



**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

**7B10
TIME BASE
OPERATORS**

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**

Serial Number _____

070-2317-00
Product Group 42

First Printing SEP 1978
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Normal

The NORM MODE provides a triggered display with the correct settings of the LEVEL control whenever an adequate trigger signal is applied. The TRIG'D light indicates when the display is triggered.

The normal trigger mode must be used to produce triggered displays with trigger repetition rates below about 30 hertz. When the TRIG'D light is off, no trace is displayed.

Single Sweep

When the signal to be displayed is not repetitive or varies in amplitude, waveshape, or repetition rate, a conventional repetitive type display may produce an unstable presentation. Under these circumstances, a stable display can often be obtained by using the single-sweep feature of this unit. The single-sweep mode is also useful to photograph non-repetitive or unstable displays.

To obtain a single-sweep display of a repetitive signal, first obtain the best possible display in the NORM MODE. Then, without changing the other TRIGGERING controls, press the SINGLE SWP RESET button. A single trace is presented each time this button is pressed. Further sweeps cannot be presented until the SINGLE SWP RESET button is pressed again. If the displayed signal is a complex waveform composed of varying amplitude pulses, successive single-sweep displays may not start at the same point on the waveform. To avoid confusion due to the crt persistence, allow the display to disappear before pressing the SINGLE SWP RESET button again. At fast sweep rates, it may be difficult to view the single-sweep display. The apparent trace intensity can be increased by reducing the ambient light level or by using a viewing hood as recommended in the mainframe instruction manual.

When using the single-sweep mode to photograph waveforms, the graticule may have to be photographed separately in the normal manner to prevent over exposing the film. Be sure the camera system is well protected against stray light, or operate the system in a darkened room. For repetitive waveforms, press the SINGLE SWP RESET button only once for each waveform unless the signal is completely symmetrical. Otherwise, multiple waveforms may appear on the film. For random signals, the lens can be left open until the signal triggers the unit. Further information on photographic techniques is given in the appropriate camera instruction manual.

TRIGGERING COUPLING

The TRIGGERING COUPLING push buttons select the method in which the trigger signal is connected to the trigger circuits. Each position permits selection or rejection of some frequency components of the signal which triggers the sweep.

AC

AC COUPLING blocks the dc component of the trigger signal. Signals with low-frequency components below about 30 hertz are attenuated. In general, AC COUPLING

can be used for most applications. However, if the signal contains unwanted frequency components or if the sweep is to be triggered at a low repetition rate or dc level, one of the other COUPLING switch positions will provide a better display.

AC LF REJ

AC LF REJ COUPLING rejects dc, and attenuates low-frequency trigger signals below about 50 kilohertz. Therefore, the sweep is triggered only by the higher-frequency components of the trigger signal. This position is particularly useful for providing stable triggering if the trigger signal contains line-frequency components. Also, the AC LF REJ position provides the best alternate-mode vertical displays at fast sweep rates when comparing two or more unrelated signals.

AC HF REJ

AC HF REJ COUPLING passes all low-frequency signals between about 30 hertz and 30 kilohertz. Dc is rejected and signals outside the above range are attenuated. When triggering from complex waveforms, this position is useful to provide a stable display of the low-frequency components.

DC

DC COUPLING can be used to provide stable triggering from low-frequency signals which would be attenuated in the other COUPLING switch positions. DC COUPLING can be used to trigger the sweep when the trigger signal reaches a dc level set by the LEVEL control. When using internal triggering, the setting of the vertical unit position control affects the triggering point.

TRIGGERING SOURCE

The TRIGGERING SOURCE push buttons select the source of the trigger signal which is connected to the trigger circuits.

Internal

The INT position connects the trigger signal from the vertical plug-in unit. Further selection of the internal trigger signal may be provided by the vertical plug-in unit or by the mainframe; see the instruction manuals for these instruments for more information. For most applications, the internal source can be used. However, some applications require special triggering which cannot be obtained in the INT position. In such cases, the LINE or EXT positions of the SOURCE switches must be used.

Line

The LINE position connects a sample of the power-line voltage from the mainframe to the trigger circuit. Line triggering is useful when the input signal is time-related (multiple or submultiple) to the line frequency. It is also useful for providing a stable display of a line-frequency component in a complex waveform.



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7B10 TIME BASE

INSTRUCTION MANUAL

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070-2316-00
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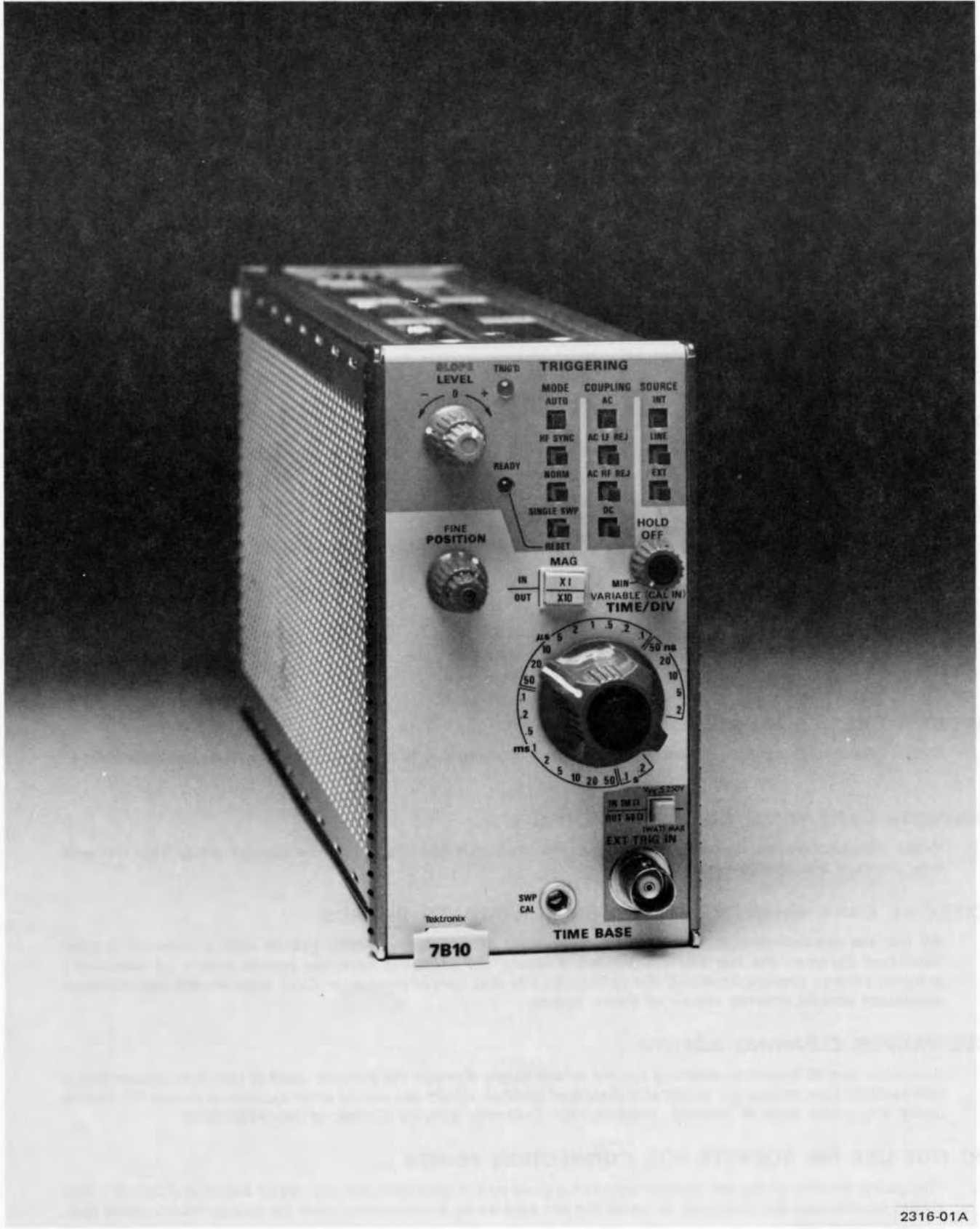
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REPAIRING SAFETY SUMMARY



2316-01A

GENERAL INFORMATION

INTRODUCTION

OPERATORS MANUAL

The Operators Manual contains information necessary to effectively operate the 7B10 Time Base and is divided into three sections: Section 1 provides a basic description of the 7B10 with instrument specifications and accessories, section 2 contains operating information for the instrument, Instrument Option information is located in section 3 of the manual.

To install the unit in a plug-in compartment, push it in until it fits firmly into the compartment. The front panel of the unit should be flush with the front panel of the mainframe. Even though the gain of the mainframe is standardized, the sweep calibration of the unit should be checked when installed. The procedure for checking the unit is given under Sweep Functions in the Operators Checkout procedure in section 2.

INSTRUCTION MANUAL

The Instruction Manual provides both operating and servicing information for the 7B10 Time Base. The Instruction Manual is divided into nine sections. Operating information is covered in the first two sections; servicing information for use by qualified service personnel is contained in the remaining seven sections of the manual. Schematic diagrams are located at the rear of the manual and can be unfolded for reference while reading other parts of the manual. The reference designators and symbols used on the schematics are defined on the first page of the Diagrams and Circuit Board Illustrations section. All abbreviations used in this manual, with the exception of the parts list and schematic diagrams, comply with the American National Institute Y1.1-1972 publication. The parts lists are computer printouts and use computer-supplied abbreviations. Instrument Option information is located in section 6 of the Instruction Manual.

To remove the unit, pull the release latch (see Fig. 1-1) to disengage the unit from the mainframe, and pull it out of the plug-in compartment.

INSTALLATION

The time-base unit is designed to operate in the horizontal plug-in compartment of the mainframe. This instrument can also be installed in a vertical plug-in compartment to provide a vertical sweep on the crt. However, when used in this manner, there are no internal triggering or retrace blanking provisions, and the unit may not meet specifications.

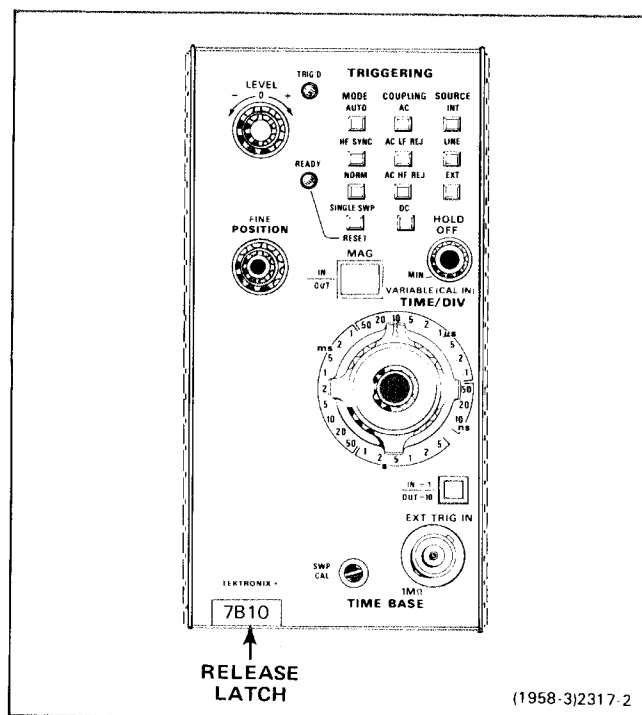


Fig. 1-1. Location of release latch.



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**7B15
DELAYING TIME
BASE**

INSTRUCTION MANUAL

**Tektronix, Inc.
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WARNING

THE REMAINING SECTIONS OF THIS MANUAL CONTAIN SERVICING INSTRUCTIONS. THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CALLED OUT IN THE OPERATING INSTRUCTIONS UNLESS QUALIFIED TO DO SO.

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CHANGE:	DESCRIPTION
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SCHMATIC CORRECTIONS

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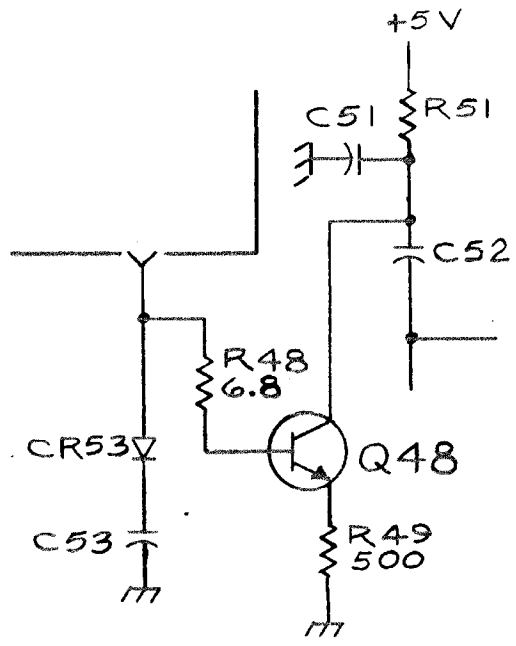
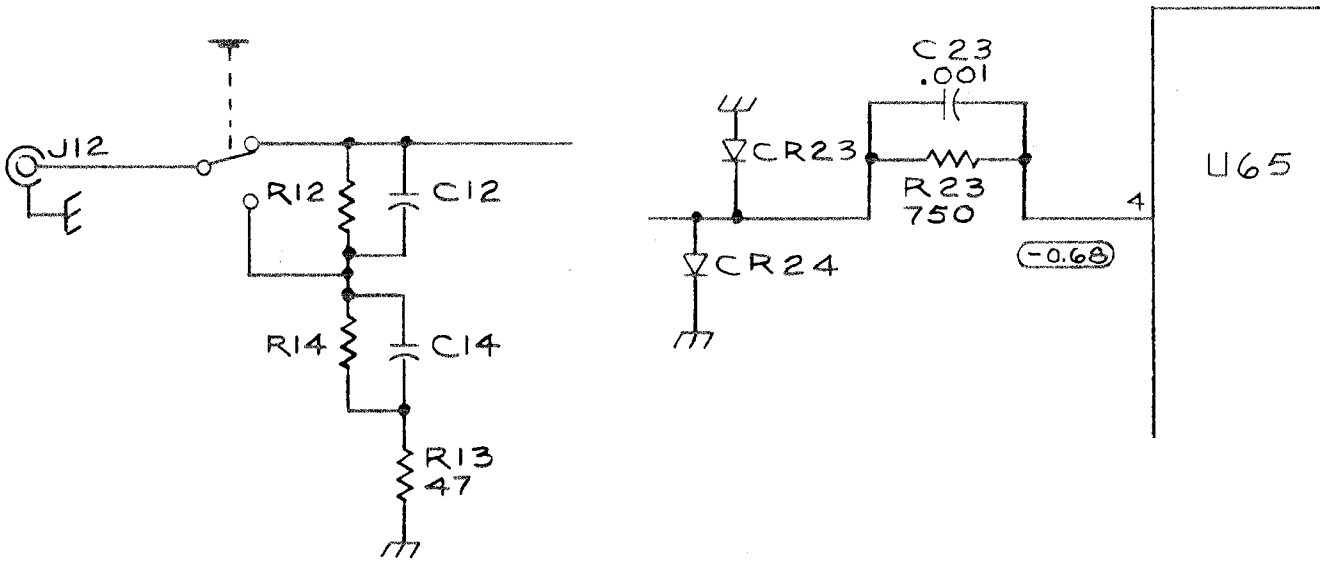


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Abbreviations and symbols used in this manual are based on or taken directly from IEEE Standard 260 "Standard Symbols for Units", MIL STD-12B and other standards of the electronics industry. Change information, if any, is located at the rear of this manual.

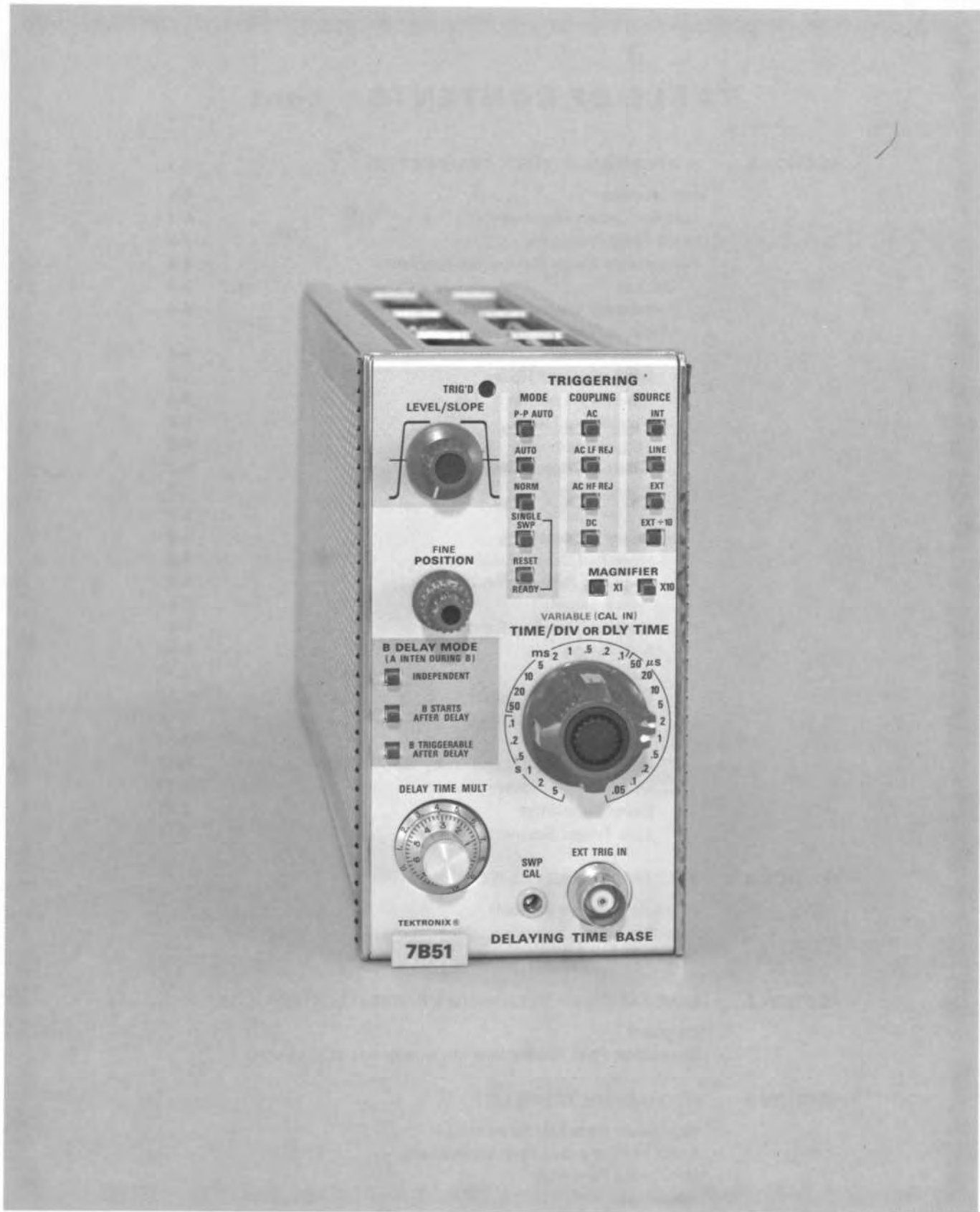


Fig. 1-1. Type 7B51 Delaying Time-Base.

