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TEKTRONIX®

TG 501

**TIME MARK
GENERATOR**

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97005

Serial Number _____

WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repair and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

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OPERATING INSTRUCTIONS

INTRODUCTION

Description

The TG 501 is a general purpose Time Mark Generator plug-in designed to operate in a TM 500 Series Power Module. A Variable Timing Readout provides a simple, but accurate means of measuring timing errors over $\pm 7.5\%$ minimum range. Since many specifications are given in percentages, the error readout eliminates the need for computations and, additionally, lessens parallax discrepancies.

Marker selection from 5 s through 1 ns in a 1,2,5, sequence is available. 5 s through 10 ns markers are selected by a rotary switch. 5, 2, and 1 ns modified sine waves are selected by self-canceling push-buttons when the rotary switch is in the 521N position.

All outputs are available at the front-panel connectors or by modification of the interface connector, located at the back of the plug-in, and the TM 500 Series Power Module.

Power supplies are current limited. The 5 volt supply is over-voltage protected to avoid damage to the integrated circuits.

Installation

The TG 501 is calibrated and ready for use when received. Referring to Fig. 1-1, install the Generator and turn on the Power Module. Check the front-panel of the Generator to see that the knob skirt is lighted. The TG 501 is designed to operate in any compartment of a TM 500

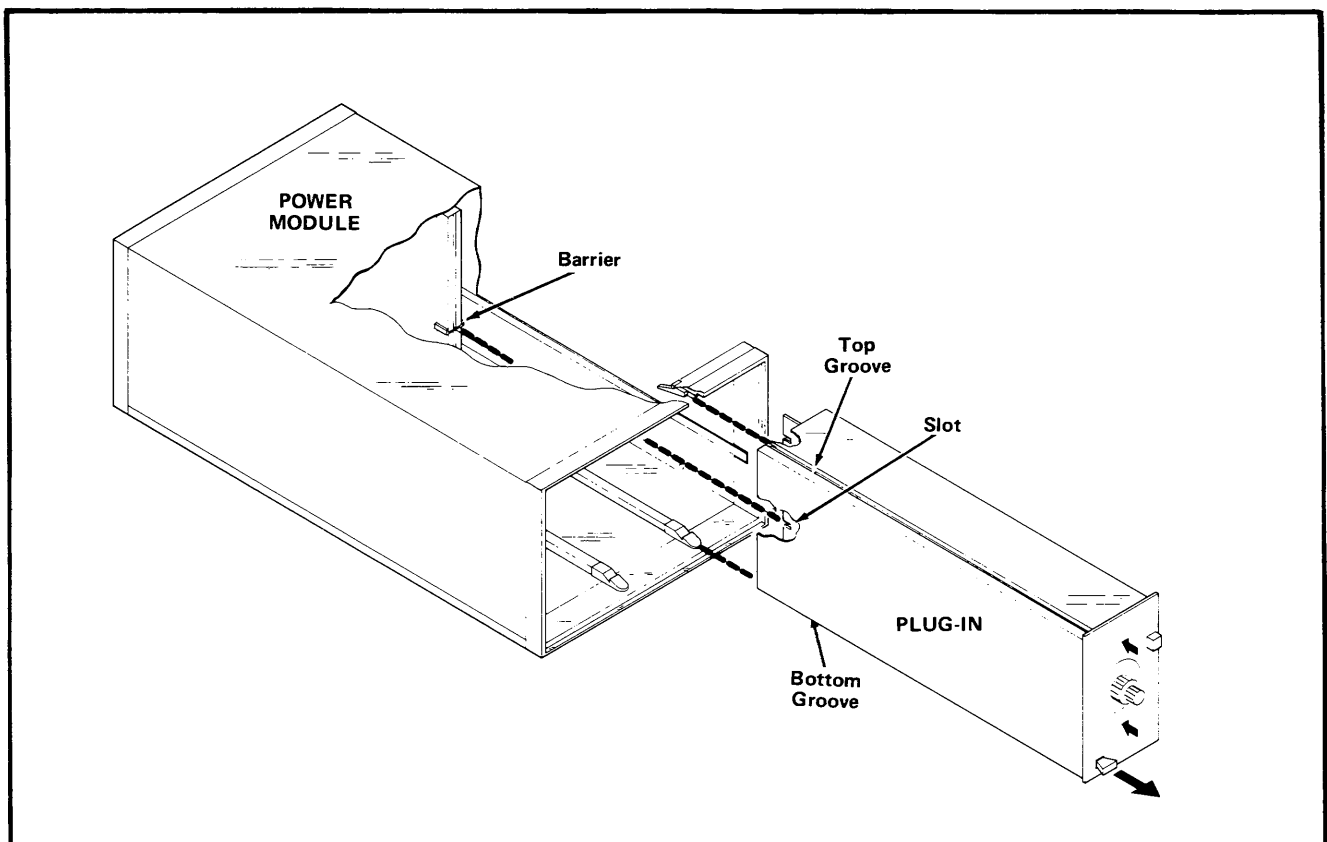


Fig. 1-1. Plug-in Installation and Removal.

Operating Instructions—TG 501

Series Power Module. Refer to the Power Module Instruction Manual for line voltage requirements and Power Module operation.

at the connector terminals can reduce connector life. However, no internal damage will result if the Generator is inserted into a live Power Module.

NOTE

It is recommended that the Power Module be turned off before inserting or removing the TG 501. Arcing

Refer to the Controls and Adjustments fold out page for front-panel controls, connectors and indicator descriptions.

