

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:

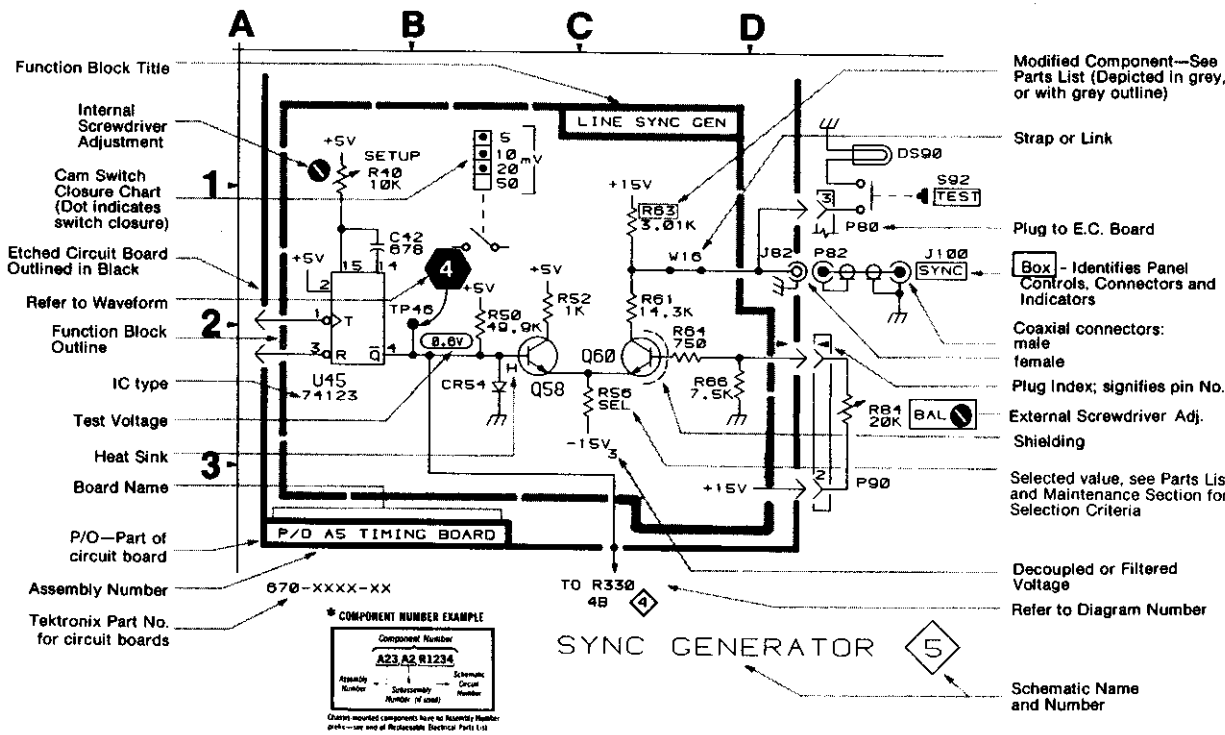
- Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω).

— 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 grid coordinates is provided for ease of locating a component. Only the components illustrated on the schematic diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry of a circuit board, the circuit board illustration may 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.



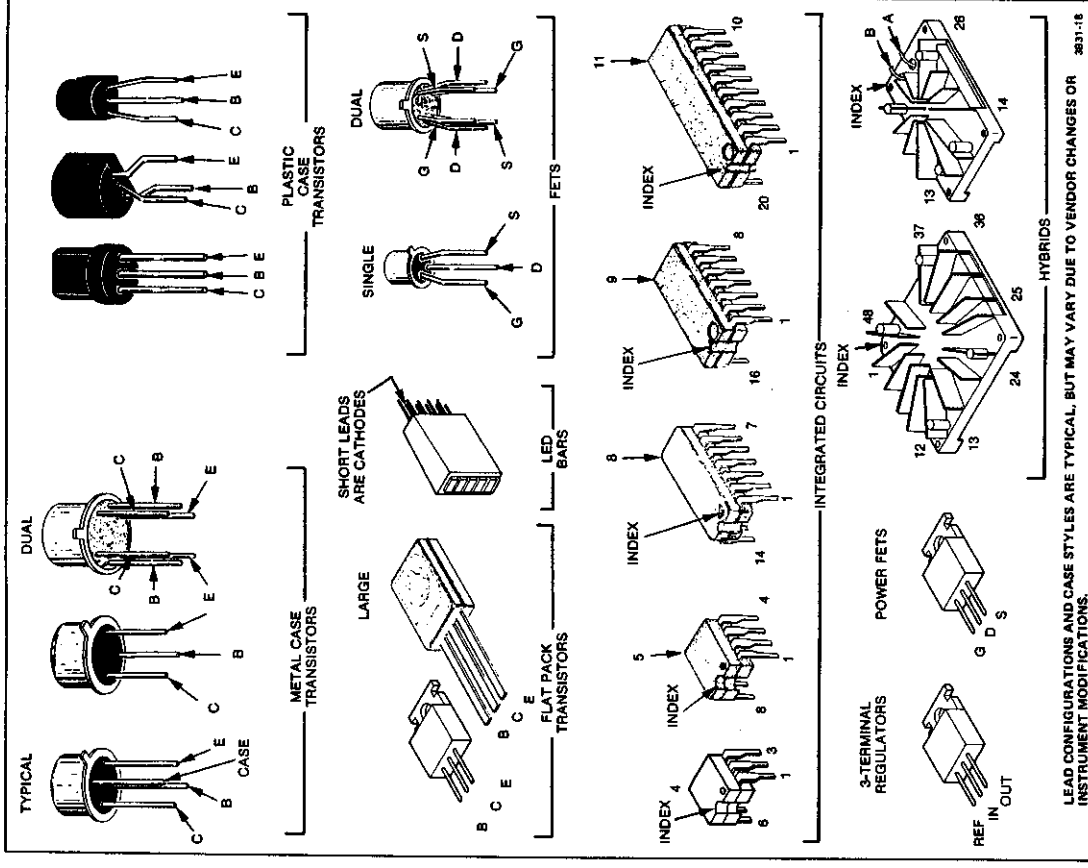
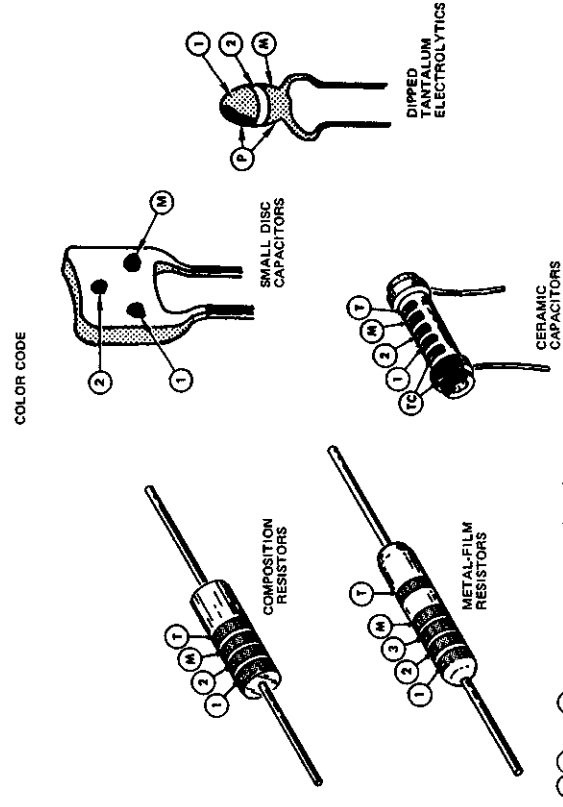


Figure 8-2. Semiconductor lead configurations.



1 2 and 3 - 1st, 2nd, and 3rd significant figures
 M - multiplier
 T - tolerance
 TC - temperature coefficient
 P - polarity and voltage rating
 T and/or TC color code may not be present on some capacitors

COLOR	SIGNIFICANT FIGURES	RESISTORS		CAPACITORS		DIPPED TANTALUM VOLTAGE RATING
		MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE	
BLACK	0	1	---	over 10 pF	under 10 pF	4 VDC
BROWN	1	10	±1%	---	±2 pF	6 VDC
RED	2	10 ² or 100	±2%	---	±0.1 pF	10 VDC
ORANGE	3	10 ³ or 1 K	±3%	---	---	15 VDC
YELLOW	4	10 ⁴ or 10 K	±4%	+100% -9%	---	20 VDC
GREEN	5	10 ⁵ or 100 K	±5%	±5%	±0.5 pF	25 VDC
BLUE	6	10 ⁶ or 1 M	±6%	---	---	35 VDC
VIOLET	7	---	±1/10%	---	---	50 VDC
GRAY	8	---	---	10 ⁻² or 0.01	±0.25 pF	---
WHITE	9	---	---	10 ⁻¹ or 0.1	±1 pF	3 VDC
GOLD	---	10 ⁻¹ or 0.1	±5%	---	---	---
SILVER	---	10 ⁻² or 0.01	±10%	---	---	---
NONE	---	---	±20%	---	±1 pF	---

(1861-20A) 2662-48

Figure 8-1. Color codes for resistors and capacitors.

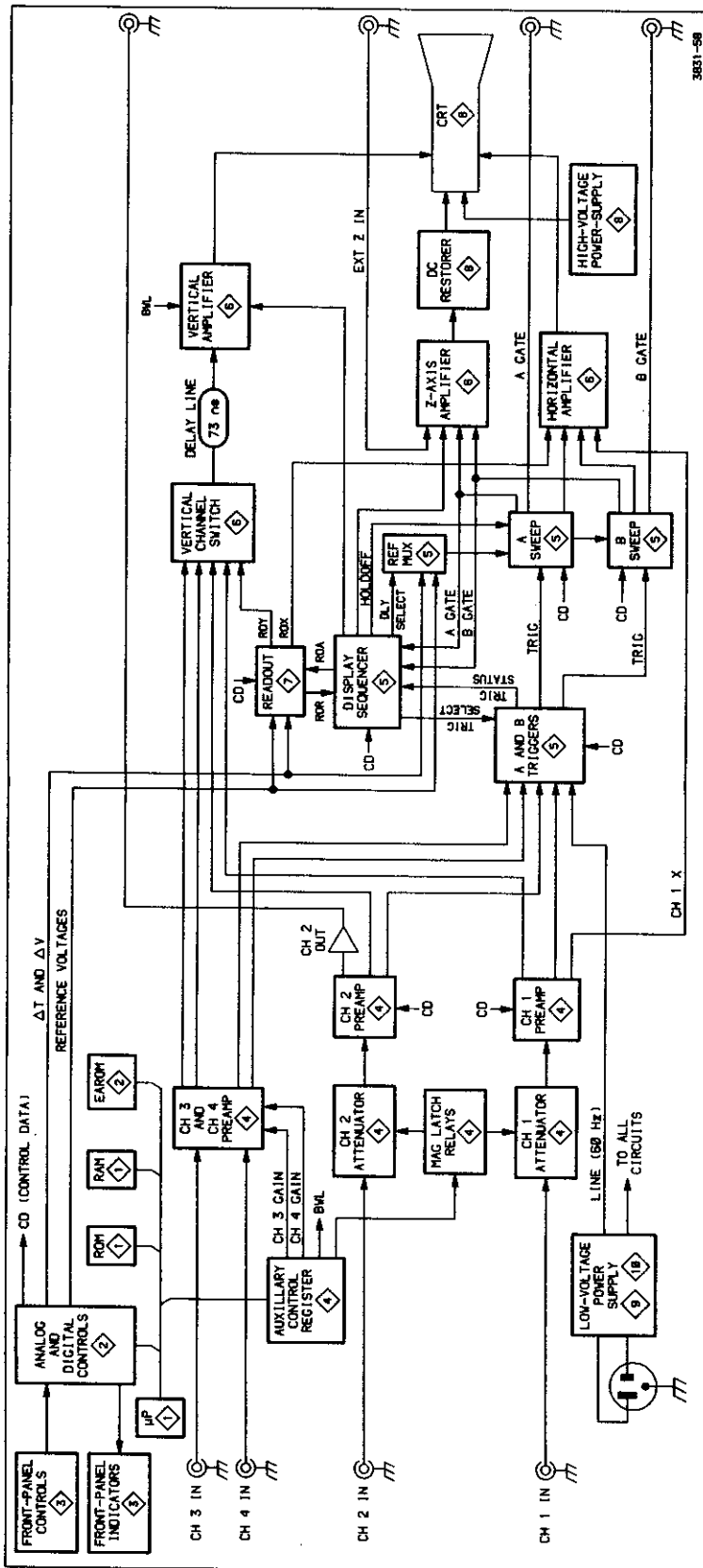
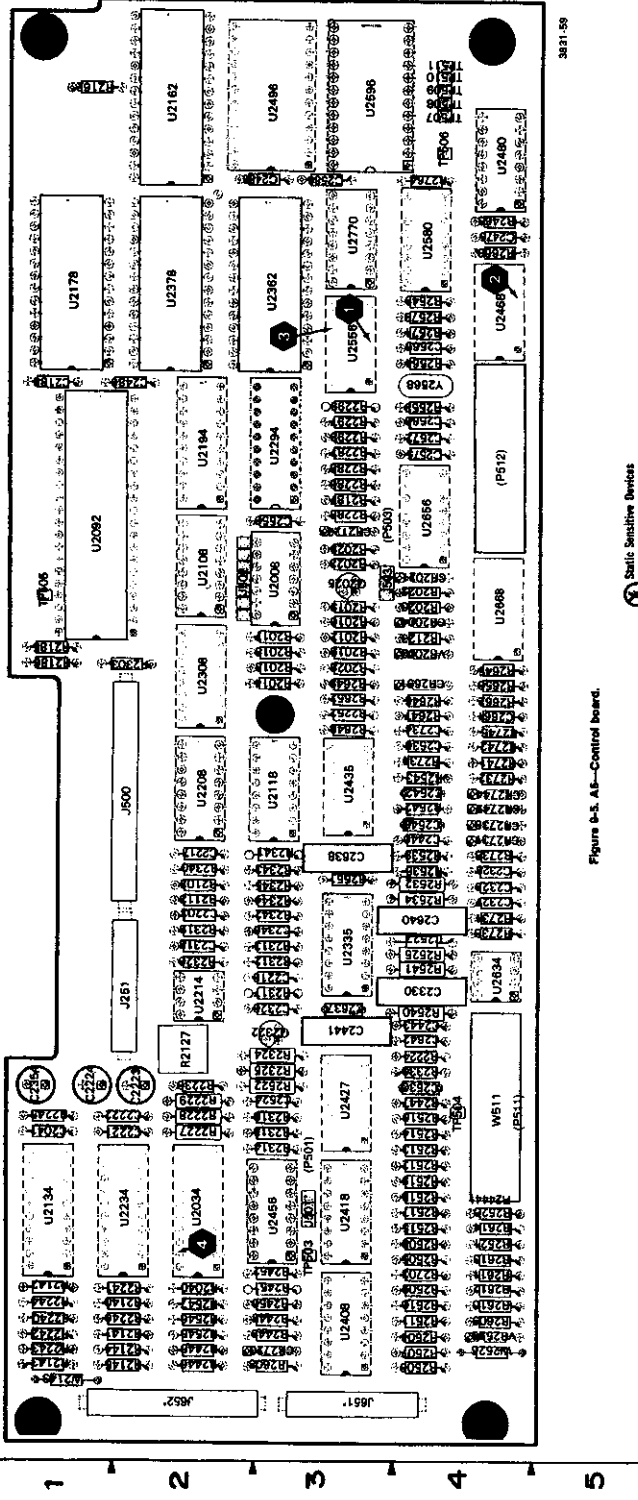


Figure 9-4. 2465 Moot diagram.



3831-59

Figure 9-3. AI-Control board.

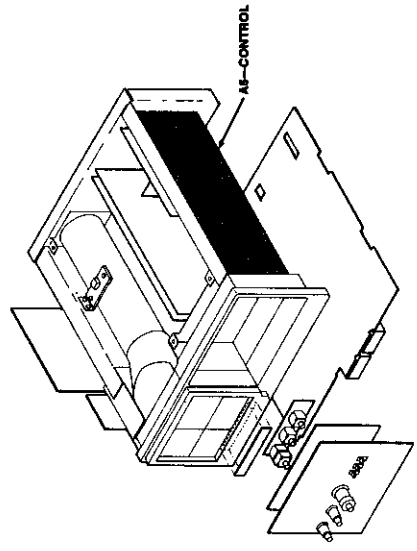
⊗ Static Sensitive Devices
See Maintenance Section

⊕ COMPONENT NUMBER EXAMPLE

Component Number	U2382		
Assembly Position	A3	B2	C1234
Original Component Number (if any)			

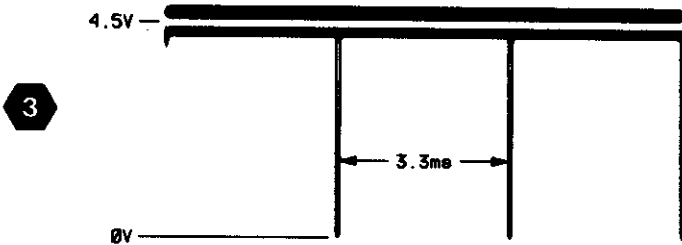
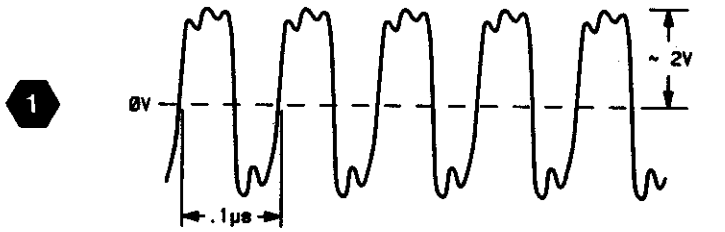
Dimensions shown are typical. Use appropriate electrical part, U.S. products only.

- * LABELED ON SOME BOARDS AS "P" VICE "J".
- () COMPONENTS WITHIN PARENTHESES MAY NOT BE LOCATED PRECISELY AS SHOWN BUT ARE NEAR THEIR INDICATED POSITION.
- † INDICATES COMPONENTS THAT WERE MANUALLY ADDED TO THE BOARD AS A RESULT OF MODIFICATION.



TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points whenever the instrument is running.



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A5—CONTROL BOARD

CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
C2041	12	P503	1	R2317	2	R2614	2	U2362	1
C2188	12	P511	2	R2319	2	R2645	1	U2362	12
C2203	1	P511	2	R2320	2	R2646	1	U2378	1
C2217	12	P511	2	R2324	2	R2647	1	U2378	12
C2218	12	P511	12	R2325	2	R2648	1	U2408	2
C2221	12	P512	1	R2330	2	R2649	1	U2408	12
C2222	2	P512	2	R2340	2	R2650	1	U2418	2
C2223	12	P512	2	R2341	2	R2652	1	U2418	12
C2224	2	P512	2	R2342	2	R2662	1	U2427	2
C2240	12	P512	12	R2343	2	R2663	1	U2427	2
C2318	2	Q2025	2	R2344	2	R2703	2	U2427	2
C2326	2	Q2322	2	R2345	2	R2730	2	U2427	2
C2327	2	R2012	2	R2444	2	R2731	2	U2427	12
C2328	12	R2013	2	R2445	2	R2732	2	U2435	1
C2329	2	R2014	2	R2446	2	R2734	2	U2435	2
C2330	2	R2015	2	R2447	2	R2735	2	U2435	2
C2346	12	R2016	2	R2448	2	R2741	2	U2435	2
C2354	12	R2017	2	R2449	2	R2742	2	U2435	12
C2440	12	R2018	2	R2450	2	R2745	2	U2456	2
C2441	2	R2019	2	R2451	2	R2764	1	U2456	12
C2443	2	R2020	2	R2452	2	TP503	2	U2468	1
C2475	12	R2022	2	R2463	1	TP504	2	U2468	1
C2485	12	R2023	2	R2504	2	TP505	1	U2468	12
C2486	1	R2028	2	R2505	2	TP506	1	U2480	1
C2524	2	R2029	2	R2506	2	TP507	1	U2480	12
C2527	12	R2040	2	R2507	2	TP508	12	U2496	1
C2530	2	R2103	2	R2508	2	TP509	1	U2496	12
C2536	2	R2113	2	R2509	2	TP510	1	U2556	1
C2540	2	R2123	2	R2510	2	TP511	1	U2556	1
C2542	2	R2127	2	R2511	2	U2008	2	U2556	1
C2550	1	R2140	2	R2512	2	U2008	2	U2556	1
C2565	1	R2141	2	R2513	2	U2034	2	U2556	1
C2566	1	R2142	2	R2514	2	U2034	12	U2556	1
C2572	1	R2143	2	R2515	2	U2092	1	U2556	12
C2575	12	R2144	2	R2516	2	U2092	12	U2580	1
C2586	12	R2145	2	R2517	2	U2108	2	U2580	12
C2637	12	R2162	1	R2518	2	U2108	12	U2596	1
C2638	2	R2185	1	R2519	2	U2118	1	U2596	12
C2640	2	R2188	1	R2520	2	U2118	2	U2634	2
C2642	12	R2187	1	R2521	2	U2118	2	U2634	2
C2661	1	R2224	2	R2522	2	U2118	2	U2634	12
C2734	12	R2227	2	R2525	2	U2118	2	U2656	1
CR2004	2	R2228	2	R2532	2	U2118	2	U2656	1
CR2021	2	R2229	2	R2534	2	U2118	2	U2656	1
CR2122	2	R2230	2	R2535	2	U2118	2	U2656	1
CR2651	1	R2241	2	R2539	2	U2134	2	U2656	12
CR2723	2	R2242	2	R2540	2	U2134	12	U2668	1
CR2731	2	R2243	2	R2541	2	U2162	1	U2668	12
CR2733	2	R2244	2	R2542	2	U2162	12	U2770	1
CR2742	2	R2245	2	R2543	2	U2178	1	U2770	12
CR2744	2	R2246	2	R2545	2	U2178	12	VR2003	2
J251	1	R2252	1	R2546	2	U2194	1	VR2526	2
J251	12	R2285	1	R2547	2	U2194	1	W511	2
J500	1	R2286	1	R2549	1	U2208	1	W511	2
J500	1	R2287	1	R2551	1	U2208	2	W511	2
J500	1	R2288	1	R2553	1	U2214	2	W511	12
J501	2	R2297	1	R2564	1	U2214	12	W512	1
J502	2	R2298	1	R2571	1	U2234	2	W512	2
J503	1	R2299	1	R2573	1	U2234	12	W512	2
J651	2	R2303	2	R2608	12	U2294	1	W512	2
J651	2	R2312	2	R2609	2	U2294	1	W512	12
J651	2	R2313	2	R2610	2	U2308	2	W2143	12
J652	2	R2314	2	R2611	2	U2308	12	W2526	12
J652	2	R2315	2	R2612	2	U2335	2	Y2568	1
P501	2	R2316	2	R2613	2	U2335	12		

PROCESSOR AND DIGITAL CONTROL DIAGRAM

1

ASSEMBLY A5								
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2203	6C	2D	R2299	9A	3H	U2194	7B	2H
C2486	6C	2H	R2483	4C	4J	U2194	9C	2H
C2550	6C	3G	R2549	4C	4J	U2208	7C	2E
C2565	4C	4H	R2551	5N	3E	U2294	7B	3H
C2566	4B	4H	R2553	4B	4H	U2294	9D	3H
C2572	3B	4H	R2564	4C	4H	U2362	8H	3J
C2661	6A	4F	R2571	3B	4J	U2378	8F	2J
			R2573	3B	4J	U2435C	6B	3E
CR2651	6B	4F	R2645	5D	4F	U2468A	4D	4J
			R2646	5B	4F	U2468B	2E	4J
J251	5A	2D	R2647	5B	4F	U2480	5G	4K
J500	1P	2E	R2648	5B	3F	U2496	8K	3K
J500	4A	2E	R2649	5C	3F	U2556A	4B	3J
J500	8P	2E	R2650	6C	4F	U2556B	4C	3J
J503	6B	3G	R2652	5A	3F	U2556C	4F	3J
			R2662	6P	4F	U2556D	3B	3J
P503	6B	3G	R2663	4G	4J	U2556E	3H	3J
P512	4P	4H	R2784	3D	4K	U2556F	3F	3J
						U2580	4K	4J
R2162	6H	1K	TP505	4E	1G	U2596	5M	3K
R2185	4B	1F	TP506	5G	4K	U2656A	6C	4G
R2186	5D	1F	TP507	5H	4K	U2656B	5N	4G
R2187	9B	3G	TP509	5H	4K	U2656C	3G	4G
R2252	7B	3F	TP510	5H	4K	U2656D	5N	4G
R2285	8A	3G	TP511	5H	4K	U2668	3H	4G
R2286	9A	3H				U2770	4H	3J
R2287	9B	3H	U2092	5D	1G			
R2288	8B	3H	U2118A	7B	3E	W512	7P	4H
R2287	9B	3H	U2162	6H	2K			
R2298	8A	3H	U2178	6F	1J	Y2588	4B	4H

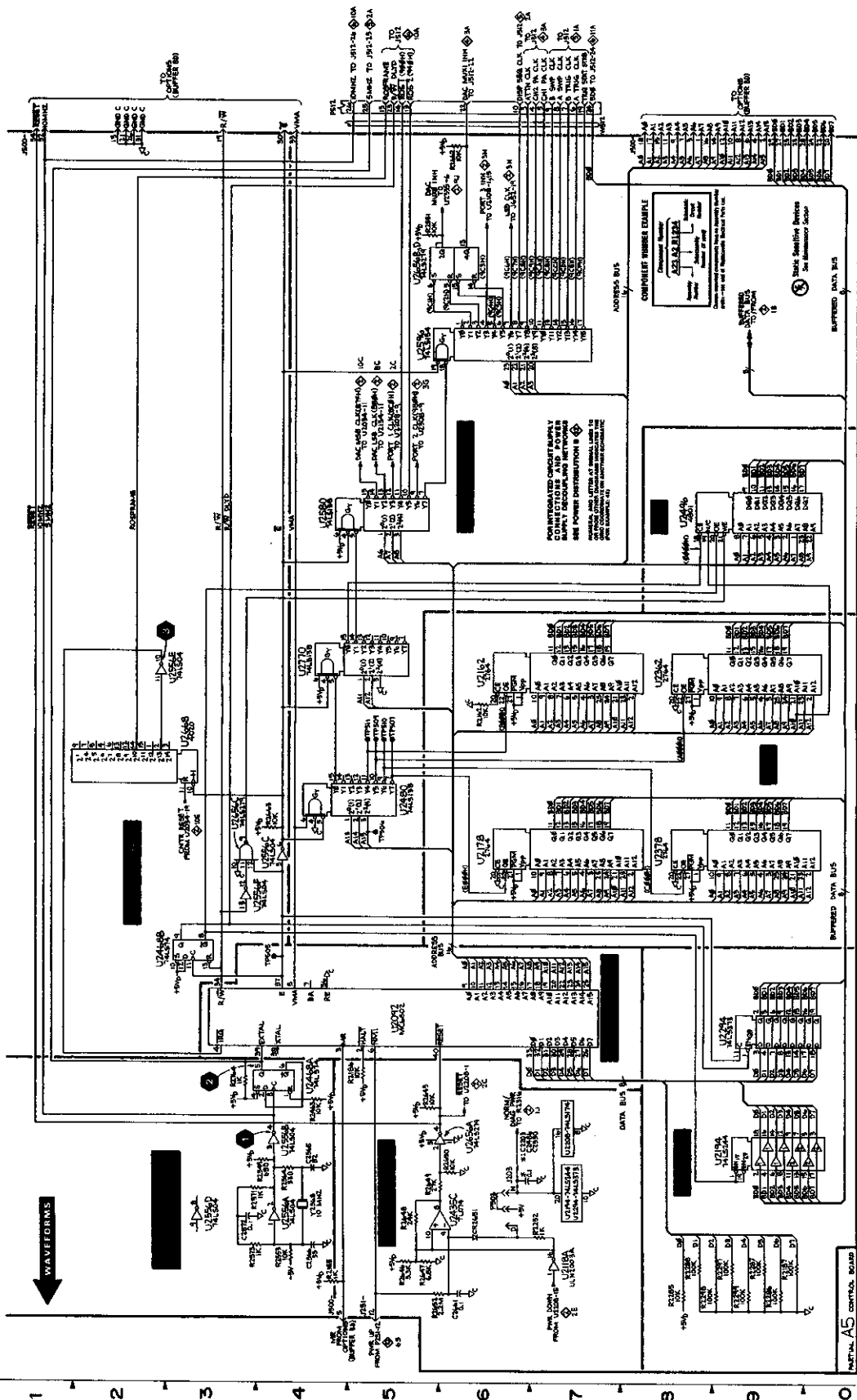
Partial A5 also shown on diagrams 2 and 12.

