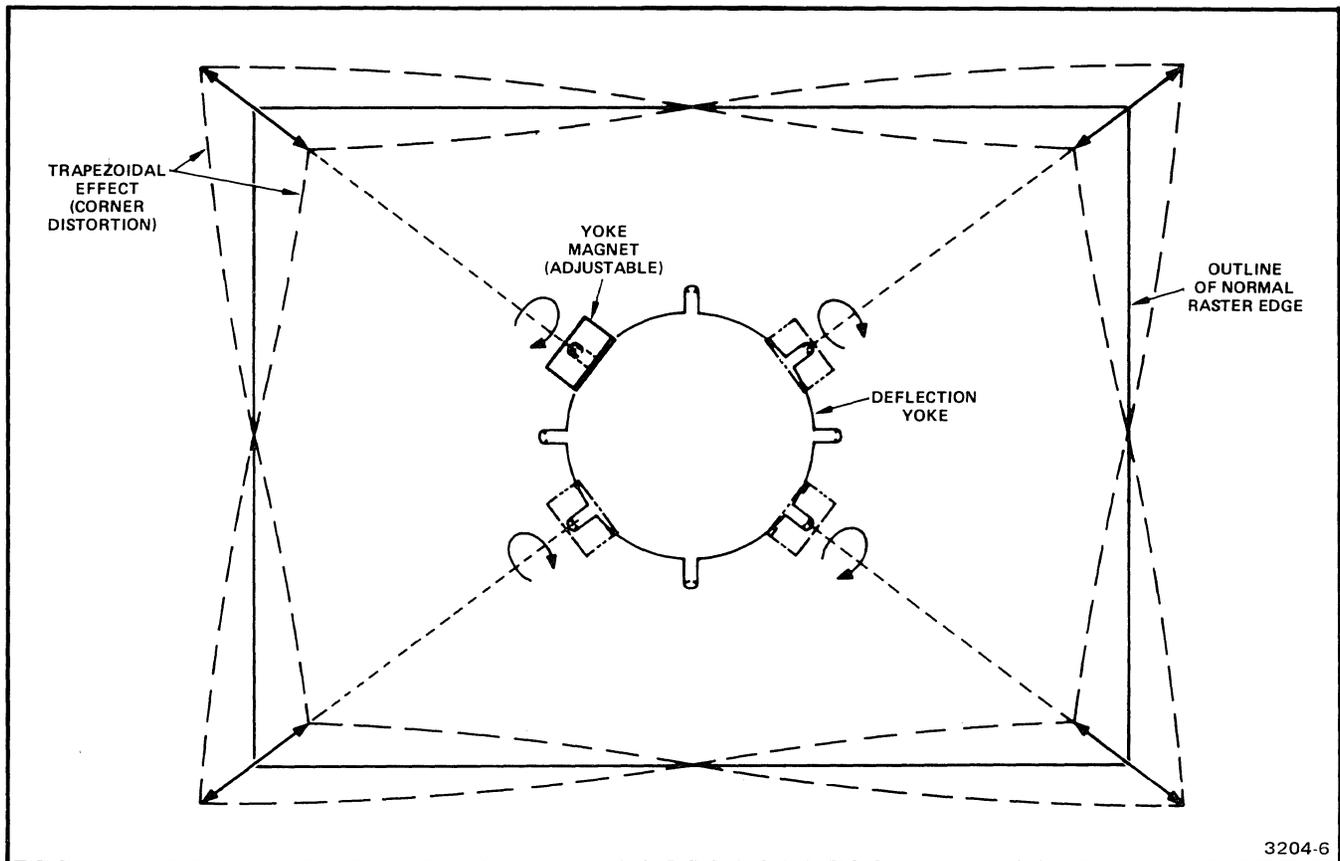


Figure 5-6. Trapezoidal Effect and Adjustment.

This completes the adjustment procedure for the Motorola Display Monitor. Turn off the power to the DAS mainframe.

1. Re-install the protective shields around the monitor.
2. Detach the extender cable from the monitor and re-install the monitor in the DAS Mainframe.
3. After the monitor is re-installed, reconnect the monitor to the Interconnect, J422.
4. Remove the Controller Module from the Main Extender board.
5. Remove the Main Extender board from the mainframe and re-insert the Controller in slot 0 of the DAS mainframe.
6. Put the side and top panels back on the DAS mainframe.

MAINTENANCE: GENERAL INFORMATION

REMOVING THE MONITOR (MONOCHROME ONLY)

WARNING

CRTs RETAIN HAZARDOUS VOLTAGES FOR LONG PERIODS OF TIME AFTER POWER-DOWN. The monitor should be serviced only by qualified personnel familiar with CRT servicing procedures and precautions.

USE EXTREME CAUTION WHEN HANDLING THE CRT. Rough handling may cause it to violently implode. Do not nick or scratch the glass or subject it to undue pressures during removal or installation. When handling the CRT, wear safety goggles and heavy gloves for protection.

Figure 6-1 calls out parts that must be disconnected or removed in order to remove the monitor.