OPERATING CONSIDERATIONS

The internal reference of the TG 501 is a 1 MHz crystal. If Option 1 is ordered, a high accuracy 5 MHz crystal is provided and Integrated Circuit, U50 is installed on the back of the main circuit board. Provisions are made for buffered output of either 1 MHz or 5 MHz internal clock through interface connector pin 25A with associated ground on pin 26A.

A 1 MHz, 5 MHz or 10 MHz external clock can be substituted. To use an external 5 or 10 MHz clock, U50 must be installed on the back of the main circuit board and the necessary jumpers added (see Fig. 1-2) to divide down the input to meet the 1 MHz internal requirement. U50 is not required for a 1 MHz external clock, but jumpers must be added.

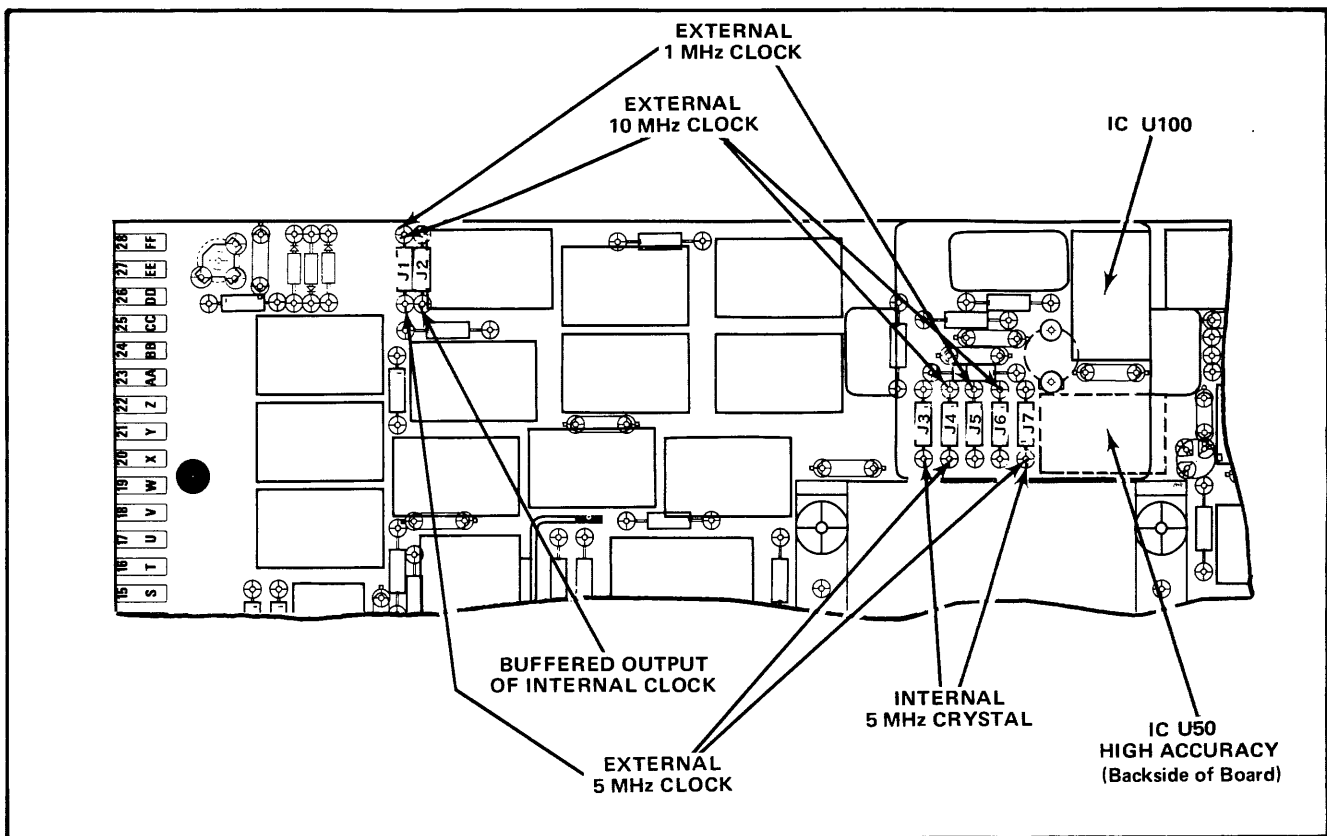


Fig. 1-2. Location of Jumpers and Integrated Circuits required for various clock choices.

Remove U100 before using external clocks. Interface connector pin 24B is used for External Clock Input with the associated ground on pin 25B. Fig. 1-2 shows the location on the main circuit board of the jumpers that must be installed to use the TG 501 with the various clock choices. The required jumpers are:

Standard Internal Reference	No jumpers required
1 MHz Crystal	

Buffered Output of Internal Clocks	Install J2
External 1 MHz clock (Remove U100)	Install J1, J5
External 5 MHz clock (Remove U100, Add U50)	Install J1, J4, J7
External 10 MHz clock (Remove U100, Add U50)	Install J1, J4, J6

OPERATING MODES

Calibrated Mode

When center-button of VARIABLE TIMING Control is pushed in, the MARKER Control selects calibrated marker intervals from 5 s to 10 ns indicated by the lighted knob skirt. To select 5, 2 or 1 ns modified sine wave markers, set MARKER Control to 521N position and depress desired pushbutton.

Variable Timing Mode

When center button of VARIABLE TIMING Control is out, output timing is faster or slower than the calibrated

marker to the percentage indicated by the VARIABLE TIMING READOUT Display and the FAST-SLOW Indicator lights. 5, 2 and 1 ns push-button controlled modified sine waves are not variable and Readout Display is turned off when MARKER Control is in 521N position.