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

- | | |
|--|--|
| <p>ATTN CLK . . . attenuator clock
 A0 – A15 . . . address bits 0 – 15
 A000H . . . address block A000 hex
 BA . . . bus available
 BD0 – BD7 . . . buffered data bits 0 – 7
 C000H . . . address block C000 hex
 DAC MUX0 INH . . . DAC multiplexer 0 inhibit
 DAC MUX1 INH . . . DAC multiplexer 1 inhibit
 D0 – D7 . . . data bits 0 – 7
 E . . . enable
 \bar{E} . . . enable
 EXTAL . . . external crystal
 E000H . . . address block E000 hex
 GND C . . . virtual ground "C"
 IRQ . . . interrupt request
 LED CLK . . . LED clock
 MR . . . memory ready
 NMI . . . non-maskable interrupt
 PORT 3 INH . . . port 3 inhibit
 RE . . . RAM enable
 ROSFRAME . . . readout subframe</p> | <p>ROS1 (900H) . . . readout strobe 1 (address 0900 hex)
 ROS2 (940H) . . . readout strobe 2 (address 0940 hex)
 R/\bar{W} . . . read/write
 R/\bar{W} DLY'D . . . read/write delayed
 TRIG STAT STRB . . . trigger status strobe
 VMA . . . valid memory address
 XTAL . . . crystal
 0000H . . . address block 0000 hex
 8000H . . . address block 8000 hex
 9C1H – 9CFH . . . addresses 09C1 hex – 09CF hex</p> |
|--|--|

A Y B Y C Y D Y E Y F Y G Y H Y I Y J Y K Y L Y M Y N Y P Y S

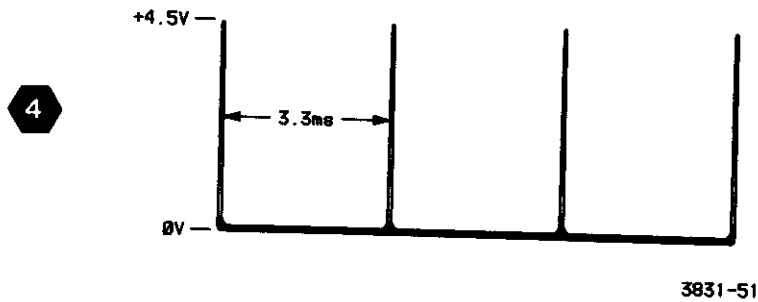


2465 PARTIAL AS CONTROL BOARD 2881-7L PROCESSOR AND DIGITAL CONTROL

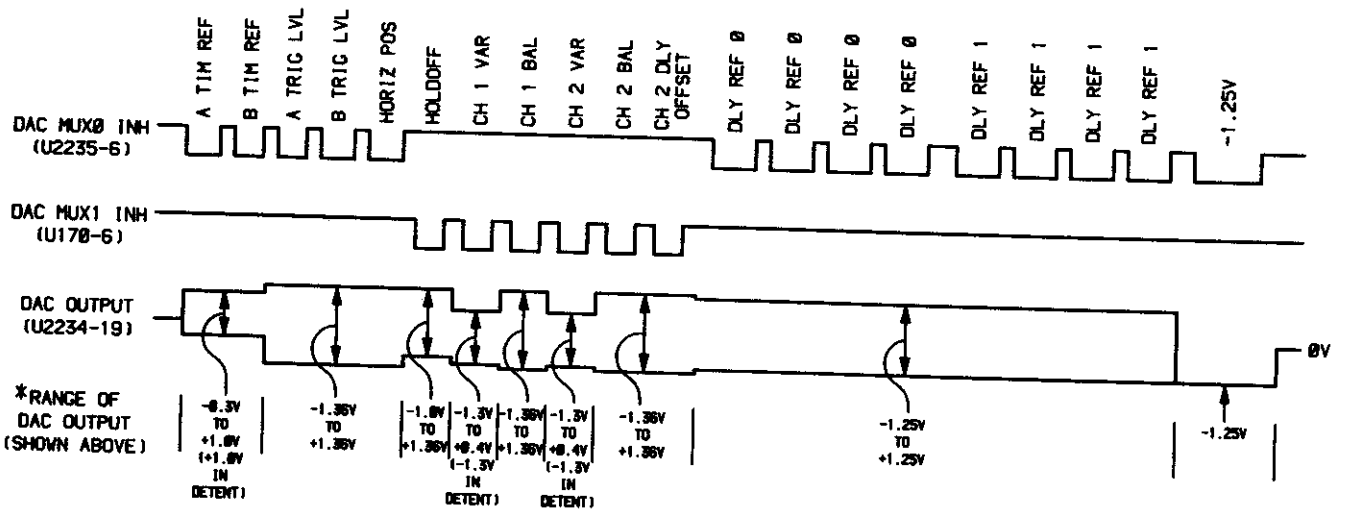
TEST WAVEFORM SETUP INFORMATION

The waveform below was obtained at the test point indicated on the accompanying schematic diagram. The waveform is representative of the signal that may be expected at the test point whenever the instrument is running.

Also shown below is an illustration depicting timing of the D to A Converter and the output ranges that may be expected as the DAC sets up the various analog reference voltages. Test point locations and setup information are called out on the illustration.



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*NOTE: AS ANY GIVEN CONTROL IS EXERCISED, THE CORRESPONDING PORTION OF THE DAC OUTPUT WAVEFORM SHOULD VARY WITHIN THE LIMITS INDICATED.

3831-19

WAVEFORMS

ANALOG CONTROL DIAGRAM

2

ASSEMBLY A5											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2222	8H	2C	R2018	2L	3G	R2444	5F	4B	R2732	9N	4E
C2224	8H	1C	R2017	2K	3F	R2445	5G	2A	R2734	9N	4F
C2318	4J	2D	R2018	3K	3F	R2446	5F	2A	R2735	9M	4E
C2326	5P	3D	R2019	2L	3G	R2447	6F	4C	R2741	9M	4F
C2327	8M	4E	R2020	3K	4G	R2448	6G	3B	R2742	10M	4F
C2329	8L	4E	R2022	2K	4G	R2449	6G	3A	R2745	10L	4F
C2330	6K	4D	R2023	2N	3G	R2450	6H	3B			
C2441	6L	3D	R2028	3L	3F	R2451	6H	3B	TP503	5P	3B
C2443	7N	4D	R2029	2N	3G	R2452	6H	3B	TP504	6P	4C
C2524	5N	3C	R2040	10C	2B	R2504	3E	4A			
C2530	6L	4C	R2103	4K	2E	R2505	2D	4B	U2008	2N	3G
C2536	8N	4F	R2113	2P	2E	R2506	3D	4A	U2008	3N	3G
C2540	9L	4E	R2123	2N	4F	R2507	3E	4A	U2034	9D	2B
C2542	9L	4E	R2127	8H	2C	R2508	3E	4B	U2108	2P	2G
C2638	9L	3E	R2140	8G	2B	R2509	3D	4B	U2118B	2K	3E
C2640	9K	4D	R2141	8D	2A	R2510	3E	4B	U2118C	3K	3E
			R2142	8D	1B	R2511	3D	4A	U2118D	2K	3E
CR2004	1K	4G	R2143	8G	1A	R2512	5E	4C	U2118E	2K	3E
CR2021	3K	4G	R2144	8E	2A	R2513	4D	4C	U2118F	3K	3E
CR2122	2P	3G	R2145	8E	2A	R2514	4D	4C	U2118G	2N	3E
CR2723	5P	3A	R2224	6G	4C	R2515	5D	4B	U2118	1L	3E
CR2731	9M	4E	R2227	8H	2C	R2516	5E	4C	U2134	8D	1B
CR2733	9N	4E	R2228	7H	2C	R2517	5E	4B	U2208	2D	2E
CR2742	9M	4E	R2229	7H	2C	R2518	5E	4B	U2214	5K	2D
CR2744	9L	4E	R2230	7G	2C	R2519	5D	4B	U2234	7J	2B
			R2241	8E	2B	R2520	5D	4B	U2308	3H	2F
J501	7H	3B	R2242	8E	1A	R2521	5D	4B	U2335	8K	3D
J502	2M	2G	R2243	8F	1A	R2522	5N	3C	U2408	4F	3A
J651	2B	3A	R2244	8F	1B	R2525	5N	4D	U2418	5F	3B
J651	5P	3A	R2245	8F	1C	R2532	7N	4E	U2427A	6M	3C
J651	8B	3A	R2246	8G	2A	R2534	7N	4E	U2427B	6L	3C
J652	3P	2A	R2303	4G	2F	R2535	8N	4E	U2427C	7N	3C
J652	5B	2A	R2312	2F	3D	R2539	8N	4E	U2427D	5N	3C
			R2313	4F	3D	R2540	7L	4D	U2435A	9M	3E
P501	7G	3B	R2314	2J	3C	R2541	7L	4D	U2435B	9L	3E
P511	4A	4C	R2315	2J	3C	R2542	9L	4E	U2435D	8N	3E
P511	6S	4C	R2316	2J	3C	R2543	9L	4E	U2456	5J	3B
P511	9A	4C	R2317	4J	3D	R2545	5G	2A	U2634A	7M	4D
P512	10S	4H	R2319	4J	2D	R2546	5H	2A	U2634B	8L	4D
P512	1A	4H	R2320	5J	2D	R2547	5H	2B			
P512	4S	4H	R2324	6K	3C	R2609	3D	4B	VR2003	1K	4F
			R2325	5J	3C	R2610	3D	4B	VR2526	6N	4A
Q2025	2N	3G	R2330	6L	4C	R2611	3D	4B			
Q2322	5P	3D	R2340	10N	2E	R2612	3E	4B	W511	10B	4C
			R2341	10P	3E	R2613	5D	4B	W511	5B	4C
R2012	2L	3F	R2342	10N	3D	R2614	6E	4B	W511	9P	4C
R2013	2K	3F	R2343	10P	3E	R2703	5P	4B	W512	10P	4H
R2014	3K	3F	R2344	10N	3E	R2730	8M	4D	W512	1B	4H
R2015	2L	3F	R2345	10P	3E	R2731	8L	4D	W512	5P	4H

Partial A5 also shown on diagrams 1 and 12.

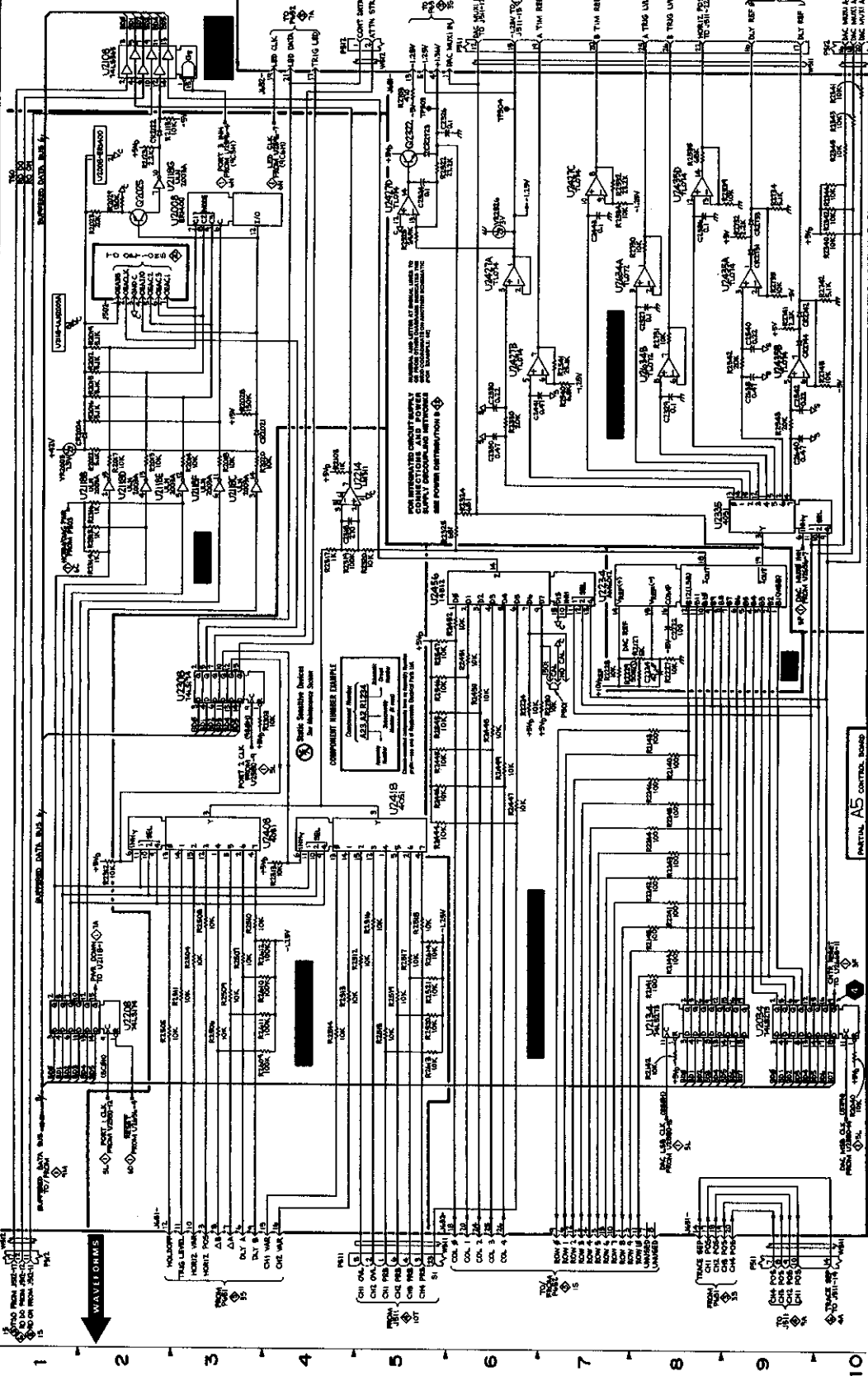
ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

- A TIM REF ... A timing reference
- ATTN STRB ... attenuator strobe
- BD0 - BD7 ... buffered data bits 0 - 7
- B TIM REF ... B timing reference
- CH1 OVL ... channel 1 overload
- CH2 OVL ... channel 2 overload
- CH1 PRB ... channel 1 probe
- CH2 PRB ... channel 2 probe
- CH3 PRB ... channel 3 probe
- CH4 PRB ... channel 4 probe

- CONT DATA ... control data
- DAC MUX0 INH ... DAC multiplexer 0 inhibit
- DAC MUX1 A0 ... DAC multiplexer 1, address bit 0
- DAC MUX1 A1 ... DAC multiplexer 1, address bit 1
- DAC MUX1 A2 ... DAC multiplexer 1, address bit 2
- DAC MUX1 IN ... DAC multiplexer input
- GND C ... virtual ground "C"
- OEA35 ... option EAROM +35 volt
- OEACLK ... option EAROM clock
- OEAI/O ... option EAROM input/output
- OEAC1 ... option EAROM mode code, bit 1
- OEAC2 ... option EAROM mode code, bit 2
- OEAC3 ... option EAROM mode code, bit 3
- PORT 3 INH (9C3H) ... port 3 inhibit
- RO DO ... readout data out
- RO ON ... readout on
- SI ... scope identification
- TSO ... trigger status output

A I B I C I D I E I F I G I H I J I K I L I M I N I P I S



2465

REV OCT 1985

PARTIAL A5 CONTROL BOARD

ANALOG CONTROL

WAVEFORMS

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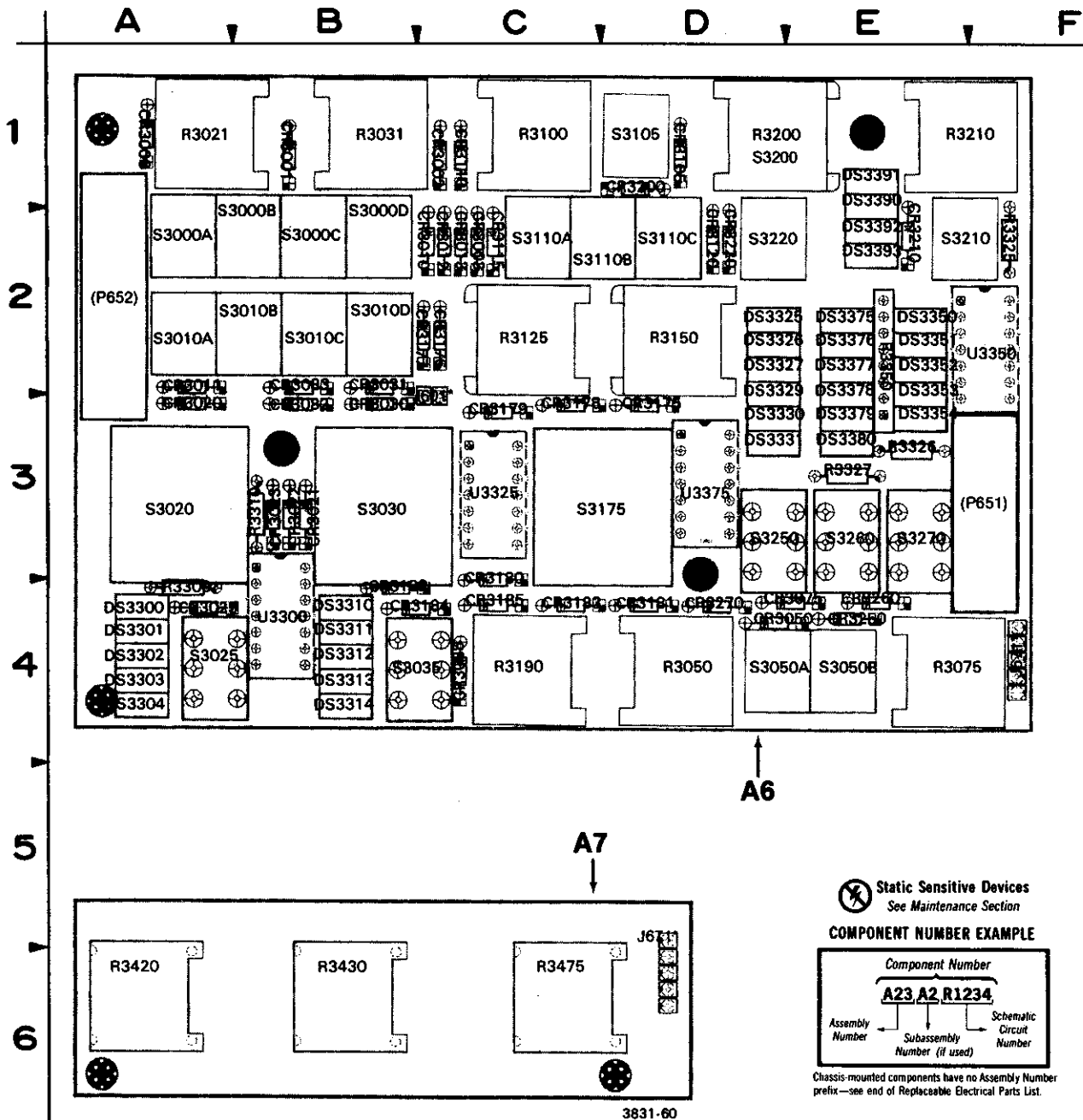


Figure 9-6. A6—Front Panel and A7—Front Panel Variable boards.

* LABELED ON SOME BOARDS AS "P" VICE "J".

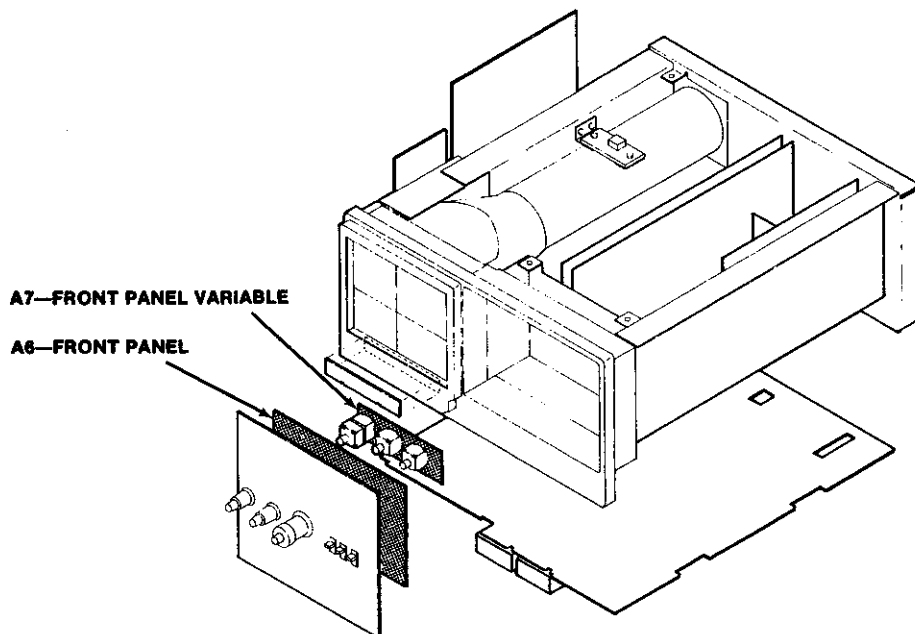
() COMPONENTS WITHIN PARENTHESES MAY NOT BE LOCATED PRECISELY AS SHOWN BUT ARE NEAR THEIR INDICATED POSITION.

ALL COMPONENTS MOUNTED ON A7—FRONT PANEL VARIABLE CIRCUIT BOARD ARE SHOWN ON SCHEMATIC DIAGRAM 3.

FRONT PANEL VARIABLE CIRCUIT BOARD & FRONT PANEL CIRCUIT VIEW FIG. 9-6, -7

A6—FRONT PANEL BOARD

CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
CR3000	3	CR3200	3	DS3392	3	S3010	3
CR3001	3	CR3210	3	DS3393	3	S3010	3
CR3002	3	CR3220	3	J601	3	S3010	3
CR3003	3	CR3250	3	J671	3	S3010	3
CR3010	3	CR3260	3	P651	3	S3020	3
CR3011	3	CR3270	3	P651	12	S3025	3
CR3012	3	DS3300	3	P652	3	S3030	3
CR3013	3	DS3301	3	P652	3	S3035	3
CR3020	3	DS3302	3	P652	12	S3050	3
CR3021	3	DS3303	3	R3021	3	S3050	3
CR3022	3	DS3304	3	R3031	3	S3105	3
CR3023	3	DS3310	3	R3050	3	S3110	3
CR3025	3	DS3311	3	R3075	3	S3110	3
CR3030	3	DS3312	3	R3100	3	S3110	3
CR3031	3	DS3313	3	R3125	3	S3175	3
CR3032	3	DS3314	3	R3150	3	S3175	3
CR3033	3	DS3325	3	R3190	3	S3200	3
CR3035	3	DS3326	3	R3200	3	S3210	3
CR3050	3	DS3327	3	R3210	3	S3220	3
CR3075	3	DS3329	3	R3300	3	S3250	3
CR3105	3	DS3330	3	R3310	3	S3260	3
CR3110	3	DS3331	3	R3325	3	S3270	3
CR3115	3	DS3350	3	R3326	3	U3300	3
CR3120	3	DS3351	3	R3327	3	U3300	12
CR3175	3	DS3352	3	R3350	3	U3325	3
CR3176	3	DS3353	3	R3350	3	U3325	12
CR3177	3	DS3354	3	R3350	3	U3350	3
CR3178	3	DS3375	3	R3350	3	U3350	12
CR3179	3	DS3376	3	R3350	3	U3375	3
CR3180	3	DS3377	3	R3350	3	U3375	12
CR3181	3	DS3378	3	R3350	3	W651	3
CR3182	3	DS3379	3	S3000	3	W651	12
CR3183	3	DS3380	3	S3000	3	W652	3
CR3184	3	DS3390	3	S3000	3	W652	3
CR3185	3	DS3391	3	S3000	3	W652	12



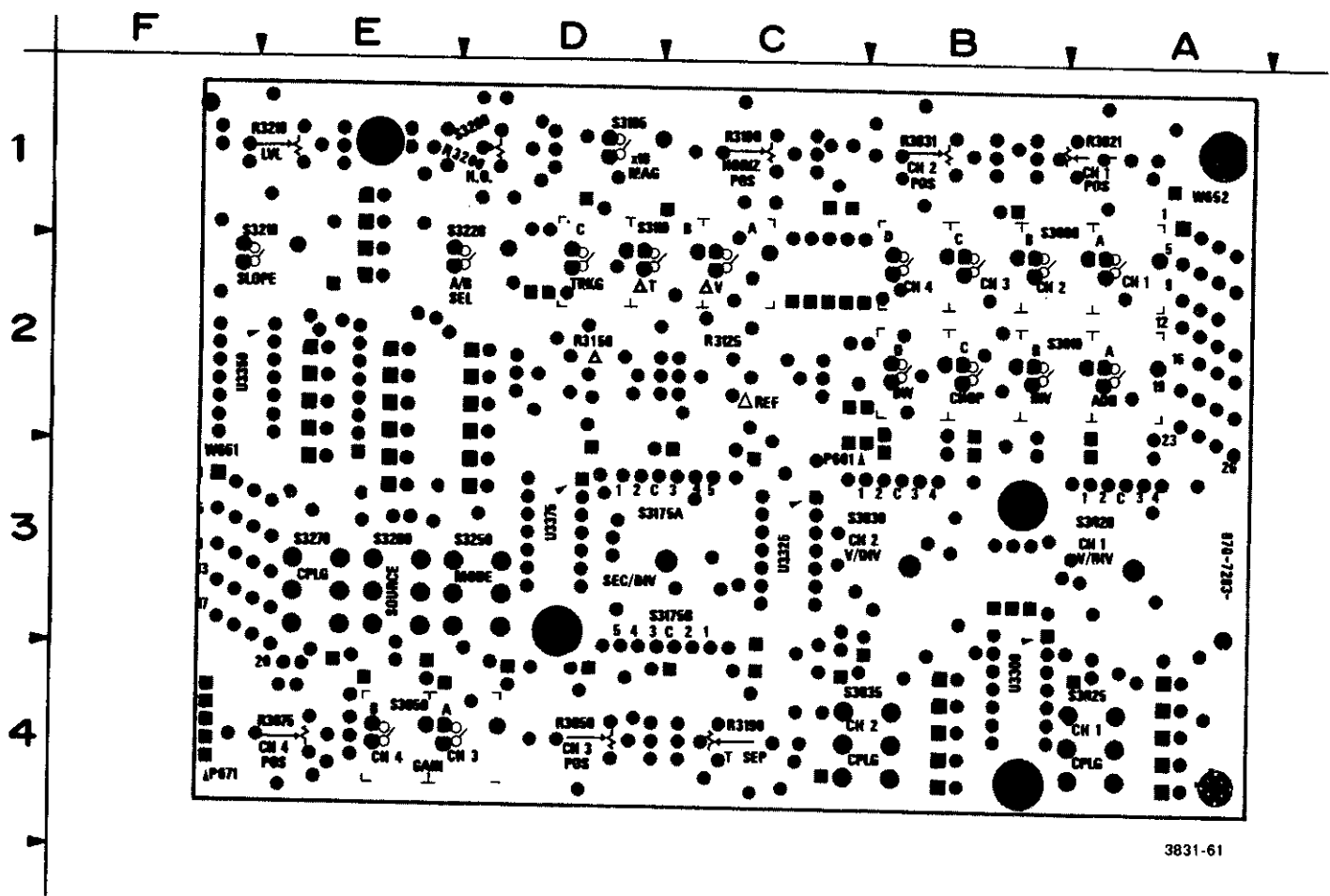
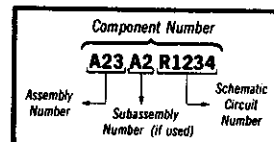


Figure 9-7. Circuit view of A6—Front Panel.

 **Static Sensitive Devices**
See Maintenance Section

COMPONENT NUMBER EXAMPLE



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

FRONT PANEL CONTROLS DIAGRAM



ASSEMBLY A6											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR03000	2J	1A	CR3200	3J	1D	DS3391	10P	1E	S3000B	3K	2B
CR3001	2K	1B	CR3210	4N	2E	DS3392	8L	2E	S3000C	3M	2B
CR3002	2M	1C	CR3220	5L	2D	DS3393	7F	2E	S3000D	3N	2B
CR3003	2N	2C	CR3250	5K	4E				S3010A	3L	2A
CR3010	2L	2C	CR3260	6J	4E	J601	5D	3C	S3010B	3D	2B
CR3011	3D	2A	CR3270	2B	4D	J671	7P	4F	S3010C	3K	2B
CR3012	3K	2C							S3010D	3L	2B
CR3013	3L	2C	DS3300	6B	4A	P651	3S	3F	S3020	3D	3A
CR3020	3B	3A	DS3301	6C	4A	P652	1S	2A	S3025	1B	4A
CR3021	3B	3B	DS3302	6C	4A	P652	7A	2A	S3030	4D	3B
CR3022	3B	3B	DS3303	7C	4A				S3035	2C	4B
CR3023	3C	3B	DS3304	7D	4A	R3021	3P	1A	S3050A	2B	4D
CR3025	2C	4A	DS3310	7D	4B	R3031	4P	1B	S3050B	2A	4E
CR3030	5B	3B	DS3311	7E	4B	R3050	4P	4D	S3105	4J	1D
CR3031	5B	2B	DS3312	7E	4B	R3075	5P	4E	S3110A	4M	2C
CR3032	5B	3B	DS3313	7E	4B	R3100	5P	1C	S3110B	4L	2C
CR3033	5C	2B	DS3314	7F	4B	R3125	5P	2C	S3110C	4K	2D
CR3035	2C	4C	DS3325	8H	2D	R3150	6P	2D	S3175A	3H	3C
CR3050	2C	4D	DS3326	8H	2D	R3190	3P	4C	S3175B	5H	3C
CR3075	2B	4D	DS3327	8G	2D	R3200	6P	1D	S3200	3J	1D
CR3105	4J	1D	DS3329	7G	2D	R3210	6P	1E	S3210	4N	2E
CR3110	4M	1C	DS3330	8J	3D	R3300	6D	4A	S3220	5L	2D
CR3115	4L	2C	DS3331	8J	3D	R3310	7F	3B	S3250	5K	3D
CR3120	4K	2D	DS3350	8J	2E	R3325	8L	2F	S3260	5J	3E
CR3175	2F	3D	DS3351	8K	2E	R3326	9N	3E	S3270	1A	3E
CR3176	2F	2C	DS3352	8K	2E	R3327	9P	3E			
CR3177	2F	2C	DS3353	8L	2E	R3350A	9N	2E	U3300	8B	4B
CR3178	2G	3C	DS3354	8L	3E	R3350B	9M	2E	U3325	9E	3C
CR3179	2G	3C	DS3375	9M	2E	R3350C	8M	2E	U3350	9H	2F
CR3180	5F	3C	DS3376	9M	2E	R3350D	7J	2E	U3375	10L	3D
CR3181	6F	4D	DS3377	9N	2E	R3350E	10P	2E			
CR3182	6F	4B	DS3378	9N	2E	R3350F	7G	2E	W651	8S	3F
CR3183	6G	4C	DS3379	9N	3E	R3350G	7M	2E	W652	10A	2A
CR3184	6G	4B	DS3380	9P	3E				W652	3S	2A
CR3185	5C	4C	DS3390	7G	1E	S3000A	3J	2A			

Partial A6 also shown on diagram 12.