Maintenance—Type 7B51

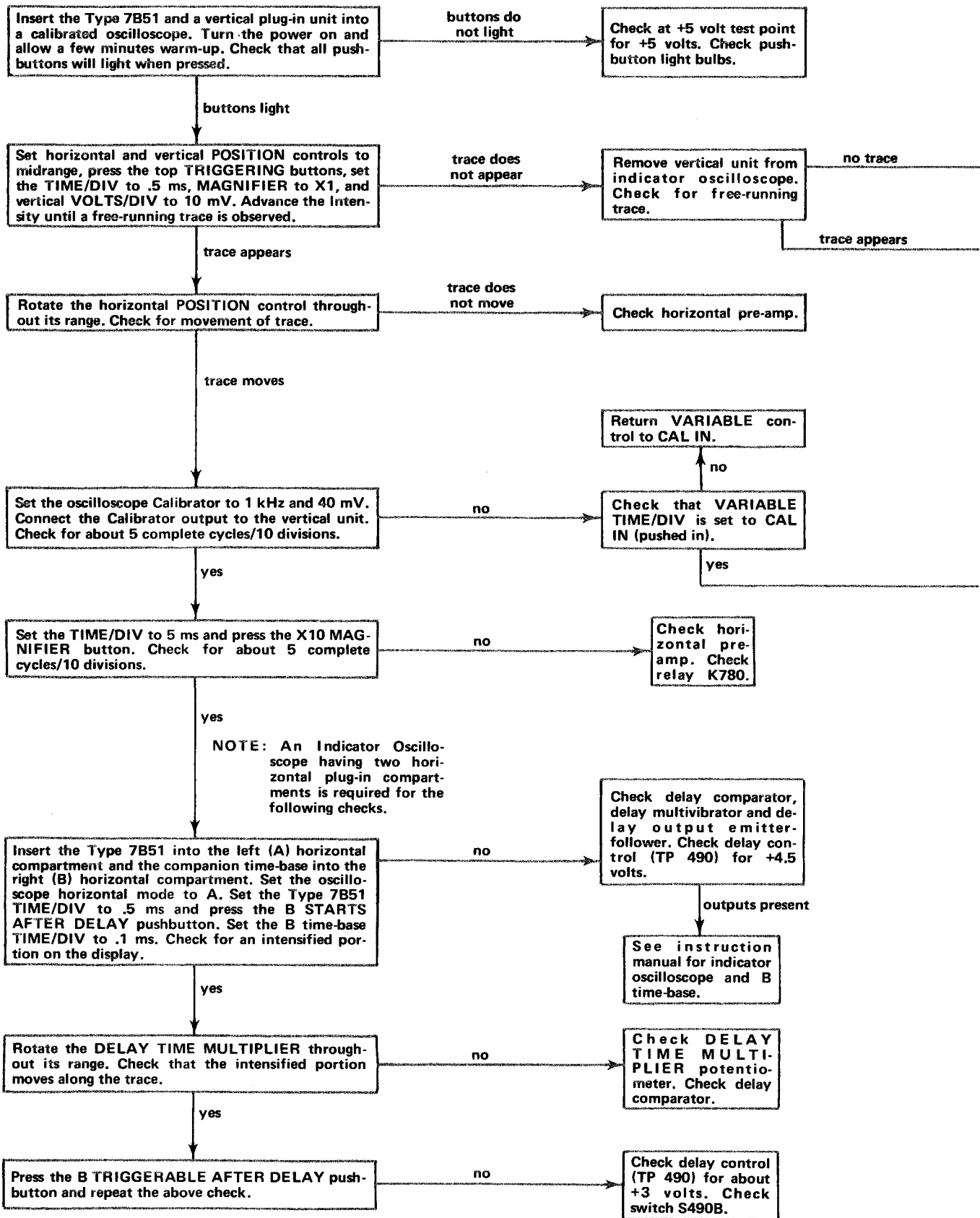
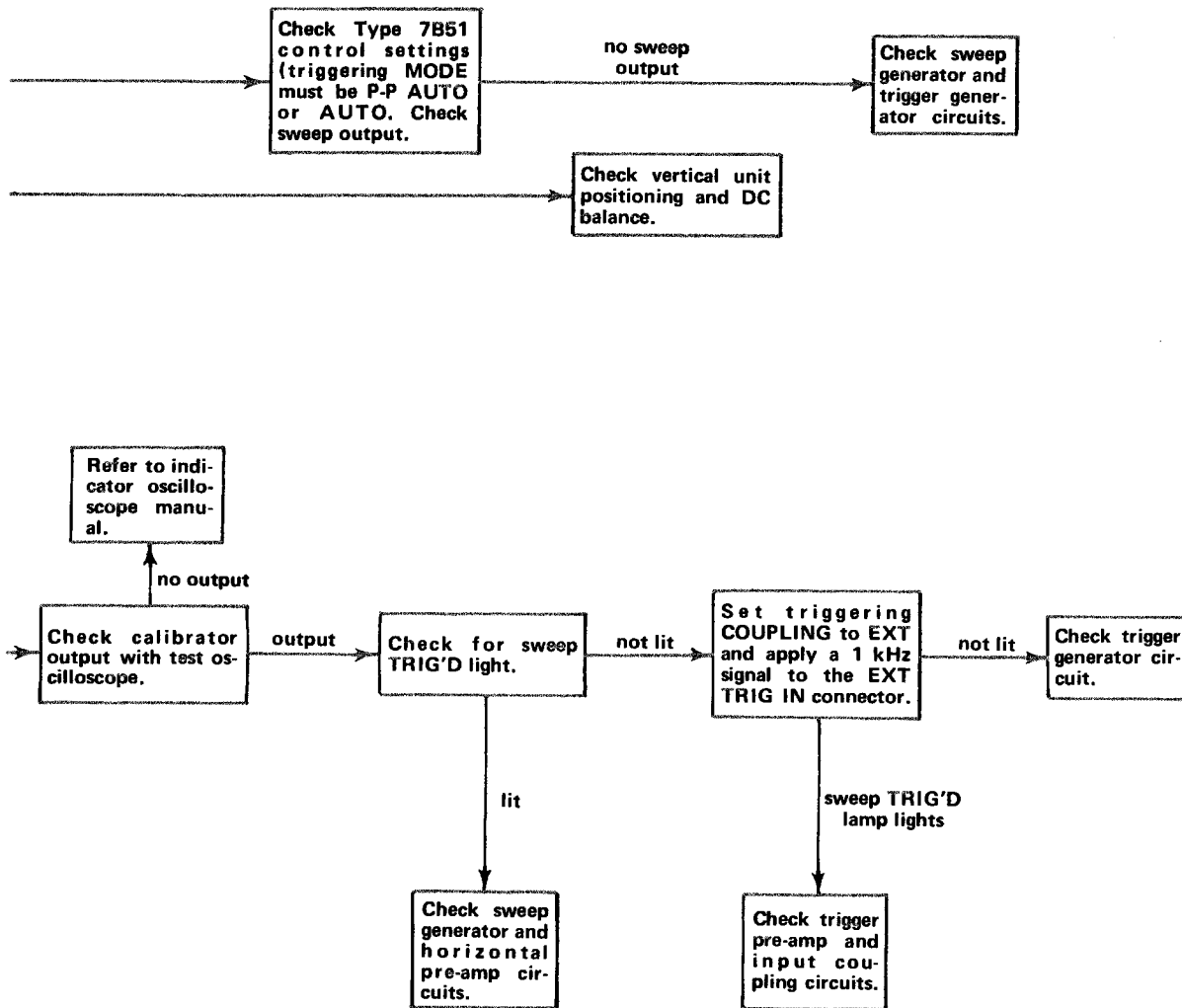


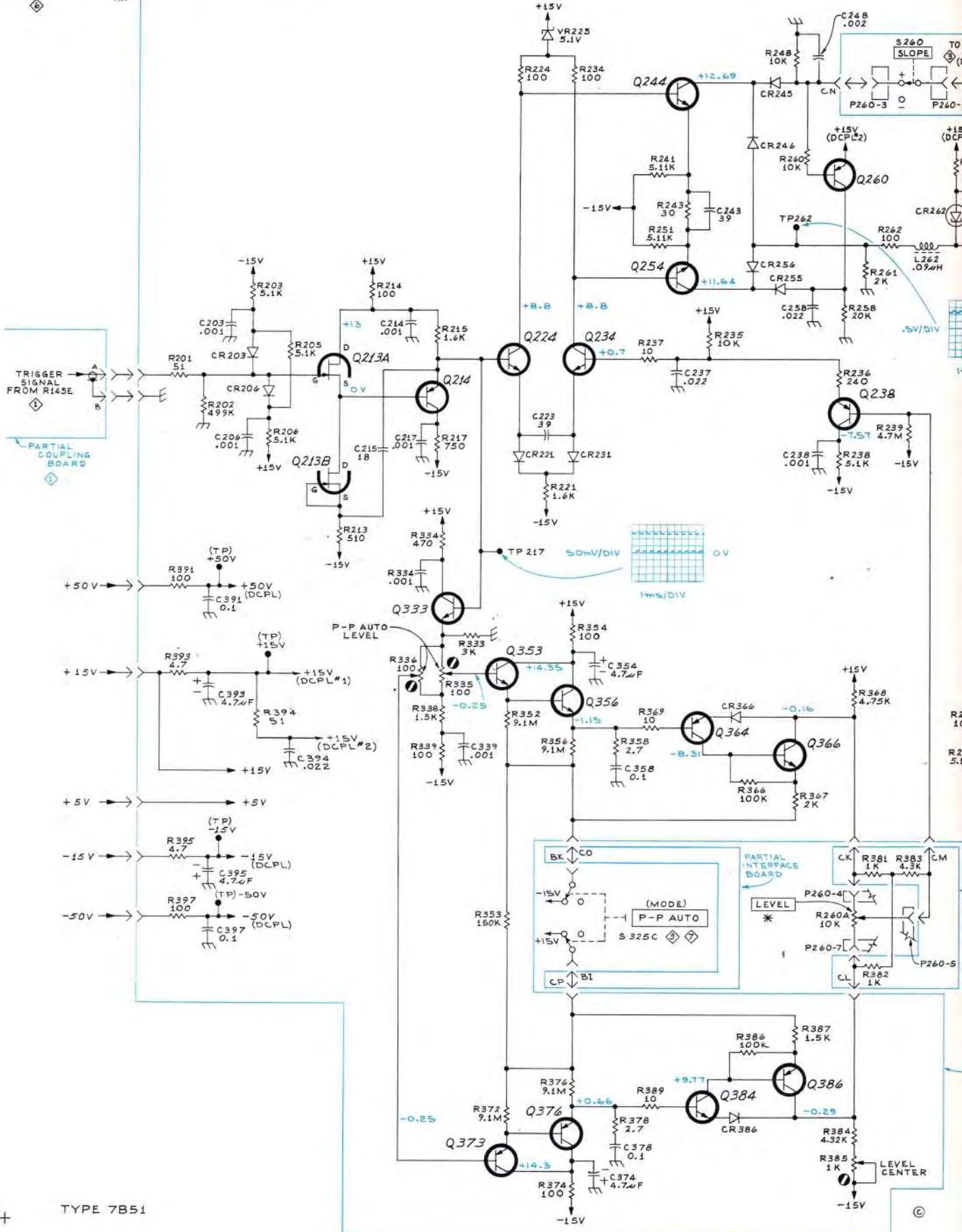
Fig. 4-2. Troubleshooting chart for the Type 7B51.



For a trouble not covered by this chart, use the troubleshooting methods in steps 6 and 7 of the troubleshooting techniques.

Fig. 4-2. Troubleshooting chart for the Type 7B51.

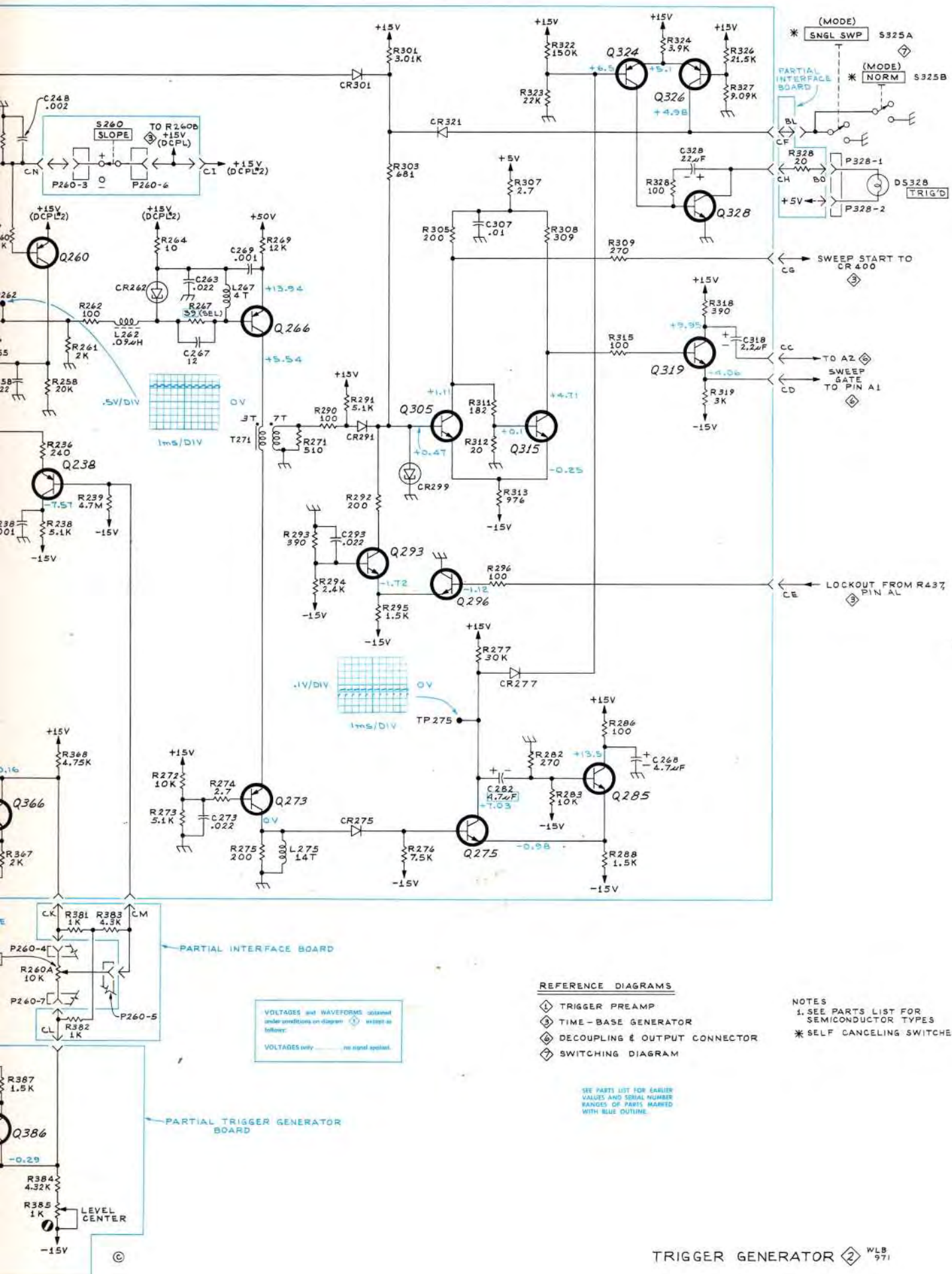
FROM PIN B1 → AK → DELAY MODE CONTROL



TYPE 7B51

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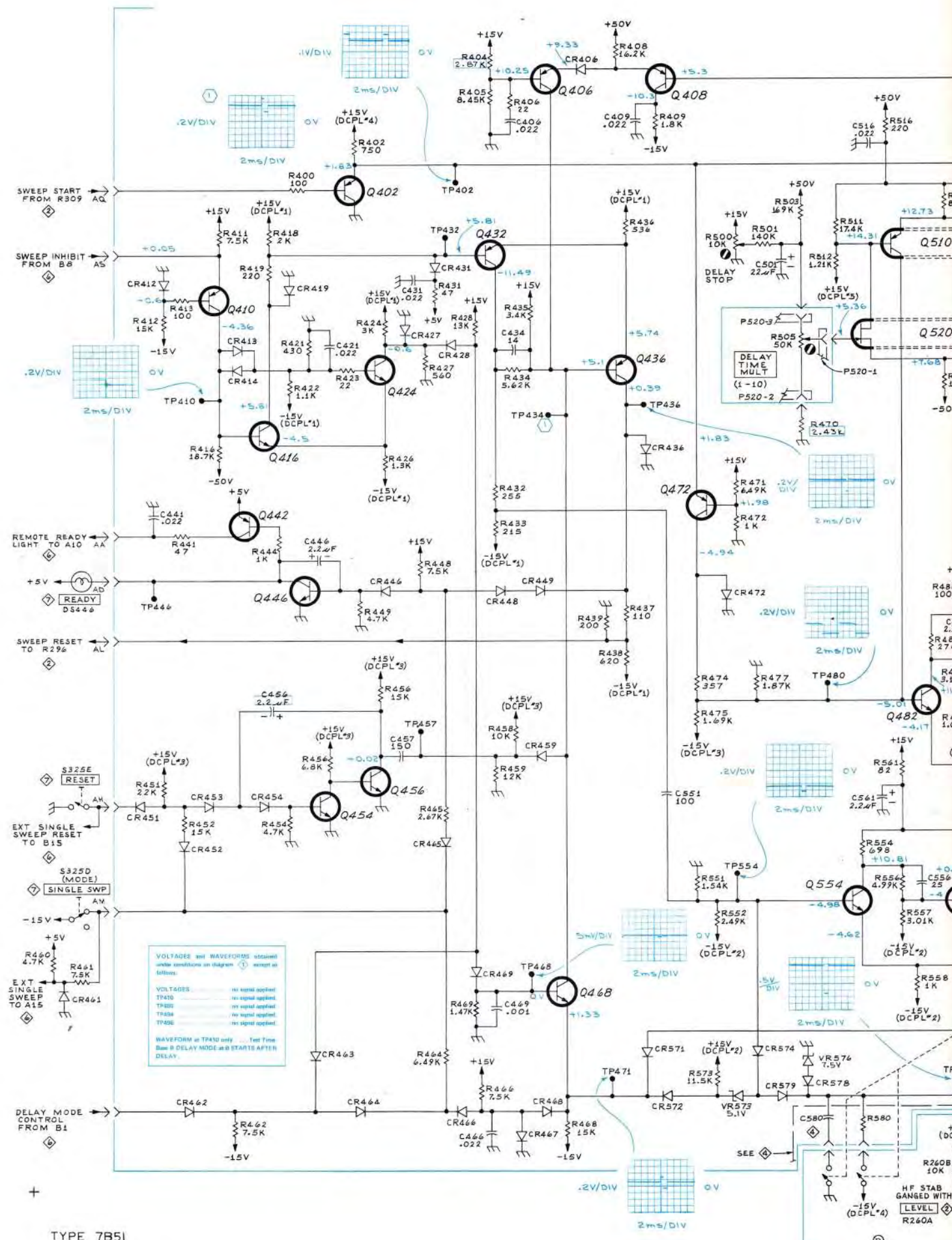


REFERENCE DIAGRAMS

- ① TRIGGER PREAMP
- ② TIME-BASE GENERATOR
- ③ DECOUPLING & OUTPUT CONNECTOR
- ④ SWITCHING DIAGRAM

- NOTES
1. SEE PARTS LIST FOR SEMICONDUCTOR TYPES
 - * SELF CANCELING SWITCHES

SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBERS. RANGES OF PARTS MARKED WITH BLUE OUTLINE.

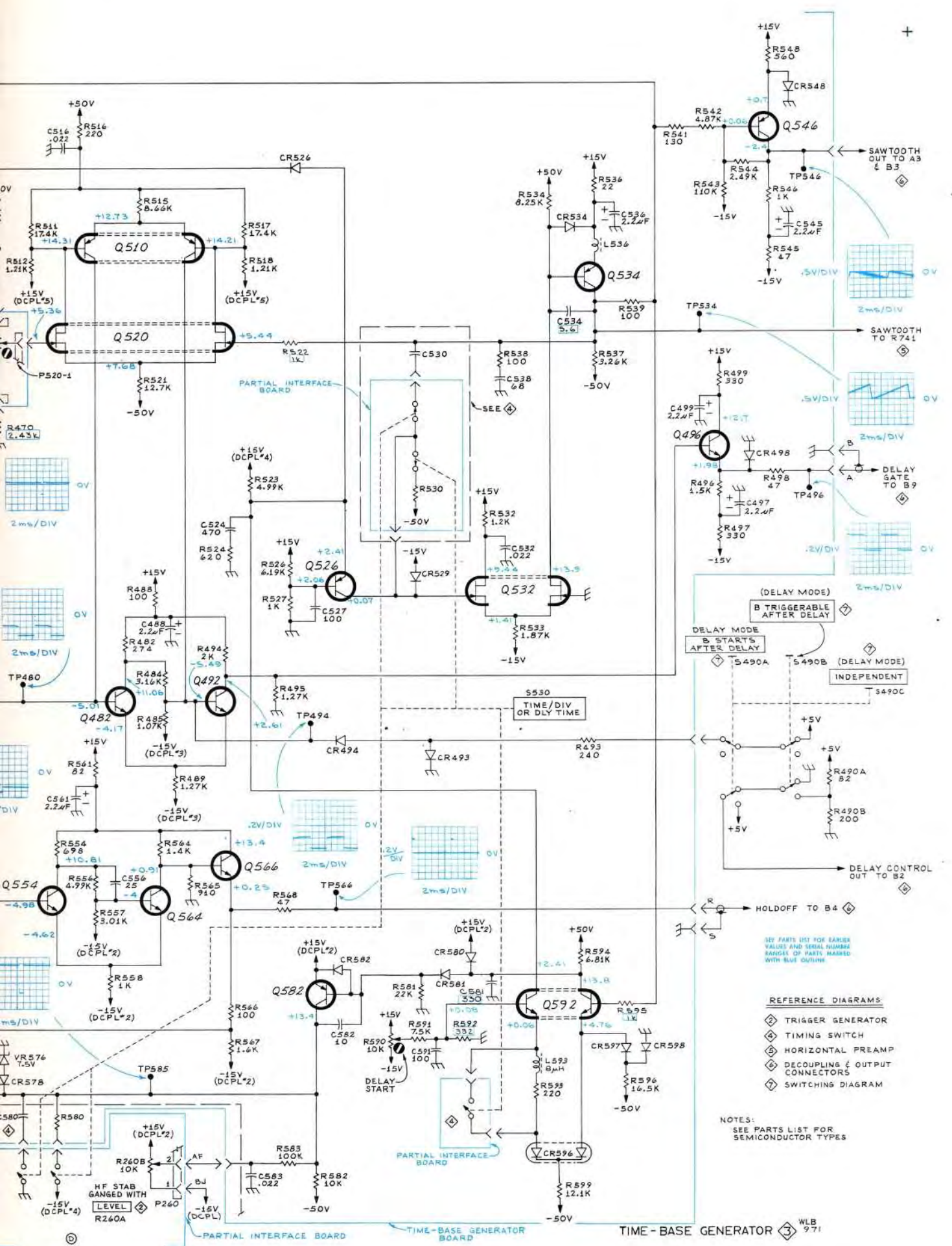


VOLTAGES and WAVEFORMS obtained under conditions on diagram (1) except as follows:

VOLTAGES: — no signal applied;
 TP410 — no signal applied;
 TP430 — no signal applied;
 TP436 — no signal applied;
 TP480 — no signal applied.