Readout Display Test

To check the operation of the display LED's (Light-Emitting Diodes), fully depress the center button of the VARIABLE TIMING Control (push in firmly). All LED segments should light, displaying 8.8 in the Readout.

TYPICAL APPLICATIONS

The TG 501 can be used for many applications not described in the manual. Use the following examples to become familiar with the TG 501's VARIABLE TIMING READOUT. Contact your Tektronix Field Office or representative for making specific measurements with this instrument.

Time Base Measurements

To accurately determine the timing error of a time base:

1. Connect the MARKER OUT of the TG 501 to the Vertical Input of the oscilloscope. Use a 50 Ω coaxial cable terminated into 50 Ω .

2. connect the TRIGGER OUT of the TG 501 to the External Trigger Input of the time base. Use a 50 Ω coaxial cable terminated into 50 Ω .

3. Select external trigger source on the time base.
4. Select, for example, 1 μ s sweep rate of the time base.
5. Set MARKER Control rotary switch of TG 501 to 1 μ s.
6. Make sure center button of VARIABLE TIMING Control, concentric with MARKER Control, is out (Variable Timing Mode).

7. Use Horizontal Position control of time base to make first time mark coincide with first graticule line on the oscilloscope. See Fig. 1-3.

8. Rotate VARIABLE TIMING knob until all time markers coincide with graticule lines on the oscilloscope, as shown in Fig. 1-4.

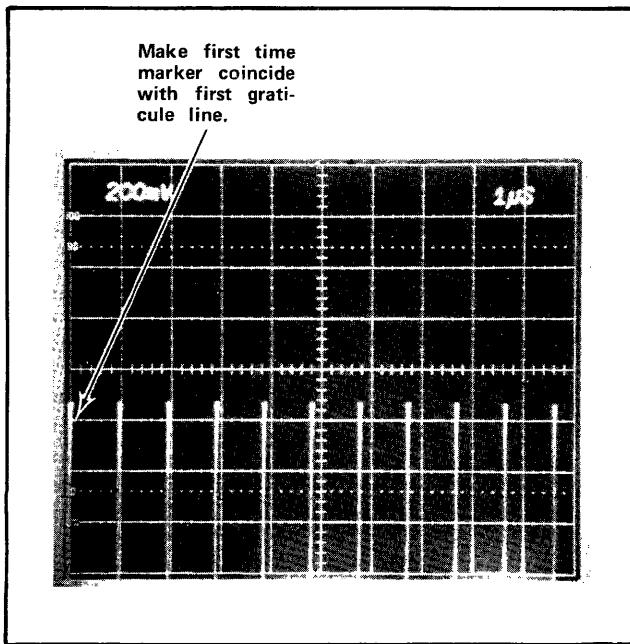


Fig. 1-3. Timing Error of Time Base.

9. Either the FAST or SLOW Indicator will light showing whether the time base is faster or slower than the calibrated markers of the TG 501. Read the percentage of error from the VARIABLE TIMING READOUT Display.

Pulse Generator Measurements

To accurately determine pulse duration or period of a Pulse Generator.

1. A dual-trace vertical oscilloscope is required. Select alternate mode.

2. Connect the MARKER OUT of the TG 501 to one channel of the dual-trace oscilloscope. Use a 50 Ω coaxial cable terminated into 50 Ω.

3. Connect the Output of the pulse generator to the other channel of the dual-trace, using a 50 Ω coaxial cable terminated into 50 Ω.

4. Set the time/div switch to display 1 cycle of a pulse in 10 divisions of the graticule on the oscilloscope, as indicated in Fig. 1-5.

5. Use the MARKER Control switch of the TG 501 to display one time marker approximately at pulse duration

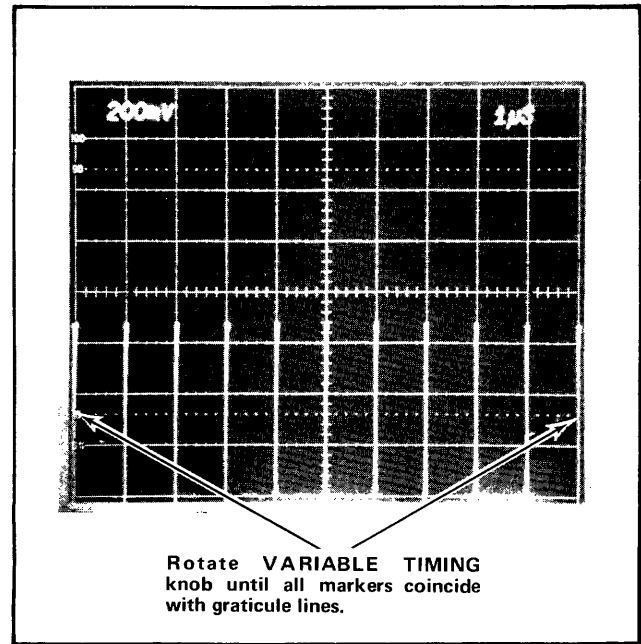


Fig. 1-4. Measuring Timing Error of Time Base.

and one at pulse period. Align first time marker with beginning of pulse wave-form. See Fig. 1-5.

6. Select Variable Timing Mode on the TG 501, VARIABLE TIMING Control center button out.

7. Use the Vertical Position control of the oscilloscope to set the peaks of the time markers at 50% amplitude of pulse shown in Fig. 1-5.