ASSEMBLY A7											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J671	7N	5D	R3420	7M	6A	R3475	8M	6C			
			R3430	7M	6B						

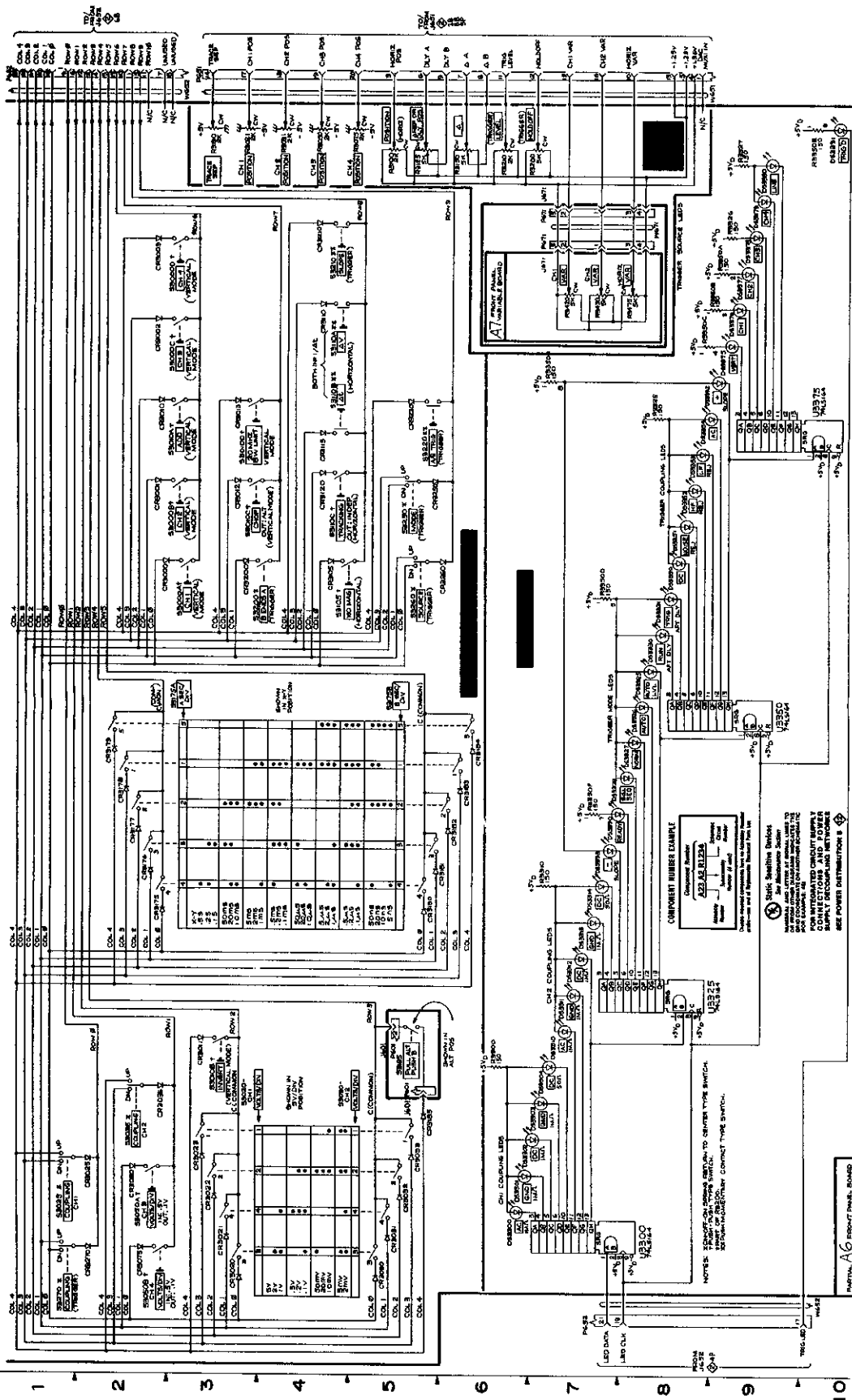
CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
P601	5D	CHASSIS	S3185	5D	CHASSIS	W671	8N	CHASSIS			
P671	7N	CHASSIS									

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

- CH1 VAR . . . channel 1 variable
- CH2 VAR . . . channel 2 variable
- DAC MUX1 IN . . . DAC multiplexer 1 input
- HORIZ VAR . . . horizontal variable

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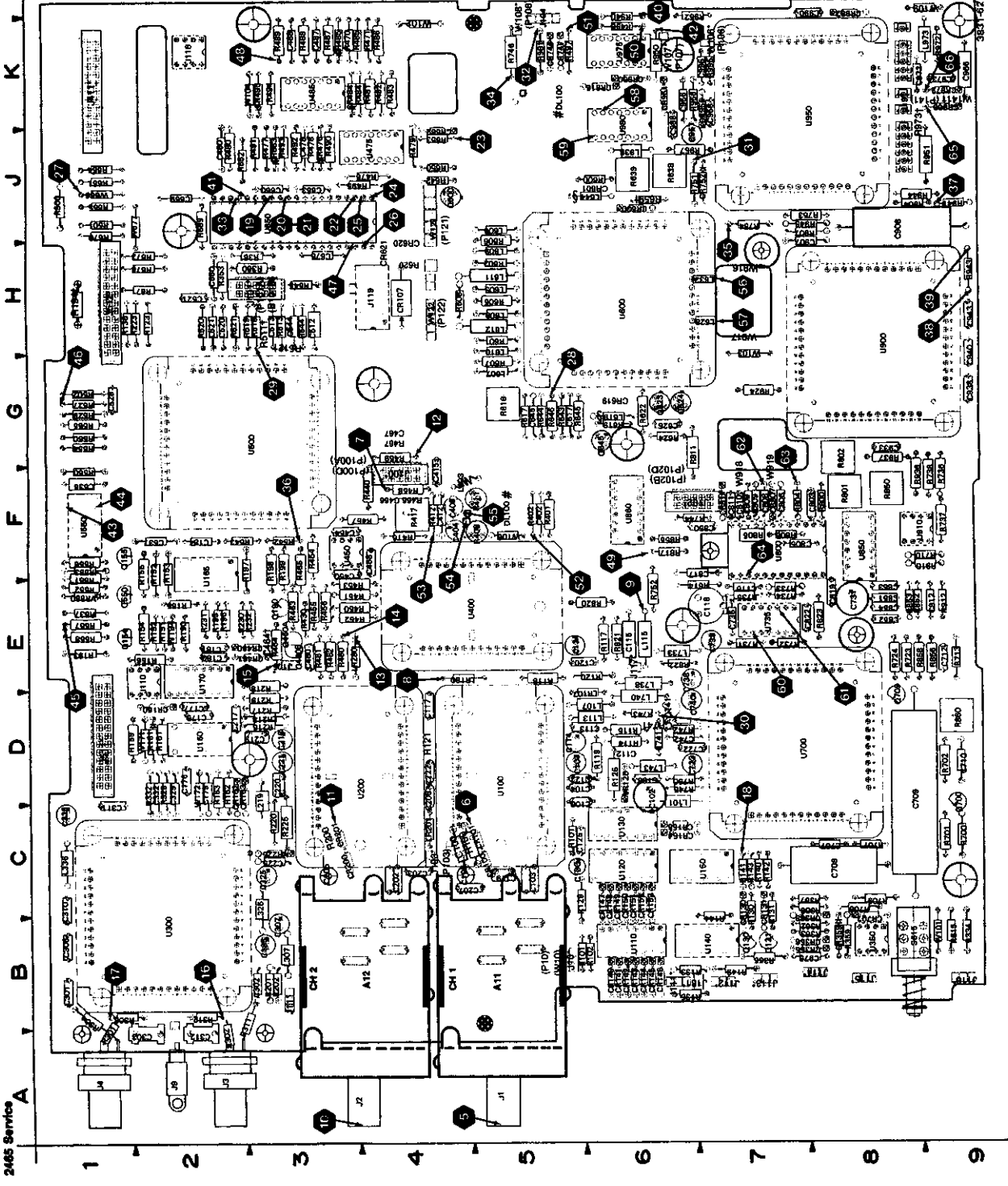


FRONT PANEL CONTROLS

2465

2465

2465



2465 Service A

1 2 3 4 5 6 7 8 9

A B C D E F G H I J K

AT-MARK AS-SCALE ILLUMINATION FIG. 3-3

CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
R527	5	R811	11	U485	6
R529	5	R817	6	U500	11
R537	5	R820	6	U550	5
R542	5	R821	6	U550	5
R543	5	R822	6	U550	5
R544	5	R823	6	U550	5
R545	5	R850	6	U550	5
R550	5	R852	5	U800	6
R551	5	R853	5	U800	11
R552	5	R855	6	U850	5
R553	5	R856	6	U850	11
R554	5	R858	6	U700	5
R555	5	R860	6	U700	11
R556	5	R904	5	U735	6
R557	5	R907	5	U735	6
R558	5	R910	5	U735	6
R560	5	R912	5	U735	6
R600	6	R924	5	U735	6
R601	6	R936	5	U800	6
R602	6	R937	5	U800	11
R605	6	R940	5	U850	5
R606	6	R941	5	U850	5
R607	6	R943	5	U850	6
R608	6	R944	5	U850	11
R614	6	R945	5	U860	5
R615	6	R950	5	U860	5
R617	6	R951	11	U860	6
R618	6	R952	5	U860	11
R619	6	R956	6	U900	5
R620	6	R957	6	U900	11
R622	6	R972	6	U910	5
R624	6	R973	6	U910	5
R638	6	R981	5	U910	11
R639	6	R995	6	U950	6
R642	6	S615	6	U950	11
R643	5	U100	4	U975	5
R644	5	U100	11	U975	5
R645	5	U110	4	U975	6
R646	5	U110	11	U975	6
R650	5	U120	4	U975	11
R651	5	U120	11	U980	5
R652	5	U130	4	U980	5
R653	5	U130	4	U980	6
R654	5	U130	4	U980	11
R655	5	U130	4	U980	11
R659	6	U130	4	VR125	11
R669	5	U130	4	VR225	11
R670	5	U130	4	VR550	5
R671	5	U130	11	W101	11
R672	5	U140	4	W102	11
R678	5	U140	11	W103	11
R700	11	U150	4	W104	11
R701	11	U150	11	W105	11
R702	11	U160	4	W106	6
R707	5	U160	4	W107	5
R708	5	U160	4	W108	5
R709	5	U160	4	W109	11
R710	5	U160	11	W121	11
R713	5	U165	4	W121	11
R723	5	U165	5	W122	5
R724	5	U165	5	W122	11
R731	6	U165	5	W141	6
R732	6	U165	11	W141	6
R733	6	U170	4	W171	4
R734	6	U170	11	W172	4
R735	6	U200	4	W194	4
R736	5	U200	11	W686	5
R737	5	U300	4	W677	5
R738	5	U300	11	W916	6
R741	5	U350	5	W917	6
R742	5	U350	5	W918	6
R743	5	U350	11	W919	6
R744	5	U400	6		
R745	5	U400	11		
R746	5	U450	4		
R750	5	U450	4		
R751	5	U450	11		
R752	5	U475	6		
R753	5	U475	6		
R754	5	U475	6		
R800	6	U475	6		
R801	6	U475	6		
R802	6	U485	6		
R804	6	U485	6		
R805	6	U485	6		
R806	6	U485	6		
R809	6				

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

APO+ . . . auxiliary pickoff, noninverting
ATTN CLK . . . attenuator clock
ATTN STRB . . . attenuator strobe
BDCA . . . bypass delay comparator A
BDCB . . . bypass delay comparator B
BPO+ . . . second auxiliary pickoff, noninverting
BWL . . . bandwidth limit
BYP . . . bypass
CC . . . control clock
CD . . . control data
CH1 OVL . . . CH1 overload
CH2 OVL . . . CH2 overload
CH1 PA CLK . . . CH1 preamp clock
CH2 PA CLK . . . CH2 preamp clock
CH1 PRB - CH4 PRB . . . CH1 - CH4 probe encoding
CONT DATA . . . control data
CTC . . . capacitor, timing compensation
DAC MUX1 INH . . . DAC multiplexer 1 inhibit
DAC MUX1 A0 . . . DAC multiplexer 1, address bit 0
DAC MUX1 A1 . . . DAC multiplexer 1, address bit 1
DAC MUX1 A2 . . . DAC multiplexer 1, address bit 2
DAC MUX1 IN . . . DAC multiplexer 1 input
DO+ . . . display output, noninverting
DO- . . . display output, inverting
DON3 . . . display output, negative CH 3
DOP3 . . . display output, positive CH 3
DON4 . . . display output, negative CH 4
DOP4 . . . display output, positive CH 4
GA3 . . . gain 3
GA4 . . . gain 4
SI . . . scope identification bit
SIL . . . slow intensity limit
TPO- . . . trigger pickoff, inverting
TPO3 . . . CH3 trigger pickoff
TPO4 . . . CH4 trigger pickoff
TPT- . . . trigger pickoff reverse termination
TXY . . . triggered X-Y

TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points when the following setup conditions are observed. Any change(s) from the given setup conditions required to produce a given waveform are noted with that waveform illustration.

2465 SETUP

Connect a 200-mV, 1-kHz squarewave signal from a signal generator to the CH 1 and CH 2 inputs of the 2465 via a BNC T-connector, a 50-ohm BNC cable and a dual-input coupler.

TRIGGER		
MODE		AUTO
SOURCE		VERT
COUPLING		DC

All other control settings are irrelevant.

Set:

VERTICAL MODE	CH 1
Input Coupling	
CH 1 and CH 2	1 M Ω DC
VOLTS/DIV	
CH 1 and CH 2	50 mV
A and B SEC/DIV	0.5 ms (knobs locked)

TEST OSCILLOSCOPE SETUP

Connect the 200-mV, 1-kHz squarewave from the BNC T-connector to the External Trigger input of the test oscilloscope using a 50-ohm BNC cable. Externally trigger the test oscilloscope on the rising edge of the 1-kHz signal and, using a X10 probe with the test oscilloscope, set its Volts/Div and Time/Div ranges as required to obtain the indicated displays.

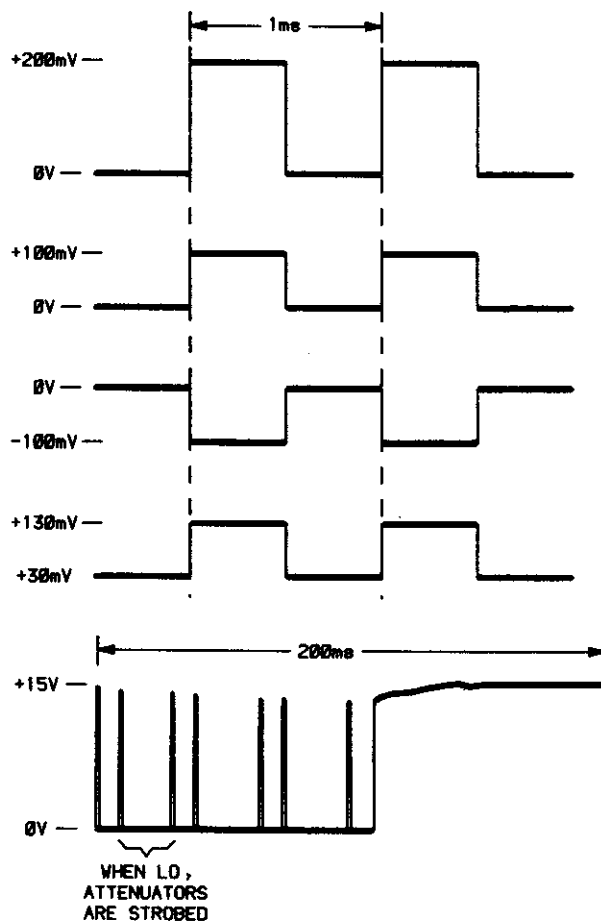
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7 12 14 15

8 13

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ATTENUATORS AND PREAMPS DIAGRAM



ASSEMBLY A1											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C100	1H	4C	CR148	7G	6C	R114	3N	6D	R329	9L	2D
C103	3G	5C	CR149	7F	6C	R115	3P	6D	R332	10L	2D
C104	2M	5D	CR150	7F	6C	R117	2K	6E	R430	8P	3E
C105	1H	4C	CR151	7F	6C	R118	2M	5E	R440	8K	4F
C112	3P	6D	CR152	7E	6C	R119	2L	6D	R450	2P	3E
C115	3P	6E	CR153	7E	6C	R121	2M	4D	R451	2S	3E
C116	3S	7E	CR154	4G	6C	R123	3C	2H	R452	2P	3E
C117	2M	4D	CR155	7G	6C	R129	6B	5C	R453	2S	3E
C118	3S	7E	CR160	7L	2D	R130	6B	7B	R454	7P	3F
C122	2M	5D	CR161	7L	2D	R131	6C	7B	R455	7P	3E
C130	6B	5C	CR162	2L	2D	R133	5M	6B	R456	7S	3E
C175	7K	2D	CR163	2L	2D	R135	4N	6B	R457	7S	4F
C176	7K	2D	CR200	8K	3C	R136	3B	1H	R458	1T	4F
C177	2L	2D	CR201	8K	3C	R140	7B	7C	R459	7T	4G
C179	1K	2D	CR460	8S	3E	R141	6B	7C	R460	8N	3E
C184	9M	2F	CR461	8S	3E	R142	6C	7C	R461	9N	3E
C185	9N	3B				R143	6B	7C	R462	9P	4J
C200	8H	3C	J10	1H	5B	R144	5C	7B	R463	8P	3E
C202	7G	4C	J11	8H	3B	R149	4C	7B	R464	8T	3E
C203	8M	4C	J100	1T	4F	R159	7L	1D	R465	8P	3F
C205	7H	3C	J100	7T	4F	R161	7L	2D	R466	6S	4G
C206	7M	4D	J100	8K	4F	R162	2L	2D	R467	6S	4G
C217	8L	2D	J103	8L	4C	R163	2K	2D	R502	3B	1G
C222	7M	4D	J105	8T	3E	R190	3J	2E			
C301	11B	1B	J110	6T	2E	R191	3J	2E	U100	2N	5D
C302	10B	3B	J111	4N	6B	R192	4J	2E	U110	4E	6B
C303	11C	2A	J117	2P	6E	R193	4J	1E	U120	6E	6C
C310	9H	1C	J181	5P	6B	R194	3J	1H	U130A	5G	6C
C311	2H	1C	J511	10T	1D	R195	8N	2E	U130B	5G	6C
C312	10C	2A	J511	9B	1D	R196	8M	2E	U130C	6L	6C
C329	10M	2D	J512	3A	1H	R197	9M	2F	U130D	5N	6C
C332	10L	2D				R198	9M	3F	U130E	6N	6C
C450	2P	3F	L115	3P	6E	R199	9M	3F	U130F	4N	6C
C454	7P	3F				R200	8H	3C	U130G	6B	6C
C460	8P	3E	LR180	2N	4E	R201	8H	3B	U140	5D	7B
C464	9T	3E	LR280	7N	3E	R202	8H	3B	U150	6D	7C
C466	1S	4F				R216	7L	3D	U160A	2L	2D
C467	1S	4F	P100A	1T	4F	R217	8K	3D	U160B	8L	2D
CR100	1K	5C	P100D	7T	4F	R218	8K	3E	U160C	7K	2D
CR101	1K	5C	P103	8L	4C	R219	8L	3D	U160D	1K	2D
CR130	6C	7B	Q130	6C	7B	R223	3C	2H	U165A	8M	2F
CR131	7C	7B	Q131	6C	7B	R230	3D	2E	U170	4K	2E
CR140	4G	6B	Q190	9N	3E	R231	3B	2E	U200	7N	4D
CR141	4G	6B	Q460A	8P	3E	R232	3C	3E	U300	10N	2B
CR142	4F	6B	Q460B	8P	3E	R301	10A	1A	U450A	7P	3F
CR143	4F	6B				R302	10A	2A	U450B	2P	3F
CR144	4F	6B	R100	1H	4C	R303	10C	1B			
CR145	4E	6B	R101	1H	5B	R304	11A	1B	W171	7L	2D
CR146	4E	6B	R102	2H	5B	R311	10A	2A	W172	1M	2D
CR147	7G	6C				R312	10C	2B	W194	3J	2E

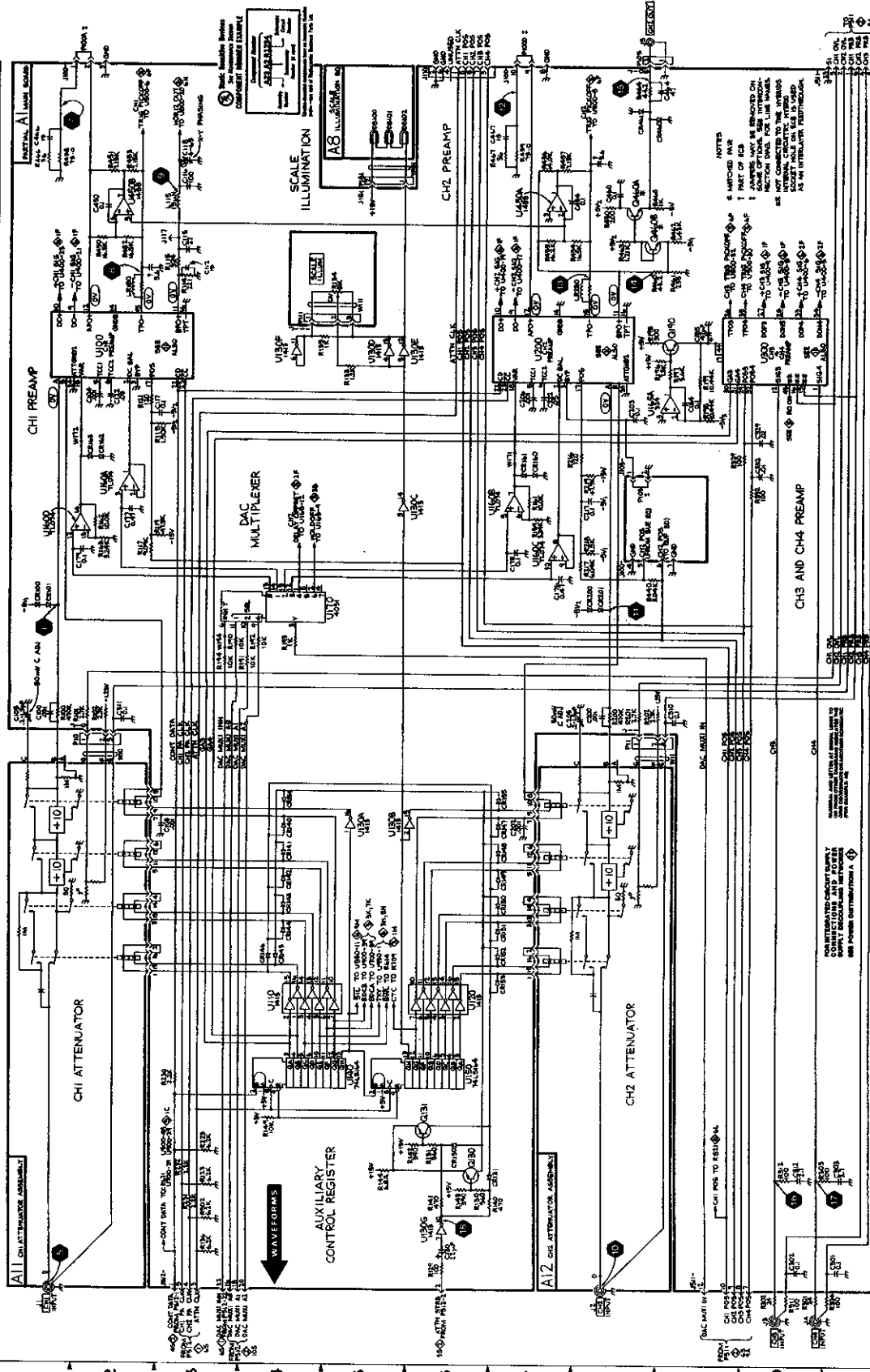
Partial A1 also shown on diagrams 5, 6, 8 and 11.

ASSEMBLY A8											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
DS100	5S	1M	DS102	5S	1P	P181	5S	1P	W181	5S	1P
DS101	5S	1N									

ASSEMBLY A11											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J1	1A	5A	P10	1H	5B	W10	2H	5B			

ASSEMBLY A12 CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J2	8A	3A	J5	8T	CHASSIS	P105	8T	CHASSIS	R134	5N	CHASSIS
J3	10A	CHASSIS	P11	8H	3B	P111	4N	CHASSIS	W11	9H	3B
J4	10A	CHASSIS							W111	5N	CHASSIS

A B C D E F G H J K L M N P Q R S T



ATTENUATORS AND PREAMPS

REV. 75
REV. OCT. 1965

2465

FOR INTEGRATED CIRCUIT SUPPLY
CAPACITORS MUST BE INSTALLED
AS SHOWN IN THIS DRAWING
SEE POWER DISTRIBUTION A

DAC PART IN
CHI POS. 10
CHI POS. 11
CHI POS. 12

CHI POS. TO REF. IN
CHI POS. 10
CHI POS. 11
CHI POS. 12

CHI POS. TO REF. IN
CHI POS. 10
CHI POS. 11
CHI POS. 12

CHI POS. TO REF. IN
CHI POS. 10
CHI POS. 11
CHI POS. 12

CHI POS. TO REF. IN
CHI POS. 10
CHI POS. 11
CHI POS. 12

TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points when the following setup conditions are observed. Any change(s) from the given setup conditions required to produce a given waveform are noted with that waveform illustration. Where B Sweep setup conditions are referenced with a waveform, it is assumed that the B SEC/DIV knob is set to 100 $\mu\text{s}/\text{div}$ unless otherwise noted.

2465 SETUP

Connect a 200-mV, 1-kHz squarewave to the CH 1 input of the 2465 using a BNC cable.