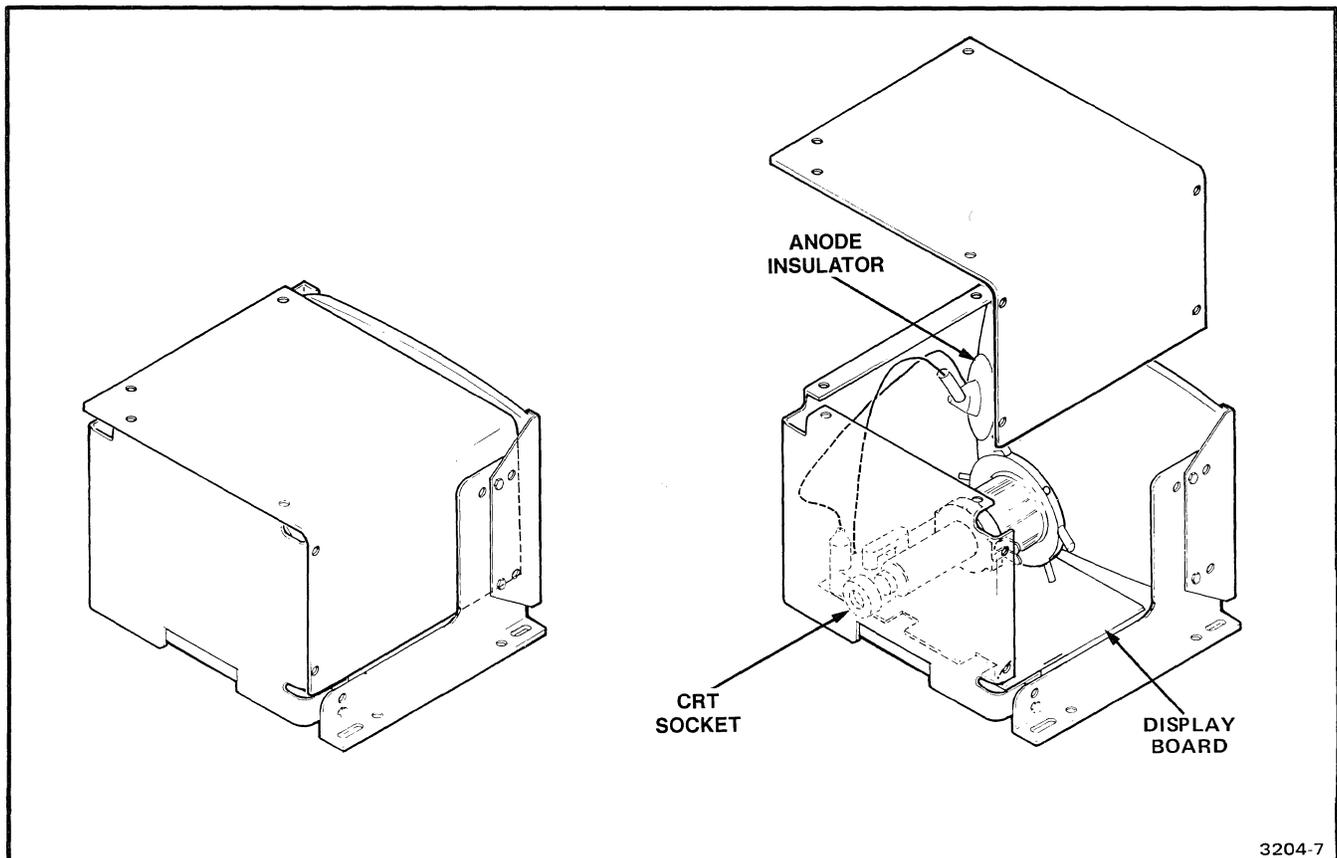


Figure 6-1. Monitor Parts for Disassembly.

1. Power down and unplug the DAS, then wait five minutes before proceeding to the next step.
2. Remove the top panel, the left side panel, the power supply cover, and the instrument module cover. Wait five minutes after the warning lamp on the capacitor bracket board stops flashing before proceeding to the next step.
3. Remove the front fan. (Refer to the *DAS 9100 Series Service Manual, Volume II* for specific instructions.)
4. Disconnect the ribbon cable connecting the monitor to the interconnect board at J422.
5. Remove the eight screws (four top, four left, 6-32 X 0.250) on the CRT top left frame. Remove the cover to expose the CRT circuits.

WARNING

CRTs RETAIN HAZARDOUS VOLTAGES FOR LONG PERIODS OF TIME AFTER POWER-DOWN. Before attempting any work inside the monitor, discharge the CRT by shorting the anode connection to chassis ground. When discharging, go from ground to anode.

6. Remove the four screws and lock washers (two front, 10-32 X 0.312; two rear, 10-32 X 0.312) securing the monitor to the bottom of the mainframe.
7. Slowly lift the monitor up and out, taking care not to jar the monitor on the mainframe.

REMOVING THE DISPLAY BOARD:

1. To remove the display board, the back and side frame of the monitor must be removed. Do this by removing the four screws (6-32 X 0.250), two on the right front side and one on each bottom rear corner.
2. Take note of the wire positions before pulling any connectors. The board is connected to the CRT yoke by four single connectors and to the CRT socket by five wires. Pull the CRT socket straight out, away from the end of the yoke.
3. Remove the anode connector from the CRT, located underneath the insulator. Using needle-nose pliers, squeeze the two prongs together and pull straight back away from the CRT.
4. Detach the ground wire from the frame.
5. Remove the four screws (6-32 X 0.312) located on each corner of the board and slide the board out.