WAVEFORM at TP410 only — Test Time Base B DELAY MODE as B STARTS AFTER DELAY.

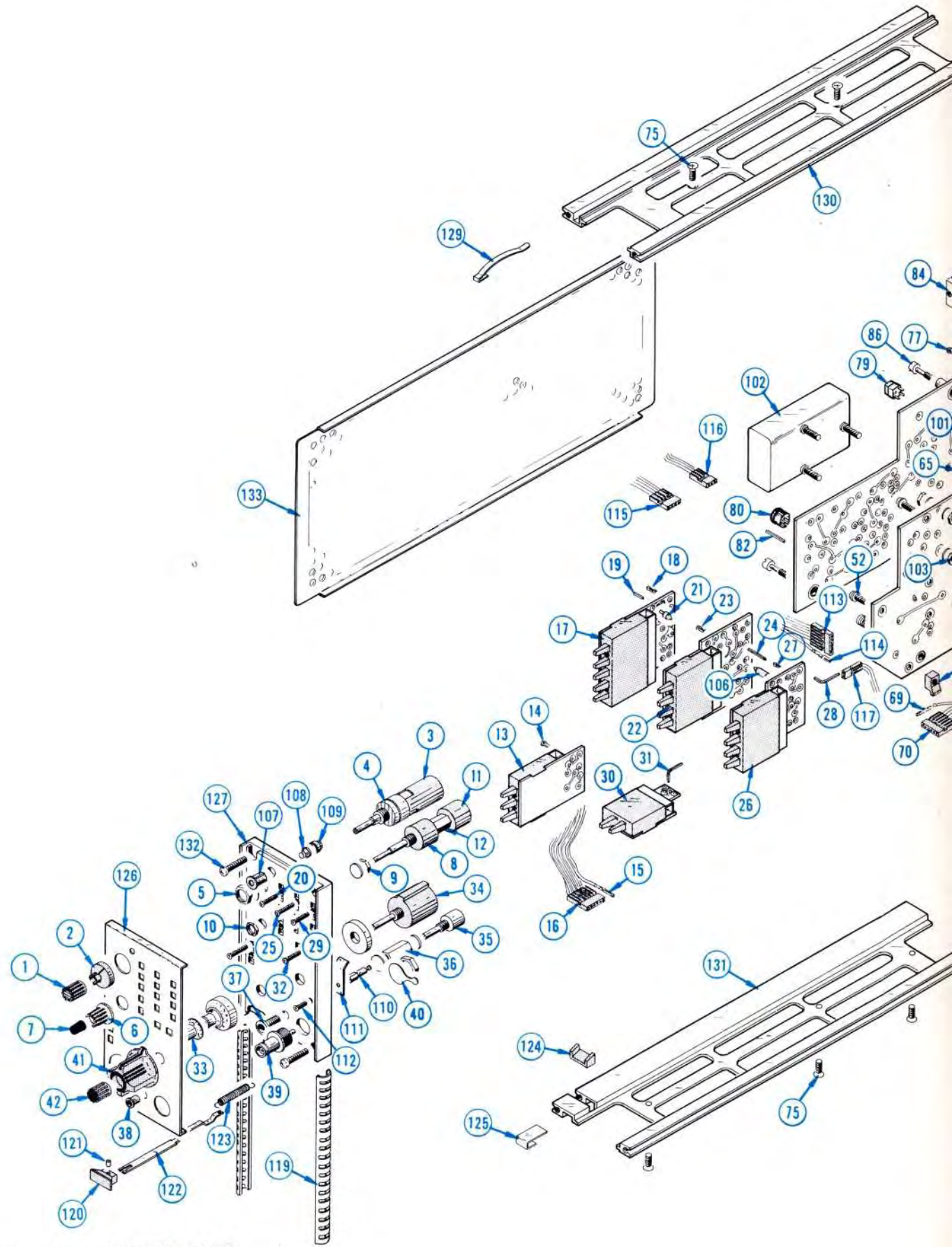
TYPE 7B51



- REFERENCE DIAGRAMS**
- ① TRIGGER GENERATOR
 - ② TIMING SWITCH
 - ③ HORIZONTAL PREAMP
 - ④ DECOUPLING & OUTPUT CONNECTORS
 - ⑤ SWITCHING DIAGRAM

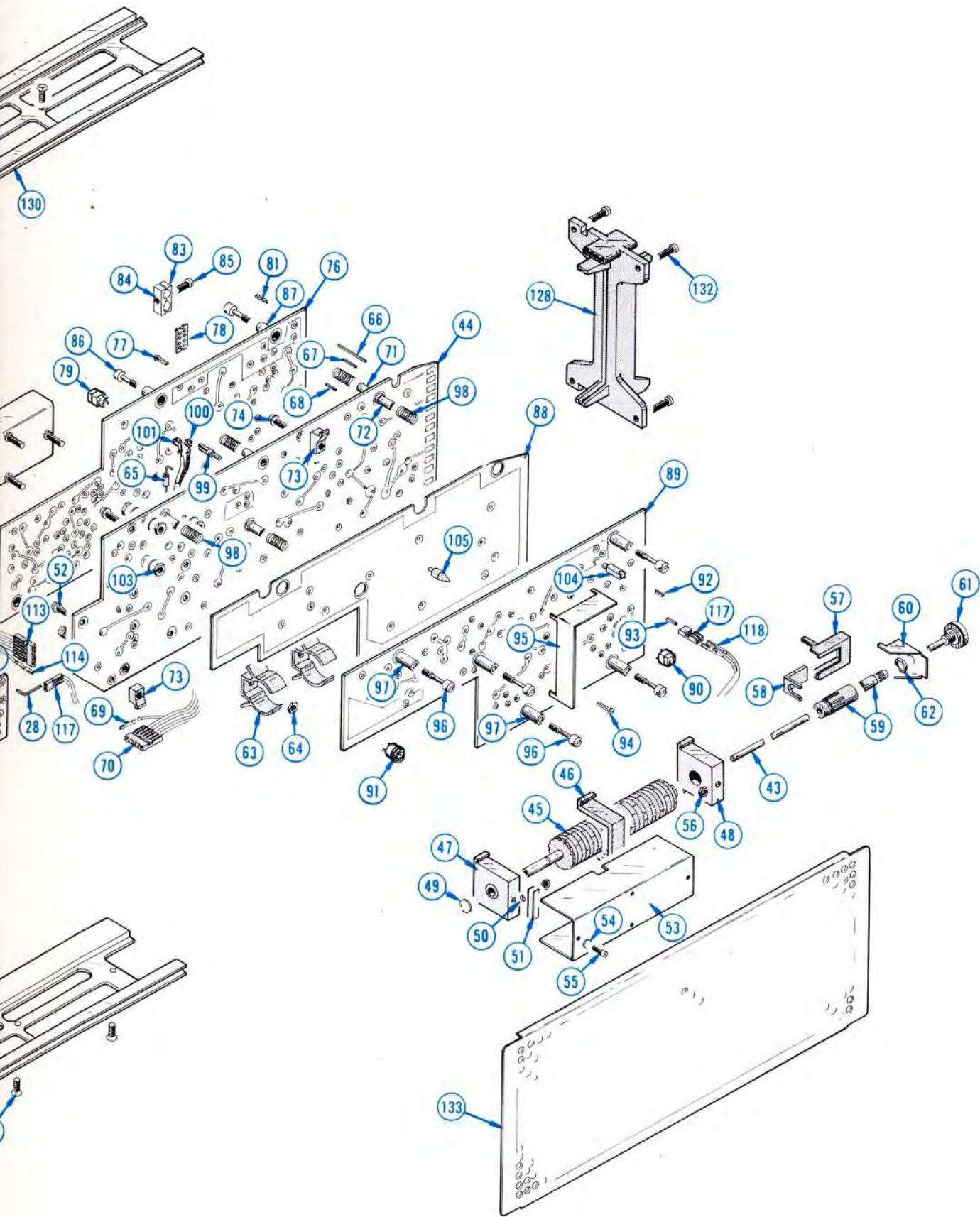
NOTES:
SEE PARTS LIST FOR SEMICONDUCTOR TYPES

FIGURE 1 EXPLODED



TYPE 7B51 DELAYING TIME BASE

FIGURE 1 EXPLODED



INSTRUCTION MANUAL

Serial Number _____

7B52

DUAL TIME BASE

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Abbreviations and symbols used in this manual are based on or taken directly from IEEE Standard 260 "Standard Symbols for Units", MIL STD-12B and other standards of the electronics industry. Change information, if any, is located at the rear of this manual.

TEKTRONIX®

7B53A/7B53AN
DUAL TIME BASE
OPERATORS

18113895

INSTRUCTION MANUAL

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		<i>Refer to the 7B53A/7B53AN Service Manual for circuit description, maintenance, calibration, diagrams, and parts replacement information.</i>	



PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.

**7B53A/7B53AN
DUAL TIME BASE**

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**

070-1342-01
Product Group 42

H-712205
First Printing SEP 1980
Revised MAY 1988

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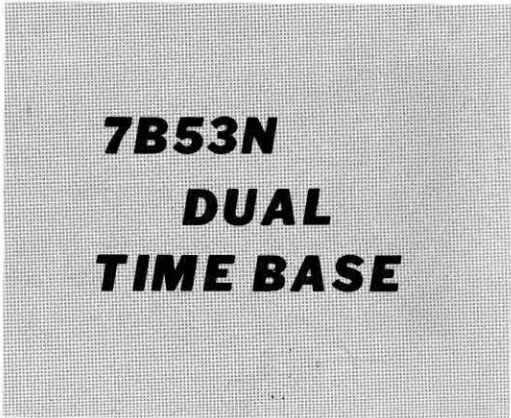
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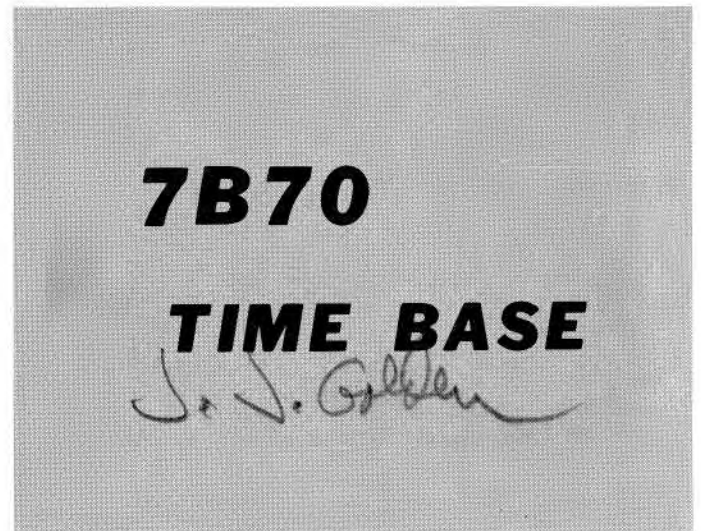
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**7B53N
DUAL
TIME BASE**

INSTRUCTION MANUAL

Serial Number _____



Tektronix, Inc.

S.W. Millikan Way • P. O. Box 500 • Beaverton, Oregon 97005 • Phone 644-0161 • Cables: Tektronix

070-0982-00

170

7B70 TENT SN B120000-up

ELECTRICAL PARTS LIST AND SCHEMATIC CORRECTION

INTERFACE

Circuit Board Assembly

CHANGE TO:

670-1137-01

Complete Board

ADD:

CR702

152-0185-00

Silicon

Replaceable by 1N4152

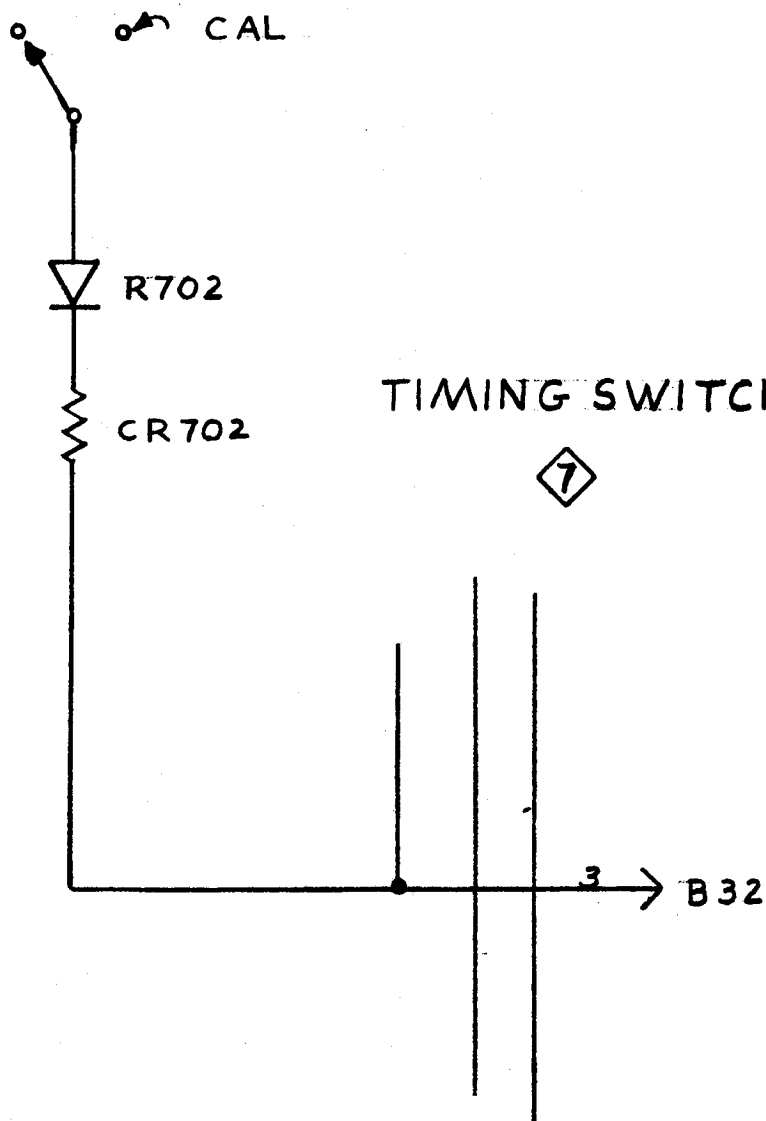


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THIS MANUAL REPRINTED JUNE 1978

TEKTRONIX®

**7B80
TIME BASE
WITH OPTIONS**

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

Serial Number _____

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WARNING

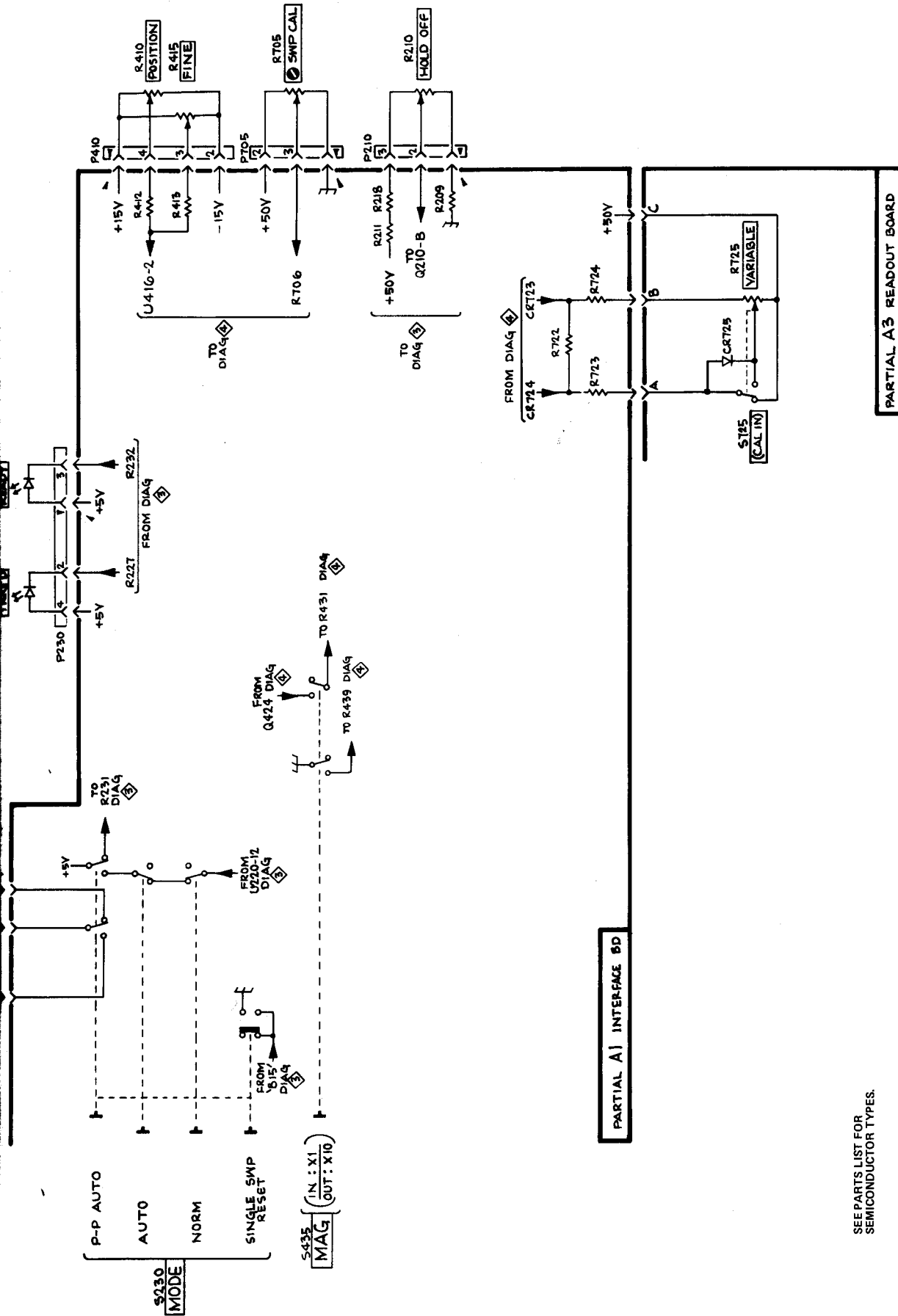
THE REMAINING SECTIONS OF THIS MANUAL CONTAIN SERVICING INSTRUCTIONS. THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CALLED OUT IN THE OPERATING INSTRUCTIONS UNLESS QUALIFIED TO DO SO.

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SEE PARTS LIST FOR SEMICONDUCTOR TYPES.