8. To check the timing of pulse duration, rotate the VARIABLE TIMING knob until time marker coincides with pulse duration, as shown in Fig. 1-6.

9. Either the FAST or SLOW Indicator will light, showing whether the pulse duration of the pulse generator is faster or slower than the calibrated time mark of the TG 501. Read the percentage of error from the VARIABLE TIMING READOUT Display.

10. To check the timing of pulse period, rotate the VARIABLE TIMING knob until time marker coincides with pulse period. See Fig. 1-7.

11. Read the VARIABLE TIMING READOUT Display and check the FAST-SLOW Indicators as described in step 9 to find the percentage of error from standard timing.

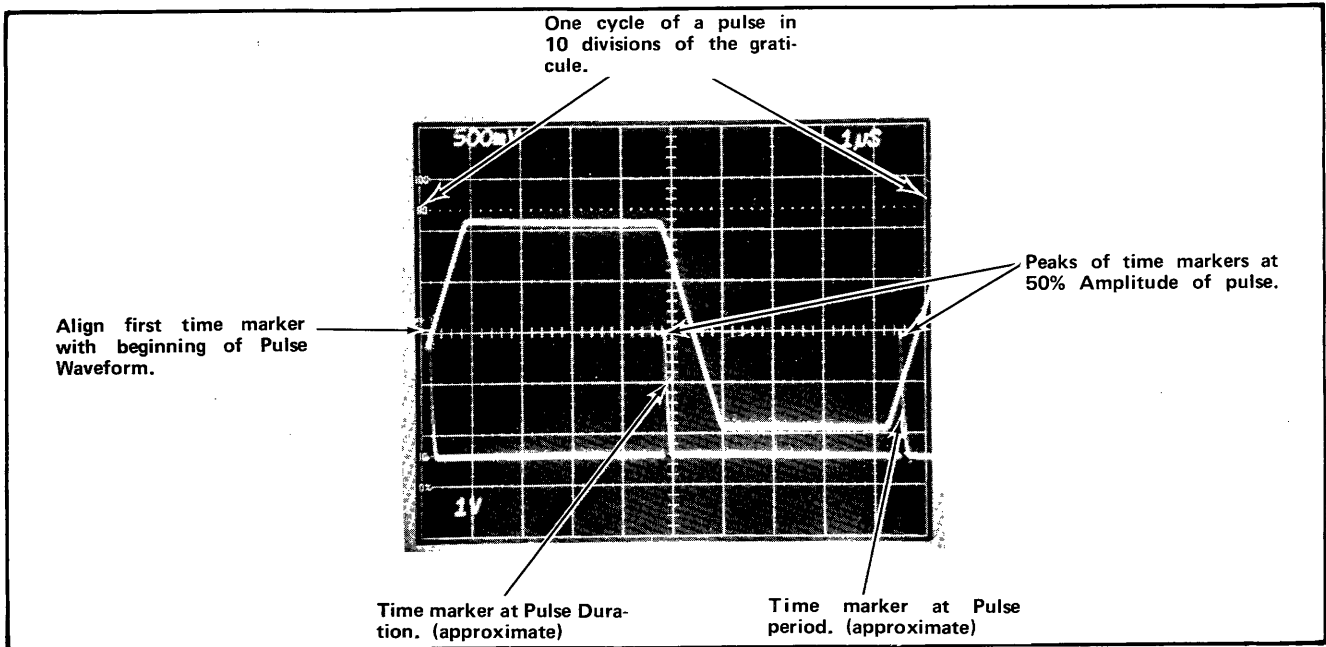


Fig. 1-5. Markers approximately at pulse duration and period.

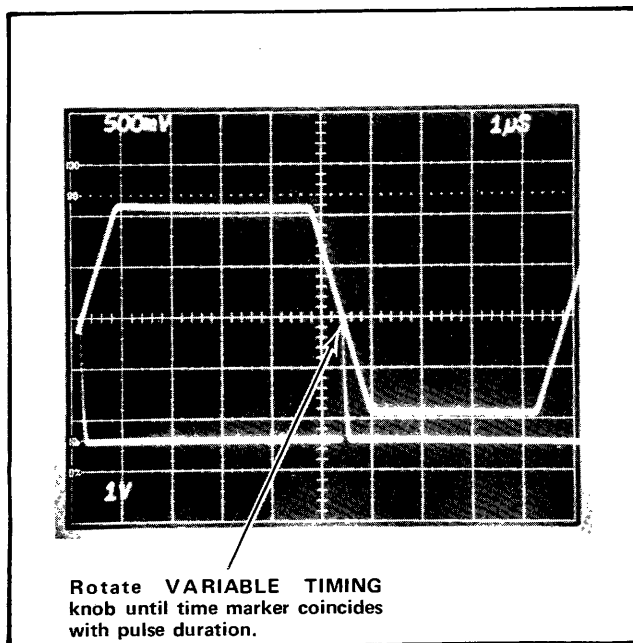


Fig. 1-6. Measuring Pulse Duration.