Set:

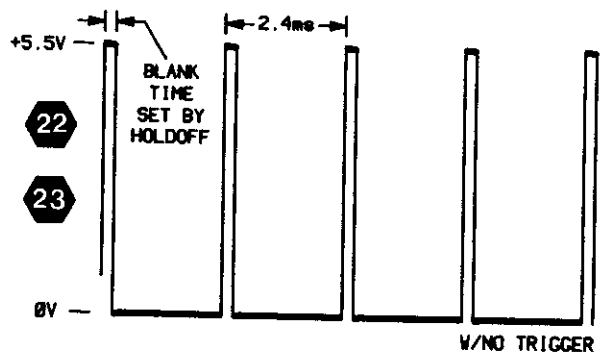
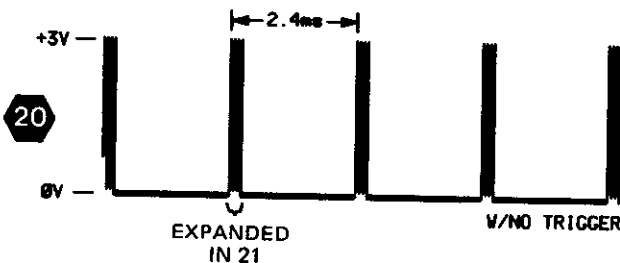
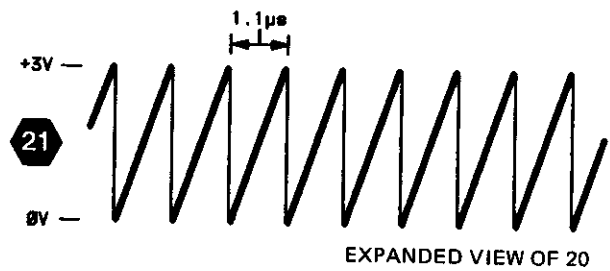
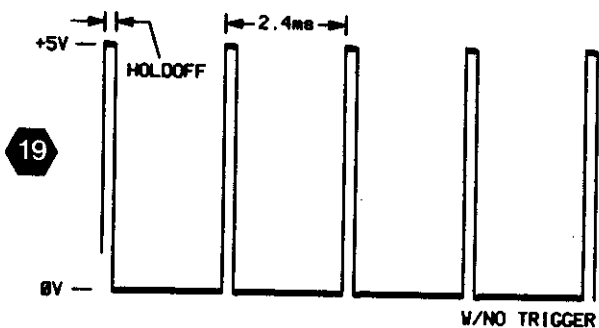
- VERTICAL MODE CH 1
- Input Coupling CH 1 and CH 2 1 M Ω DC
- VOLTS/DIV CH 1 and CH 2 50 mV
CH 1 and CH 2 VAR In detent
- A and B SEC/DIV 0.2 ms (knobs locked)
- A and B SEC/DIV VAR In detent
- TRIGGER MODE AUTO
- SOURCE VERT
- COUPLING NOISE REJ
- HOLDOFF In detent
- SLOPE + (plus)
- LEVEL Stably triggered display

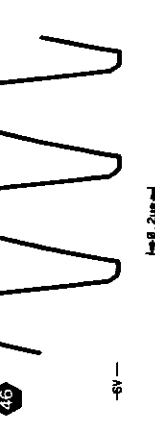
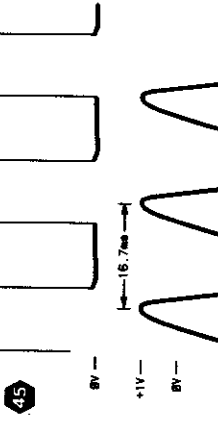
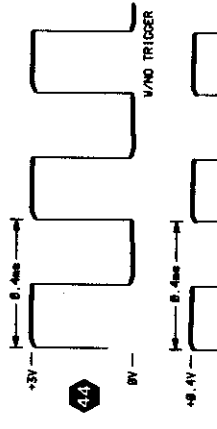
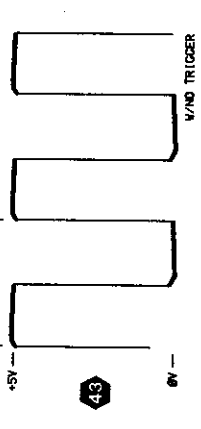
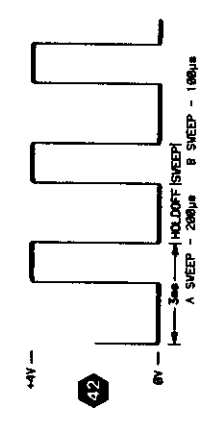
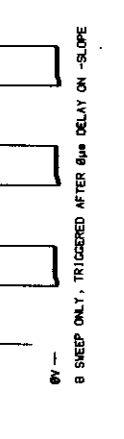
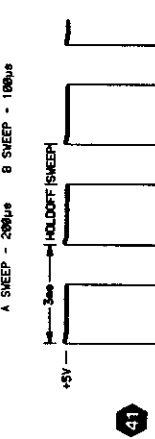
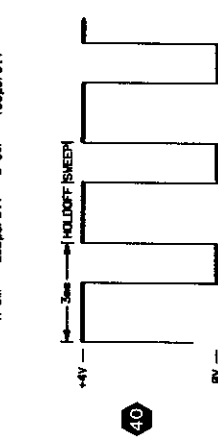
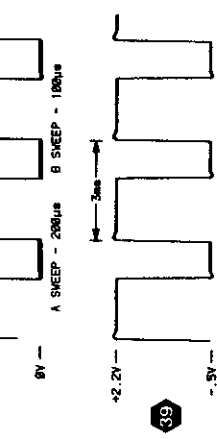
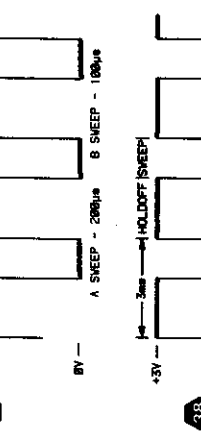
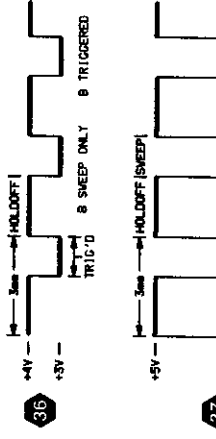
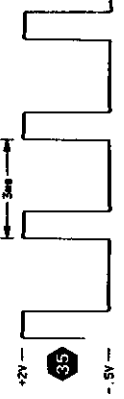
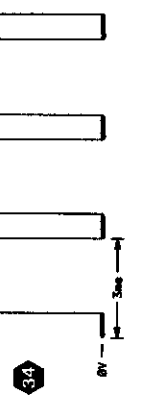
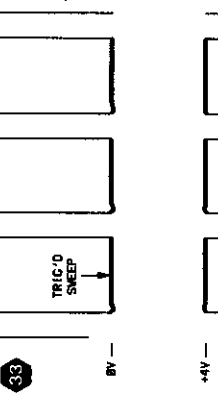
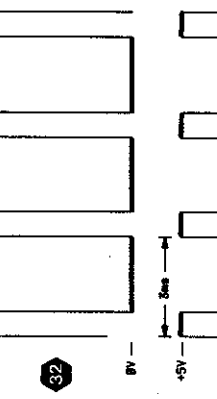
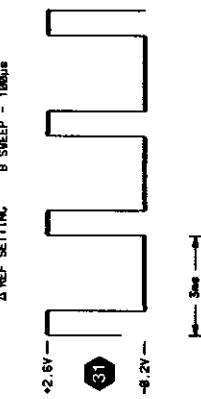
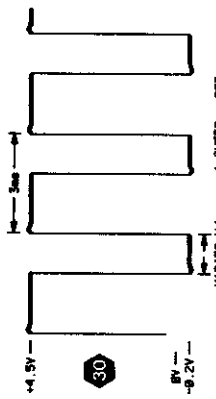
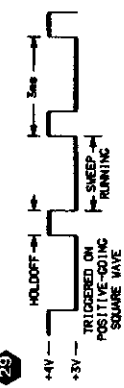
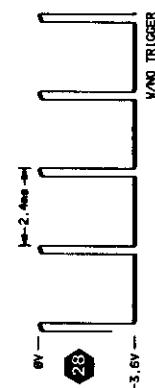
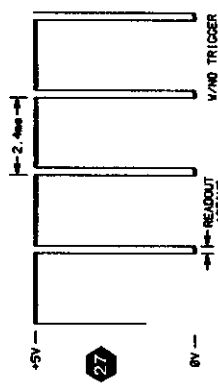
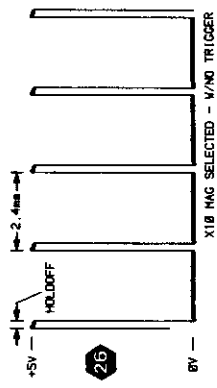
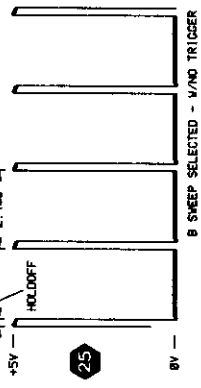
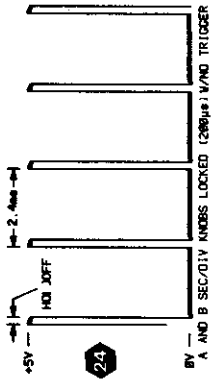
- Δt DLY readout
- Δ REF OR DLY POS 1000.0 μs readout
- INTENSITY Midrange
- READOUT INTENSITY Minimum (once DLY readout is set)

All other control settings are irrelevant.

TEST OSCILLOSCOPE SETUP

Using a X10 probe with the test oscilloscope, set its Trigger Slope, Trigger Level, Volts/Div and Time/Div ranges as required to obtain the indicated displays.





ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

ACA . . . A low-pass capacitor	$\overline{\text{ROR}}$. . . readout request
ACB . . . B low-pass capacitor	SDO . . . sweep delay offset
AHO . . . A holdoff	$\overline{\text{SG}}$. . . sweep gate
A TIM REF . . . A timing reference	$\overline{\text{SGA}}$. . . sweep gate A
B TIM REF . . . B timing reference	$\overline{\text{SGAZ}}$. . . sweep gate A to Z axis
BDC . . . bypass delay comparator	SGB . . . sweep gate B
BDCA . . . bypass delay comparator A	$\overline{\text{SGBZ}}$. . . sweep gate B to Z axis
BDCB . . . bypass delay comparator B	$\overline{\text{SROA}}$. . . A trigger source select 0
BWL B . . . bandwidth limited B signal	$\overline{\text{SR1A}}$. . . A trigger source select 1
CAL . . . calibrator	$\overline{\text{SR2A}}$. . . A trigger source select 2
CAL OUT . . . calibrator out	$\overline{\text{SROB}}$. . . B trigger source select 0
$\overline{\text{CC}}$. . . control clock	$\overline{\text{SR1B}}$. . . B trigger source select 1
$\overline{\text{CCA}}$. . . control clock A	$\overline{\text{SR2B}}$. . . B trigger source select 2
$\overline{\text{CCB}}$. . . control clock B	SSA . . . A selected signal source
CD . . . control data	SSB . . . B selected signal source
CHN5A . . . CH5 (for A trigger)	SSR . . . sweep start reference
CHN5B . . . CH5 (for B trigger)	$\overline{\text{STBA}}$. . . A compare strobe
CONT DATA . . . control data	$\overline{\text{STBB}}$. . . B compare strobe
CT . . . calibrator timing out	TC . . . timing clock
CTC . . . capacitor, timing compensation	TCS . . . timing capacitor select
CT0 . . . timing capacitor 0	$\overline{\text{TGA}}$. . . A trigger
CT2 . . . timing capacitor 2	$\overline{\text{TGA}}$. . . inverted A trigger
DG . . . delay gate	TGB . . . B trigger
DGB . . . delay gate bypass	$\overline{\text{TGB}}$. . . inverted B trigger
DI . . . display intensity	THO . . . trigger holdoff
DOR . . . delay offset reference	THOA . . . trigger holdoff A
DR . . . delay reference	THOB . . . trigger holdoff B
$\overline{\text{DS}}$. . . delay select	TLA . . . trigger level A
HRR . . . holdoff ramp reset	TLB . . . trigger level B
HSA . . . horizontal select A	TRIG STAT STRB . . . trigger status strobe
HSB . . . horizontal select B	$\overline{\text{TSA}}$. . . trigger status A
IREF . . . current reference	$\overline{\text{TSB}}$. . . trigger status B
IT . . . timing current	TS IN . . . trace separation input
ITF . . . timing current feedback	TSO . . . trigger status output
ITR . . . timing current reference	$\overline{\text{TSS}}$. . . trigger status strobe
ITREF . . . timing current reference	TS1 . . . trace separation voltage 1
ITRR . . . timing current reference return	TS2 . . . trace separation voltage 2
IZD . . . inhibit zero delay	TS1+TS2 . . . trace separation 1 and 2
RDA . . . reset delay adjust	VBB1 . . . bias voltage in
$\overline{\text{ROA}}$. . . readout acknowledge	$\overline{\text{VBBO}}$. . . bias voltage out
$\overline{\text{ROB}}$. . . readout blank	$\overline{\text{VS1}} - \overline{\text{VS4}}$. . . vertical selects 1 - 4
ROI . . . readout intensity	
RO ON . . . readout on	

DISPLAY SEQUENCER, TRIGGERING, A & B SWEEPS DIAGRAM

ASSEMBLY A1											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C180	3B	2E	J118	9S	2K	R550	8P	1G	R936	6K	9F
C181	2G	2E	J411	10S	1K	R551	8N	1E	R937	6K	8G
C306	1P	1B	J411	6A	1K	R552	8N	1E	R940	7M	6K
C512	8F	3H	J511	8A	1D	R553	9N	1F	R941	7M	9J
C513	8E	3H	J512	1A	1H	R554	8N	1G	R943	6M	9H
C520	7C	2H	J512	1S	1H	R555	8P	1G	R944	7M	8J
C528	7F	1G				R556	9P	1F	R946	6M	7H
C536	9F	1F	P101A	7B	3H	R557	9P	1E	R950	7P	6K
C537	9E	2F	P101B	8B	3H	R558	9P	1E	R952	6E	7K
C544	8C	3H	P102B	4K	7F	R560	7N	1F	R981	4P	5K
C645	8F	5G	P102D	8K	7F	R643	8F	5G			
C660	6E	7K	P107	7S	6K	R644	8F	5G	U165B	8N	2F
C663	6C	3J	P108	4S	5K	R645	7F	5G	U165C	3C	2F
C660	4C	3J	P122	8A	4H	R646	8F	5G	U166D	2G	2F
C669	5C	2J				R651	6B	1J	U350A	6C	8B
C707	2M	8C	Q154	4C	1E	R652	6C	2J	U350B	1N	8B
C708	2M	8C	Q155	3D	1F	R653	5E	4J	U500	7G	3G
C709	2M	8D	Q550	8S	1E	R654	7B	1J	U550A	9P	1F
C712	1K	9E	Q645	8F	6G	R655	7B	1J	U550B	8P	1F
C742	3K	6D	Q709	2M	8D	R669	5C	2J	U550C	8P	1F
C851	3H	8E	Q741	4M	6D	R670	2B	1H	U550D	8N	1F
C852	3H	8E				R671	2D	2H	U550E	9P	1F
C853	3H	8E	R152	3C	2F	R672	2B	2H	U650	6D	3J
C854	3H	8E	R153	3C	2F	R678	2B	2H	U700	3L	7D
C907	6M	7H	R154	4C	2E	R707	2N	8C	U850B	6J	8F
C908	5M	8J	R155	3C	2F	R708	2N	8C	U850C	3J	8F
C912	5K	9E	R156	4C	2E	R709	1N	8C	U860A	3M	6F
			R166	2H	2E	R710	1K	9F	U860B	2J	6F
CR355	1P	7B	R334	6B	9B	R713	1K	9E	U900	6L	8H
CR356	1P	7B	R353	6B	2H	R723	2K	8E	U910A	5K	9F
CR358	5B	7B	R355	1P	7B	R724	2K	8E	U910B	2K	9F
CR359	6B	8B	R357	5C	7C	R736	2K	9F	U975B	4P	6K
CR652	6E	4J	R358	5B	7C	R737	2K	9F	U975D	7P	6K
CR653	6C	3J	R359	6B	8B	R738	2K	9F	U980A	4N	6K
CR707	2M	8B	R360	5C	3H	R741	4M	6D	U980D	6M	8K
CR741	4M	6D	R361	6C	3H	R742	4M	6D			
CR746	3P	5K	R362	1N	7B	R743	4J	6D	VR650	7N	1E
CR747	4P	5K	R363	1N	7B	R744	4L	7F			
CR752	3N	7J	R511	4F	3H	R745	3M	6D	W107	7S	6K
CR950	7P	6K	R512	4F	3H	R746	3P	5K	W108	3S	5K
CR951	6P	6K	R513	8E	3H	R750	3M	6D	W122	8A	4H
			R518	4H	3H	R751	3M	7J	W666	8E	1H
J9	9S	2A	R519	4H	3H	R752	3N	6E	W677	2E	2J
J101	4H	3H	R520	7C	2H	R753	3N	8J			
J101	7C	3H	R521	7C	2H	R754	3N	7J			
J102	3F	7F	R527	7F	1G	R852	3H	8E			
J102	4K	7F	R529	7F	1G	R853	3H	8E			
J102	8K	7F	R537	9E	1E	R904	6K	8J			
J104	4S	5K	R542	7H	3F	R907	6M	7J			
J104	7S	5K	R543	8H	2F	R910	5K	9F			
J113	5A	7B	R544	8C	3H	R912	5K	9E			
J116	6A	9B	R545	8C	3H	R924	5K	7G			

Partial A1 also shown on diagrams 4, 6, 8 and 11.

CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J7	7S	CHASSIS	P113	5A	CHASSIS	R351	5A	CHASSIS	W113	6A	CHASSIS
J8	3S	CHASSIS	P116	6A	CHASSIS	R352	6A	CHASSIS	W116	6A	CHASSIS

A B C D E F G H I J K L M N O P S

1

2

3

4

5

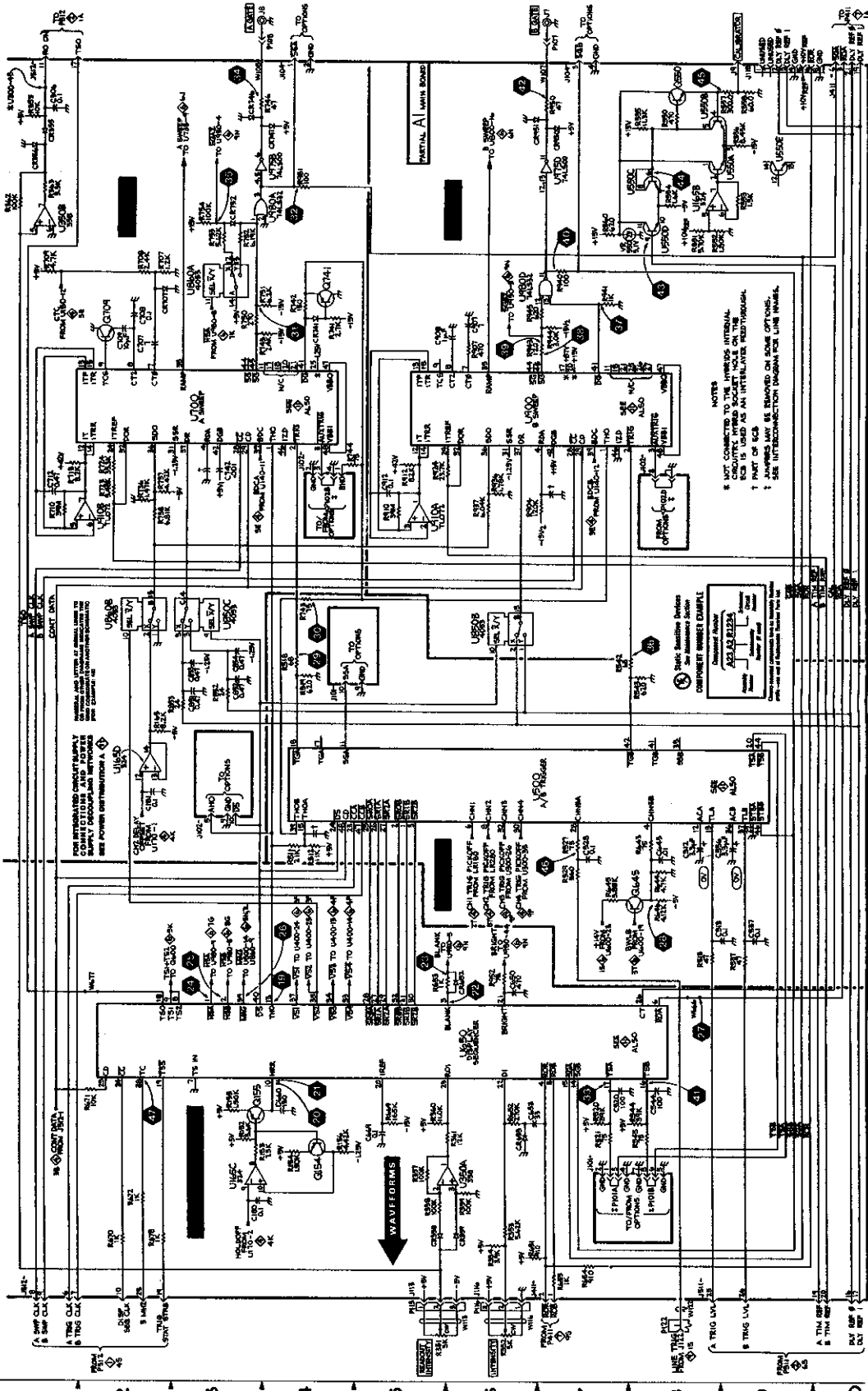
6

7

8

9

10



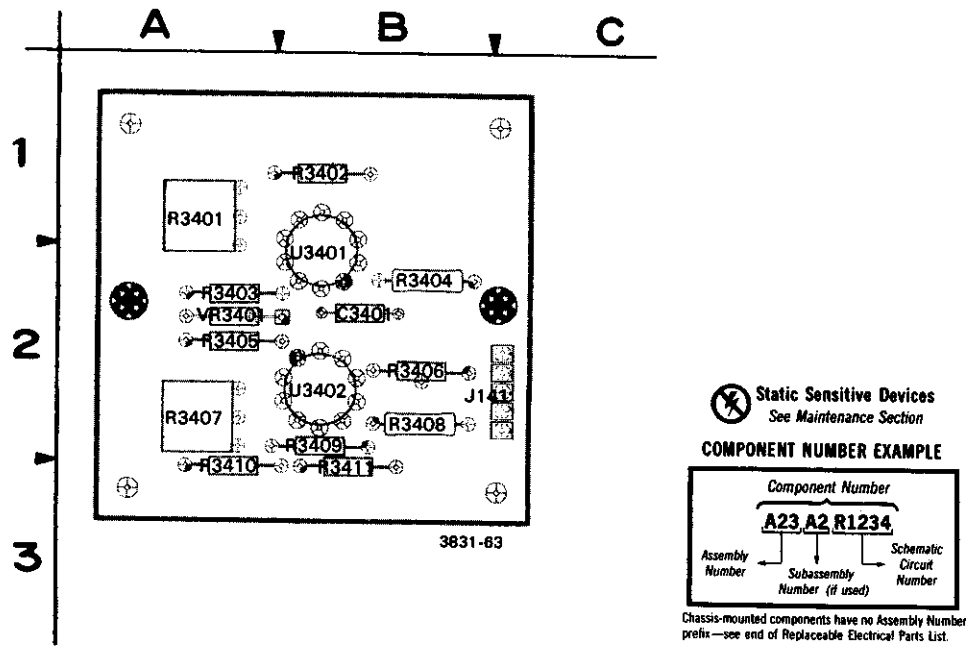
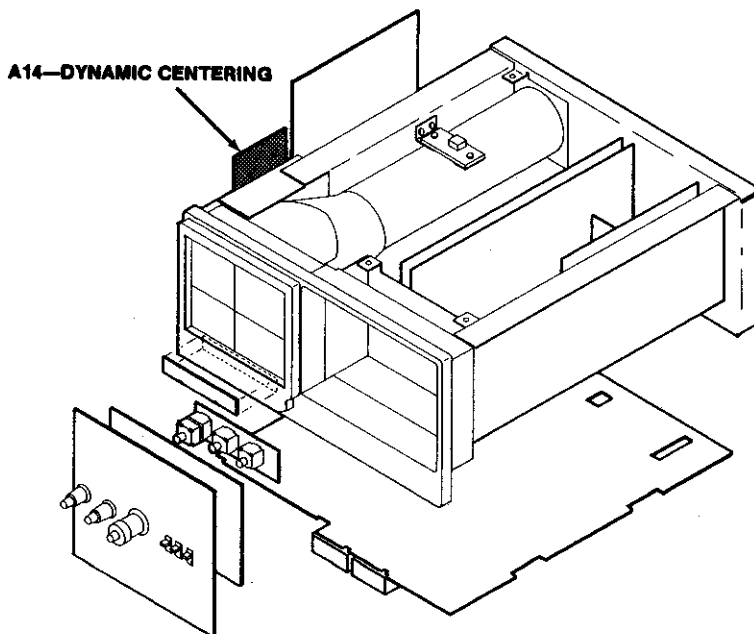


Figure 9-9. A14—Dynamic Centering board.

ALL COMPONENTS MOUNTED ON A14—DYNAMIC CENTERING BOARD ARE SHOWN ON SCHEMATIC DIAGRAM 6



TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points when the following setup conditions are observed. Any change(s) from the given setup conditions required to produce a given waveform are noted with that waveform illustration. Where B Sweep setup conditions are referenced with a waveform, it is assumed that the B SEC/DIV knob is set to 100 μ s/div unless otherwise noted.

2465 SETUP

Connect a 200-mV, 1-kHz squarewave to the CH 1 input of the 2465 using a BNC cable.

Set:

VERTICAL MODE	CH 1	DLY readout
Input Coupling	CH 1 and CH 2	1000.0 μ s readout
VOLTS/DIV	1 M Ω DC	Micrange
CH 1 and CH 2	50 mV	Minimum (once DLY readout is set)
CH 1 and CH 2 VAR	In detent	

All other control settings are irrelevant.

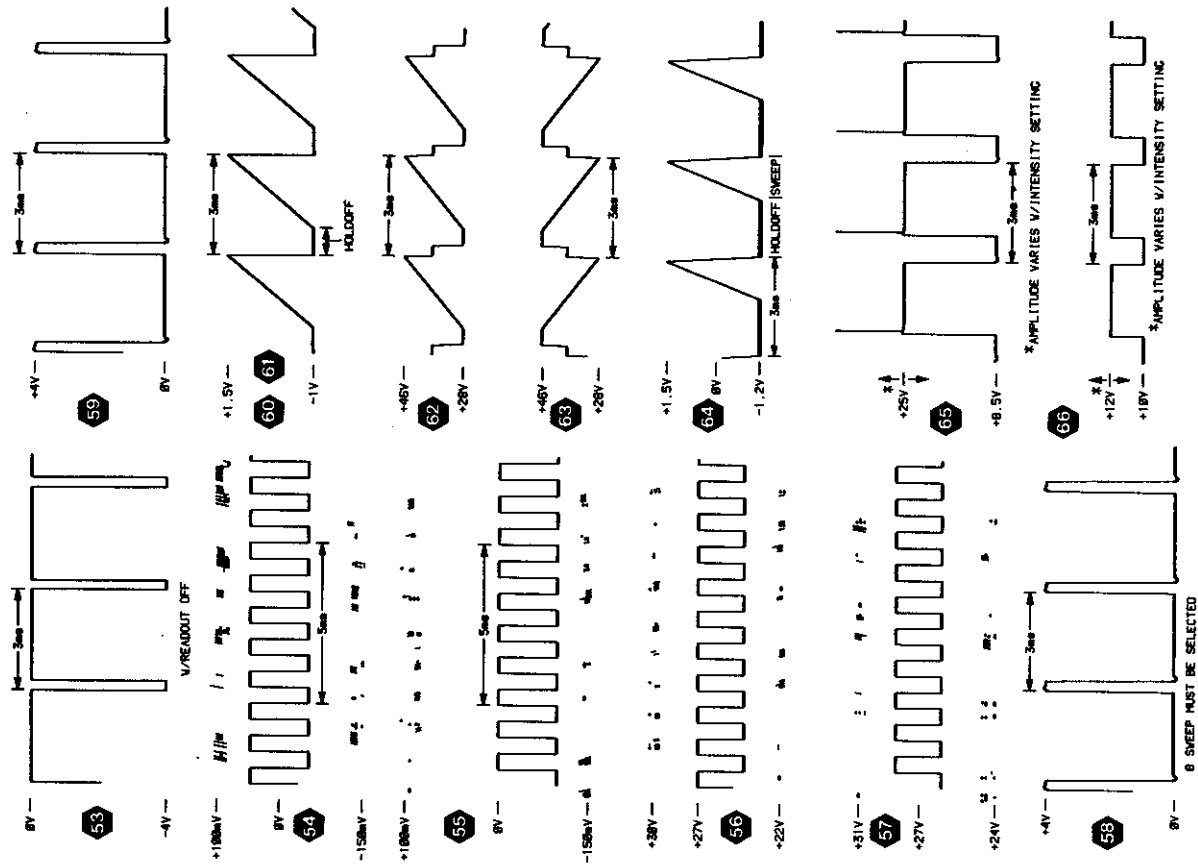
TEST OSCILLOSCOPE SETUP

Using a X10 probe with the test oscilloscope, set its Trigger Slope, Trigger Level, Volts/Div and Time/Div ranges as required to obtain the indicated displays.