FRONT-PANEL DISTRIBUTION

FRONT-PANEL DISTRIBUTION

1

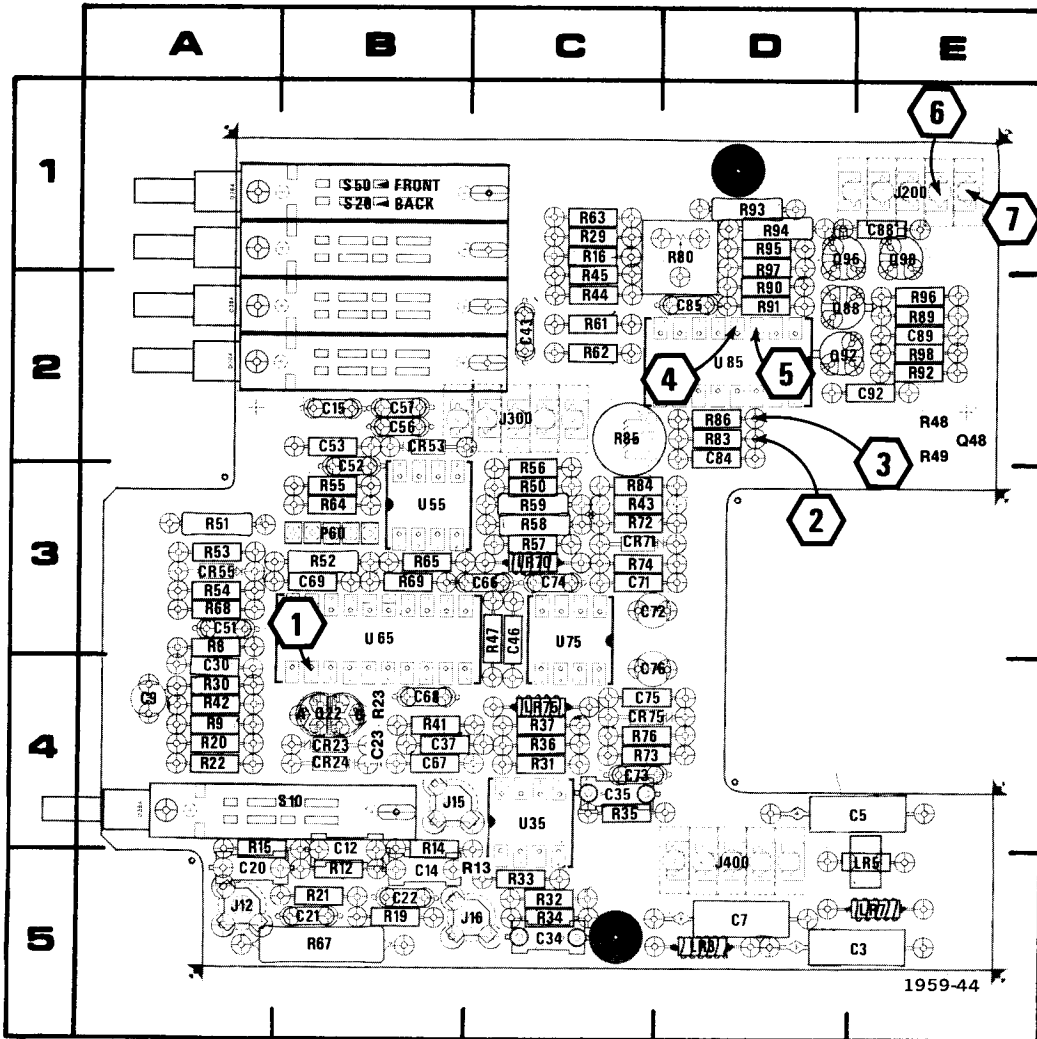


Fig. 8-7. A2-Trigger circuit board assembly.

CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD
C3	5E	C77	1E	Q22	4B	R43	3C	R83	2D
C5	4E	C84	2D	Q48*	2E	R44	2C	R84	3C
C7	5D	C85	2D	Q88	2D	R45	2C	R85	2C
C9	4A	C88	1E	Q92	2D	R47	3C	R86	2D
C12	5B	C89	2E	Q96	1D	R48*	2E	R89	2E
C14	5B	C92	2E	Q98	1E	R49*	2E	R90	2D
C15	2B					R50	3C	R91	2D
C20	5A	CR23	4B	R8	3A	R51	3A	R92	2E
C21	5B	CR24	4B	R9	5A	R52	3B	R93	1C
C22	5B	CR53	2B	R12	5B	R53	3A	R94	1D
C23*	4B	CR55	3A	R13*	5C	R54	3A	R95	1D
C30	4A	CR71	3C	R14	5B	R55	3B	R96	2D
C34	5C	CR75	4C	R15	5A	R56	3C	R97	1D
C35	4C			R16	1C	R57	3C	R98	2E
C37	4B	J12	5A	R19	5B	R58	3C		
C43	2C	J15	4B	R20	4A	R59	3C	S10	4B
C46	3C	J16	5C	R21	5B	R61	2C	S20	1B
C51	3A	J200	1E	R22	4A	R62	1C	S50	1B
C52	3B	J300	2C	R23*	2E	R63	1C		
C56	2B	J400	5D	R29	1C	R64	3B	U35	4C
C57	2B			R30	4A	R65	3B	U55	3B
C66	3C	LR3	5D	R31	4C	R66	5B	U65	3B
C68	4B	LR5	5E	R32	5C	R67	3C	U75	3C
C69	3B	LR7	5E	R33	5C	R68	3A	U85	2D
C72	3C	LR70	3C	R34	5C	R69	3B		
C73	4C	LR75	4C	R35	4C	R72	3C		
C74	3C			R36	4C	R73	4C		
C76	4C	P60	3B	R37	4C	R74	3C		
				R41	4B	R76	4C		
				R42	4A	R80	1D		

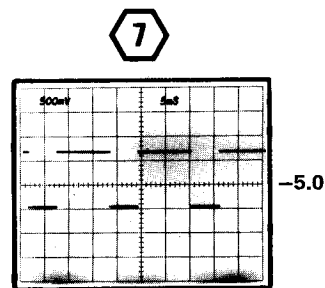
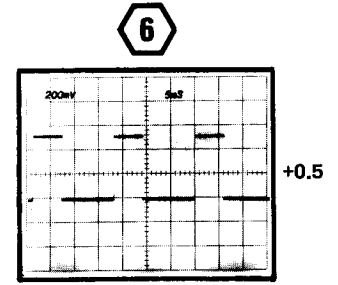
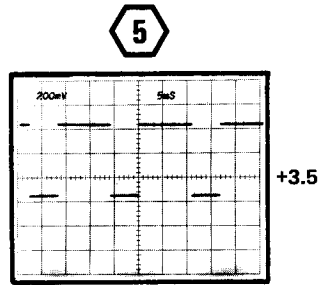
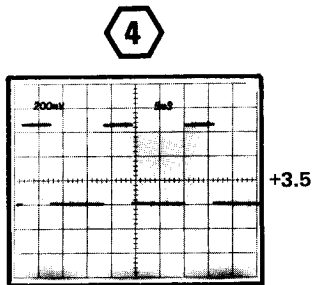
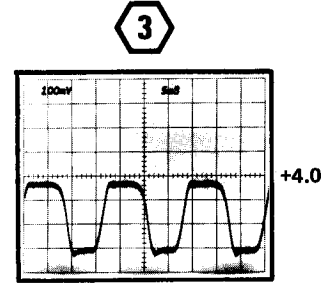
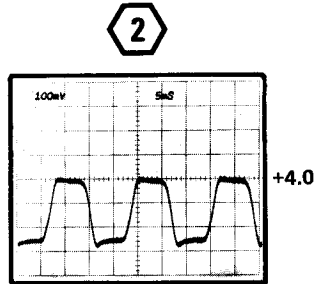
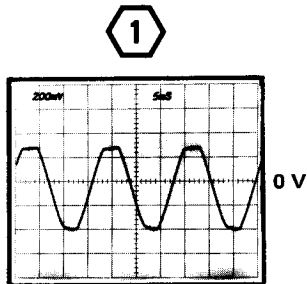
VOLTAGE AND WAVEFORM CONDITIONS

The voltages and waveforms shown were obtained with the 7B80 controls set as follows:

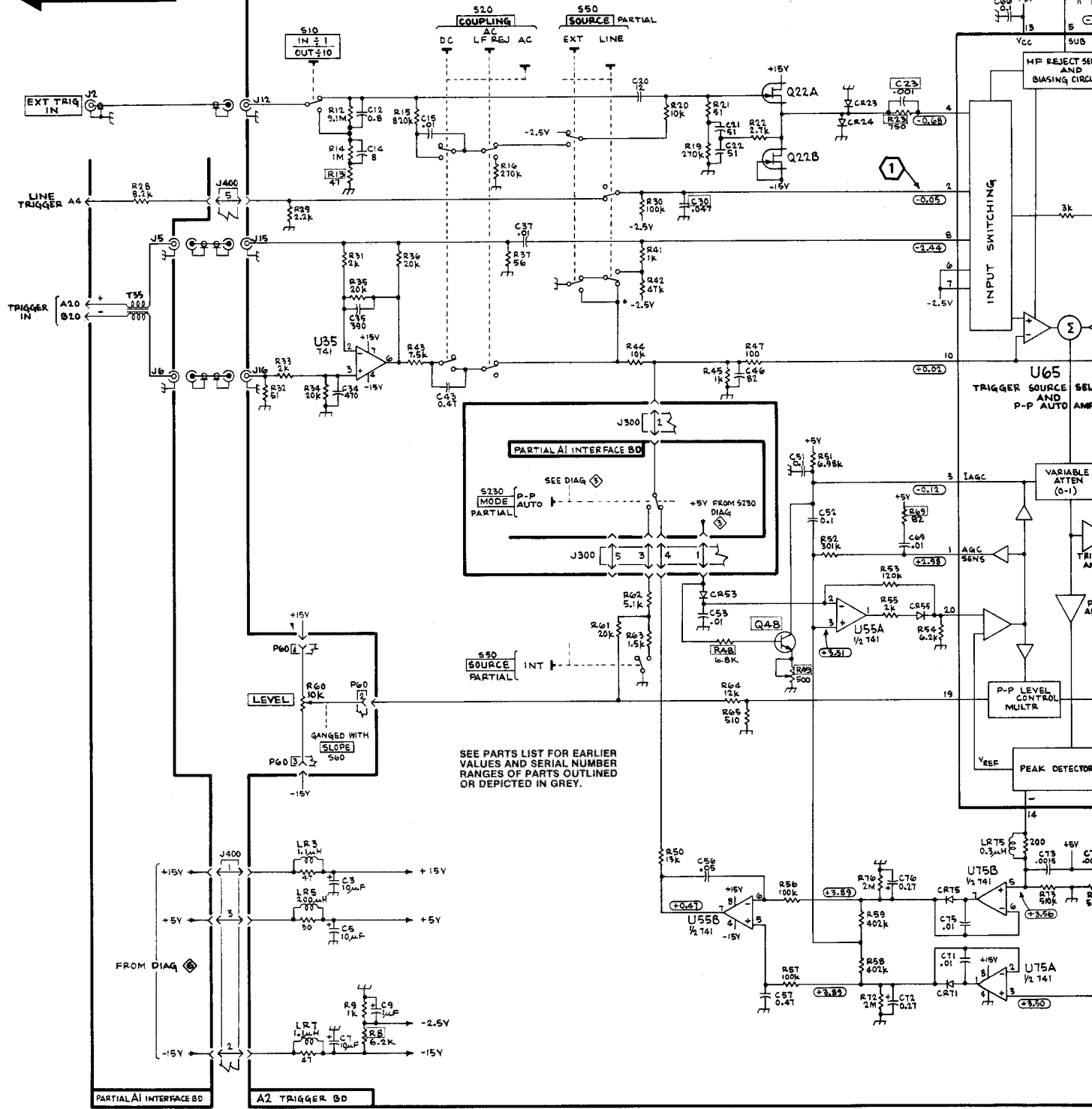
TIME/DIV, 1 ms; VARIABLE (CAL IN), knob in; MAG, X1 (button in); HOLD OFF, fully counterclockwise; SWP CAL, midranged; POSITION, midranged; TRIGGERING: LEVEL, midranged; MODE, P-P AUTO; COUPLING, AC; SOURCE, LINE; SLOPE, +.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a 10 M Ω input impedance (Tektronix DM 501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with 10 M Ω input impedance and at least 60 MHz bandwidth (Tektronix 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with 10X probe).

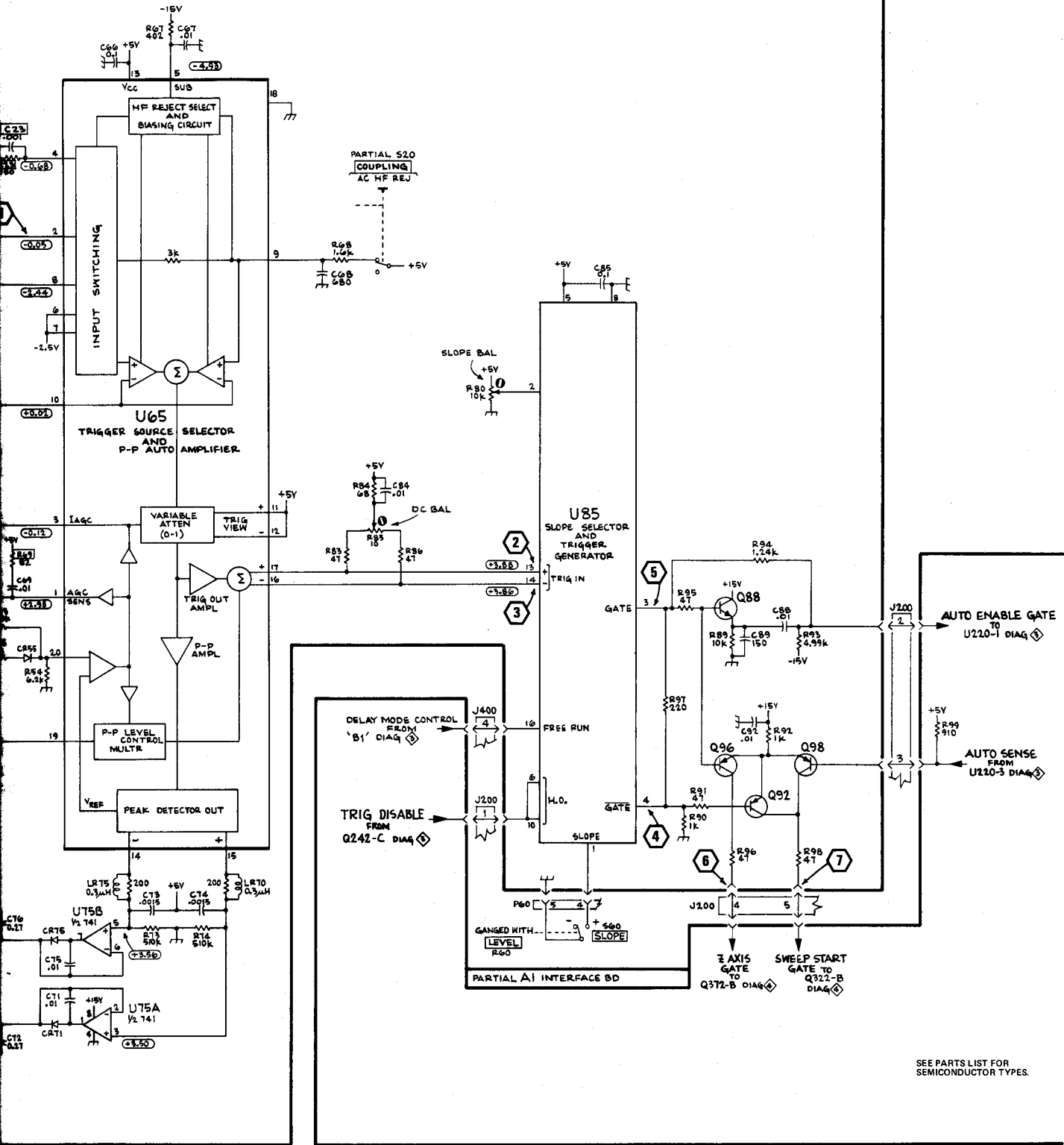


VOLTAGE & WAVEFORM CONDITIONS



7B80

1959-63
REV. B, MAY 1978



SEE PARTS LIST FOR SEMICONDUCTOR TYPES.

TRIGGER GENERATOR



OPTION 2

X-Y Display

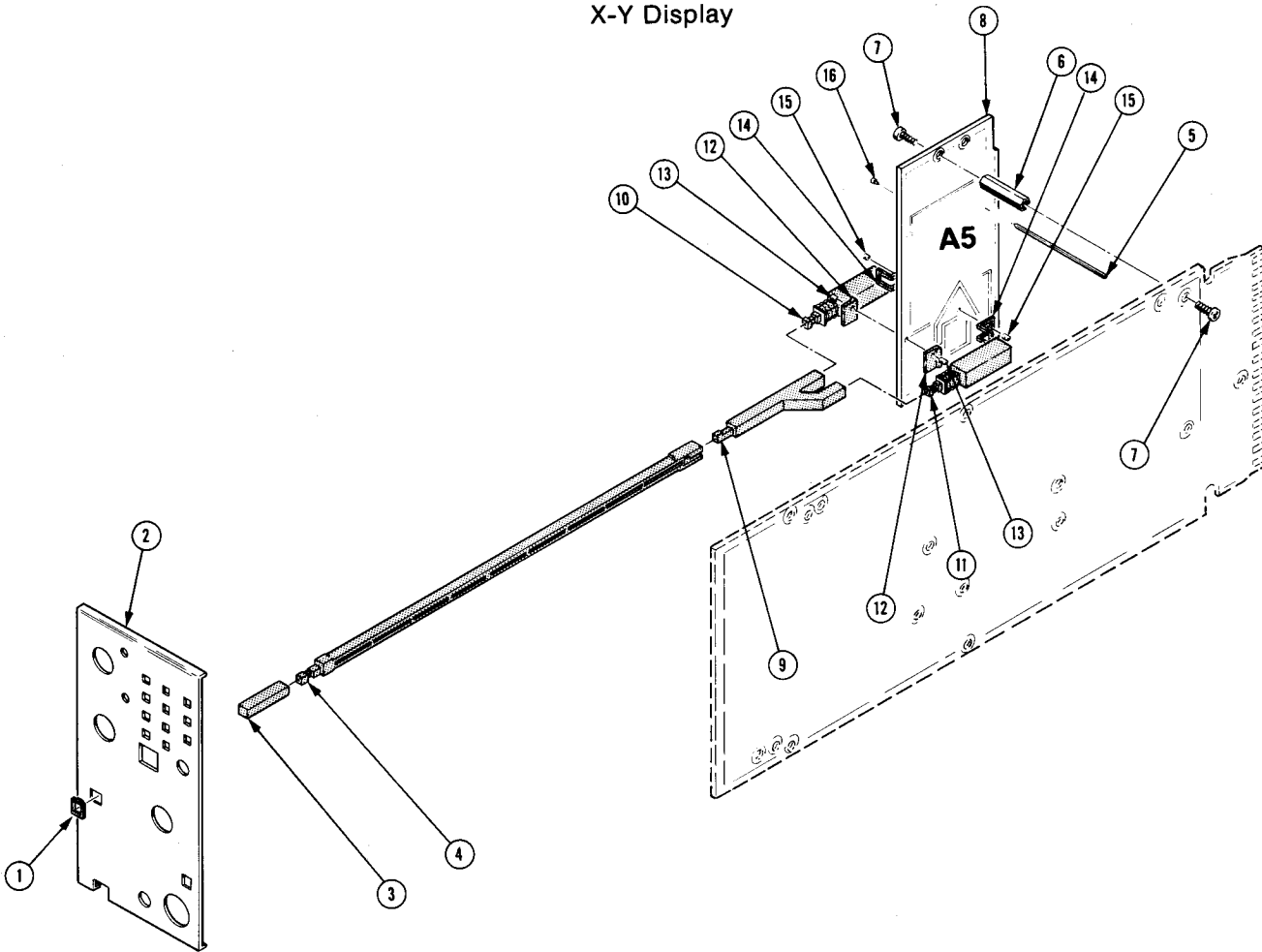


Fig. &
Index
No.

Tektronix
Part No.