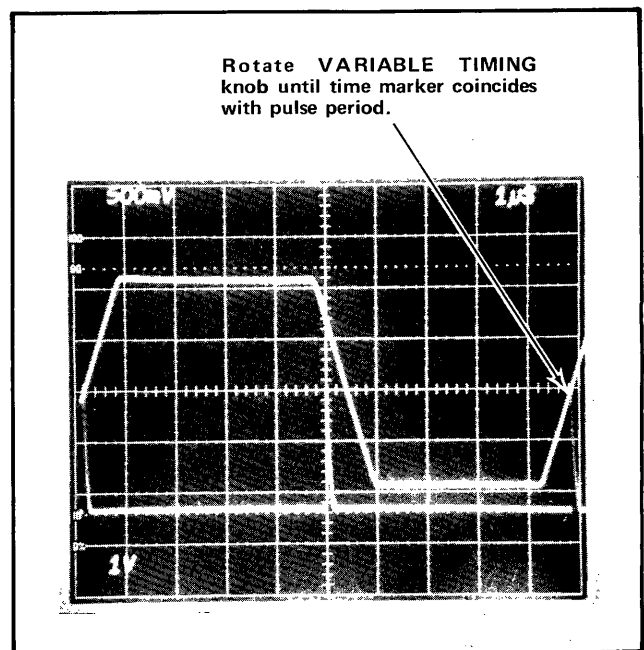


Fig. 1-7. Measuring Pulse Period.

REAR INTERFACE

Unused pins are available at the rear connector for routing signals to and from the TG 501 for specialized applications (see Rear Connector Pin Assignments in Section 2). One or more compartments of a multi-plug-in

Power Module can be wired with barriers installed to provide specific functions between compartments. See Power Module instruction manual for additional information.

A Power Module mainframe option (Option 2) is available which provides a rear-panel, multi-pin connector to which I/O lines can be hard-wired for external access.

Also possible are intra-compartment connections with other plug-in modules in multiple-compartment mainframes.

SPECIFICATIONS

The electrical specifications are valid only if (1) the instrument has been calibrated at an ambient temperature between +20°C and +30°C; (2) the instrument is operating at an ambient temperature between 0°C and +50°C, unless

otherwise noted; (3) plug-in must be operating (fully installed) in a calibrated system.

Any conditions that are unique to a particular specification are stated as part of that specification.

**TABLE 1-1
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirements		Supplemental Information
Markers	5 s through 1 ns in a 1,2,5 sequence		5 s through 10 ns are selected by a rotary switch. 5 ns, 2 ns and 1 ns are pushbutton selected modified sine waves
Marker Amplitude	≥1 V peak on 5 s through 10 ns markers. ≥750 mV peak-to-peak into 50 Ω on 5 ns and 2 ns markers. ≥200 mV peak-to-peak into 50 Ω on 1 ns markers.		
Trigger Output Signal	Slaved to marker output from 5 s through 100 ns. Remains at 100 ns for all faster markers ≥1 V peak into 50 Ω		
Internal Reference	Standard	Option 1	
Crystal Frequency	1 MHz	5 MHz	
Stability (20°C to 50°C) after 1/2 hour Warm-Up	Within 1 part in 10 ⁵	Within 5 parts in 10 ⁷	
Long-Term Drift	1 part or less in 10 ⁵ per month	1 part or less in 10 ⁷ per month	
Accuracy	Adjustable to within 1 part in 10 ⁷	Adjustable to within 5 parts in 10 ⁹	
External Reference Input (Available Only if U50 and jumpers are installed and U100 is removed)			IC and jumpers for 5 or 10 MHz, 1 MHz external reference requires jumpers only
Acceptable Frequencies	1 MHz, 5 MHz, or 10 MHz		Internally hard wired so output frequencies counted down to 1 MHz
Input Amplitude	Must be TTL compatible		
Error Readout Range	To ±7.5%		
Error Readout Resolution	To 0.1%		Least significant digit counted is 0.01% and is rounded off between 5 and 6 providing a more accurate error readout resolution (±0.07% of L.S.D.)

TABLE 1-2
ENVIRONMENTAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Temperature		
Operating	0°C to +50°C	
Storage	-40°C to +75°	
Altitude		
Operating	To 15,000 feet	
Storage	To 50,000 feet	
Vibration		
Operating and Non-Operating	With the instrument complete and operating, vibration frequency swept from 10 to 50 to 10 Hz at 1 minute per sweep. Vibrate 15 minutes in each of the three major axes at 0.015" total displacement. Hold 3 minutes at any major resonance, or if none, at 50 Hz. Total time, 54 minutes	
Shock		
Operating and Non-Operating	30 g's, 1/2 sine, 11 ms duration, 2 shocks in each direction along 3 major axes, for a total of 12 shocks	
Transportation	Qualified under National Safe Transit Committee Test Procedure 1A, Category II	