A and B SEC/DIV 0.2 ms (knobs locked)

A and B SEC/DIV VAR In detent

TRIGGER MODE AUTO
 SOURCE VERT
 COUPLING NOISE REJ
 HOLD-OFF In detent
 SLOPE + (plus)
 LEVEL Stably triggered display



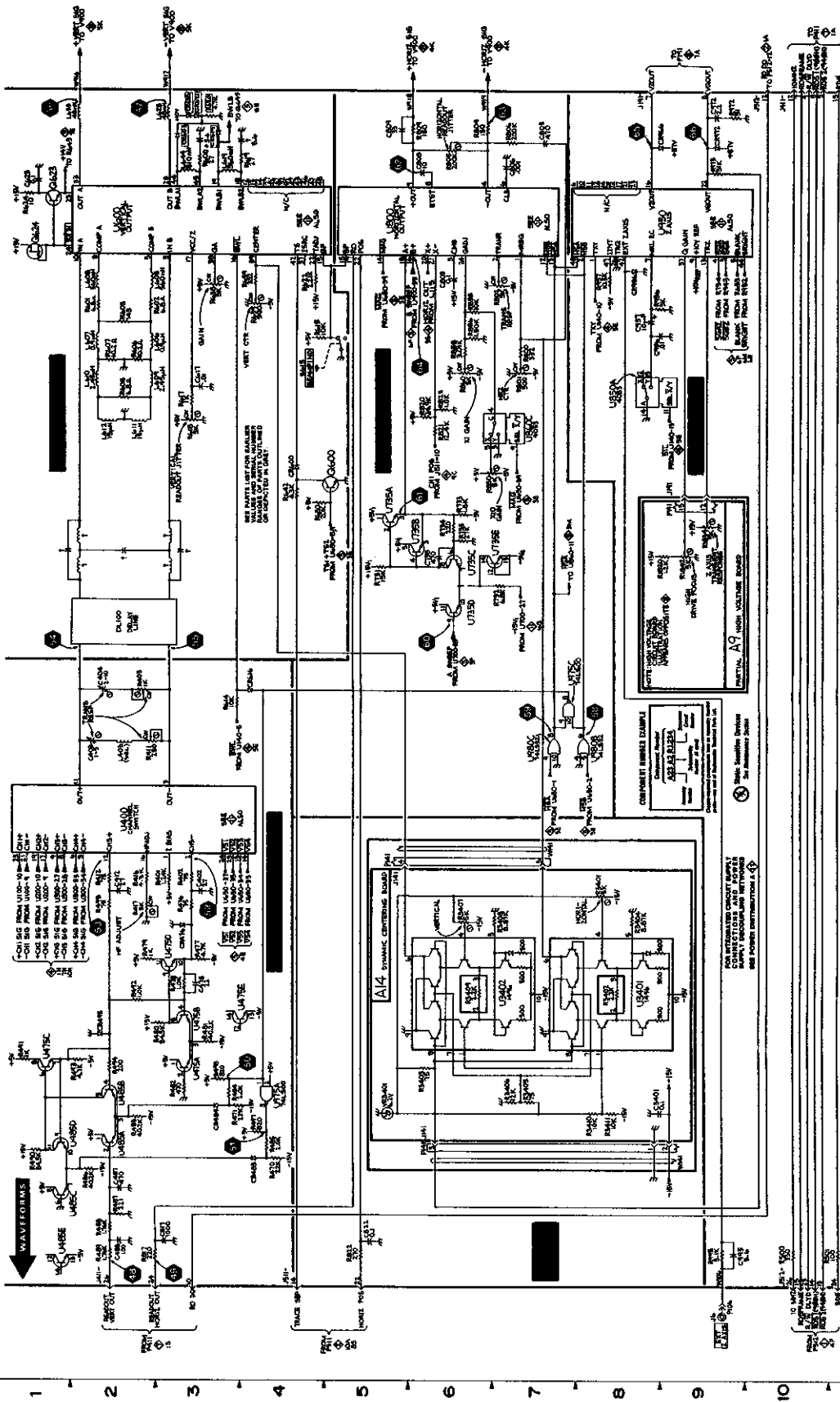
B SWEEP MUST BE SELECTED

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

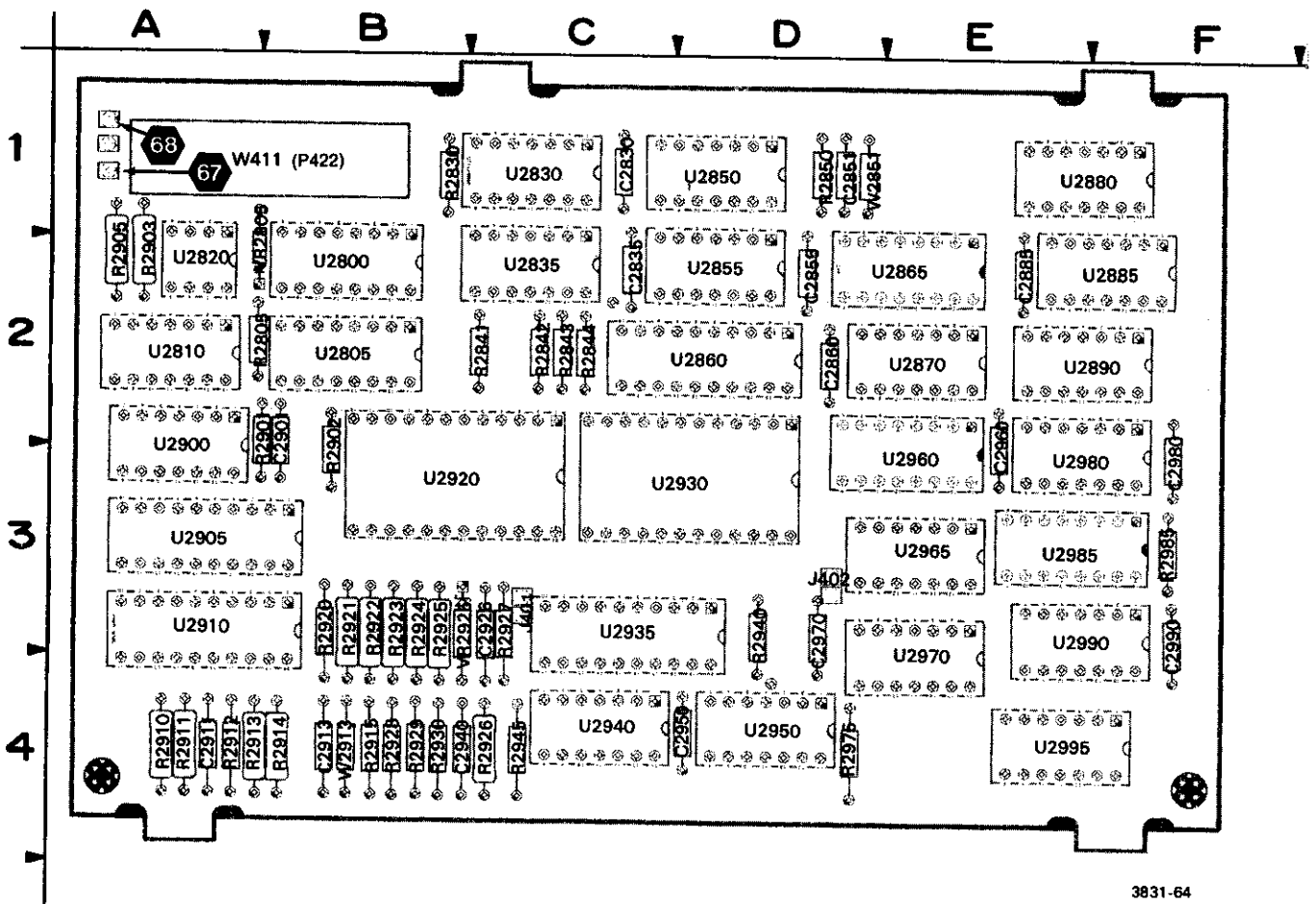
A+ . . . A sweep
 B+ . . . B sweep
 BDO . . . buffered data bit 0
 BF . . . beamfind
 BTST . . . bootstrap
 BWL . . . bandwidth limit
 BWLA1 . . . A bandwidth limit inductor input
 BWLA2 . . . A bandwidth limit inductor output
 BWLB . . . bandwidth limit B
 BWLB1 . . . B bandwidth limit inductor input
 BWLB2 . . . B bandwidth limit inductor output
 CLB . . . current limit bypass
 CMB . . . common mode bypass
 COMP A . . . A compensation
 COMP B . . . B compensation
 GA . . . gain
 GADJ . . . gain adjust
 HSA . . . horizontal select A
 HSB . . . horizontal select B
 I BIAS . . . current reference
 ISRC . . . current source
 MKL RC . . . mean cathode loading RC
 MREG . . . mag registration
 Q GAIN . . . quadrapole gain
 RO DO . . . readout data out
 ROSFRAME . . . readout subframe
 R/W DLYD . . . read/write delayed
 RO . . . readout
 $\overline{ROS1}$. . . readout strobe 1
 $\overline{ROS2}$. . . readout strobe 2
 \overline{SGA} . . . sweep gate A
 \overline{SGAZ} . . . sweep gate A to Z-axis
 \overline{SGB} . . . sweep gate B
 \overline{SGAB} . . . sweep gate B to Z-axis
 \overline{SIL} . . . slow intensity limit
 TADJ . . . thermal adjust
 TRANR . . . transient response
 TRANS RESP . . . transient response
 TRQ . . . transient response, quadrapole drive
 TRZ . . . transient response, Z-axis
 TS . . . trace separation
 TS1+TS2 . . . trace separation inputs 1 and 2
 TXY . . . triggered X-Y
 VZOUT . . . variable Z-axis output
 VQOUT . . . variable quadrapole output
 $\overline{VS1} - \overline{VS4}$. . . vertical selects 1 - 4
 X+ . . . noninverting external input
 X- . . . inverting external input

A B C D E F G H I J K L M N O P Q R S T



NOTE: 1 PART OF SCA
 PARTIAL A1 UNIT BOARD
 PARTIAL A9 HIGH VOLTAGE BOARD
 2465
 281-177-100
 281-177-100

for angles.



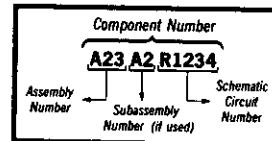
3831-64

Figure 9-10. A4—Readout board.

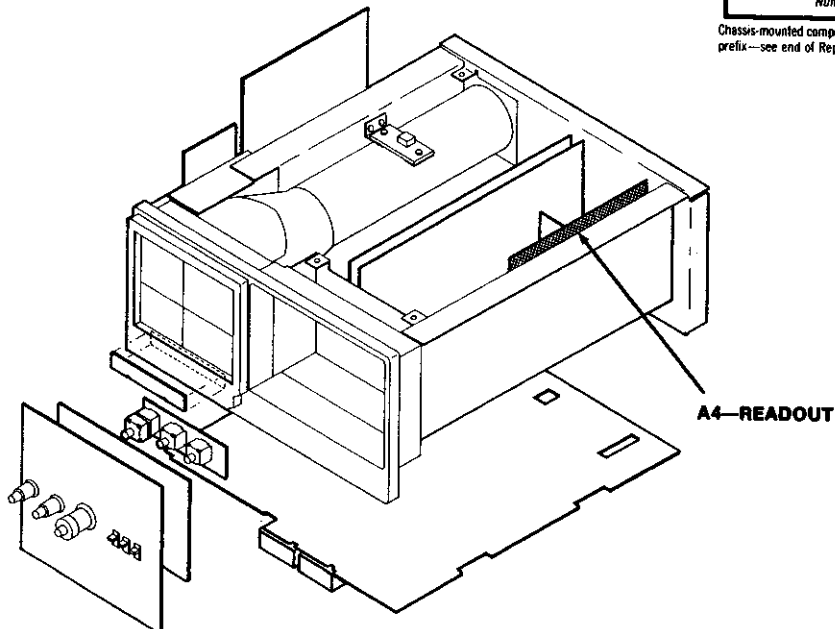
() COMPONENTS WITHIN PARENTHESES MAY NOT BE LOCATED PRECISELY AS SHOWN BUT ARE NEAR THEIR INDICATED POSITION.

 Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



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

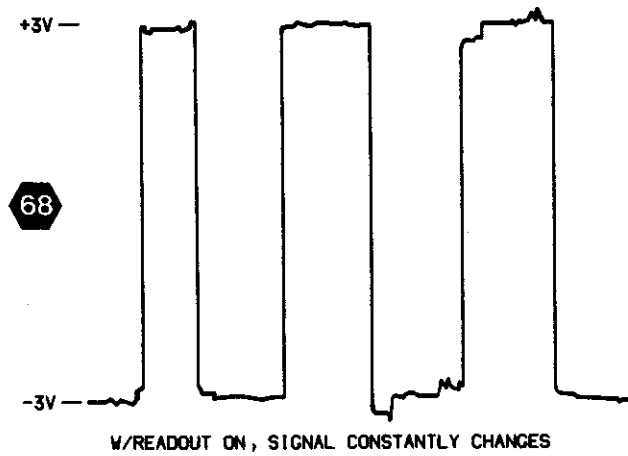
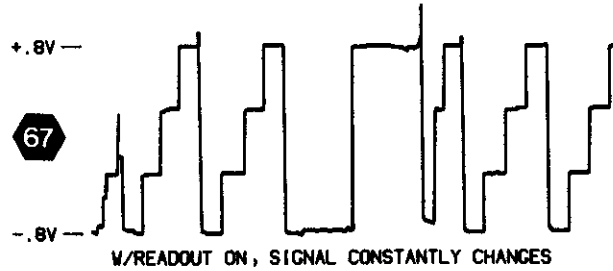


A4—READOUT BOARD

CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
C2830	12	R2920	7	U2855	7	U2940	12
C2835	12	R2921	7	U2855	7	U2950	7
C2851	12	R2922	7	U2855	7	U2950	7
C2855	12	R2923	7	U2855	12	U2950	12
C2860	12	R2924	7	U2860	7	U2960	7
C2885	12	R2925	7	U2860	12	U2960	12
C2901	12	R2926	7	U2865	7	U2965	7
C2911	7	R2927	7	U2865	12	U2965	7
C2913	12	R2928	7	U2870	7	U2965	7
C2926	12	R2929	7	U2870	7	U2965	7
C2940	12	R2930	7	U2870	12	U2965	12
C2950	12	R2940	7	U2880	7	U2970	7
C2960	12	R2945	7	U2880	7	U2970	7
C2970	12	R2975	7	U2880	12	U2970	7
C2980	12	R2985	7	U2885	7	U2970	7
C2990	12	U2800	7	U2885	7	U2970	12
J401	7	U2800	12	U2885	7	U2980	7
J402	7	U2805	7	U2885	12	U2980	7
P411	7	U2805	12	U2890	7	U2980	7
P411	7	U2810	7	U2890	7	U2980	7
P411	7	U2810	7	U2890	7	U2980	12
P411	12	U2810	7	U2890	7	U2985	7
R2605	12	U2810	7	U2890	12	U2985	12
R2630	7	U2810	12	U2900	7	U2990	7
R2641	7	U2820	7	U2900	7	U2990	7
R2642	7	U2820	7	U2900	7	U2990	7
R2643	7	U2820	12	U2900	12	U2990	7
R2644	7	U2830	7	U2905	7	U2990	12
R2650	7	U2830	7	U2905	12	U2995	7
R2901	7	U2830	12	U2910	7	U2995	12
R2902	7	U2835	7	U2910	12	VR2805	12
R2903	7	U2835	7	U2920	7	VR2925	7
R2905	7	U2835	7	U2920	12	W411	7
R2910	7	U2835	7	U2930	7	W411	7
R2911	7	U2835	12	U2930	12	W411	7
R2912	7	U2850	7	U2935	7	W411	12
R2913	7	U2850	7	U2935	12	W2851	12
R2914	7	U2850	12	U2940	7	W2913	12
R2915	7	U2955	7	U2940	7		

TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points when the indicated setup conditions are observed.



READOUT DIAGRAM



ASSEMBLY A4								
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2911	2K	4A	R2945	2B	4C	U2900B	5L	2A
J401	1H	3C	R2975	7M	4D	U2900B	9L	2A
J402	3H	3D	R2985	8E	3F	U2900C	5L	2A
						U2905	4K	3A
P411	1A	1A	U2800	4P	2B	U2910	1K	3A
P411	1S	1A	U2805	2P	2B	U2920	2F	3B
P411	9S	1A	U2810A	6L	2A	U2930	1H	3D
			U2810B	6L	2A	U2935	1D	3C
			U2810C	6N	2A	U2940A	2C	4C
R2830	8C	1B	U2810D	5N	2A	U2940B	1B	4C
R2841	5M	2C	U2820A	5P	2A	U2950A	9E	4D
R2842	3B	2C	U2820B	3P	2A	U2950B	9J	4D
R2843	4B	2C	U2830A	8C	1C	U2960	3D	2E
R2844	5B	2C	U2830B	7B	1C	U2965A	5C	3E
R2850	9D	1D	U2835A	6G	2C	U2965B	9H	3E
R2901	5M	2B	U2835B	9K	2C	U2965C	4F	3E
R2902	3F	2B	U2835C	9G	2C	U2965D	9M	3E
R2903	5P	2A	U2835D	2E	2C	U2970A	9N	3E
R2905	5P	2A	U2850A	9D	1D	U2970B	9H	3E
R2910	1K	4A	U2850B	9E	1D	U2970C	7G	3E
R2911	1K	4A	U2855A	7B	2D	U2970D	9G	3E
R2912	2L	4A	U2855B	6E	2D	U2980A	9H	2E
R2913	3L	4A	U2855C	3E	2D	U2980B	8P	2E
R2914	3L	4B	U2855D	3E	2D	U2980C	9N	2E
R2915	4L	4B	U2860	5F	2D	U2980D	5E	2E
R2920	4M	3B	U2865	6D	2E	U2985	8F	3E
R2921	5M	3B	U2870A	6F	2E	U2990A	8E	3E
R2922	5M	3B	U2870B	5F	2E	U2990B	9H	3E
R2923	4M	3B	U2880A	8J	1E	U2990C	9M	3E
R2924	4M	3B	U2880B	8P	1E	U2990D	8M	3E
R2925	4M	3B	U2885A	10H	2F	U2995	9M	4E
R2926	5M	4C	U2885B	8J	2F			
R2927	2H	3C	U2885C	8S	2F	VR2925	4M	3C
R2928	4L	4B	U2890A	8B	2E			
R2929	4L	4B	U2890B	9K	2E	W411	10S	1A
R2930	4M	4B	U2890C	6L	2E	W411	1A	1A
R2940	8D	3D	U2890D	9K	2E	W411	5S	1A

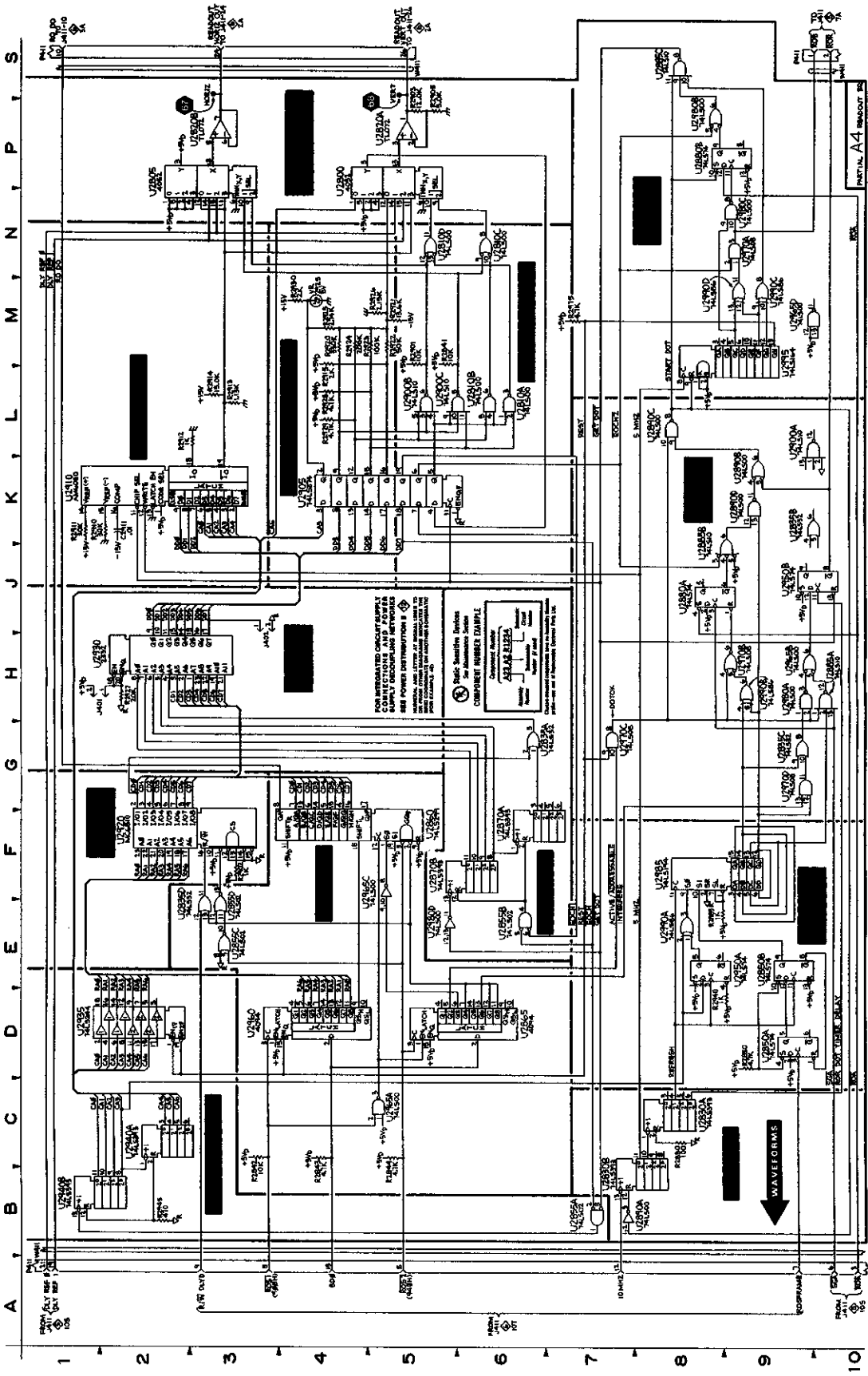
Partial A4 also shown on diagram 12.

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

BD0 . . . buffered data bit 0
 CA0 – CA6 . . . character address bits 0 – 7
 CD0 – CD7 . . . character data bits 0 – 7
 DD0 – DD7 . . . dot data bits 0 – 7
 $\overline{\text{EOCH}}$. . . end of character
 $\overline{\text{EOCH1}}$. . . end of character delayed 1 dot
 $\overline{\text{EOCH2}}$. . . end of character delayed 2 dots
 RA0 – RA6 . . . RAM address bits 0 – 6
 ROA . . . readout acknowledge

$\overline{\text{ROB}}$. . . readout blank
 $\overline{\text{RO DO}}$. . . readout data out
 $\overline{\text{ROR}}$. . . readout request
 $\overline{\text{ROR DOT TIMER DELAY}}$. . . readout request dot timer delay
 $\overline{\text{ROSFRAME}}$. . . readout subframe
 $\overline{\text{ROS1}}$. . . readout strobe 1
 $\overline{\text{ROS2}}$. . . readout strobe 2
 $\overline{\text{R/W DLYD}}$. . . read/write delayed
 $\overline{\text{SGA}}$. . . sweep gate A



303-18

2465

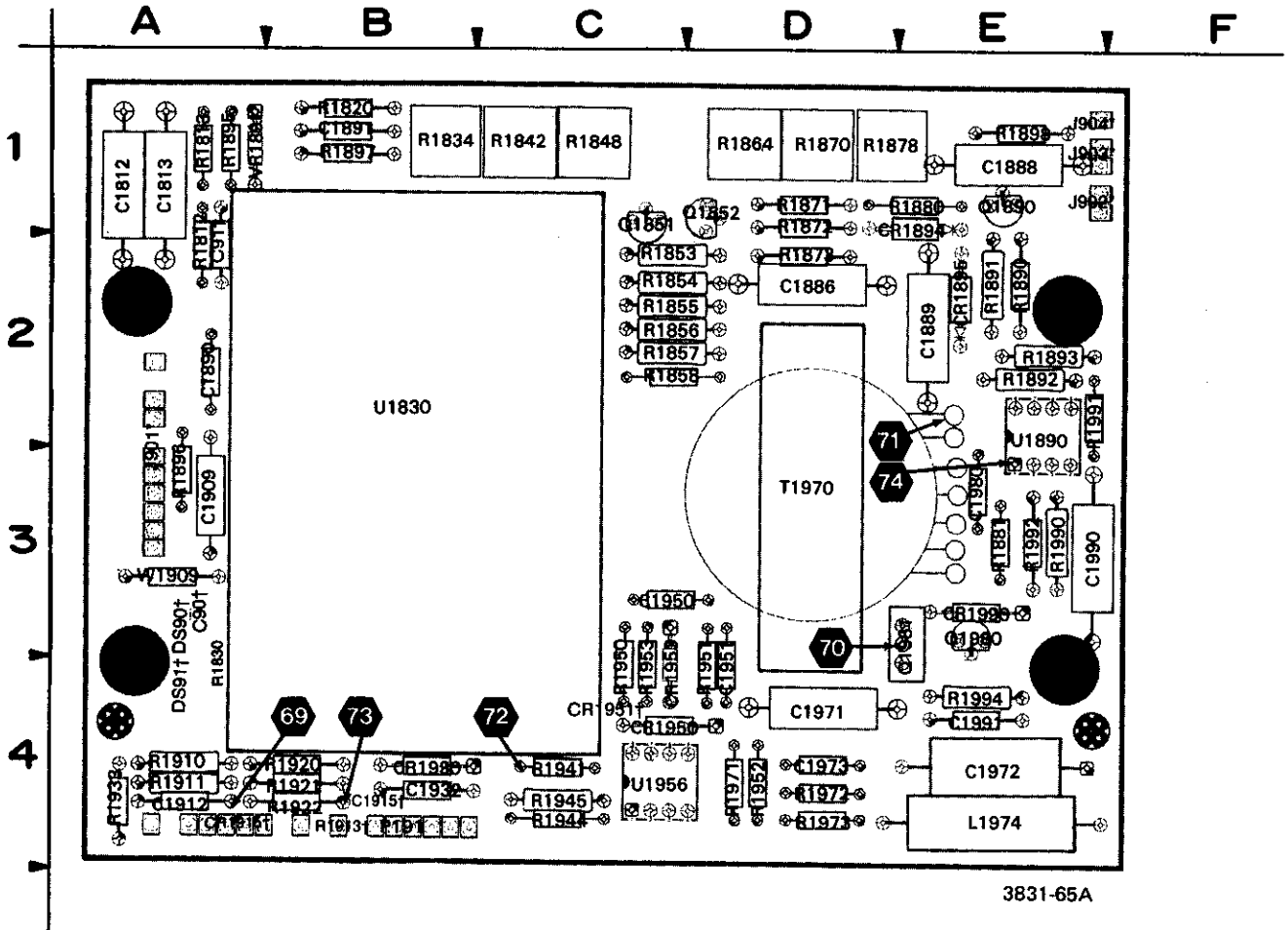
READOUT

PARTIAL A4 REWIND 18

WAVEFORMS

A B C D E F G H I J K L M N O P S

1 2 3 4 5 6 7 8 9 10



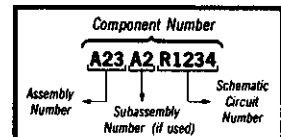
3831-65A

Figure 9-11. A9—High Voltage board.

- * LABELED ON SOME BOARDS AS "P" VICE "J".
- † INDICATES COMPONENTS THAT WERE MANUALLY ADDED TO THE BOARD AS A RESULT OF MODIFICATION.

 Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



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

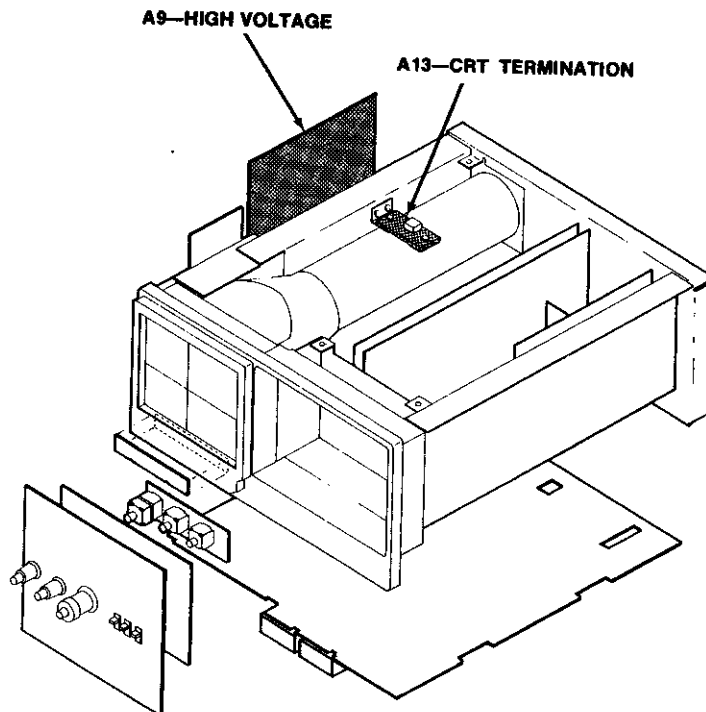
ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

- PDA (14KV) . . . post deflection accelerator
- VQOUT . . . variable quadrapole out
- VZOUT . . . variable Z-axis out

A9—HIGH VOLTAGE BOARD

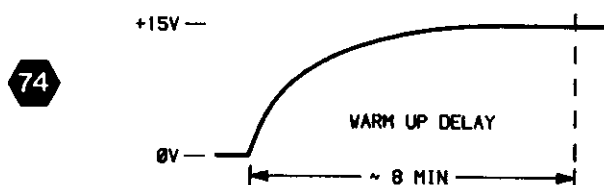
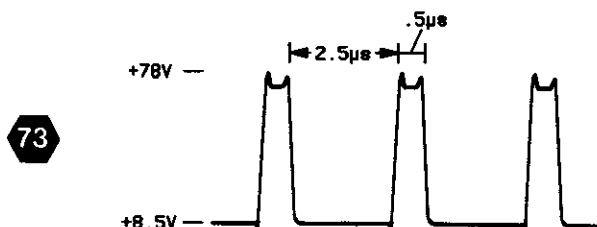
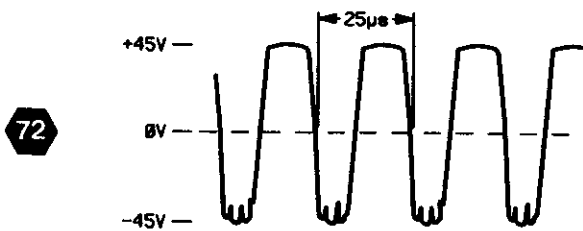
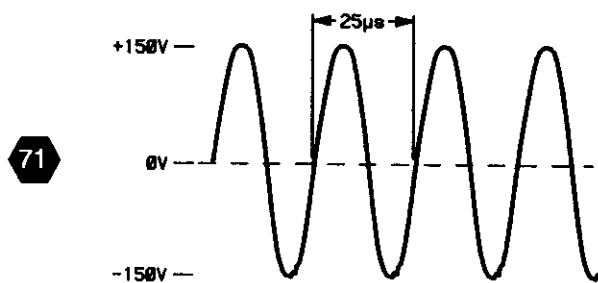
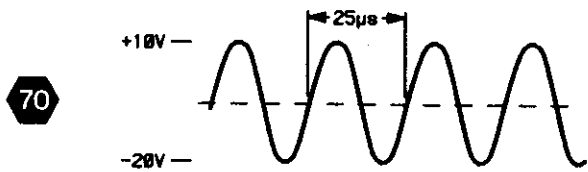
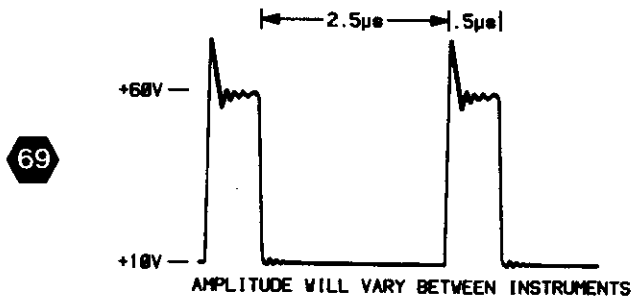
CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
C90	8	L1974	8	R1896	8
C91	8	P191	8	R1897	8
C1812	8	P191	6	R1898	8
C1813	8	P191	8	R1910	8
C1886	8	P191	12	R1911	8
C1888	8	Q1851	8	R1913	8
C1889	8	Q1852	6	R1920	8
C1890	8	Q1890	8	R1921	8
C1891	8	Q1980	8	R1922	8
C1909	12	Q1981	8	R1922	8
C1912	8	R1812	8	R1933	12
C1915	8	R1813	6	R1941	8
C1832	8	R1820	6	R1944	8
C1950	8	R1830	8	R1945	8
C1951	8	R1834	6	R1950	8
C1871	8	R1842	6	R1951	8
C1972	8	R1848	8	R1952	8
C1973	8	R1853	8	R1953	8
C1880	8	R1854	8	R1971	8
C1990	8	R1855	8	R1972	8
C1991	8	R1856	8	R1973	8
CR1894	8	R1857	8	R1990	8
CR1895	8	R1858	8	R1991	8
CR1915	8	R1864	8	R1992	8
CR1930	8	R1870	8	R1994	8
CR1950	8	R1871	8	T1970	8
CR1951	8	R1872	8	U1830	8
CR1953	8	R1873	8	U1890	8
CR1990	8	R1878	8	U1890	8
DS90	8	R1890	8	U1890	12
DS91	8	R1881	8	U1956	8
J901	8	R1890	8	U1956	8
J901	8	R1891	8	U1956	12
J901	8	R1892	8	VR1891	8
J902	8	R1893	8	W1909	12
J903	8	R1895	8		
J904	8				



REV OCT 1983

TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points whenever the instrument is running.



HIGH VOLTAGE SUPPLY AND CRT DIAGRAM

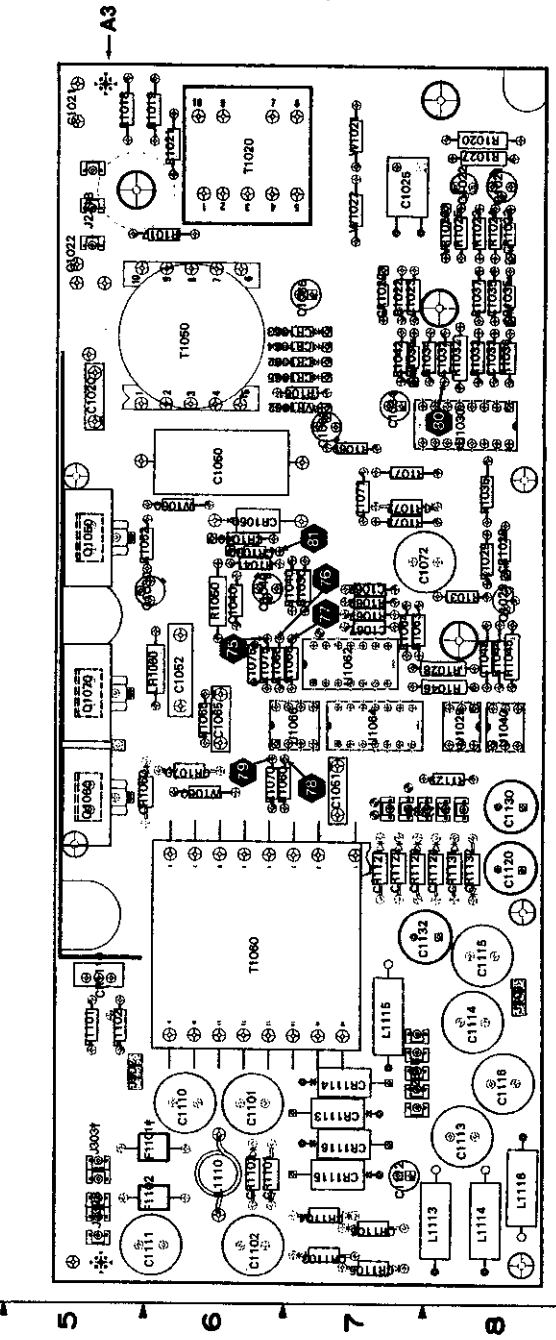
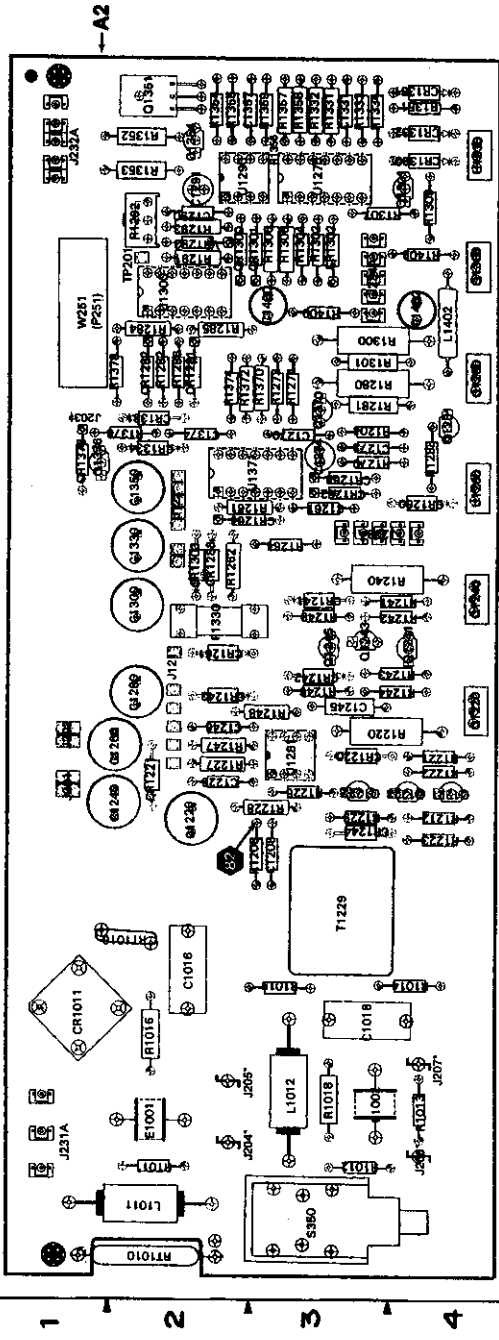


ASSEMBLY A1											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C975	3D	7B	J112 J114	3C 2C	7B 8B	J115	4C	8B			
<i>Partial A1 also shown on diagrams 4, 5, 6 and 11.</i>											
ASSEMBLY A9											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C90	8H	3A	CR1990	8E	3E	R1853	4F	2C	R1922	7E	4B
C91	8H	2A				R1854	5F	2C	R1941	7E	4C
C1812	4F	1A	DS90	7H	3A	R1855	4E	2C	R1944	6C	4C
C1813	5F	1A	DS91	8H	4A	R1856	4E	2C	R1945	6D	4C
C1886	8C	2D				R1857	5E	2C	R1950	7C	4C
C1886	3H	1E	J901	3M	3A	R1858	5E	2C	R1951	7A	4D
C1889	8B	2E	J901	4J	3A	R1864	3F	1D	R1952	6B	4D
C1890	5S	2A	J901	5M	3A	R1870	3N	1D	R1953	7C	4C
C1891	3G	1B	J902	2J	1E	R1871	4F	1D	R1971	6B	4D
C1912	6N	4A	J903	4M	1E	R1872	5F	1D	R1972	6C	4D
C1915*	6E	4B	J904	5P	1E	R1873	3F	2D	R1973	6C	4D
C1932	6D	4B				R1878	8D	1D	R1990	3G	3E
C1950	7B	3C	L1974	9A	4E	R1880	4H	1E	R1991	8D	2E
C1951	7B	4D				R1881	8E	3E	R1992	8E	3E
C1971	8E	4D	P191	2E	4B	R1890	3G	2E	R1994	8E	4E
C1972	8A	4E	P191	7A	4B	R1891	4G	2E			
C1973	8C	4D				R1892	3G	2E	T1970	10B	3D
C1980	8B	3E	Q1851	4F	1C	R1893	3G	2E			
C1990	8D	3E	Q1852	5F	1D	R1895	5S	1A	U1830	8G	2B
C1991	7E	4E	Q1890	3H	1E	R1896	5S	3A	U1890A	8D	2E
CR1894	8C	1E	Q1990	8E	3E	R1897	3H	1B	U1890B	3G	2E
CR1895	8B	2E	Q1981	8B	3E	R1898	4N	1E	U1956A	6C	4C
CR1915*	7E	4B				R1910	6P	4A	U1956B	6B	4C
CR1930	7E	4B	R1812	4F	2A	R1911	6P	4A			
CR1950	7E	4C	R1813	5F	1A	R1913*	7E	4B	VR1891	5S	1A
CR1951	7E	4C	R1830	9E	4A	R1920	7E	4B			
CR1953	7C	4C	R1848	4N	1C	R1921	6P	4B			
<i>Partial A9 also shown on diagrams 6 and 12.</i>											
ASSEMBLY A13											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J904	5P	**	R1501	5N	**						
CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
L90	2L	CHASSIS	P901	3M	CHASSIS	R976	5B	CHASSIS	W115	5B	CHASSIS
LR1513	5M	CHASSIS	P901	4J	CHASSIS	R977	4B	CHASSIS	W900	3M	CHASSIS
LR1514	5M	CHASSIS	P901	5M	CHASSIS	R996	3K	CHASSIS	W900	6J	CHASSIS
			P902	2J	CHASSIS				W900	7J	CHASSIS
			P903	4M	CHASSIS	V900	2L	CHASSIS	W900	7M	CHASSIS
P112	3C	CHASSIS	P904	5P	CHASSIS				W902	3J	CHASSIS
P114	2C	CHASSIS				W112	4B	CHASSIS	W903	4M	CHASSIS
P115	4C	CHASSIS	R975	2B	CHASSIS	W114	3B	CHASSIS	W904	5P	CHASSIS

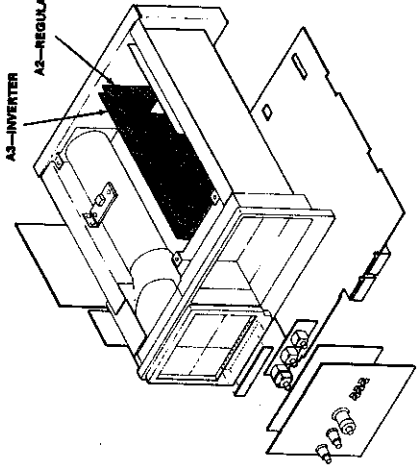
★★ BOARD ILLUSTRATION NOT SHOWN

*See Parts List for serial number ranges.

A B C D E F G H I J



* LABELED ON SOME BOARDS AS "P" VICE "J".
 † THESE COMPONENTS MAY NOT EXIST IN EARLIER INSTRUMENTS.
 () COMPONENTS WITHIN PARENTHESES MAY NOT BE LOCATED PRECISELY AS SHOWN BUT ARE NEAR THEIR INDICATED POSITION.
 ALL COMPONENTS MOUNTED ON A3-INVERTER BOARD ARE SHOWN ON SCHEMATIC DIAGRAM ◊



ⓧ Static Sensitive Devices See Attention Section
 COMPONENT NUMBER EXAMPLE
 Component Number
 Assembly Number
 Subassembly Number
 Part Number
 Revision Number
 Revision Letter

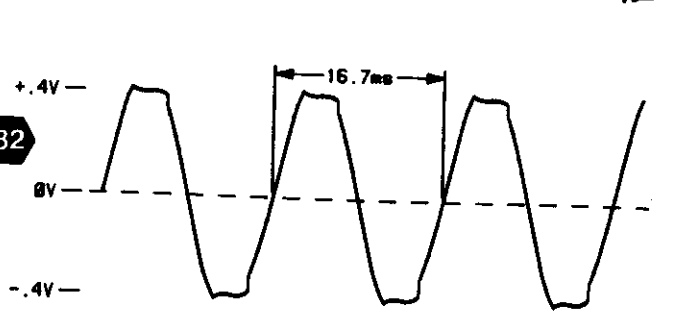
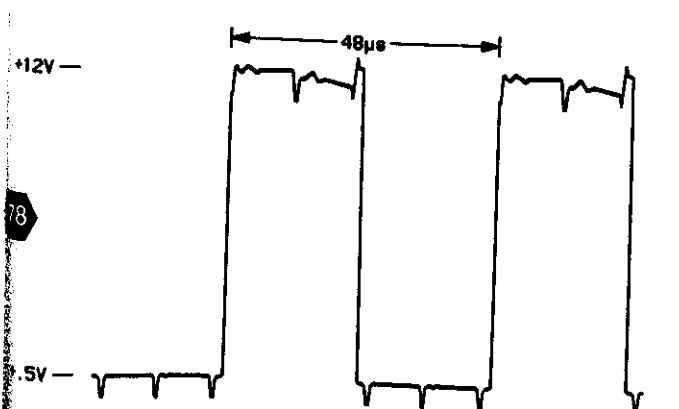
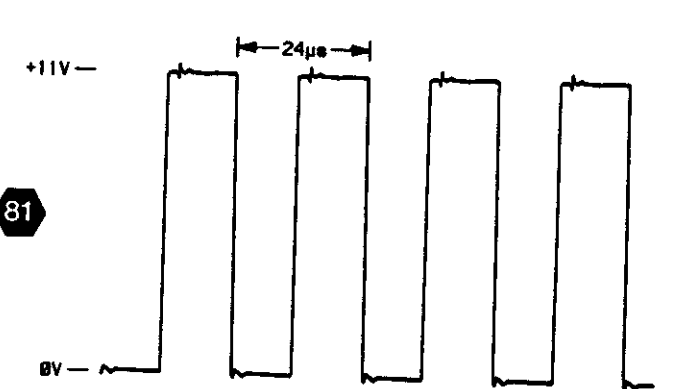
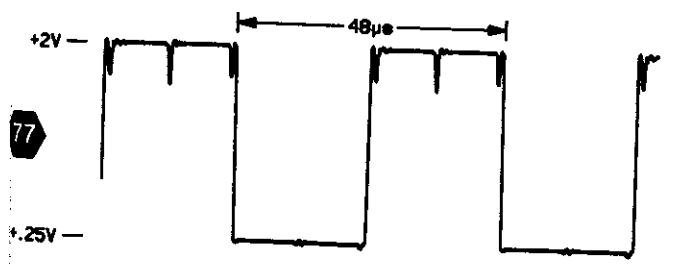
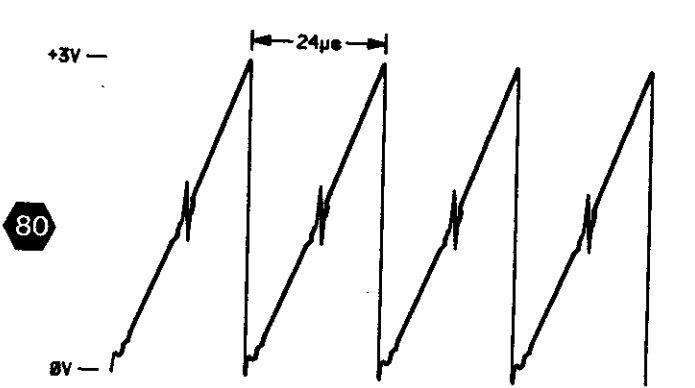
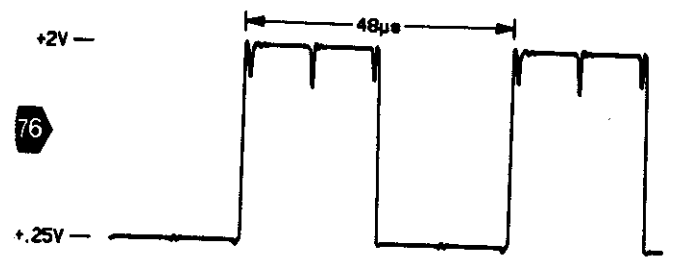
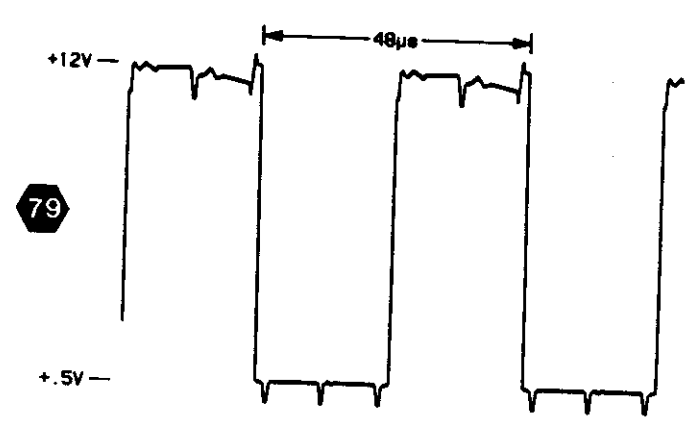
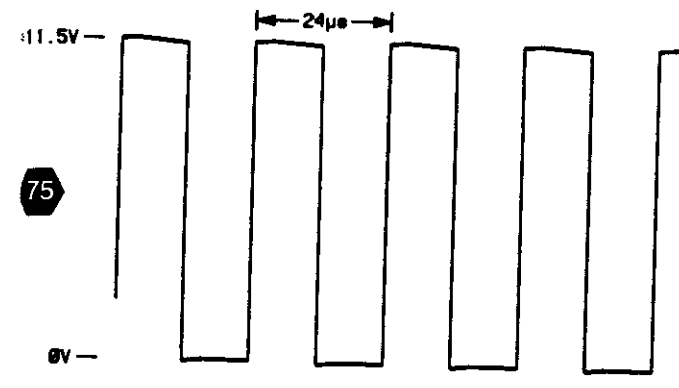
3831-66A

Figure 5-12. A2—Regulator and A3—Inverter boards.

FIG. 4-12 A3-INVERTER BOARD

TEST WAVEFORM SETUP INFORMATION

The numbered waveforms below were obtained at the test points indicated on the accompanying schematic diagram and board dolly. The waveforms are representative of signals that may be expected at the associated points whenever the instrument is running.



A2—REGULATOR BOARD

CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER	CIRCUIT NUMBER	SCHEM NUMBER
C1016	9	CR1351	10	R1015	9	R1331	10
C1018	9	CR1376	10	R1016	9	R1332	10
C1208	9	E1001	9	R1018	9	R1333	10
C1220	10	E1002	9	R1204	10	R1334	10
C1226	10	F1330	10	R1208	9	R1351	10
C1240	10	J121	10	R1212	10	R1352	10
C1245	10	J122	9	R1220	10	R1353	10
C1246	10	J122	10	R1221	10	R1354	10
C1260	10	J201	10	R1222	10	R1355	10
C1261	10	J202	10	R1223	10	R1356	10
C1270	10	J203	10	R1226	10	R1357	10
C1272	10	J204	9	R1227	10	R1358	10
C1274	10	J205	9	R1228	10	R1359	10
C1280	10	J206	9	R1229	10	R1370	10
C1290	10	J207	9	R1240	10	R1372	10
C1291	10	J231	9	R1241	10	R1374	10
C1300	10	J232	10	R1242	10	R1376	10
C1330	10	J232	10	R1243	10	R1378	10
C1331	10	J233	10	R1244	10	R1400	10
C1350	10	J233	10	R1246	10	R1402	10
C1357	10	J234	10	R1247	10	RT1010	9
C1374	10	J234	10	R1248	10	RT1016	9
C1400	10	J234	10	R1249	10	S350	9
C1402	10	L1011	9	R1261	10	T1229	9
CR1011	9	L1012	9	R1262	10	TP201	10
CR1220	10	L1402	10	R1264	10	U1260	10
CR1221	10	P251	10	R1270	10	U1270	10
CR1241	10	Q1220	10	R1273	10	U1270	10
CR1242	10	Q1221	10	R1274	10	U1270	10
CR1243	10	Q1222	10	R1280	10	U1270	10
CR1244	10	Q1223	10	R1281	10	U1270	10
CR1260	10	Q1240	10	R1282	10	U1281	10
CR1261	10	Q1241	10	R1283	10	U1281	10
CR1262	10	Q1243	10	R1284	10	U1281	10
CR1263	10	Q1245	10	R1285	10	U1290	10
CR1264	10	Q1280	10	R1286	10	U1300	10
CR1281	10	Q1281	10	R1291	10	U1300	10
CR1282	10	Q1300	10	R1292	10	U1300	10
CR1283	10	Q1301	10	R1293	10	U1300	10
CR1300	10	Q1351	10	R1300	10	U1300	10
CR1301	10	Q1354	10	R1301	10	U1330	10
CR1302	10	Q1370	10	R1302	10	U1371	10
CR1303	10	Q1376	10	R1304	10	U1371	10
CR1330	10	R1011	9	R1305	10	U1371	10
CR1331	10	R1012	9	R1306	10	U1371	10
CR1332	10	R1013	9	R1307	10	U1371	10
CR1334	10	R1014	9	R1309	10	VR1293	10
						W251	10

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

FB . . . feedback

PWM COMPARATOR . . . pulse-width modulator comparator

+5VD . . . +5 V digital

LOW-VOLTAGE POWER SUPPLY DIAGRAM



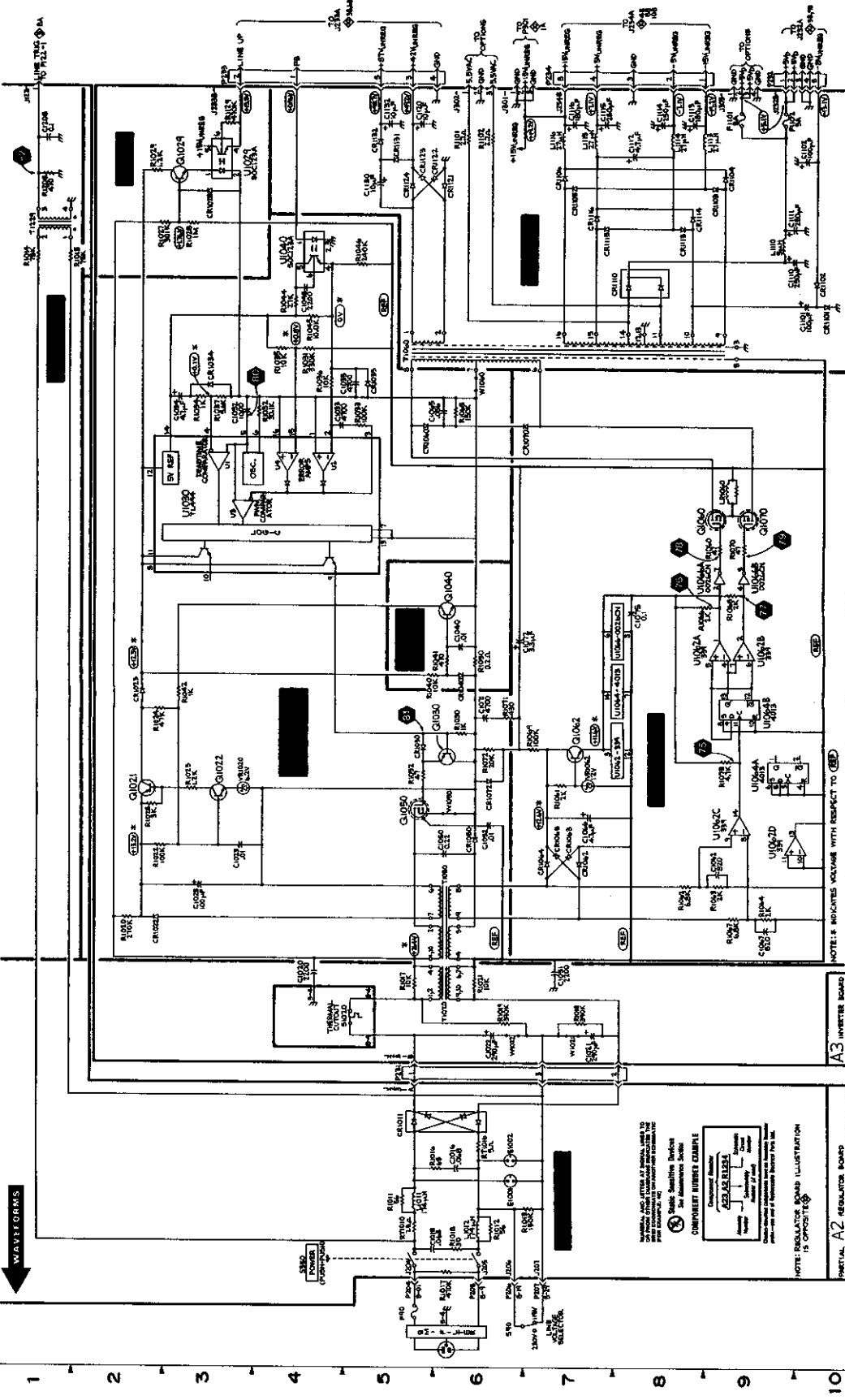
ASSEMBLY A2											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1018	8C	2C	J122	1S	2F	R1011	5B	2A	RT1010	5B	2A
C1018	8B	3B	J204	5B	2B	R1012	6B	3A	RT1016	6C	2C
C1208	1P	3D	J205	6B	2B	R1013	7B	4B			
			J206	6B	4B	R1014	1N	4C	S350	4B	3A
CR1011	5C	1B	J207	7B	4B	R1015	1N	3C			
			J231A	5D	1B	R1016	6C	2B	T1228	1N	3C
E1001	6B	2B				R1018	8B	3B			
E1002	8C	3B	L1011	5B	2A	R1208	1N	3D			
			L1012	6B	3B						

Partial A2 also shown on diagram 10.