Serial/Model No.
Eff Dscont

Qty

1 2 3 4 5

Name & Description

Mfr

Code

Mfr Part Number

3-1	426-1072-00			1	FRAME,PUSH BTN:PLASTIC	80009	426-1072-00
-2	333-2151-00			1	PANEL,FRONT:	80009	333-2151-00
-3	366-1512-00			1	PUSH BUTTON:GRAY,0.18 SQ X 0.83 INCH LG	80009	366-1512-00
-4	384-1058-00	B010100	B019999	1	EXTENSION SHAFT:8.157 INCH LONG	80009	384-1058-00
	384-1445-00	B020000		1	EXTENSION SHAFT:10.294 INCH LONG,PLASTIC	80009	384-1445-00
-5	131-0592-00			13	CONTACT,ELEC:0.885 INCH LONG	22526	47353
-6	129-0198-00			2	POST,ELEC-MECH:0.188 HEX X 0.74 INCH L,BRS (ATTACHING PARTS)	80009	129-0198-00
-7	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-8	211-0116-00			1	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
-9	-----			1	CKT BOARD ASSY:X-Y SWITCHING(SEE A5 EPL)		
-10	384-1425-00	B010100	B019999	1	. EXTENSION SHAFT:2.137 INCH LONG	80009	384-1425-00
	384-1445-00	B020000		1	. EXTENSION SHAFT:10.294 INCH LONG,PLASTIC	80009	384-1445-00
-11	263-0011-00			1	. ACTR ASSY:PB:1 PUSH,10MM	80009	263-0011-00
-12	263-0011-06			1	. ACTR ASSY:PB:1 MOMENTARY,11 MM,3 CONTACT	80009	263-0011-06
-13	343-0495-01			2	. CLIP,SWITCH:FRONT,7.5 MM,1 UNIT (ATTACHING PARTS)	80009	343-0495-01
-14	210-3050-00			2	. EYELET,METALLIC:0.218 L X 0.059 OD,BRS -----*	07707	SE-27
-15	343-0499-01			2	. CLIP,SWITCH:REAR,7.5 MM,1 UNIT (ATTACHING PARTS FOR EACH)	80009	343-0499-01
-16	210-3050-00			2	. EYELET,METALLIC:0.218 L X 0.059 OD,BRS -----*	07707	SE-27
-17	136-0252-04			6	. CONTACT,ELEC:0.188 INCH LONG	22526	75060



MANUAL CHANGE INFORMATION

PRODUCT 7B50A, 7B80 & 7B85

CHANGE REFERENCE C4/978

DATE 9-29-78

CHANGE:

DESCRIPTION

7B50A (070-1986-00)

7B80 (070-1959-00)

7B85 (070-1961-00)

TEXT CORRECTIONS

ADD new Step A4 as follows: Page 5-5 (7B50A & 7B80) Page 5-6 (7B85)

A4. ADJUST TRIGGERING SENSITIVITY (R49)

- a. Set the TRIGGERING LEVEL control to 0. Set the TRIGGERING MODE to NORM, SOURCE to INT.
- b. Set the amplifier unit deflection factor to 50 millivolts/division. Set the low-frequency sine-wave generator for a 5-division display (250 millivolts) at 1 kilohertz.
- c. Set the amplifier unit deflection factor to 1 volt/division (0.25 division). Set the TRIGGERING LEVEL control for a stable display.
- d. ADJUST - R49, Trigger Sensitivity, for a stable crt display.
- e. Set the amplifier unit deflection factor to 2 volts/division (0.125 division). Set the TRIGGERING LEVEL control for a stable display (stable display may not be possible).
- f. ADJUST - R49, Trigger Sensitivity, to a setting that provides a visible trace, but the display remains unstable.
- g. Repeat part c of this step.
- h. Set the amplifier unit deflection factor to 5 volts/division (0.05 division).
- i. CHECK - Rotate the TRIGGERING LEVEL control throughout its range and check for no trace (one displayed sweep will occur when control passes the midrange point).

RENUMBER: Step A4 to A5
 A5 to A6
 A6 to A7
 A7 to A8



MANUAL CHANGE INFORMATION

PRODUCT 7B80 & 7B85

CHANGE REFERENCE M34715

DATE 9-21-78

CHANGE:	DESCRIPTION
---------	-------------

EFF SN B054000 (7B80) 070-1959-00
EFF SN B084000 (7B85) 070-1961-00

ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

- | | | |
|------|-------------|-------------------------------|
| Q98 | 151-0342-00 | TRANSISTOR:SILICON,PNP,2N4249 |
| Q201 | 151-0221-00 | TRANSISTOR:SILICON,PNP,2N5771 |
| Q352 | 151-0221-00 | TRANSISTOR:SILICON,PNP,2N5771 |
| Q356 | 151-0221-00 | TRANSISTOR:SILICON,PNP,2N5771 |
| Q362 | 151-0221-00 | TRANSISTOR:SILICON,PNP,2N5771 |



**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

**7B85
DELAYING
TIME BASE
WITH OPTIONS**

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**
070-1961-01
Product Group 42

Serial Number _____

First Printing JAN 1976
Revised AUG 1983

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		<i>THESE SERVICING INSTRUCTIONS ARE FOR USE</i>	
		<i>BY QUALIFIED PERSONNEL ONLY. TO AVOID</i>	
		<i>ELECTRICAL SHOCK, DO NOT PERFORM ANY</i>	
		<i>SERVICING OTHER THAN THAT CALLED OUT IN</i>	
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**PLEASE CHECK FOR CHANGE INFORMATION
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**7B87
TIME BASE
WITH
PRETRIGGER
ACQUIRE CLOCK**

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**

070-2788-00
Product Group 42

Serial Number _____

First Printing APR 1980
Revised JAN 1986

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WARNING

THE REMAINING PORTION OF THIS TABLE OF CONTENTS LISTS SERVICING INSTRUCTIONS. THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CALLED OUT IN THE OPERATING INSTRUCTIONS UNLESS QUALIFIED TO DO SO.

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**7B90P
PROGRAMMABLE
TIME BASE**

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077
070-2309-00
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TEKTRONIX®

**7B92
DUAL TIME BASE
CIRCUIT
DESCRIPTION
SUPPLEMENT**

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
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Serial Number

B063256

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NOTE

*Refer to the 7B92 Operators Manual for specifications and complete operating information.
Refer to the 7B92 Service Manual for maintenance, calibration, diagrams, and parts replacement information.*

CIRCUIT DESCRIPTION

This manual supplement describes the circuitry used in the 7B92 Dual Time Base unit. The description begins with a discussion of the instrument, using the basic block diagram shown on Fig. 1. Next, each circuit is described in detail, using detailed block diagrams when appropriate, to show the relationship between the stages in each major circuit. Detailed schematics of each circuit are located in the Diagrams section at the back of the service manual; refer to these schematics throughout the following circuit description for specific electrical values and relationships.

BLOCK DIAGRAM

The basic block diagram in Fig. 1 shows the basic interconnections between the individual blocks; each block representing a major circuit within the instrument. The numbered diamond in each block refers to the circuit diagram (located at the rear of the service manual) which covers that specific part of the instrument.

Block Diagram Description

The Delaying Sweep Start Comparator is activated by the positive gate from the Main Trigger Generator. The output gate, coupled to the Delaying Sweep Generator, is the same duration as the delaying sweep. This gate is also coupled to the Aux Sweep Gate connector and to Display Mode Switching for Alternate Sweep operation.

The delaying sweep sawtooth signal is generated when the gate from the Delaying Sweep Start Comparator is applied to the Delaying Sweep Generator. The sawtooth duration is determined by the gate duration; the rate of change of the sawtooth is set by C_t and R_t , selected by the TIME/DIV OR DLY TIME switch. The delaying sweep sawtooth signal is coupled to the Horizontal Output Amplifier, the Delaying Sweep Stop Comparator, the Delay Pickoff circuits, and the Delaying Sweep Out connector.

One side of the Delaying Sweep Stop Comparator is driven by the delaying sweep sawtooth signal and the other side is set by the Delaying Sweep Length adjustment. When the sawtooth waveform passes through the setting of the Delaying Sweep Length adjustment the output of the comparator switches to a positive level.

The positive level from the Sweep Stop Comparator initiates the positive HOLDOFF gate. The duration of the HOLDOFF gate is variable, depending on the setting of the TIME/DIV switch. Holdoff timing capacitors are separate from sweep timing capacitors. HOLDOFF is longer for slower sweep rates. Output from the delaying sweep HOLDOFF is coupled to the Main Trigger Generator, the Delayed Trigger Generator, and the Holdoff out connector.

A sweep gate cannot be generated during the HOLDOFF interval. When the HOLDOFF falls, the trigger circuits are reset so that they are ready to receive a trigger signal.

The Lockout Amp processes mainframe logic signals (when operating the mainframe in the alternate or delaying Horizontal Modes) to provide a sweep disable pulse to the Main Trigger Generator.

The Horizontal Output Amplifier provides positioning and amplification of the sawtooth signals. Display Mode Switching works in conjunction with the Horizontal Output to provide NORMAL Sweep, INTEN, DLY'D Sweep and ALT Sweep Display Modes.

The Delay Pickoff circuits produce a delay gate when the delaying sawtooth signal passes through the LEVEL selected by the DELAY TIME MULT dial. The gate ends with the delaying sawtooth signal. The output gate is coupled to the Delayed Trigger Generator.

The Delayed Trigger Generator includes circuitry for selecting delayed sweep mode, delayed trigger mode, delayed trigger source, type of coupling, and the point on the trigger signal where sweep triggering occurs. When the Delayed Trigger LEVEL control is at the RUNS AFTER DLY TIME detent, the output sweep gate is generated as soon as the delay gate signal (from the Delay Pickoff circuits) is applied. When the Delayed Trigger LEVEL is in the DLY'D SWP TRIGGERABLE position, the output trigger is initiated by the next input trigger signal after the delay gate is applied. The delayed sweep trigger is terminated by the HOLDOFF signal. The trigger signal is coupled to the Delayed Sweep Start Comparator.

The Delayed Sweep Start Comparator is activated by the signal from the Delayed Trigger Generator. The output gate coupled to the Delayed Sweep Generator, is the same duration as the delayed sweep. The delayed sweep gate signal is also coupled to the Sweep Gate Generator.

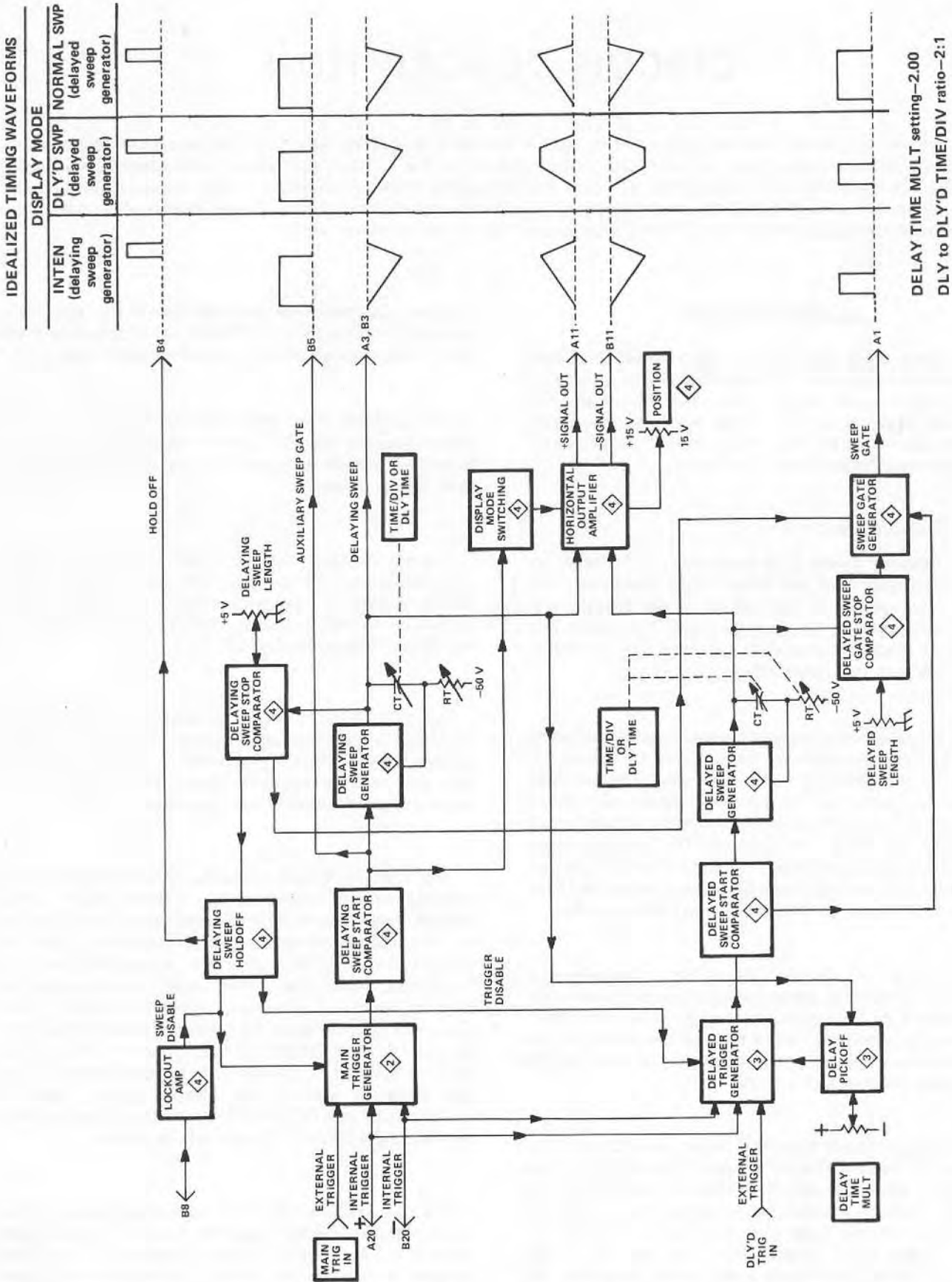


Fig. 1. 7B92 basic block diagram.

The delayed sweep sawtooth signal is developed by the Delayed Sweep Generator. The sawtooth is generated during the time that a gate is applied from the Delayed Sweep Start Comparator. Rate of change of the sawtooth is set by C_t and R_t , selected by the DLY'D TIME/DIV switch. The delayed sawtooth output is coupled to the Horizontal Output Amplifier and the Delayed Sweep Stop Comparator.

One side of the Delayed Sweep Gate Stop Comparator is driven by the delaying sweep sawtooth signal; the other side is set by the Delayed Sweep Length Adjustment. When the delayed sawtooth waveform passes through the voltage set by the Delayed Sweep Length Adjustment, the comparator switches to a positive level. This positive level is coupled to the Sweep Gate Generator.

The Sweep Gate Generator produces an unblanking pulse for the associated oscilloscope. The Sweep Gate pulse is initiated by the gate from the Delayed Sweep Start Comparator and terminated by the pulse from the Delaying Sweep Stop Comparator or Delayed Sweep Gate Stop Comparator (whichever occurs first).

CIRCUIT OPERATION

This section provides a detailed description of the electrical operation and relationship of the circuits in the 7B92. The theory of operation for circuits unique to this instrument is described in detail in this discussion. Circuits commonly used in the electronics industry are not described in detail. If more information is desired on these commonly used circuits refer to the following textbooks.

Tektronix Circuit Concepts Books (order from your local Tektronix Field Office or representatives).

Horizontal Amplifier Circuits, Tektronix Part No. 062-1144-00.

Oscilloscope Trigger Circuits, Tektronix Part No. 062-1056-00.

Sweep Generator Circuits, Tektronix Part No. 062-1098-01.

Phillip Cutler, "Semiconductor Circuit Analysis", McGraw-Hill, New York, 1964.

Lloyd P. Hunter (Ed), "Handbook of Semiconductor Electronics", second edition, McGraw-Hill, New York, 1962.

Jacob Millman and Herbert Taub, "Pulse Digital and Switching Waveforms", McGraw-Hill, New York, 1965.

The following circuit analysis is written around the detailed block diagrams which are given for each major circuit. These detailed block diagrams give the names of the individual stages within major circuits and show how they are connected together to form the major circuit. The block diagrams also show the inputs and outputs for each circuit and the relationship of the front-panel controls to the individual stages. The circuit diagrams from which the detailed block diagrams are derived are shown in the Diagrams section at the rear of the service manual.

MAIN TRIGGER

The Main Trigger circuit block includes circuitry for selecting trigger signal source, type of coupling, trigger mode, and the point on the trigger signal where sweep triggering occurs. Also, regardless of the trigger signal shape or amplitude (within specification), the main trigger circuits provide a fast-rise uniform amplitude gate pulse to the Delaying Sweep Start Comparator. Termination of the gate pulse occurs at the rise of delaying sweep HOLDOFF. Figure 2 shows a detailed block diagram of the main Trigger circuits and the schematic is shown on diagram 2 at the rear of the service manual. Refer to diagram 1 at the rear of the service manual for front-panel switching detail.

Trigger Inputs

The Main Trigger circuit block accepts trigger signals from one of three sources; 1. An external signal applied to the MAIN TRIG IN connector. 2. An internal signal from the vertical plug-in unit installed in the oscilloscope system. 3. An internal signal from a sample of the line voltage applied to the oscilloscope system. Separate amplifiers and trigger level comparators are provided for each trigger input. The internal, external, and line trigger signals are coupled to Summing Amplifier and Slope Comparator U660 (see Fig. 2).

External Trigger Amplifier. When the MAIN TRIGGERING SOURCE switch is set to EXT or EXT \div 10, the triggering signal is obtained from an external signal applied to the MAIN TRIG IN connector. Both high-frequency and low-frequency inputs are provided to External Trigger Amplifier U620. Separate input paths allow each circuit to be compensated for the appropriate frequency range. Input paths are determined by high-pass and low-pass filters.

The high-frequency input is from the MAIN TRIG IN connector, through R55, to pins 14 and 3 of U620. A high-pass filter consisting of R55 and C59 (EXT SOURCE); or R55, C57, and R58 (EXT \div 10 SOURCE) accepts external trigger signals above approximately 80 MHz.

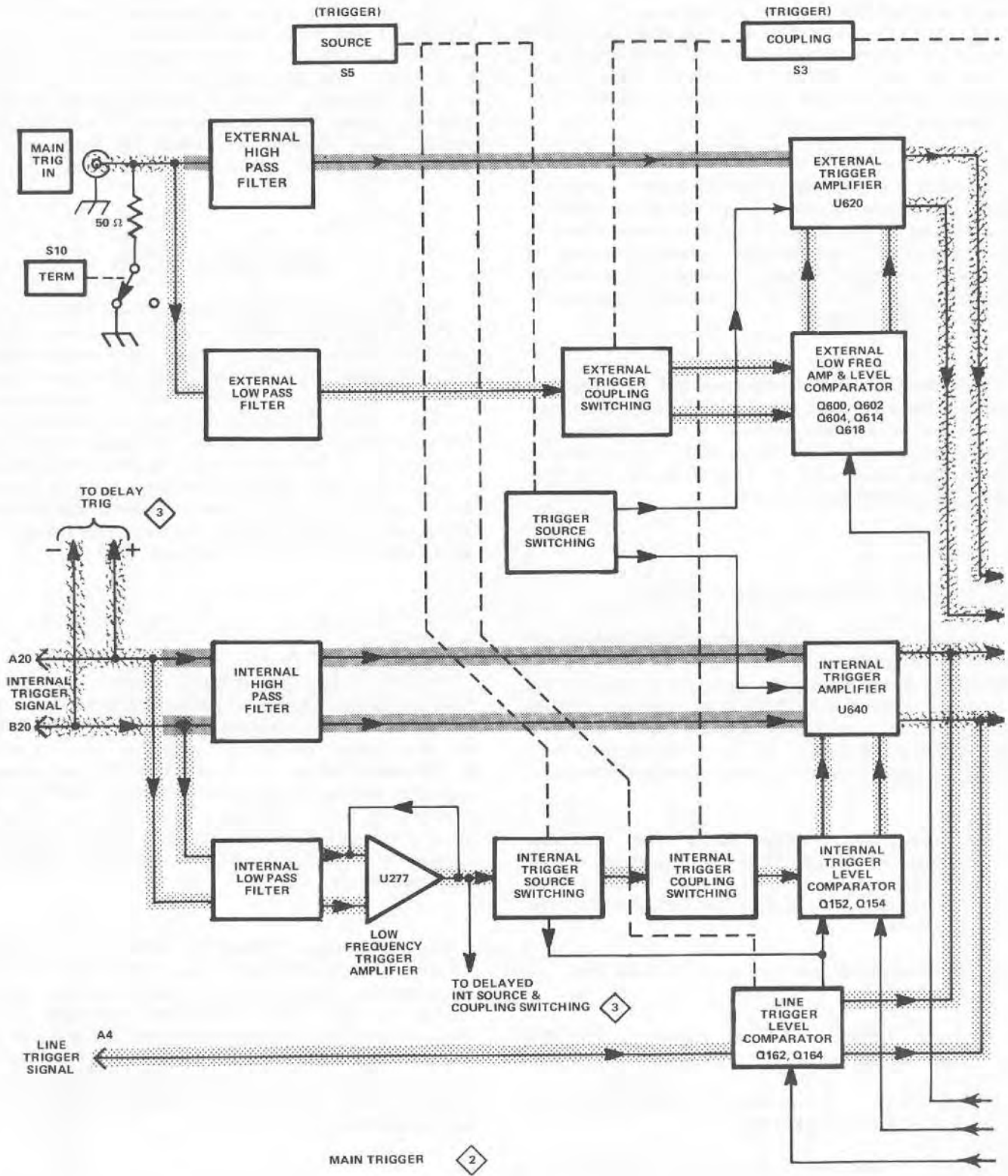


Fig. 2. Main Trigger detailed block diagram.