SERVICE INFORMATION

SYMBOLS AND REFERENCES DESIGNATORS

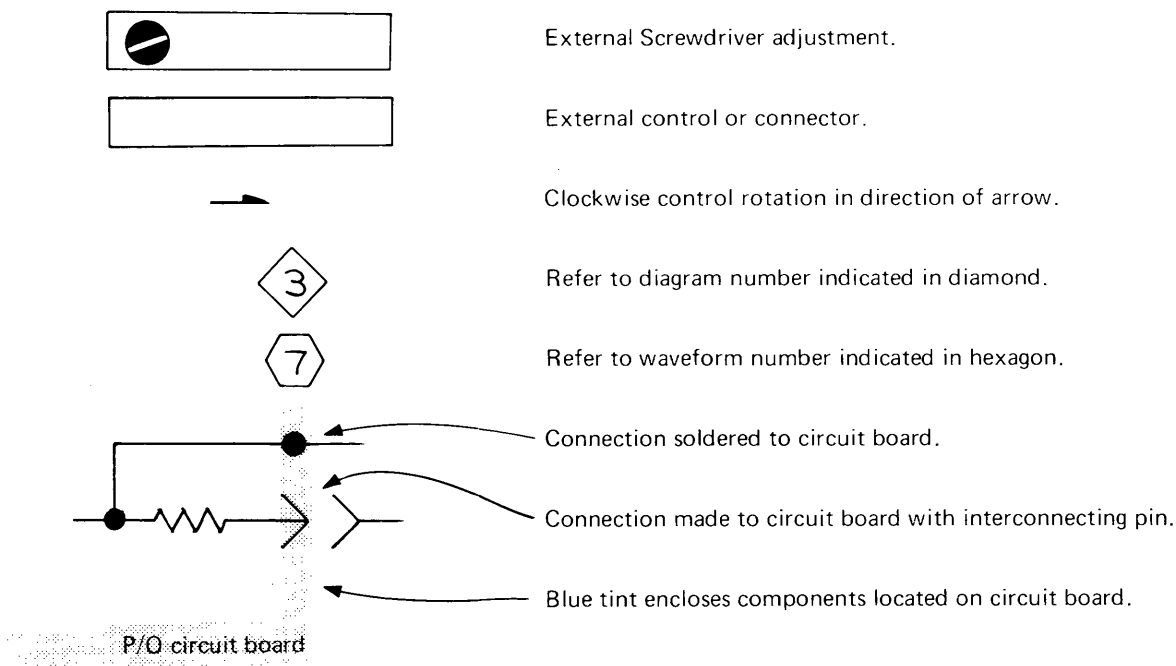
Electrical components shown on the diagrams are in the following units unless noted otherwise:

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

Symbols used on the diagrams are based on ANSI Y32.2 – 1970.

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



ELECTRICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

ITEM NAME

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

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	SEP	SEPARATELY
FXD	FIXED	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR. CODE	MANUFACTURER	ADDRESS	CITY, STATE, ZIP
00853	Sangamo Electric Co., S. Carolina Div.	P. O. Box 128	Pickens, SC 29671
01121	Allen-Bradley Co.	1201 2nd St.	Milwaukee, WI 53212
01295	Texas Instruments, Inc., Components Group	P. O. Box 5012	Dallas, TX 75222
04713	Motorola, Inc., Semiconductor Products Div.	5005 E. McDowell Rd.	Phoenix, AZ 85008
07263	Fairchild Semiconductor, A Div. of Fairchild Camera and Instrument Corp.	464 Ellis St.	Mountain View, CA 94040
07910	Teledyne Semiconductor	12515 Chadron Ave.	Hawthorne, CA 90250
08806	General Electric Co., Miniature Lamp Dept.	Nela PK.	Cleveland, OH 44112
12617	Hamlin, Inc.	Grove & Lake Sts.	Lake Mills, WI 53551
13571	Electronic Research Co.	10005 W. 75th	Overland Park, KS 66204
13715	Fairchild Semiconductor, A Div. of Fairchild Camera and Instrument Corp.	4300 Redwood HWY.	San Rafael, CA 94903
18324	Signetics Corp.	811 E. Arques	Sunnyvale, CA 94086
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
27014	National Semi-Conductor Corp.	2950 San Ysidro Way	Santa Clara, CA 95051
31718	Fairchild Microwave and Optoelectronics, a Div. of Fairchild Camera and Instrument Corp.	4001 Miranda Ave.	Palo Alto, CA 94304
50579	Litronix Inc.	19000 Homestead Rd.	Cupertino, CA 95014
56289	Sprague Electric Co.		North Adams, MA 01247
71400	Bussman Mfg., Division of McGraw Edison Co.	2536 W. University St.	St. Louis, MO 63107
71590	Centralab Electronics, Div. of Globe-Union, Inc.	5757 N. Green Bay Ave.	Milwaukee, WI 53201
72982	Erie Technological Products, Inc.	644 W. 12th St.	Erie, PA 16512
73138	Beckman Instruments, Inc., Helipot Div.	2500 Harbor Blvd.	Fullerton, CA 92634
74970	Johnson, E. F., Co.	299 10th Ave. S. W.	Waseca, MN 56093
75042	TRW Electronic Components, IRC Philadelphia Div.	401 N. Broad St.	Philadelphia, PA 19108
78526	Stanwyck Winding Div., San Fernando Electric Mfg. Co., Inc.	139 Walsh Ave.	Newburgh, NY 12550
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97005
86684	RCA Corp., Electronic Components	415 S. 5th St.	Harrison, NJ 07029
90201	Mallory Capacitor Co.	3029 E. Washington St.	Indianapolis, IN 46206