ASSEMBLY A3											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1020	4E	5G	CR1060	5L	5D	Q1021	2G	8J	R1064	9E	7E
C1021	7D	5J	CR1062	7F	7G	Q1022	3G	8J	R1065	6L	6E
C1022	6D	5H	CR1063	7F	7G	Q1029	3P	8F	R1066	8J	6E
C1023	3F	7H	CR1064	7F	7G	Q1030	6H	6F	R1067	9E	7E
C1025	3F	7H	CR1065	7F	7G	Q1040	6J	6F	R1068	9J	6E
C1032	3L	8G	CR1070	7L	6D	Q1050	5G	5F	R1069	7G	7G
C1033	4L	8G	CR1072	6G	7F	Q1060	9K	5D	R1070	9K	6D
C1034	3L	7G	CR1101	10M	6A	Q1062	7G	7G	R1071	6H	7F
C1035	4L	8H	CR1102	10M	6A	Q1070	9K	5E	R1072	6G	7F
C1040	6J	6F	CR1103	9N	7A				R1075	9G	6E
C1048	4M	8E	CR1104	9P	7A	R1017	5E	6H	R1101	6P	5B
C1050	6F	6F	CR1105	7N	7A	R1018	7D	5J	R1102	6P	5B
C1051	7E	7D	CR1106	7P	7A	R1019	6D	6J	R1129	3P	8D
C1052	6F	6E	CR1110	7M	5C	R1020	2E	8J			
C1062	9F	7F	CR1113	8N	7B	R1021	6E	6J	LR1060	9K	6E
C1065	5L	6E	CR1114	8N	7B	R1022	2F	7H			
C1066	7F	7H	CR1115	7N	7A	R1023	3G	8H	T1020	6D	6J
C1067	9E	7E	CR1116	7N	7B	R1024	2H	8H	T1050	6F	6G
C1071	6H	7F	CR1121	6P	7D	R1025	2G	8H	T1060	5M	6C
C1072	7H	7F	CR1122	5P	7D	R1027	2N	8J			
C1075	8J	6E	CR1123	5P	7D	R1028	3N	8E	U1029	3P	8E
C1101	10M	6B	CR1124	5P	8D	R1029	2P	8F	U1030	3K	8G
C1102	10P	6A	CR1131	5P	8D	R1030	6H	7F	U1062	8G	7E
C1110	9N	6B	CR1132	5P	8D	R1031	4M	8F	U1040	4N	8E
C1111	9N	6A				R1032	4L	8G	U1062A	8H	7E
C1112	8P	7A	F1101	9P	6B	R1033	5L	8G	U1062B	9H	7E
C1113	8P	8B	F1102	9P	6A	R1034	3L	8G	U1062C	9F	7E
C1114	8P	8C				R1035	4M	8F	U1062D	9F	7E
C1115	7P	8C	J231B	5D	5H	R1036	4L	8G	U1064	8H	7E
C1116	7P	8B	J232B	9P	5A	R1037	3L	8H	U1064A	9G	7E
C1120	5P	8D	J233B	3P	8D	R1040	5H	7F	U1064B	9H	7E
C1130	5P	8D	J234B	7P	7B	R1041	6H	6F	U1068	8J	7E
C1132	5P	8C	J301	6P	8C	R1042	3H	7G	U1066A	8J	7E
			J302	6P	5B	R1044	4M	8E	U1068B	9J	7E
			J303	9P	5B	R1045	4M	8E			
CR1022	2E	7H				R1046	5N	8E	VR1020	3G	8H
CR1023	2H	8H				R1050	6H	6F	VR1062	7G	7G
CR1028	3N	8F	L1110	9N	6A	R1052	5G	5F			
CR1030	5G	6F	L1113	9P	8A	R1060	9K	6D	W1021	7D	7J
CR1034	3L	7G	L1114	8P	8A	R1061	7G	7G	W1022	6D	7H
CR1035	5L	8H	L1115	7P	7C	R1062	8F	7E	W1050	6G	6F
CR1040	6H	6F	L1116	7P	8A	R1063	9F	7E	W1060	6L	6D
CR1050	6F	8F									

CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
F90	5A	CHASSIS	P206	6A	CHASSIS	P233	3S	CHASSIS	S1020	5D	CHASSIS
P204	5A	CHASSIS	P207	7A	CHASSIS	P234	7S	CHASSIS			
P205	6A	CHASSIS	P231	5D	CHASSIS						
			P232	9S	CHASSIS	S90	6A	CHASSIS			

A B C D E F G H I J K L M N O P Q R S



LOW-VOLTAGE POWER SUPPLY

8331-90

A3 INHIBIT BOARD

METAL A2 REGULATOR BOARD

2465

WAVEFORMS

WAVEFORMS AT POINTS INDICATED BY CIRCLES 1 THROUGH 10 FOR EXAMINATION.

RESISTOR VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

RESISTOR TOLERANCES: 1% (R1001, R1002, R1003, R1004, R1005, R1006, R1007, R1008, R1009, R1010, R1011, R1012, R1013, R1014, R1015, R1016, R1017, R1018, R1019, R1020, R1021, R1022, R1023, R1024, R1025)

CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

CAPACITOR TOLERANCES: 5% (C1001, C1002, C1003, C1004, C1005, C1006, C1007, C1008, C1009, C1010, C1011, C1012, C1013, C1014, C1015)

DIODES: 1N4001, 1N4002, 1N4003, 1N4004, 1N4005

INTEGRATED CIRCUITS: U1001, U1002, U1003, U1004, U1005, U1006, U1007, U1008, U1009, U1010, U1011, U1012, U1013, U1014, U1015

NOTE: REGULATOR BOARD ILLUSTRATION IS OPPOSITE PAGE.

NOTE: R INDICATES VOLTAGE WITH RESPECT TO (BE)

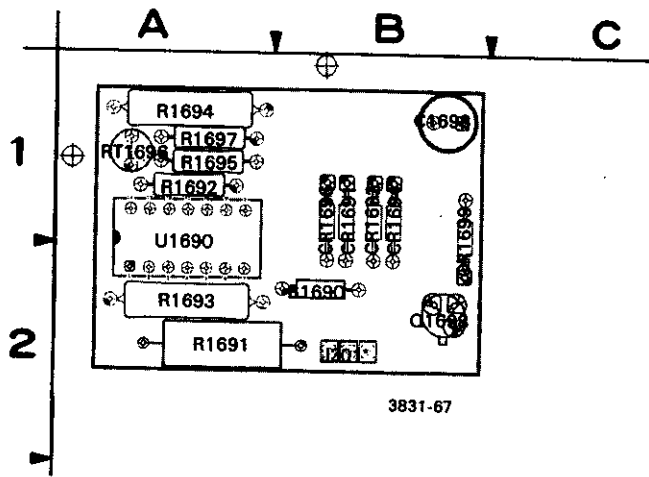


Figure 9-13. A10—Fan Motor board.

⊗ Static Sensitive Devices
See Maintenance Section

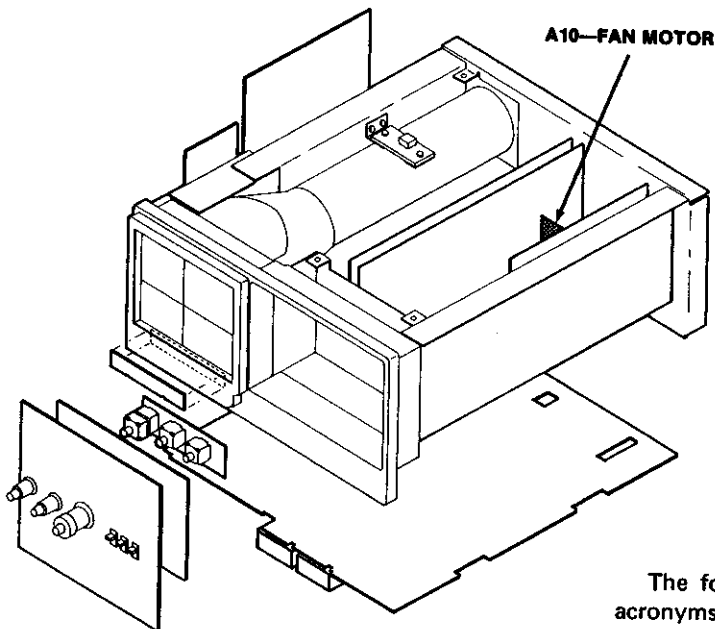
COMPONENT NUMBER EXAMPLE

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.

* LABELED ON SOME BOARDS AS "P" VICE "J".

ALL COMPONENTS MOUNTED ON A10—FAN MOTOR BOARD ARE SHOWN ON SCHEMATIC DIAGRAM 10.



ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

FB . . . feedback
+5VD . . . +5 V digital

LOW-VOLTAGE REGULATORS AND FAN DRIVE DIAGRAM

ASSEMBLY A2											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1220	2M	2D	CR1351	9H	4J	R1223	1G	4D	R1353	8J	2J
C1226	2F	2D	CR1376	7J	1F	R1226	2F	3D	R1354	8J	2J
C1240	3M	2D				R1227	2G	2D	R1355	8J	2J
C1245	3H	3E	F1330	10F	2E	R1228	2G	3D	R1356*	8H	3J
C1246	3H	2E				R1229	1F	3D	R1357	8H	3J
C1260	3M	2D	J121	2P	2E	R1240	2J	3F	R1358	8H	3J
C1261	4J	3F	J122	3P	2F	R1241	2J	4E	R1359	8H	3J
C1270	6C	3G	J201	4P	1D	R1242	2J	4E	R1370	7H	3G
C1272	6B	3G	J202	4P	1D	R1243	2J	4E	R1372	7H	2G
C1274	6B	3F	J203	5P	1G	R1244	2G	4E	R1374	7H	2G
C1280	5M	2E	J232A	5B	1J	R1246	3G	3E	R1376	7J	2G
C1290	5E	2H	J232A	9B	1J	R1247	3H	2D	R1378	6K	2G
C1291	5F	2H	J233A	3B	3F	R1248	3H	3E	R1400	4D	3H
C1300	7M	2E	J233A	6B	3F	R1249	2G	3E	R1402	7D	4H
C1330	9M	2F	J234A	10B	3H	R1261	4K	3F			
C1331	9F	3J	J234A	4B	3H	R1262	4K	2F	TP201	5F	2H
C1350	8M	2F	J234A	8B	3H	R1264	3K	3F			
C1357	8H	2J				R1270	7B	3F	U1260	3J	4F
C1374	7J	2G	L1402	7D	4H	R1273	6C	3G	U1270A	6L	3J
C1400	5D	3H				R1274	6C	3G	U1270B	7L	3J
C1402	7D	4H	P251	6S	1H	R1280	5M	3G	U1270C	9F	3J
						R1281	5M	3G	U1270D	8H	3J
CR1220	2H	3D	Q1220	1H	4E	R1282	5L	2G	U1270	5D	3J
CR1221	2N	2D	Q1221	1G	4D	R1283	4K	4F	U1281A	2F	3D
CR1241	3J	3E	Q1222	1F	3D	R1284	5L	2G	U1281B	3H	3D
CR1242	3H	3E	Q1223	1F	4D	R1285	6L	2G	U1281	5C	3D
CR1243	3N	2E	Q1240	2K	4E	R1286	5L	2G	U1290	5E	2J
CR1244	2G	3D	Q1241	2J	4E	R1291	5F	2H	U1300A	5L	2H
CR1260	3J	4F	Q1243	2H	3E	R1292	5F	2H	U1300B	6L	2H
CR1261	4N	2E	Q1245	3H	3E	R1293	6F	2H	U1300C	5F	2H
CR1262	3J	3F	Q1280	5M	4G	R1300	7M	3G	U1300D	5J	2H
CR1263	4J	3F	Q1281	5L	4G	R1301	7M	3G	U1300	5D	2H
CR1264	4K	3F	Q1300	7M	4H	R1302	7L	3H	U1330	10F	4J
CR1281	5K	2G	Q1301	7L	4H	R1304	7L	3H	U1371A	3J	3F
CR1282	5K	2G	Q1351	9K	2J	R1305	7L	3H	U1371B	4K	3F
CR1283	5N	2F	Q1354	8J	2J	R1306	6L	3H	U1371C	7C	3F
CR1300	6K	2H	Q1370	7H	3G	R1307	7K	3H	U1371D	7J	3F
CR1301	7K	3H	Q1376	7K	1F	R1309	7K	4H	U1371	6D	3F
CR1302	7K	3H				R1331	9G	3J			
CR1303	7M	2F	R1204	7H	3G	R1332	9G	3J	VR1293	5G	2H
CR1330	10F	4J	R1212	1F	4D	R1333	9F	3J			
CR1331	9N	2G	R1220	1H	3E	R1334	9F	3J	W251	8S	1H
CR1332	9F	4J	R1221	1G	4D	R1351	9H	4J			
CR1334	7N	2G	R1222	1G	4D	R1352	8K	2J			

Partial A2 also shown on diagram 9.

ASSEMBLY A10											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
B1690	2C	2B	CR1696	2D	1B	R1691	3C	2A	RT1696	3E	1A
			CR1699	1E	1B	R1692	2C	1A			
C1698	1E	1B	J301	1B	2B	R1693	1B	2A	U1690A	2D	1A
						R1694	1D	1A	U1690B	2B	1A
CR1691	2D	1B	Q1696	1D	2B	R1695	2E	1A	U1690C	2C	1A
CR1692	2D	1B				R1697	2E	1A	U1690D	2C	1A
CR1694	2D	1B									

CHASSIS MOUNTED PARTS											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
W301	1A	CHASSIS	P301	1A	CHASSIS						

*See Parts List for serial number ranges.

POWER DISTRIBUTION A DIAGRAM



ASSEMBLY A1											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C102	8B	6D	C850	7M	7F	L740	7H	6D	U170	5L	2E
C106	6A	5D	C833	2M	8G	L743	3H	6D	U200	5C	4D
C107	7B	5D	C838	7M	9G	L938	7K	6J	U300	5D	2B
C108	8B	6D	C940	7M	9G	L973	8M	9K	U350	5L	8B
C113	4B	6D	C943	3M	9H				U400	5E	4E
C114	3B	5D	C958	3M	7K	LR101	6A	5C	U450	2M	3F
C119	7B	5C	C966	1M	9K	LR107	6C	6D	U500	5E	3G
C120	2B	5E	C973	8M	9K	LR201	6B	4C	U600	5F	6H
C121	2B	5E	C988	7K	6K	LR218	7C	3D	U650	5G	3J
C125	4A	5C	C990	2M	8K				U700	5H	7D
C207	8A	4C				P121	2A	4J	U800	5J	7F
C218	7C	3D	CR107	7B	4H	P121	9A	4J	U850	6L	8F
C219	7B	3D	CR807	4J	7F	P122	3A	4H	U860	6L	6F
C220	2C	3D	CR811	2K	7F				U900	5J	8H
C221	2C	3D	CR987	4K	8K	Q700	1G	9C	U910	2G	9F
C225	4B	3C							U950	5K	8K
C307	7D	3B	J119	8S	4H	R120	2B	5E	U975	3L	6K
C325	3D	3C	J191	10S	8K	R125	4B	6D	U980	3L	6K
C336	3D	1C	J191	1S	8K	R220	2C	3C			
C415	7M	4F	J411	3S	1K	R225	4B	3C	VR125	4A	6D
C458	2M	4F	J511	10A	1D	R700	1G	9C	VR225	4B	3C
C480	2M	2J	J511	6S	1D	R701	1F	9C			
C521	7M	2H	J512	6S	1H	R702	2F	9D	W101	3A	9B
C675	3M	3H				R811	2K	7G	W102	3A	4K
C710	1G	9D	L101	8A	6D	R951	10P	9J	W103	3A	7G
C722	3H	6D	L107	7B	6D				W104	3A	3K
C723	3H	6D	L113	3B	6D	U100	5B	5D	W105	3A	5F
C731	10C	8E	L219	7B	3D	U110	2B	6B	W109	3A	9L
C733	2H	7E	L307	7D	3B	U120	2B	6C	W121	1A	4J
C738	6G	6E	L325	3D	3C	U130	2B	6C	W121	9A	4J
C740	7H	6D	L336	3D	1C	U140	3L	7B	W122	8A	4H
C810	2M	7F	L521	7E	2H	U150	3L	7C			
C811	3M	7F	L733	2H	6E	U160	2C	2D			
C819	7M	8E	L738	6G	6E	U165	4L	2F			

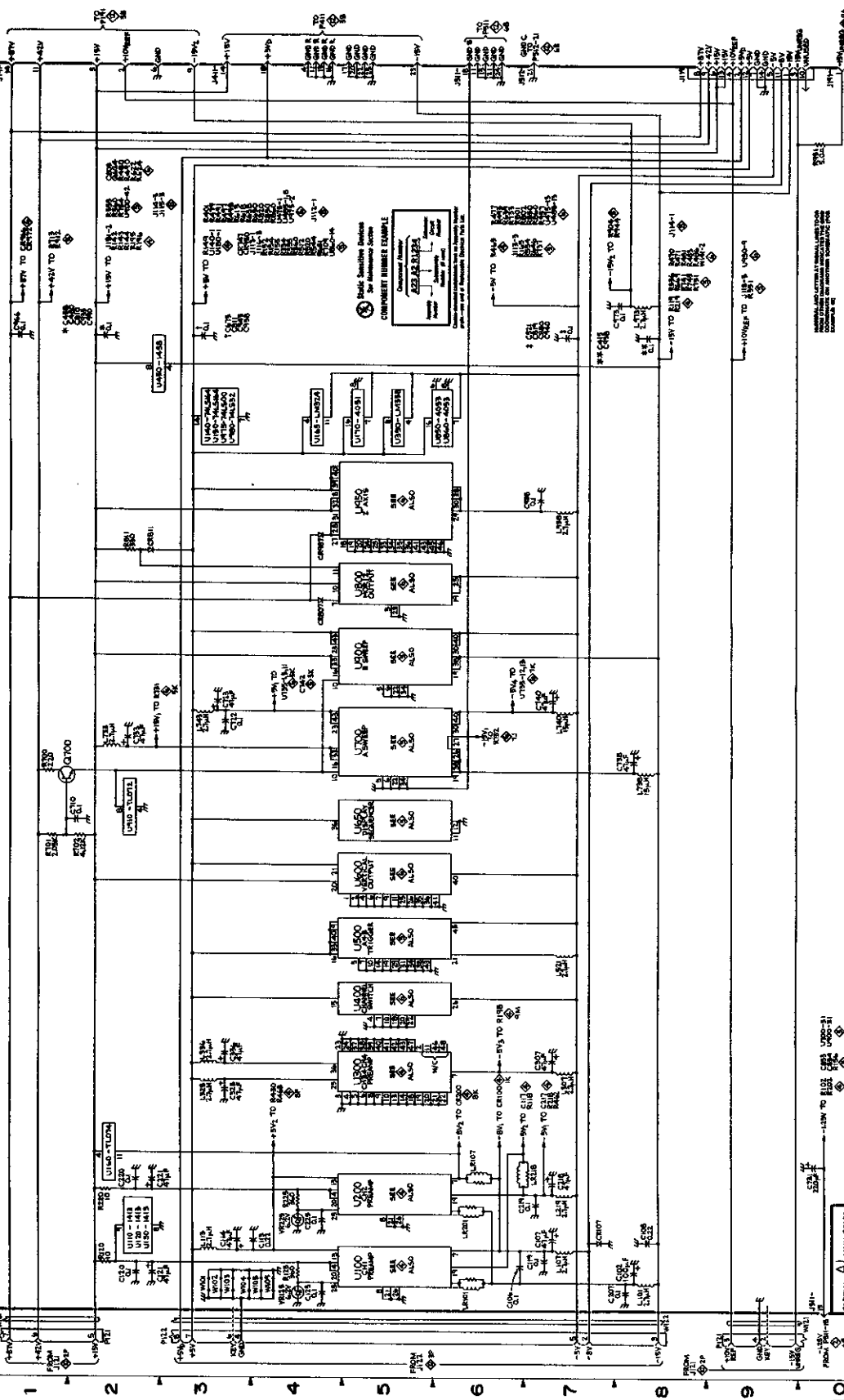
Partial A1 also shown on diagrams 4, 5, 6 and 8.

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

- GND C . . . virtual ground "C"
- GND R . . . virtual ground "R"
- GND S . . . virtual ground "S"
- +5VD . . . +5 V digital
- +5V1 . . . +5 V decoupled (1)
- +5V2 . . . +5 V decoupled (2)
- 5V1 . . . -5 V decoupled (1)
- 5V2 . . . -5 V decoupled (2)
- 5V3 . . . -5 V decoupled (3)
- 5V4 . . . -5 V decoupled (4)
- 8V1 . . . -8 V decoupled (1)
- 8V2 . . . -8 V decoupled (2)
- +15V1 . . . +15 V decoupled (1)
- 15V2 . . . -15 V decoupled (2)

A I B I C I D I E I F I G I H I J I K I L I M I N I P I S



POWER DISTRIBUTION A

3851-82

2465

ACRONYM DICTIONARY

The following listing explains some of the less obvious acronyms and signal labels used on this schematic. Acronyms and labels not shown in this listing may be included in the circuit descriptions (Section 3) and should be obvious if a little thought is given to the intended circuit function.

GND C . . . virtual ground "C"
GND R . . . virtual ground "R"
GND S . . . virtual ground "S"
+5VD . . . +5 V digital
-15V2 . . . -15 V decoupled (2)
+87V1 . . . +87 V decoupled (1)

POWER DISTRIBUTION B DIAGRAM

ASSEMBLY A4											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2830	4C	1C	C2890	4C	3F	U2860	4G	2D	U2960	4G	2E
C2835	4C	2C				U2865	4G	2E	U2965	5H	3E
C2851	4C	1D	P411	3B	1A	U2870	4H	2E	U2970	5H	3E
C2855	4C	2D				U2880	4H	1E	U2980	5H	2E
C2860	4C	2D	R2805	4C	2B	U2885	4H	2F	U2985	4G	3E
C2885	4C	2E				U2890	4H	2E	U2990	5H	3E
C2901	4C	2B	U2800	4D	2B	U2900	5H	2A	U2995	5H	4E
C2913	5B	4B	U2805	4D	2B	U2905	4E	3A			
C2926	4C	3C	U2810	4H	2A	U2910	3D	3A	VR2805	4C	2B
C2940	3B	4C	U2820	3C	2A	U2920	4E	3B			
C2950	4C	4D	U2830	4H	1C	U2930	4F	3D	W411	5B	1A
C2960	4C	2E	U2835	4H	2C	U2935	4G	3C	W2851	4B	1D
C2970	4C	3D	U2850	4H	1D	U2940	5H	4C	W2913	5B	4B
C2980	4C	2F	U2855	4H	2D	U2950	5H	4D			

Partial A4 also shown on diagram 7.

ASSEMBLY A5											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2041	8C	1C	C2637	7B	3D	U2134	8H	1B	U2496	8G	3J
C2188	8C	1H	C2642	10C	4D	U2162	8F	2J	U2558	8J	3J
C2217	9B	2E	C2734	9C	4F	U2178	8F	1J	U2580	8H	4J
C2218	9B	3D				U2214	9E	2D	U2596	9F	3J
C2221	10C	2C	J251	7B	2D	U2234	8D	2B	U2634	7D	4D
C2223	10B	2C				U2308	9F	2F	U2656	8H	4G
C2240	8C	1A	P511	6B	4C	U2335	8E	3D	U2668	9H	4G
C2328	10C	4E	P512	6B	4H	U2362	8F	3J	U2770	9H	3J
C2346	8C	3D				U2378	8F	2J			
C2354	8B	1C	R2608	6L	3A	U2408	8E	3A	W511	6B	4C
C2440	10C	4E				U2418	8E	3B	W512	7B	4H
C2475	8C	4J	TP508	7L	4K	U2427	7D	3C	W2143	7L	1A
C2485	8C	3K				U2435	7D	3E	W2528	6L	4A
C2527	7C	4D	U2034	8H	2B	U2456	8H	3B			
C2575	8C	4H	U2092	8E	1G	U2468	8J	4J			
C2586	9C	3K	U2108	8H	2G	U2480	8H	4K			

Partial A5 also shown on diagrams 1 and 2.

ASSEMBLY A6											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
P651	6M	3F	U3300	8N	4B	U3375	8N	3D	W652	10M	2A
P652	6M	2A	U3325	8N	3C						
			U3350	8N	2F	W651	6M	3F			

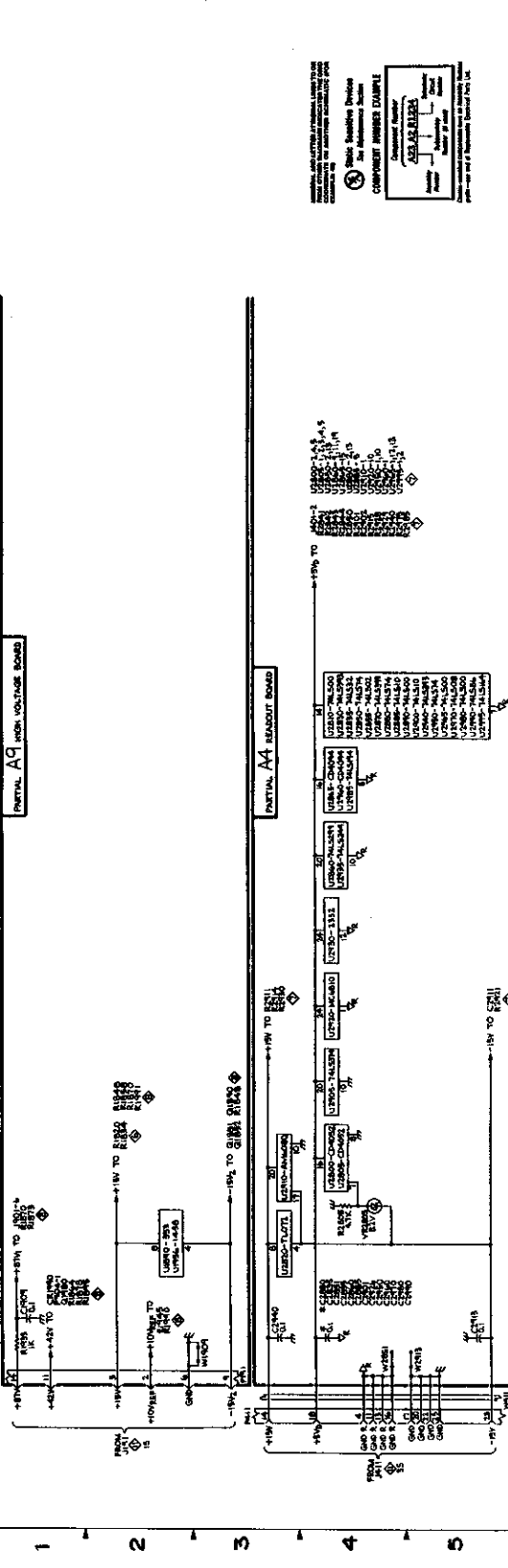
Partial A6 also shown on diagram 3.

ASSEMBLY A9											
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1909	1C	3A	R1933	1B	4A	U1956	2C	4C			
P191	3B	4B	U1890	2C	2E	W1909	3B	3A			

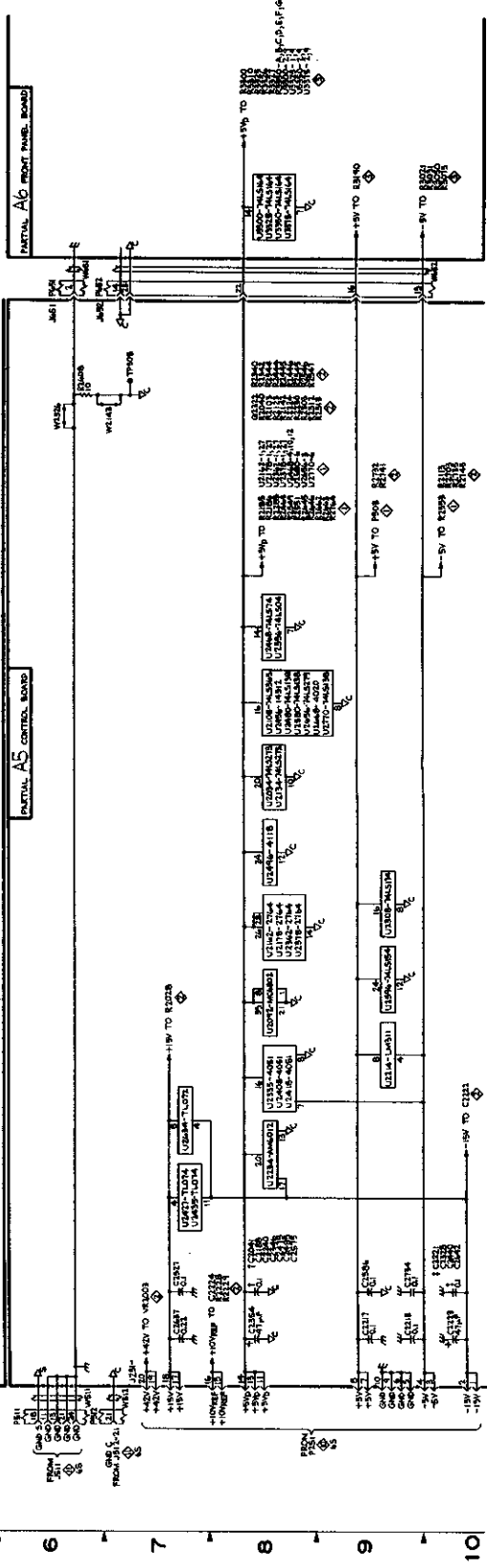
Partial A9 also shown on diagrams 6 and 8.