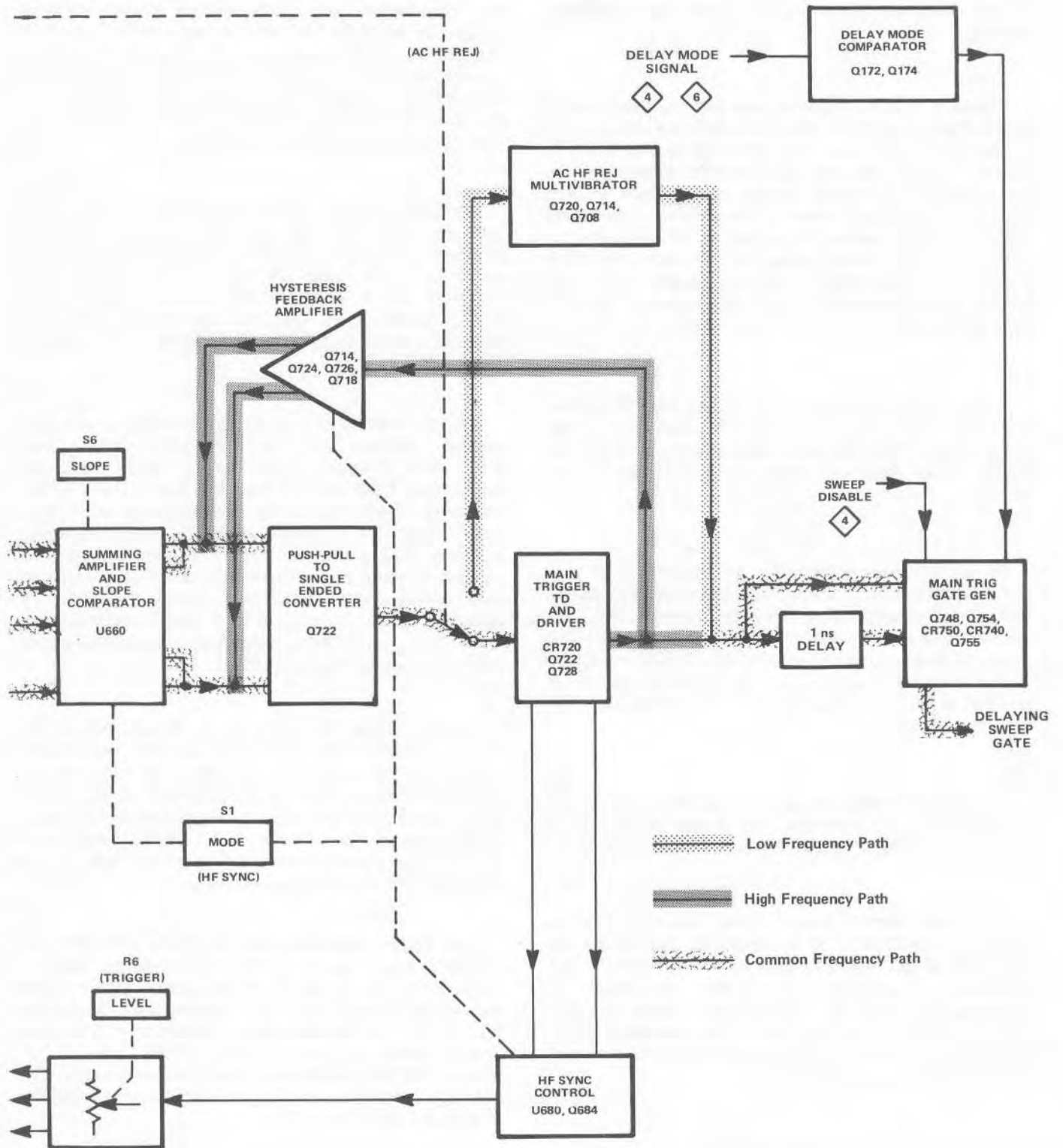


Fig. 2. (cont)

TEKTRONIX®

7B92

DUAL TIME BASE

SERVICE

INSTRUCTION MANUAL

Tektronix, Inc.
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Serial Number

8064082

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			Refer to the 7B92 Operators manual for specifications and complete operating information.	



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7B92A DUAL TIME BASE

INSTRUCTION MANUAL

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VOLTAGE AND WAVEFORM CONDITIONS

WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect the power source before replacing parts.

The voltages and waveforms shown on diagrams were taken with the 7B92A front panel controls set as follows:

VOLTAGES & WAVEFORMS*

MAIN TRIGGERING		Delayed Triggering	
MODE	AUTO	SLOPE	+
COUPLING	AC	COUPLING	AC
SOURCE	INT	SOURCE	INT
LEVEL	0	LEVEL	0
SLOPE	+		
Sweep Controls		Inputs	
POSITION	Midrange	TERM	IN 1 MΩ
TIME/DIV OR DLY TIME	1 ms		
DLY'D TIME/ DIVISION	0.5 ms/ PULL FOR ALT		
TRACE SEP	Fully clockwise		
DELAY TIME MULT	1.0		

*Ground Reference: center horizontal graticule line (Main Trigger and DELAYED Trigger).

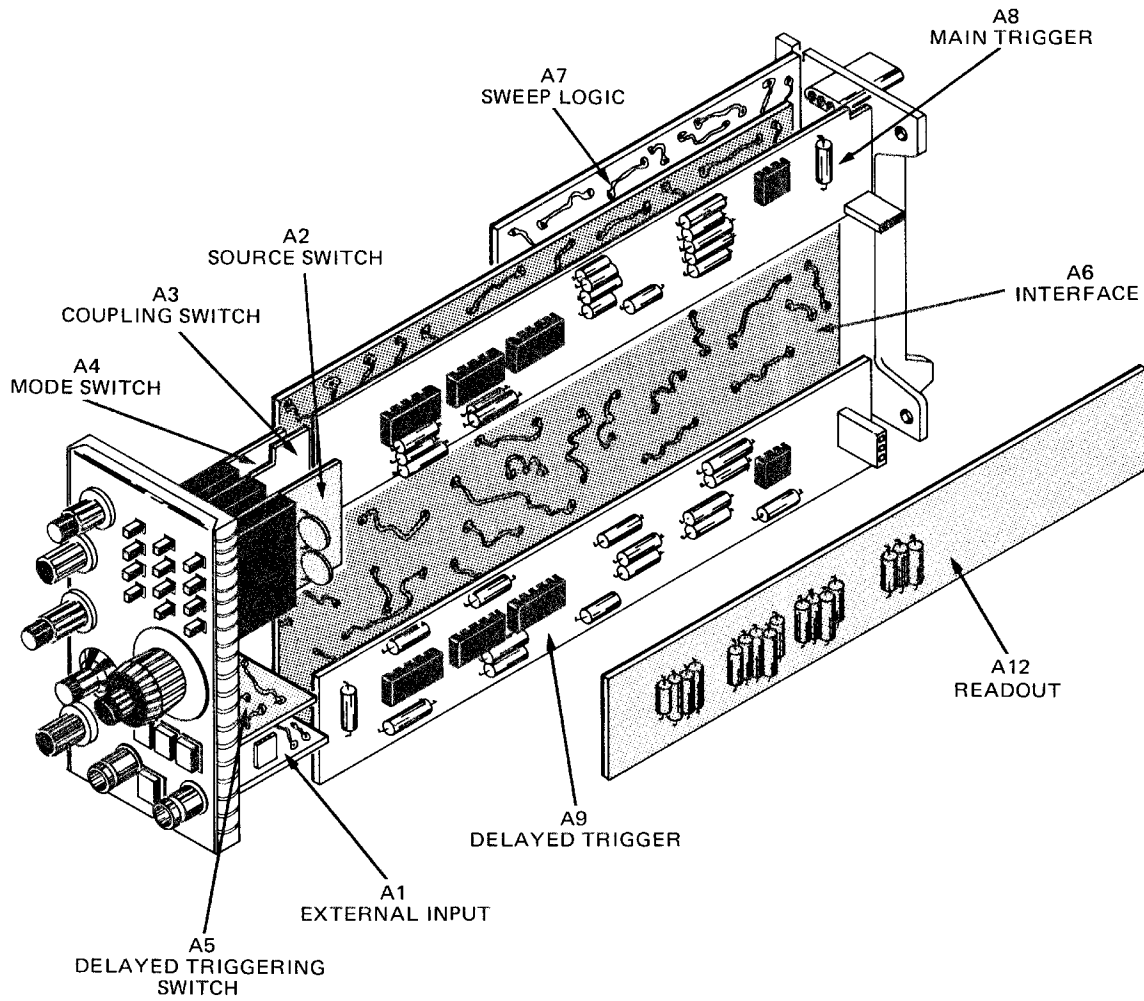
Voltage Conditions. The voltage measurements were taken under the following conditions:

A four-volt calibrator signal was applied to the vertical amplifier plug-in unit; the amplifier was set for a two-division display.

A digital multimeter with a 10 megohm input impedance, accuracy 0.1% (TEKTRONIX DM 501 Digital Multimeter was used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown were obtained using a test oscilloscope system with 10 megohm input impedance and at least 65 megahertz bandwidth (TEKTRONIX 7603 Oscilloscope, 7B53A Time Base, and 7A26 Amplifier equipped with 10X probe).

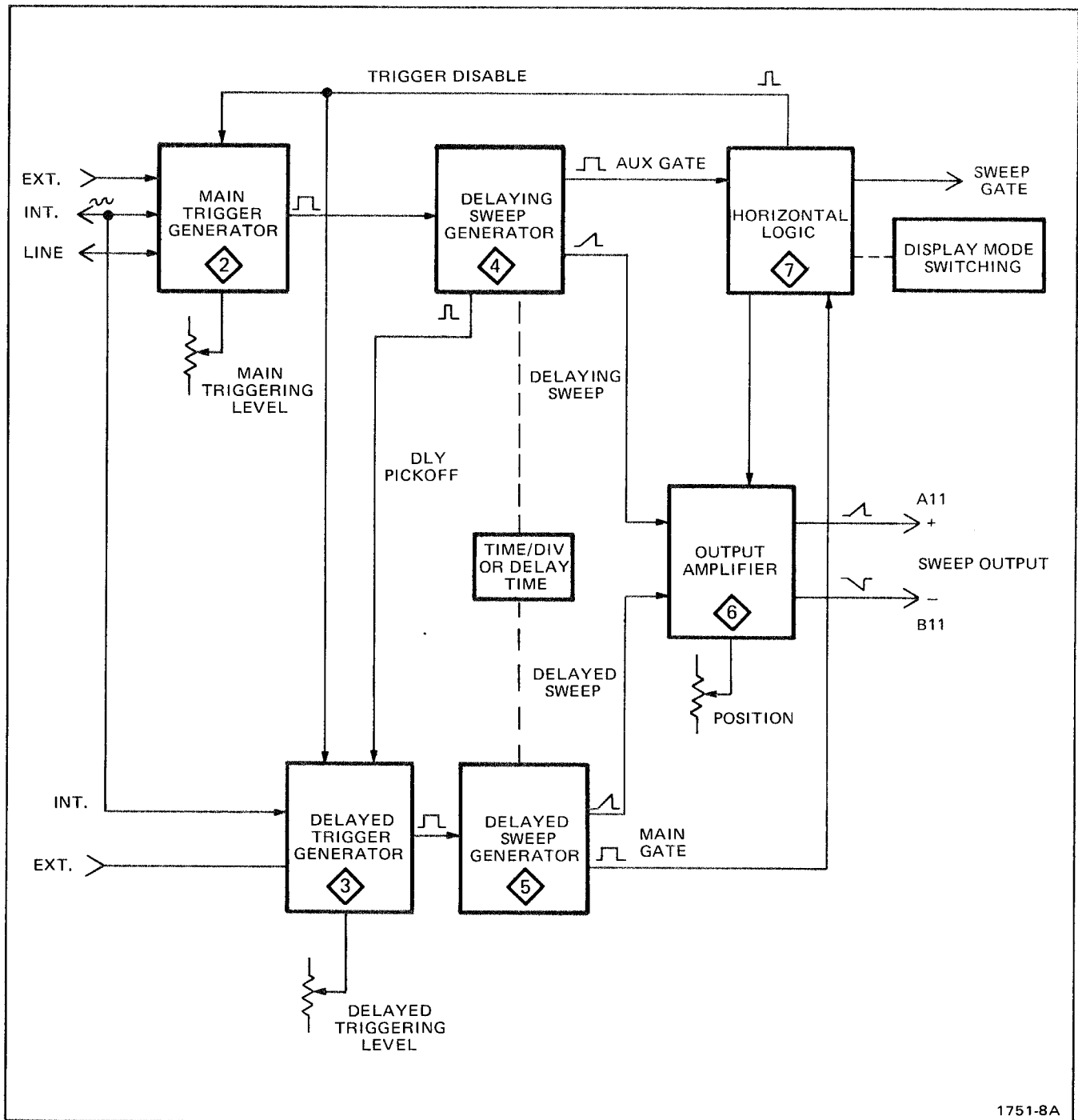
The waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on the waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



EXT. >
 INT. <
 LINE <

INT.
 EXT. >

Fig. 8-1. Circuit Board Locations.



BLOCK DIAGRAM

1751-8A

Fig. 8-2. Block Diagram.

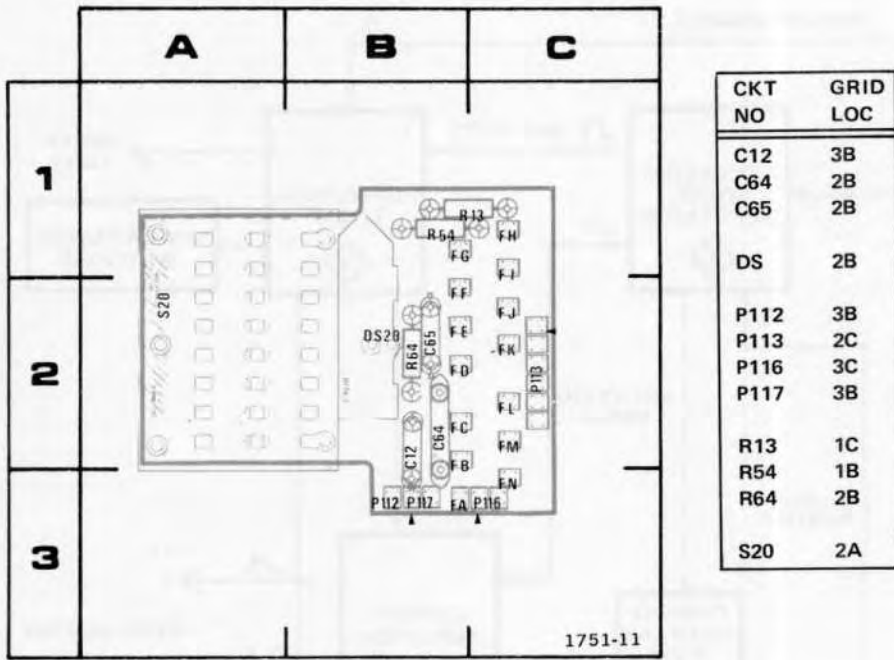


Fig. 8-3. A3—Coupling Switch Circuit Board.

CKT NO	GRID LOC
C220	2B
P126	1C
P212	2B
P214	1B
S210	2B
S220	2B
S285	2B

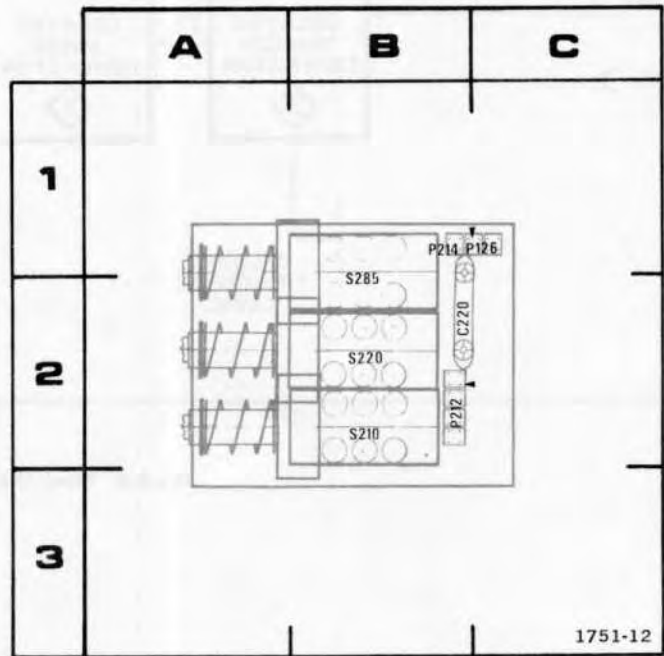


Fig. 8-4. A5—Delayed Triggering Switch Circuit Board.

ASSEMBLIES A1, A2, A3, & A4

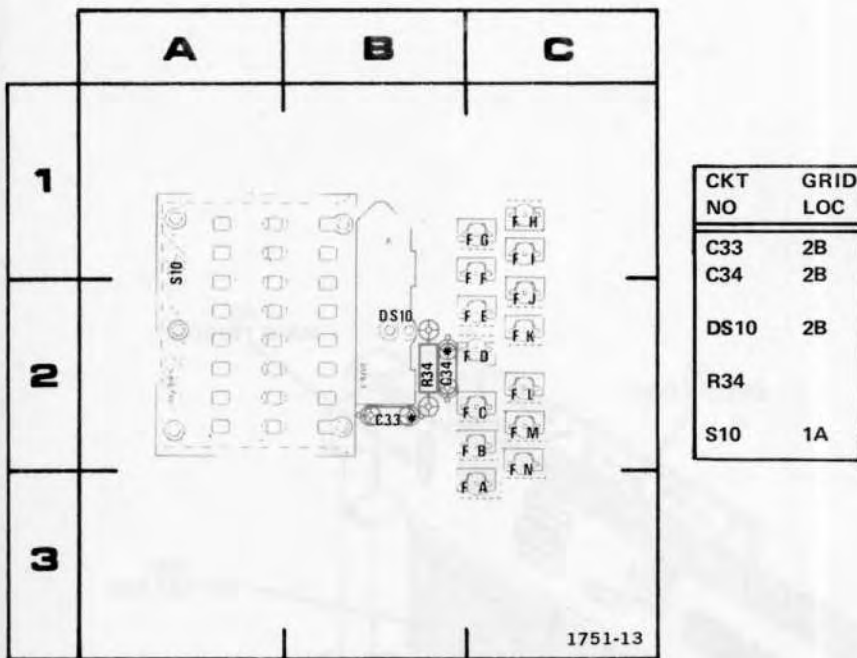


Fig. 8-5. A2—Source Switch Circuit Board.

*See Parts List for serial number ranges.