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscnt	Name & Description	Mfr Code	Mfr Part Number
A1 ¹	670-2737-00		CKT BOARD ASSY:--TIME MARK GEN	80009	670-2737-00
A1 ²	670-2737-01		CKT BOARD ASSY:--TIME MARK GEN	80009	670-2737-01
A2	670-2878-00		CKT BOARD ASSY:--TIMING READOUT LOGIC	80009	670-2878-00
A3	670-2992-00		CKT BOARD ASSY:--MULTIPLIER	80009	670-2992-00
C50	283-0111-00		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C100 ¹	281-0628-00		CAP.,FXD,CER DI:15PF,5%,600V	72982	301-000C0G150J
C102 ¹	281-0166-00		CAP.,VAR,AIR DI:1.9-15.7PF,250V	74970	187-0109-055
C105 ¹	281-0504-00		CAP.,FXD,CER DI:10PF,+/-1PF,500V	72982	301-000C0G0100F
C125	283-0111-00		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C127	283-0627-00		CAP.,FXD,MICA D:0.0033UF,5%,500V	00853	D19E332T0500
C137	290-0536-00		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C138	290-0536-00		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C160	283-0111-00		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C231	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C239	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C246	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C250	290-0529-00		CAP.,FXD,ELCTLT:4.7UF,20%,20V	56289	196D476X0020LA3
C251	290-0529-00		CAP.,FXD,ELCTLT:4.7UF,20%,20V	56289	196D476X0020LA3
C268	283-0000-00		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C271	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C272	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C285	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C290	281-0628-00		CAP.,FXD,CER DI:15PF,5%,600V	72982	301-000C0G150J
C292	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C297	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C298	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C330	283-0000-00		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C331	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C352	281-0511-00		CAP.,FXD,CER DI:22PF,+2.2PF,500V	72982	301-000C0G0220K
C355	281-0523-00		CAP.,FXD,CER DI:100PF,+/-20PF,350V	72982	301-000U2M0101M
C358	281-0536-00		CAP.,FXD,CER DI:1000PF,+/-100PF,500V	72982	301-055X5P102K
C360	281-0536-00		CAP.,FXD,CER DI:1000PF,+/-100PF,500V	72982	301-055X5P102K
C362	285-0674-00		CAP.,FXD,PLSTC:0.01UF,100V	56289	410P10391
C366	290-0572-00		CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C368	290-0534-00		CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C370	290-0536-00		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C372	290-0531-00		CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010CL
C390	281-0511-00		CAP.,FXD,CER DI:22PF,+2.2PF,500V	72982	301-000C0G0220K
C400	281-0511-00		CAP.,FXD,CER DI:22PF,+2.2PF,500V	72982	301-000C0G0220K
C404	283-0000-00		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C405	290-0533-00		CAP.,FXD,ELCTLT:330UF,20%,6V	56289	196D337X0006MA
C413	283-0000-00		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C415	290-0533-00		CAP.,FXD,ELCTLT:330UF,20%,6V	56289	196D337X0006MA
C430	290-0531-00		CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010CL
C432	290-0532-00		CAP.,FXD,ELCTLT:150UF,20%,6V	56289	196D157X0006LA
C439	281-0523-00		CAP.,FXD,CER DI:100PF,+/-20PF,350V	72982	301-000U2M0101M
C440	281-0511-00		CAP.,FXD,CER DI:22PF,+2.2PF,500V	72982	301-000C0G0220K
C450	281-0153-00		CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C452	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C454	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C455	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C457	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C458	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C462	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C465	281-0153-00		CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C467	281-0153-00		CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C481	283-0177-00		CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039E105Z
C489	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C490	283-0156-00		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z

¹ Standard only.
² Option 1 only.

Electrical Parts List—TG 501

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
	Part No.	Eff	Dscont			
C492	283-0156-00			CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C494	283-0156-00			CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C495	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	56289	196D107X0020MA3
C496	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010CL
C498	281-0153-00			CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C499	281-0578-00			CAP.,FXD,CER DI:18PF,5%,500V	72982	301-000C0G0180J
C500	281-0578-00			CAP.,FXD,CER DI:18PF,5%,500V	72982	301-000C0G0180J
C504	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C505	281-0153-00			CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C510	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C511	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C512	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C513	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C515	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C517	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C518	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C519	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C520	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-055
C550	283-0156-00			CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C610	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C615	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	56289	196D107X0020MA3
C616	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C624	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C626	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C640	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010CL
C641	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C660	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C662	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C664	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C666	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C668	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C670	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C672	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C674	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C676	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C678	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C680	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C682	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C684	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C686	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C688	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C690	283-0156-00			CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C692	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
CR50	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR52	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR54	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR115	152-0322-00			SEMICOND DEVICE:SILICON,15V	01295	A1108
CR167	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR168	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR350	152-0322-00			SEMICOND DEVICE:SILICON,15V	01295	A1108
CR358	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR359	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR360	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR361	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR363	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR364	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR366	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR367	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR369	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
CR370	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR372	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR373	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR375	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR376	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR415	152-0322-00			SEMICON D DEVICE:SILICON,15V	01295	A1108
CR445	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR450	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR470	152-0153-00			SEMICON D DEVICE:SILICON,15V,50MA	13715	FD7003
CR482	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR500	152-0503-00			SEMICON D DEVICE:SILICON,SNAP-OFF	80009	152-0503-00
CR515	152-0536-00			SEMICON D DEVICE:SILICON,HOT CARRIER,4V,280MW	04713	MBD101
CR600	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
CR626	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	CD8220
DS170	150-1001-01			LAMP,LED:GAASP,RED,DIFF LENS,2V,100MA	50579	RL-2
DS172	150-1001-01			LAMP,LED:GAASP,RED,DIFF LENS,2V,100MA	50579	RL-2
DS550	150-1011-00			NUM DISPLAY:GAASP,RED,7 SEG	31718	FND70
DS570	150-1011-00			NUM DISPLAY:GAASP,RED,7 SEG	31718	FND70
DS630	150-0048-00			LAMP,INCANDESCENCE:5V,60MA	08806	683
F620	159-0021-00			FUSE,CARTRIDGE:3AG,2A,250V,FAST BLOW	71400	AGC2
J290	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J420	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J435	131-1315-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR235-1
J450	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J465	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J468	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J470	131-1315-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR235-1
J520	131-1315-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR235-1
K450	108-0357-00			COIL,FXD:REED DRIVE,6V SINGLE	80009	108-0357-00
L137	108-0317-00			COIL,FXD:15UH	78526	71501M
L297	108-0317-00			COIL,FXD:15UH	78526	71501M
L458	108-0371-00			COIL,FXD:0.23UH	80009	108-0371-00
L460	108-0371-00			COIL,FXD:0.23UH	80009	108-0371-00
L462						
L490	108-0347-00			COIL,FXD:0.12UH	80009	108-0347-00
L492	108-0371-00			COIL,FXD:0.23UH	80009	108-0371-00
L494	108-0371-00			COIL,FXD:0.23UH	80009	108-0371-00
L500 ¹						
L502 ¹						
L510 ¹						
L511 ¹						
L512 ¹						
L513 ¹						
L517 ¹						
L518 ¹						
L519 ¹						
L520 ¹						
Q120	151-0220-00			TRANSISTOR:SILICON,PNP	07263	2N4122
Q130	151-0220-00			TRANSISTOR:SILICON,PNP	07263	2N4122
Q135	151-0220-00			TRANSISTOR:SILICON,PNP	07263	2N4122
Q140	151-0220-00			TRANSISTOR:SILICON,PNP	07263	2N4122
Q255	151-0221-00			TRANSISTOR:SILICON,PNP	07263	S024849
Q260	151-0424-00			TRANSISTOR:SILICON,NPN	07263	2N5769
Q265	151-0221-00			TRANSISTOR:SILICON,PNP	07263	S024849
Q270	151-0424-00			TRANSISTOR:SILICON,NPN	07263	2N5769
Q272	151-0221-00			TRANSISTOR:SILICON,PNP	07263	S024849
Q280	151-0221-00			TRANSISTOR:SILICON,PNP	07263	S024849