A I B I C I D I E I F I G I H I J I K I L I M I N I P I S

PARTIAL A4 HIGH VOLTAGE BOARD



PARTIAL A5 CONTROL BOARD



POWER DISTRIBUTION B

2465

381-15

2465 Service

J110 A1 Test Connector		
Pin	Line Name	Schem
1	ATTN CLK	4
2	GND	4
3	CH4 POS	4
4	Unused	4
5	CH1 POS	4
6	GND	4
7	CH3 POS	4
8	CH2 POS	4

J/P/W121 A1 to A2		
Pin	Line Name	Schem
1	-15VUNREG	10,11
2	Key ^a	10,11
3	+10VREF	10,11
4	GND	10,11
5	+15V	10,11
6	+42V	10,11
7	+87V	10,11

J/P/W251 A2 to A5		
Pin	Line Name	Schem
1	-15V	10,12
2	-15V	10,12
3	-5V	10,12
4	-5V	10,12
5	GND	10,12
6	GND	10,12
7	+5V	10,12
8	+5V	10,12
9	GND	10,12
10	GND	10,12
11	+5V _D	10,12
12	PWR UP	1,10
13	+5V _D	10,12
14	+5V _D	10,12
15	+10VREF	10,12
16	+10VREF	10,12
17	+15V	10,12
18	+15V	10,12
19	+42V	10,12
20	+42V	10,12

J/P/W122 A1 to A2		
Pin	Line Name	Schem
1	LINE TRIG	5,9
2	-8V	10,11
3	-15V	10,11
4	GND	10,11
5	-5V	10,11
6	Key ^a	10,11
7	+5V	10,11
8	+5V _D	10,11

J118 A1 Test Connector		
Pin	Line Name	Schem
1	Unused	5
2	DLY REF 0	5
3	DLY REF 1	5
4	GND	5
5	+10VREF	5
6	ROR	5
7	Unused	5
8	GND	5

J/P/W141 A1 to A14		
Pin	Line Name	Schem
1	GND	6
2	-15V	6
3	VQOUT	6
4	VERT	6
5	HORIZ	6

J/P/W411 A4 to A1		
Pin	Line Name	Schem
1	ROB	5,7
2	ROR	5,7
3	ROA	5,7
4	GND R	11,12
5	ROS 2	6,7
6	SGA	5,7
7	ROSFRAME	6,7
8	ROS 1	6,7
9	R/W DLYD	6,7
10	RO DO	6,7
11	GND R	11,12
12	10 MHZ	6,7
13	GND R	11,12
14	+15V	11,12
15	BD0	6,7
16	GND R	11,12
17	GND	11,12
18	+5V _D	11,12
19	DLY REF 1	5,7
20	GND	11,12
21	DLY REF 0	5,7
22	GND	11,12
23	-15V	11,12
24	READOUT	
	HORIZ OUT	6,7
25	GND	11,12
26	READOUT	
	VERT OUT	6,7

J119 A1 Test Connector		
Pin	Line Name	Schem
1	-15V	11
2	+5V _D	11
3	-15VUNREG	11
4	+10VREF	11
5	-5V	11
6	+15V	11
7	GND	11
8	+87V	11
9	+42V	11
10	Unused	11
11	-8V	11
12	+5V	11
13	+15V	11
14	GND	11

J/P191 A1 to A9		
Pin	Line Name	Schem
1	-15VUNREG	8,11
2	+10VREF	11,12
3	+15V	11,12
4	FOCUS	8
5	ASTIG	8
6	GND	11,12
7	VZOUT	6,8
8	VQOUT	6,8
9	-15V ₂	11,12
10	TRACE ROT	8
11	+42V	11,12
12	TRZ	6
13	QGAIN	6
14	+87V	11,12

J500 A5 to Options		
Pin	Line Name	Schem
1	A7	1
2	A15	1
3	A6	1
4	A14	1
5	MR	1
6	A13	1
7	A5	1
8	A12	1
9	A4	1
10	A11	1
11	A3	1
12	A10	1
13	GND C	1
14	A9	1
15	A2	1
16	A8	1
17	A1	1
18	A0	1
19	R/W	1
20	BD7	1
21	GND C	1
22	BD6	1
23	BD3	1
24	BD5	1
25	BD2	1
26	GND C	1
27	BD1	1
28	BD4	1
29	BD0	1
30	E	1
31	GND C	1
32	10MHZ	1
33	VMA	1
34	RESET	1

J502 A5 to Options		
Pin	Line Name	Schem
1	OEA35	2
2	OEACLK	2
3	GND C	2
4	OEA1/O	2
5	OEAC2	2
6	OEAC1	2
7	OEAC3	2

J/P/W512 A5 to A1		
Pin	Line Name	Schem
1	CONT DATA	2,4
2	ATTN STRB	2,4
3	ATTN CLK	1,4
4	CH2 PA CLK	1,4
5	CH1 PA CLK	1,4
6	A TRIG CLK	1,5
7	B TRIG CLK	1,5
8	A SWP CLK	1,5
9	B SWP CLK	1,5
10	DISP SEQ CLK	1,5
11	RO ON	2,5
12	RO DO	2,6
13	ROS 2	1,6
14	ROS 1	1,6
15	ROFRAME	1,6
16	DAC MUX1 A0	2,4
17	TSO	2,5
18	DAC MUX1 A1	2,4
19	TRIG STAT	
	STRB	1,5
20	DAC MUX1 A2	2,4
21	GND C	11,12
22	DAC MUX1 INH	1,4
23	R/W DLYD	1,6
24	BD0	1,6
25	5MHZ	1,5
26	10MHZ	1,6

J/P/W511 A5 to A1		
Pin	Line Name	Schem
1	CH1 PRB	2,4
2	CH2 OVL	2,4
3	CH4 PRB	2,4
4	CH3 PRB	2,4
5	CH1 OVL	2,4
6	CH2 PRB	2,4
7	CH4 POS	2,4
8	CH3 POS	2,4
9	CH2 POS	2,4
10	CH1 POS	2,4
11	GND	11,12
12	DAC MUX1 IN	2,4
13	GND	11,12
14	TRACE SEP	2,6
15	-1.25V	2,11
16	DLY REF 0	2,5
17	DLY REF 1	2,5
18	GND S	11,12
19	A TIM REF	2,5
20	B TIM REF	2,5
21	GND	11,12
22	HORIZ POS	2,6
23	S1	2,4
24	GND	11,12
25	A TRIG LVL	2,5
26	B TRIG LVL	2,5

J/P/W651 A6 to A5		
Pin	Line Name	Schem
1	DAC MUX1 IN	2,3
2	GND	12
3	HORIZ POS	2,3
4	+1.36V	2,3
5	-1.25V	2,3
6	DLY A	2,3
7	ΔA	2,3
8	ΔB	2,3
9	DLY B	2,3
10	HORIZ VAR	2,3
11	TRIG LEVEL	2,3
12	HOLDOFF	2,3
13	-1.25V	2,3
14	TRACE SEP	2,3
15	CH1 VAR	2,3
16	CH2 VAR	2,3
17	CH1 POS	2,3
18	CH2 POS	2,3
19	CH3 POS	2,3
20	CH4 POS	2,3

J/P/W652		A6 to A5
Pin	Line Name	Schem
1	ROW 8	2,3
2	ROW 3	2,3
3	ROW 9	2,3
4	ROW 4	2,3
5	ROW 5	2,3
6	ROW 1	2,3
7	Unused	2,3
8	Unused	2,3
9	ROW 0	2,3
10	ROW 7	2,3
11	ROW 10	2,3
12	ROW 2	2,3
13	ROW 6	2,3
14	GND C	12
15	-5V	12
16	+5V	12
17	TRIG LED	2,3
18	COL 0	2,3
19	LED CLK	2,3
20	COL 1	2,3
21	LED DATA	2,3
22	+5V _b	12
23	GND C	12
24	COL 2	2,3
25	COL 3	2,3
26	COL 4	2,3

W900		A9 to CRT
Pin	Line Name	Schem
1	HEATER	8
2	CATHODE	8
3	GRID	8
4	SLOT	8
5	Q1+	8
6	Q2+	8
7	Q3-	8
8	PLATE	
	AVERAGE	8
9	FIRST ANODE	8
10	VARIABLE	
	OCTOPOLE	8
11	Q3+	8
12	Q1-	8
13	Q2-	8
14	HEATER	8

J/P901		A9 to CRT
Pin	Line Name	Schem
1	Q3-	8
2	Key ^b	8
3	Q1-	8
4	Q2-	8
5	Key ^b	8
6	FIRST ANODE	8
7	Q3+	8
8	VARIABLE	
	OCTOPOLE	8
9	PLATE	
	AVERAGE	8
10	Q2+	8
11	Q1+	8

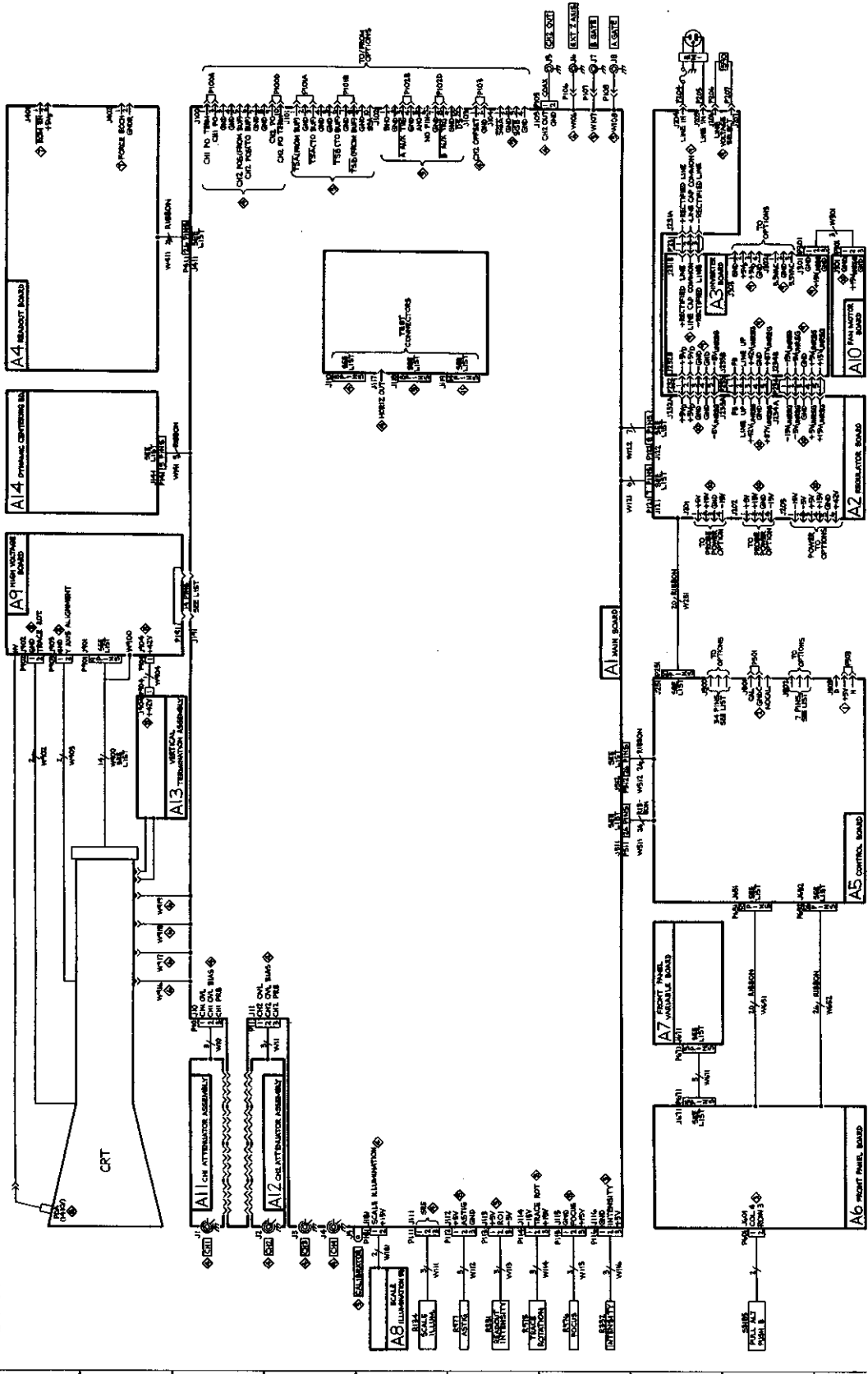
J/P/W671		A6 to A7
Pin	Line Name	Schem
1	CH2 VAR	3
2	CH1 VAR	3
3	HORIZ VAR	3
4	-1.25V	3
5	+1.36V	3

^a No pins exist in J121-2 and J122-2 positions; no wires exist in W121-2 and W122-2 positions; plugs are installed in P121-2 and P122-2 positions to key the connectors.

^b No pins exist in J901-2 and -5 positions; plugs are installed in P901-2 and -5 positions.

A T B C D E F G H I J K L M N P T S

1 2 3 4 5 6 7 8 9 10



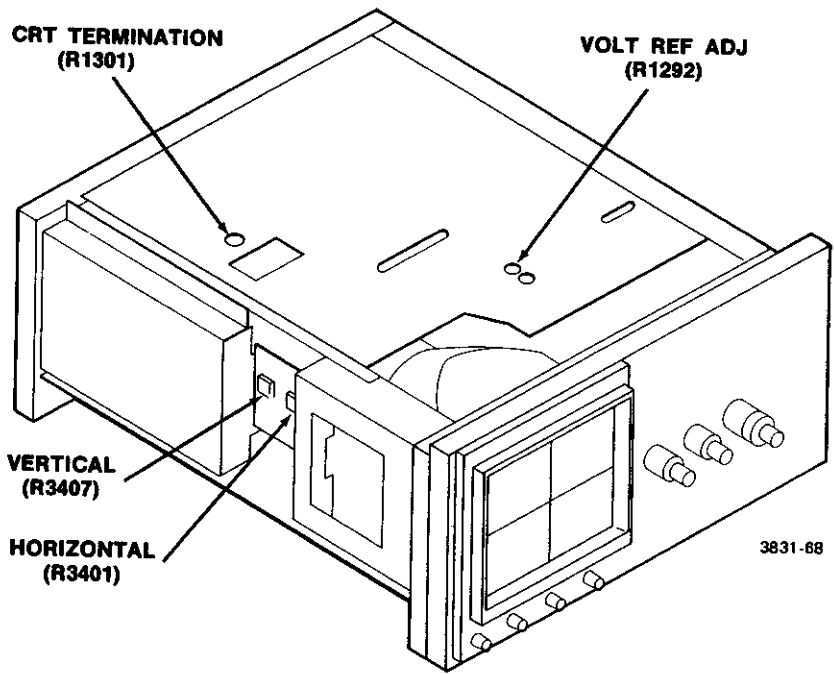
INTERCONNECTIONS

2465

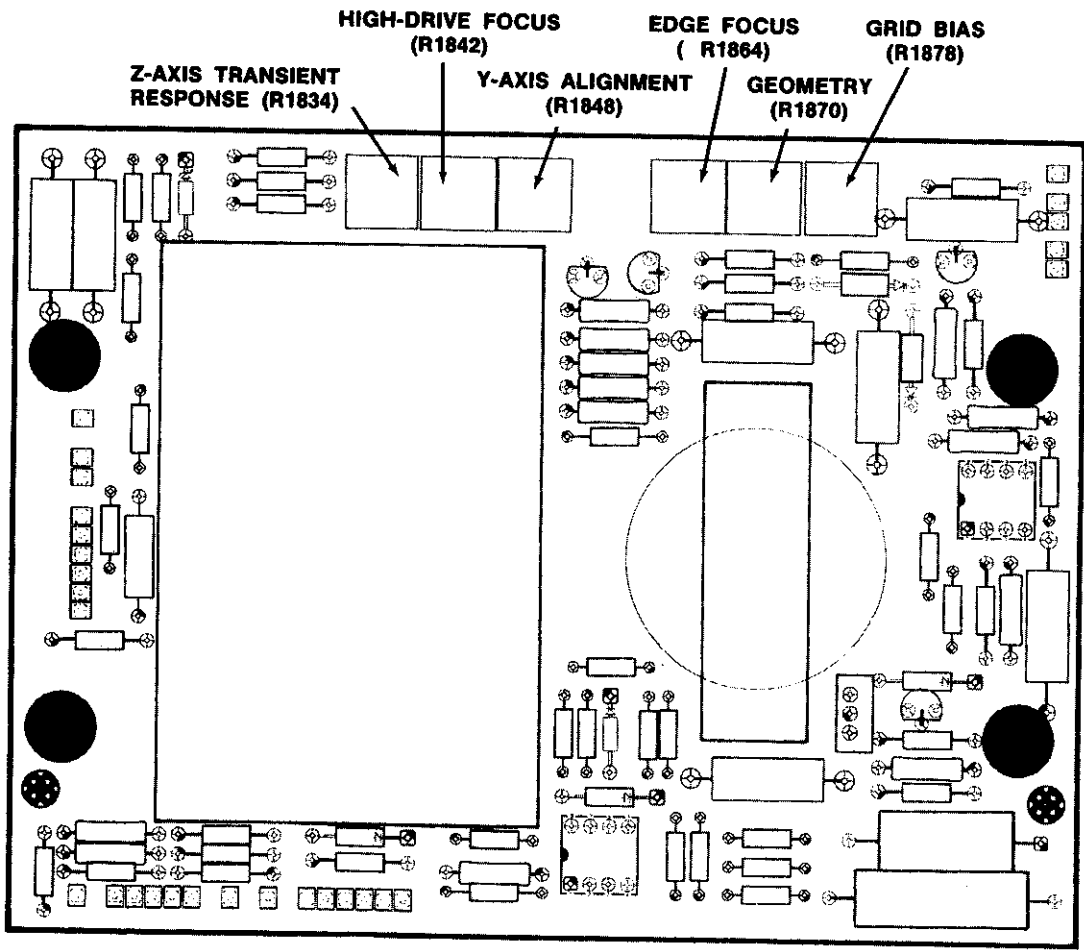
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CHASSIS MOUNTED PARTS

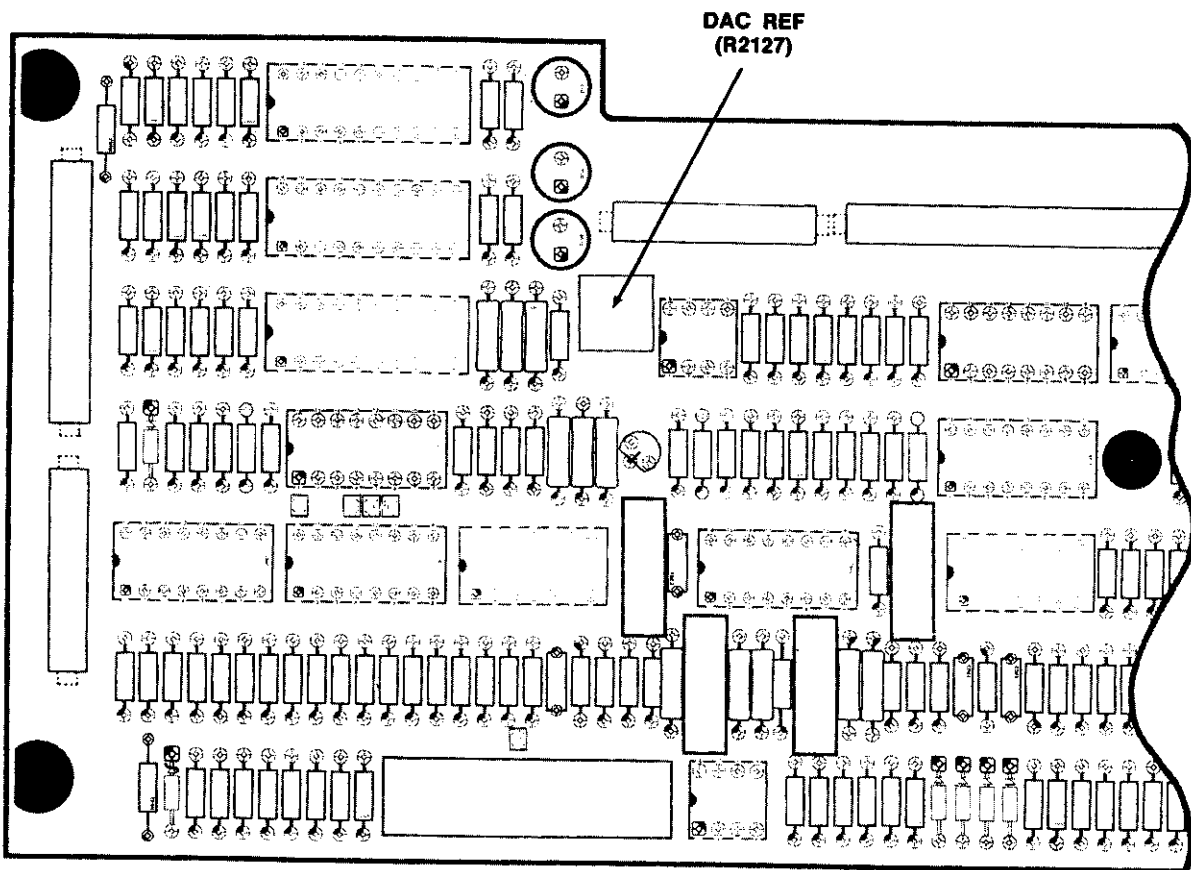
CIRCUIT NUMBER	SCHEM NUMBER	SCHEM LOCATION	CIRCUIT NUMBER	SCHEM NUMBER	SCHEM LOCATION
F90	9	5A	P904	8	5P
J3	4	10A	R134	4	5N
J4	4	10A	R351	5	5A
J5	4	8T	R352	5	6A
J6	6	9A	R975	8	2B
J7	5	7S	R976	8	5B
J8	5	3S	R977	8	4B
			R996	8	3K
L90	8	2L	S90	9	6A
LR1513	8	5M	S1020	9	5D
LR1514	8	5M	S3185	3	5D
P111	4	4N	V900	8	2L
P112	8	3C			
P113	5	5A	W111	4	5N
P114	8	2C	W112	8	4B
P115	8	4C	W113	5	6A
P116	5	6A	W114	8	3B
P204	9	5A	W115	8	5B
P205	9	6A	W116	5	6A
P206	9	6A	W121	10	2S
P207	9	7A	W122	10	3S
P231	9	5D	W122	9	1S
P232	9	9S	W301	10	1A
P233	9	3S	W671	3	8N
P234	9	7S	W900	8	3M
P601	3	5D	W900	8	6J
P671	3	7N	W900	8	7J
P901	8	3M	W900	8	7M
P901	8	4J	W902	8	3J
P901	8	5M	W903	8	4M
P902	8	2J			
P903	8	4M			



A13—CRT TERMINATION, A14—DYNAMIC CENTERING, ADJUSTMENT LOCATIONS 1

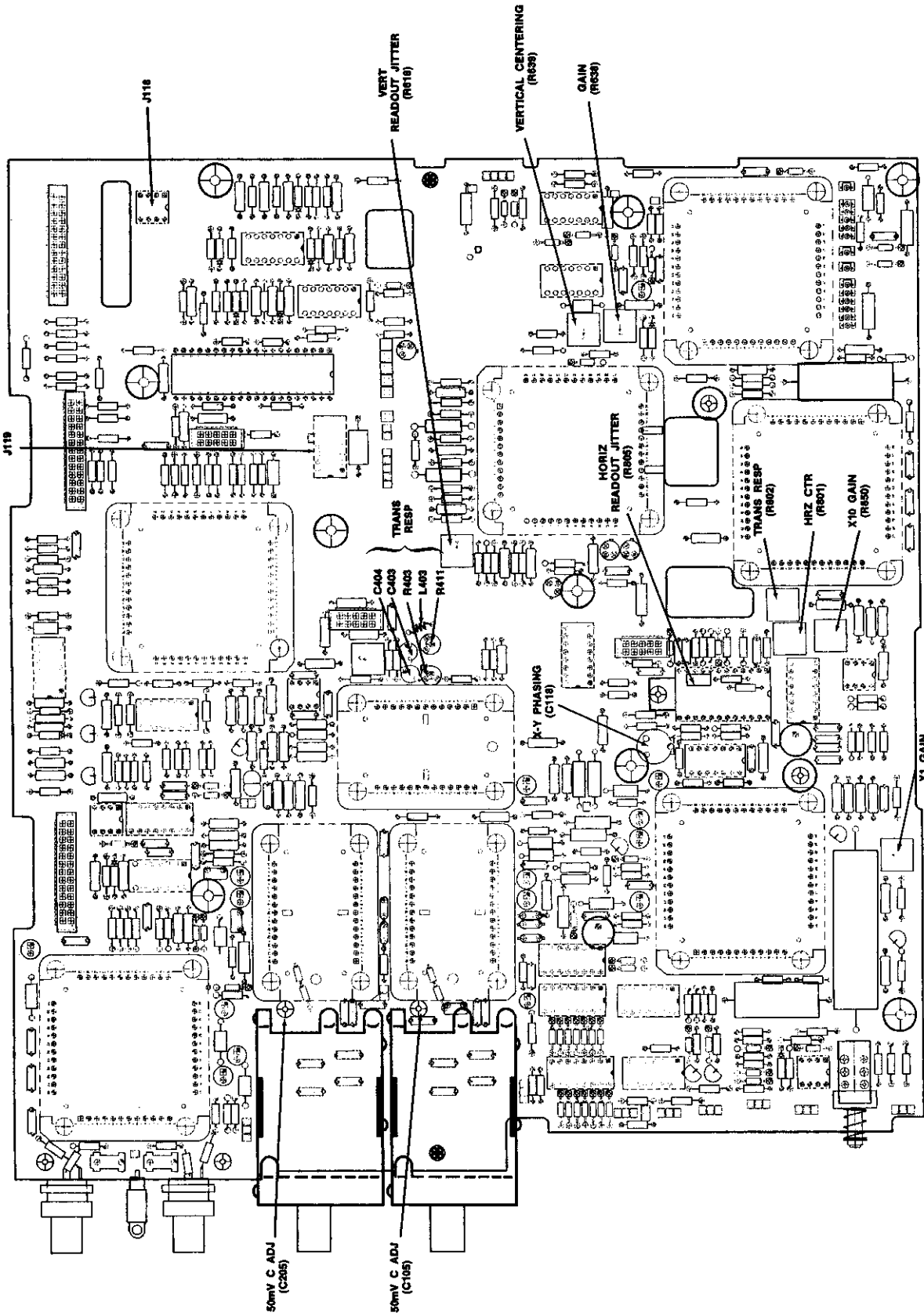


A9—HIGH VOLTAGE, ADJUSTMENT LOCATIONS 2



A5-CONTROL, ADJUSTMENT LOCATIONS 3

3831-70



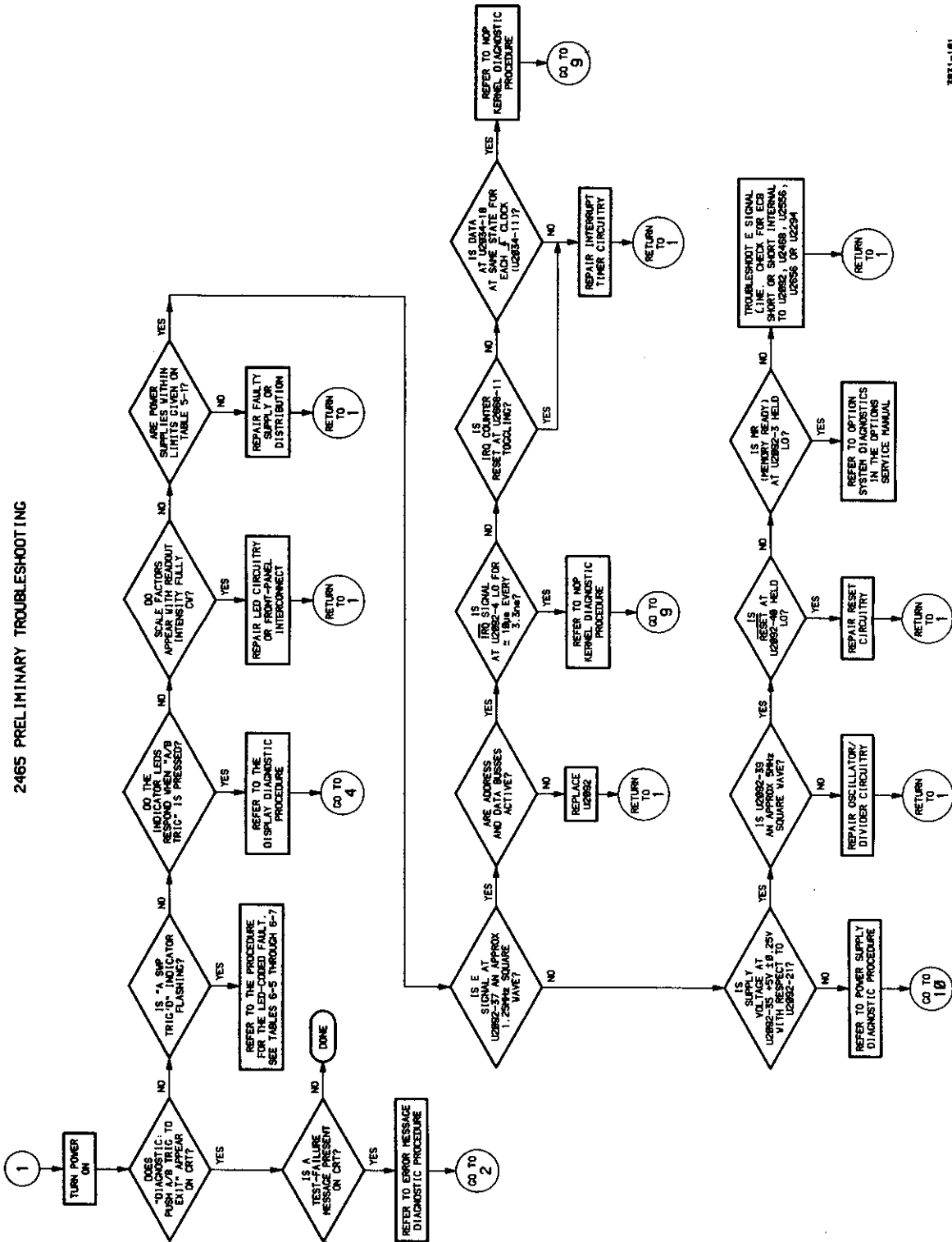
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X1 GAIN (R800)

A1—MAIN, ADJUSTMENT LOCATIONS 4

2465 PRELIMINARY TROUBLESHOOTING



Probable Causes of Trigger Error Messages

Test 05 Fail	Probable Causes of Failure
01	a. Line Signal b. U500 (Trigger) c. U650 (Trigger Status Data to Processor)
02 or 22	a. Line Signal b. U500 (Trigger)
04 or 44	a. U2634A, U2235, or U500 b. Line Signal