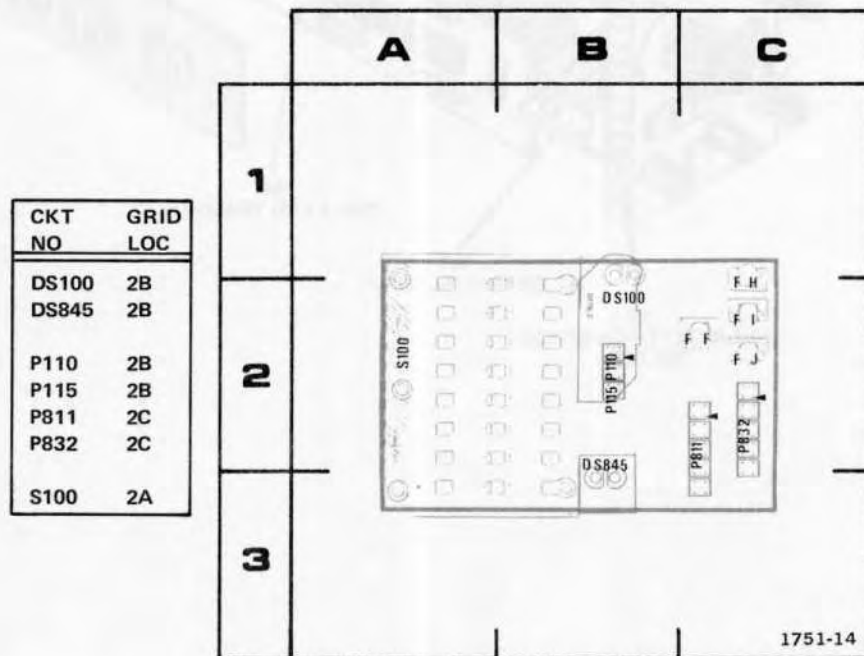
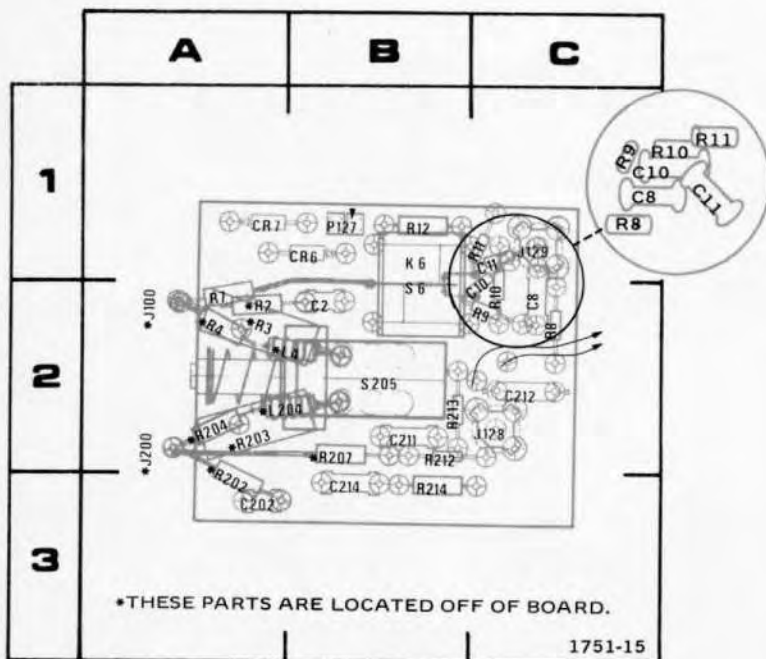
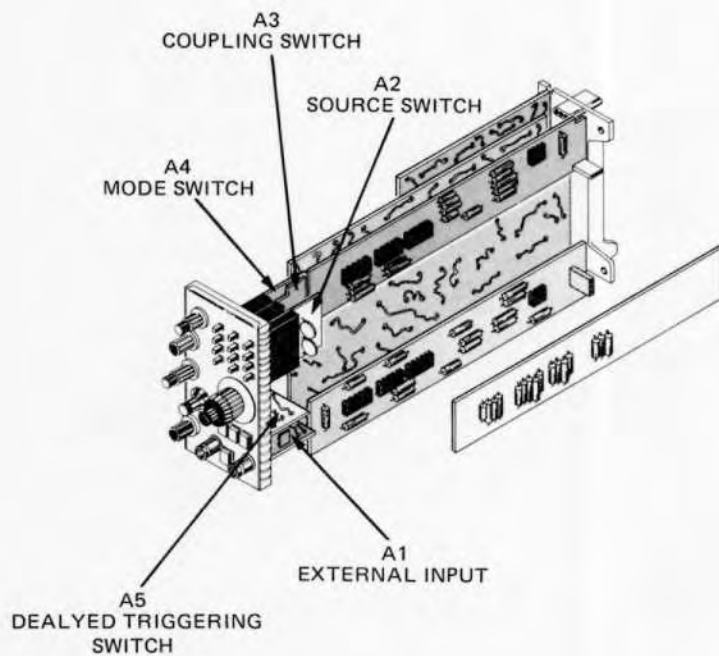


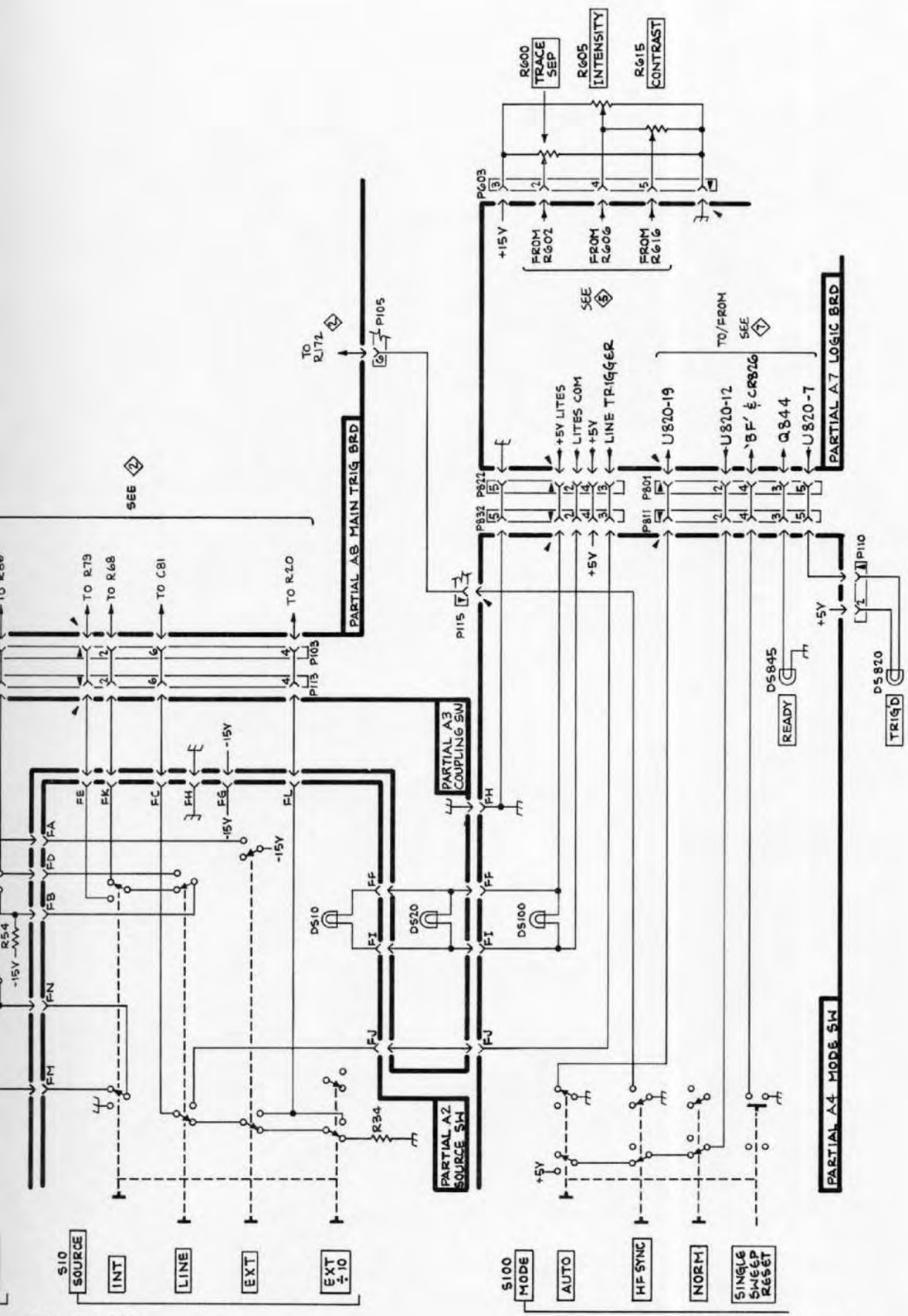
Fig. 8-6. A4—Mode Switch Circuit Board.



CKT NO	GRID LOC	CKT NO	GRID LOC
C2	2B	R2	2A
C10	2C	R3	2A
C11	1C	R4	2A
C202	3A	R7	2A
C211	2B	R8	2C
C212	2C	R9	2C
C214	3B	R10	2C
		R11	1C
CR6	1B	R12	1B
CR7	1A	R202	3A
		R203	2A
J100	2A	R204	2A
J128	2C	R207	2B
J129	1C	R212	2B
J200	2A	R213	2B
		R214	2B
K6	1B		
L4	2B	S6	2B
L204	2A	S205	2B
P127	1B		

Fig. 8-7. A1—External Input Circuit Board.

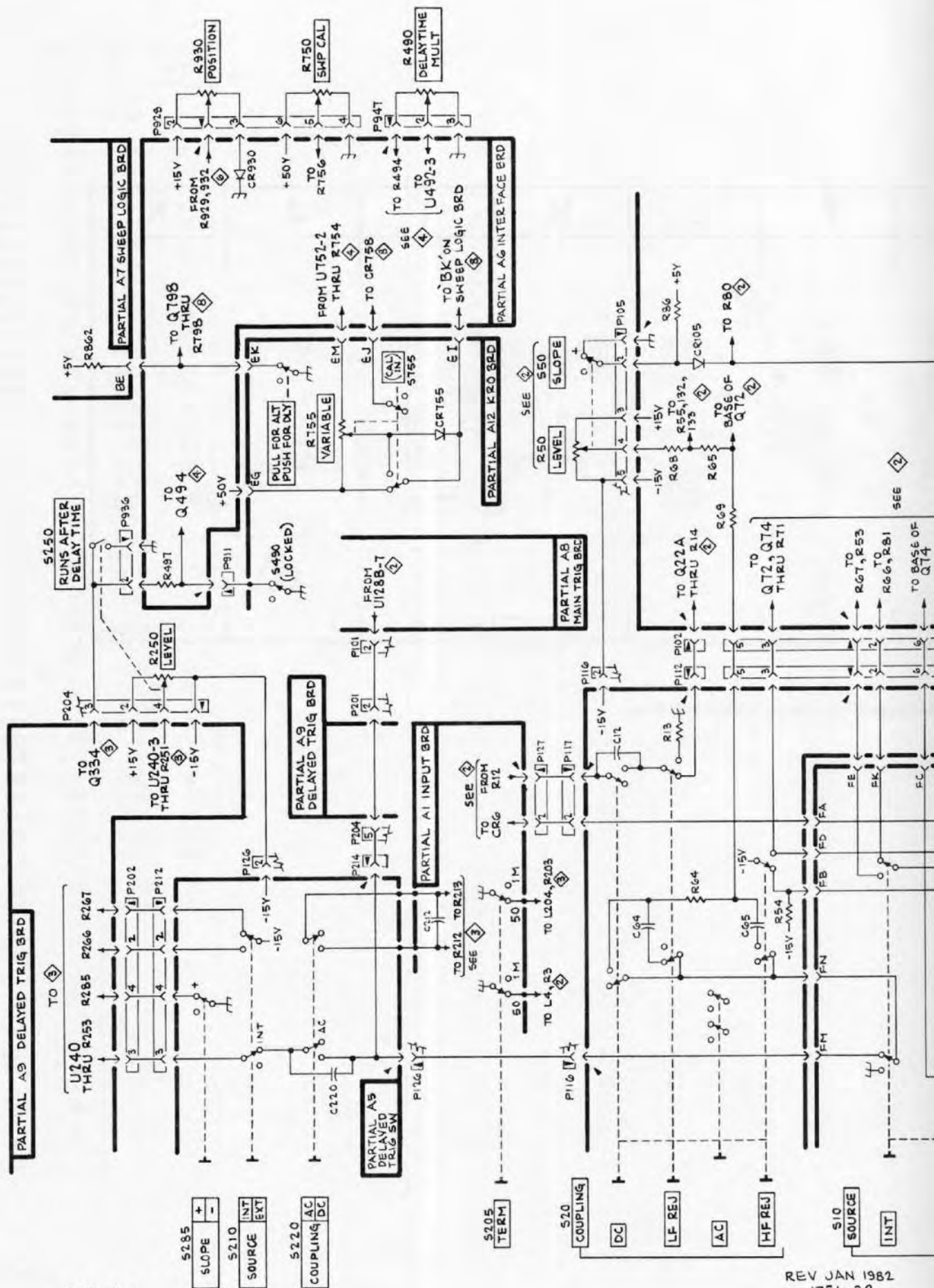




REV JAN 1982
1751-51

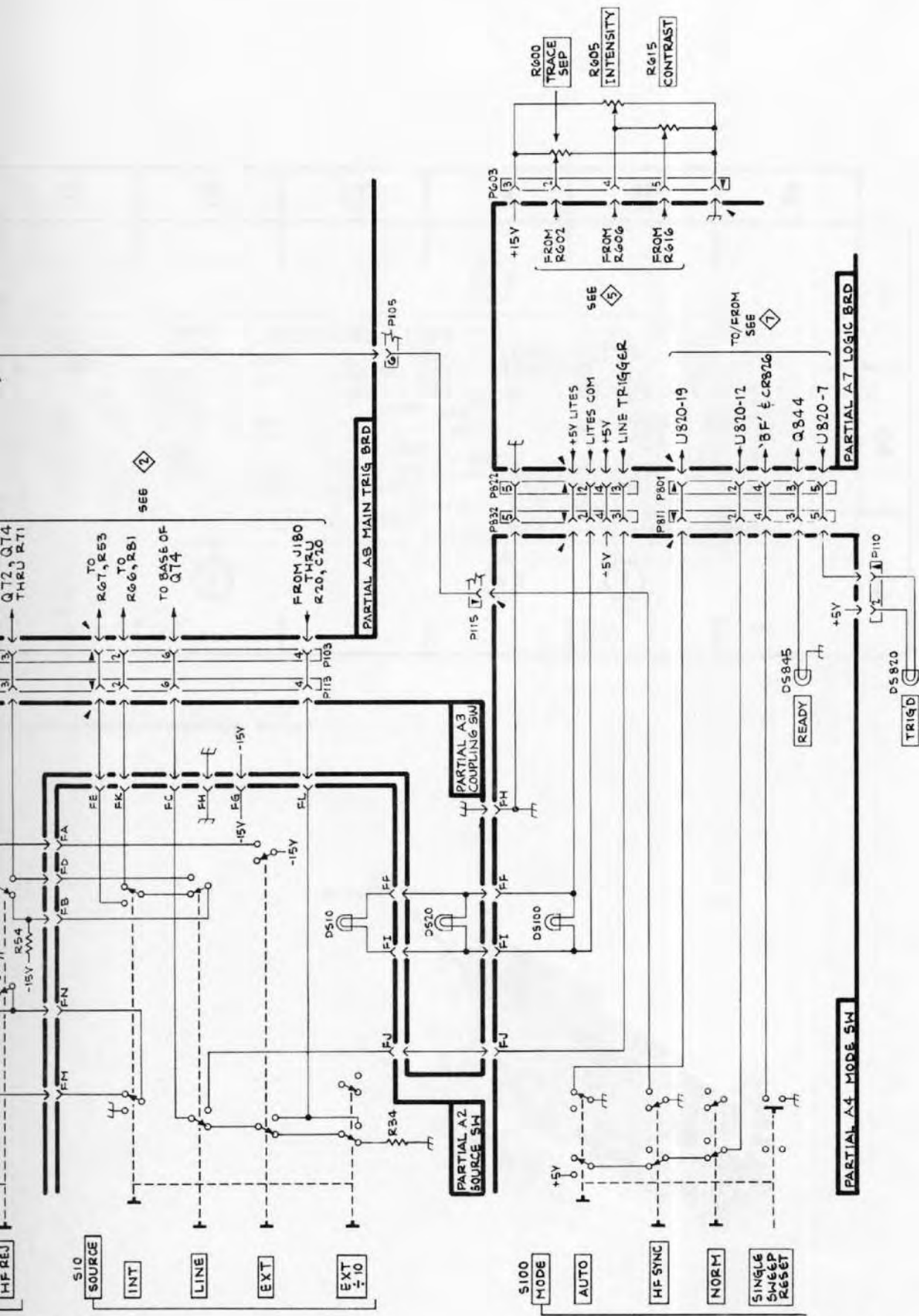
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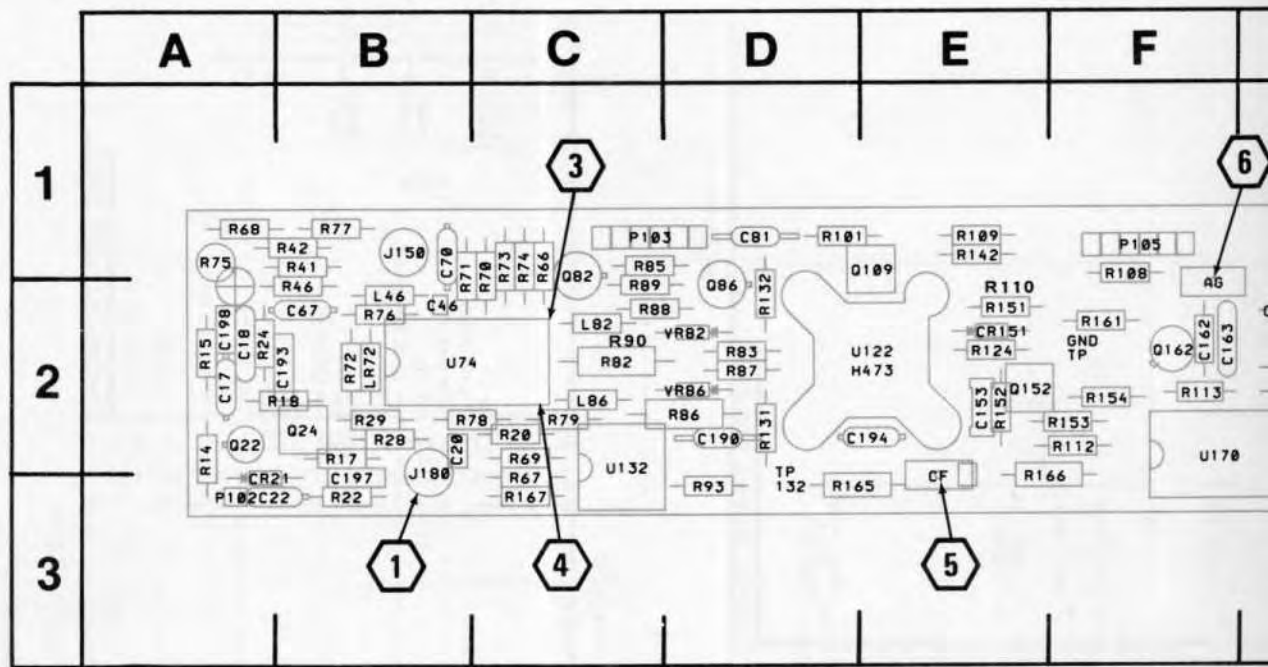
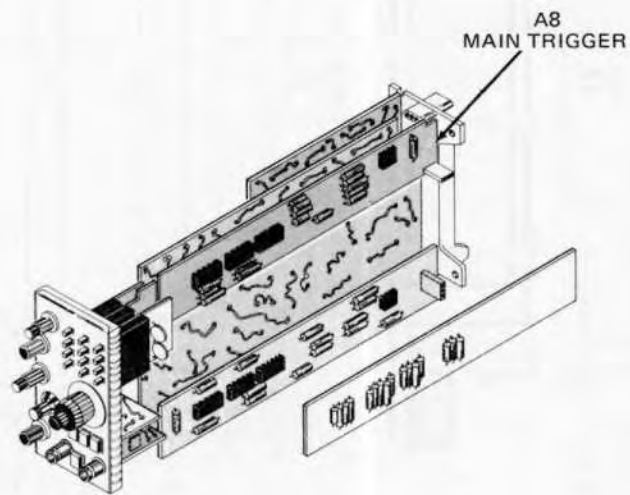
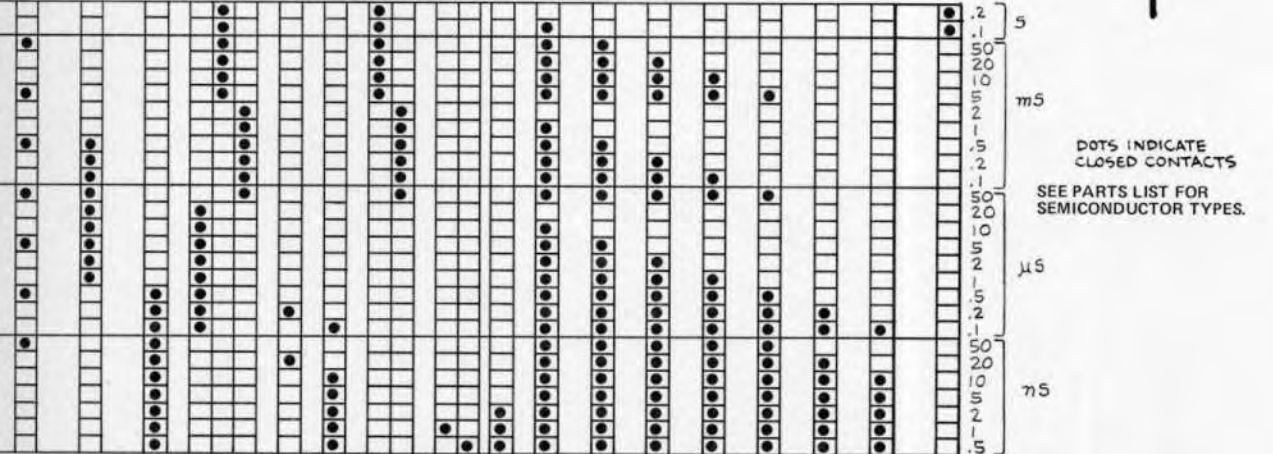
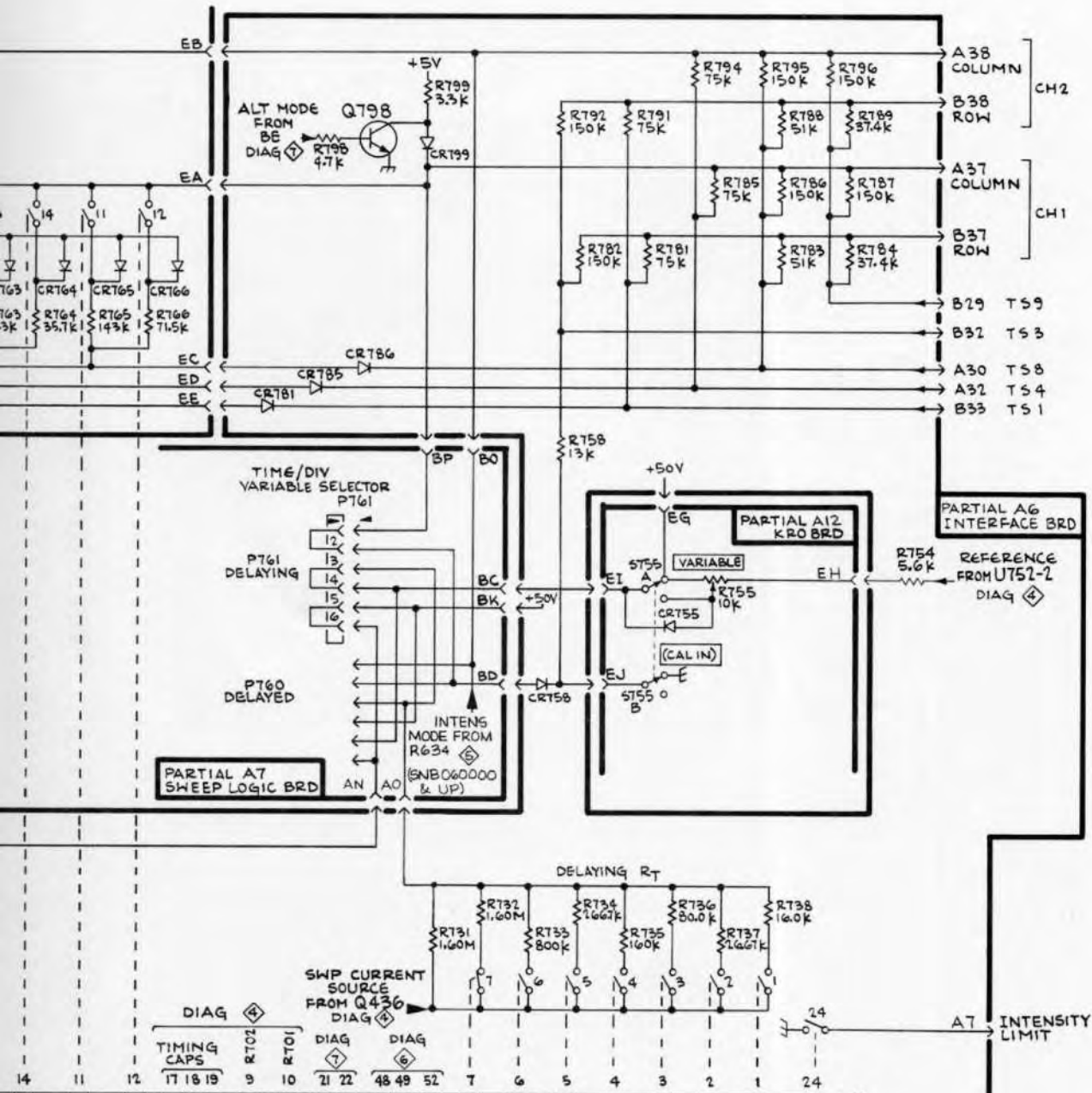
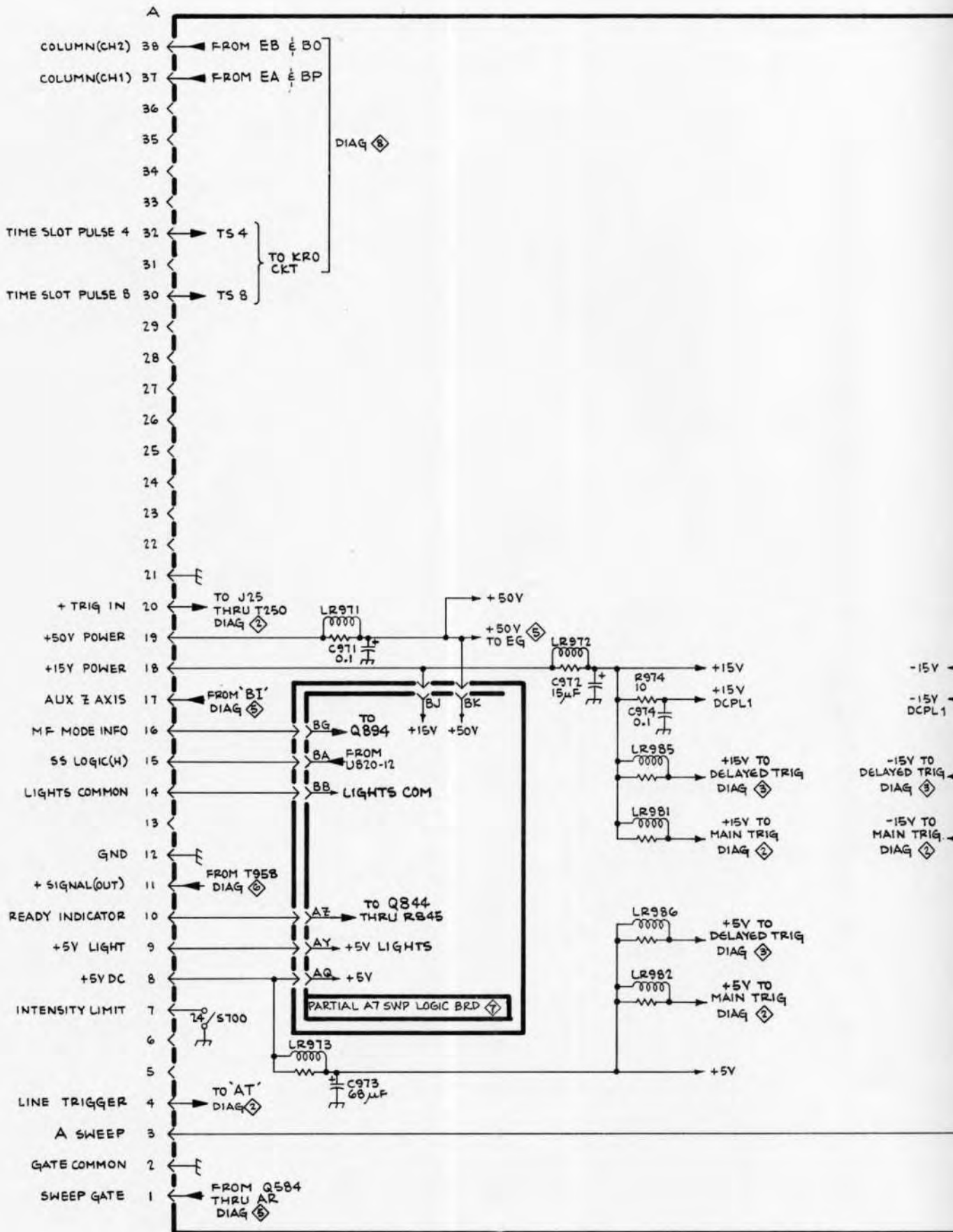


Fig. 8-8. A8—Main Trigger Circuit Board (SN



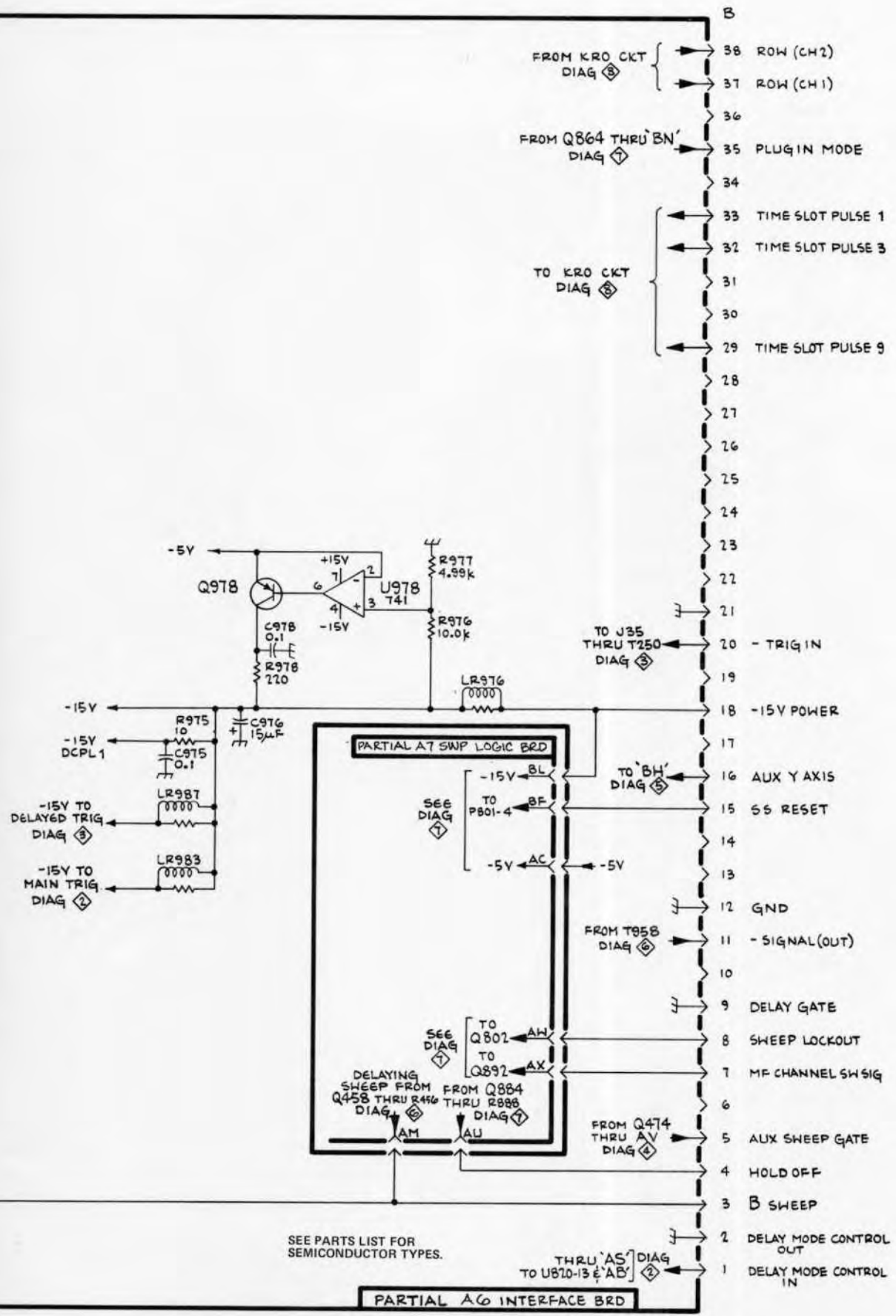


ME
 DLY TIME / DIV (DELAYING SWEEP)
 SHOWN IN 1 MS POSITION
 TIMING & READOUT SWITCH

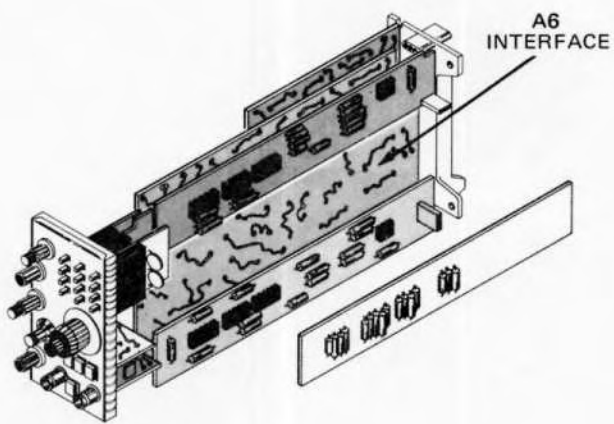


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1751-38



REAR PLUG SIGNAL LOCATOR (FRONT VIEW)



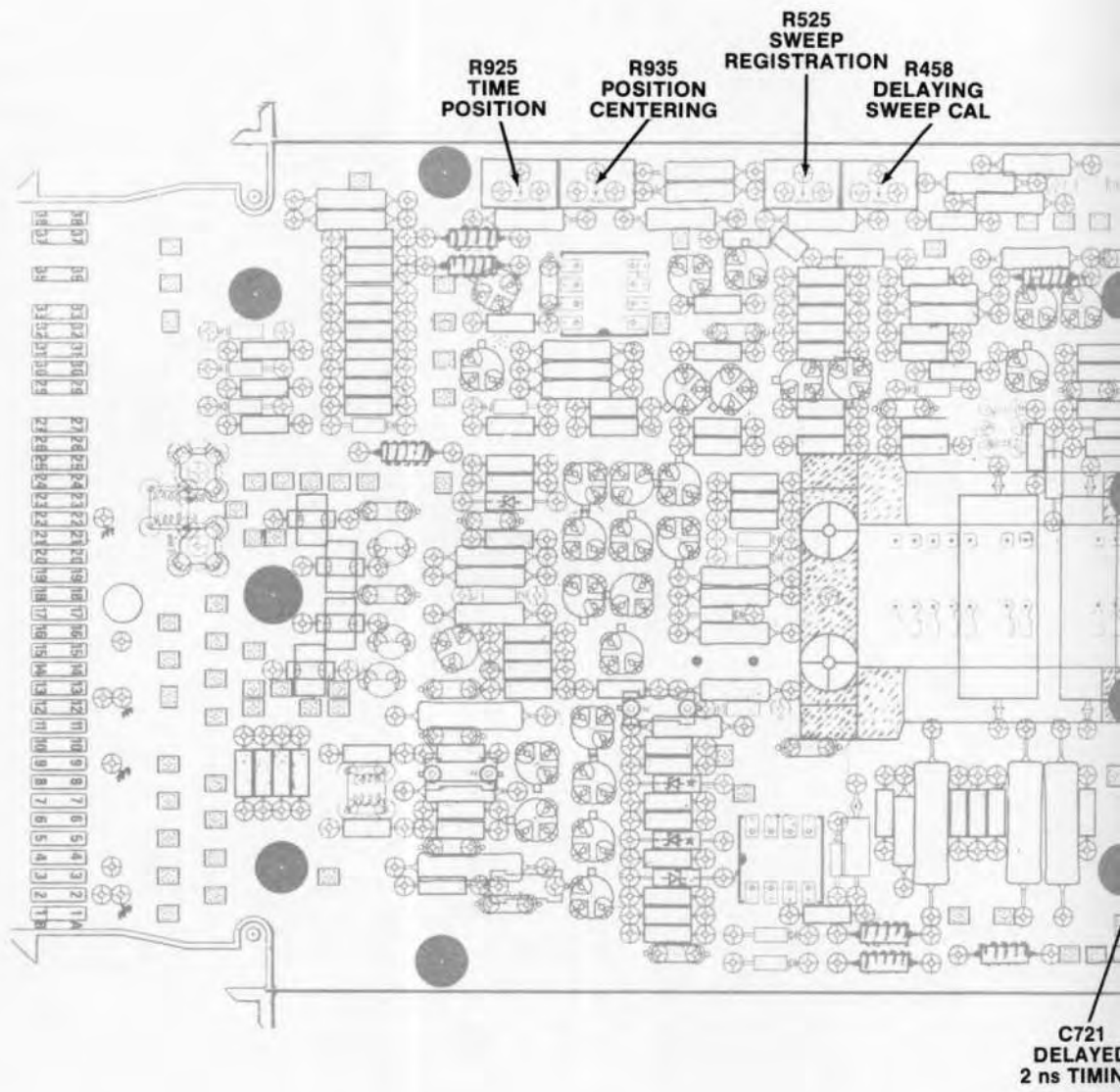


Fig. 8-18. Sweep

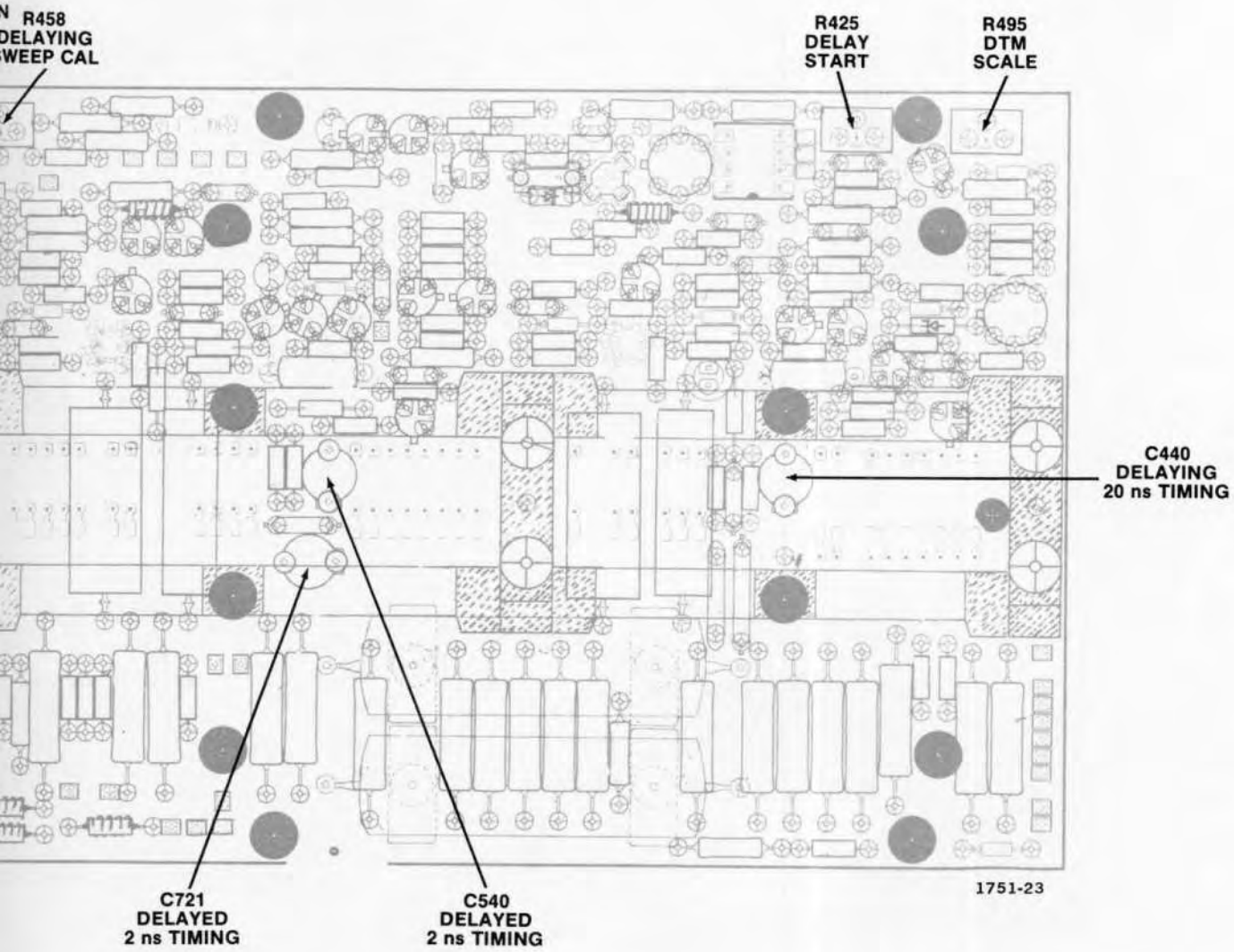


Fig. 8-18. Sweep Adjustment Locations.



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