¹Part of Circuit Board.

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
Q285	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q290	151-0424-00		TRANSISTOR:SILICON,NPN	07263	2N5769
Q330	151-0410-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q380	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q384	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q390	151-0271-00		TRANSISTOR:SILICON,PNP	01295	SRA4504
Q400	151-0271-00		TRANSISTOR:SILICON,PNP	01295	SRA4504
Q405	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q408	151-0424-00		TRANSISTOR:SILICON,NPN	07263	2N5769
Q415	151-0271-00		TRANSISTOR:SILICON,PNP	01295	SRA4504
Q430	151-0424-00		TRANSISTOR:SILICON,NPN	07263	2N5769
Q435	151-0424-00		TRANSISTOR:SILICON,NPN	07263	2N5769
Q440	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q484	151-0221-00		TRANSISTOR:SILICON,PNP	07263	S024849
Q486	151-0367-00		TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q600	151-0190-00		TRANSISTOR:SILICON,NPN	04713	2N3904
Q605	151-0190-00		TRANSISTOR:SILICON,NPN	04713	2N3904
Q610	151-0301-00		TRANSISTOR:SILICON,PNP	04713	2N2907A
Q620	151-0220-00		TRANSISTOR:SILICON,PNP	07263	2N4122
Q635	151-0302-00		TRANSISTOR:SILICON,NPN	04713	2N2222A
Q640	151-0515-01		THYRISTOR:50V,8A	04713	2N4441
R50	315-0101-00		RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R52	315-0510-00		RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R100 ¹	315-0222-00		RES.,FXD,COMP:2.2K OHM,5%,0.25W	01121	CB2225
R105 ¹	315-0222-00		RES.,FXD,COMP:2.2K OHM,5%,0.25W	01121	CB2225
R108 ¹	315-0301-00		RES.,FXD,COMP:300 OHM,5%,0.25W	01121	CB3015
R120	315-0431-00		RES.,FXD,COMP:430 OHM,5%,0.25W	01121	CB4315
R121	315-0242-00		RES.,FXD,COMP:2.4 OHM,5%,0.25W	01121	CB2425
R123	315-0102-00		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R125	315-0510-00		RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R127	315-0681-00		RES.,FXD,COMP:680 OHM,5%,0.25W	01121	CB6815
R128	315-0511-00		RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R130	315-0751-00		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R135	311-1570-00		RES.,VAR,NONWIR:200 OHM,20%,0.5W	01121	11M617
R136	315-0160-00		RES.,FXD,COMP:16 OHM,5%,0.25W	01121	CB1605
R137	315-0430-00		RES.,FXD,COMP:43 OHM,5%,0.25W	01121	CB4305
R140	315-0241-00		RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R142	315-0121-00		RES.,FXD,COMP:120 OHM,5%,0.25W	01121	CB1215
R143	315-0300-00		RES.,FXD,COMP:30 OHM,5%,0.25W	01121	CB3005
R145	311-1568-00		RES.,FXD,NONWIR:50 OHM,20%,0.5W	73138	91A-50ROOM
R150	315-0561-00		RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R151	315-0273-00		RES.,FXD,COMP:27K OHM,5%,0.25W	01121	CB2735
R153	315-0273-00		RES.,FXD,COMP:27K OHM,5%,0.25W	01121	CB2735
R154	315-0561-00		RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R158	315-0102-00		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R159	315-0102-00		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R162	315-0681-00		RES.,FXD,COMP:680 OHM,5%,0.25W	01121	CB6815
R163	315-0201-00		RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R165	315-0391-00		RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R167	315-0161-00		RES.,FXD,COMP:160 OHM,5%,0.25W	01121	CB1615
R172	315-0510-00		RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R230	315-0561-00		RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R231	315-0103-00		RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R234	315-0103-00		RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R236	315-0561-00		RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R238	315-0103-00		RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R239	315-0103-00		RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R245	315-0153-00		RES.,FXD,COMP:15K OHM,5%,0.25W	01121	CB1535
R246	315-0103-00		RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035

¹Standard only.

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
R248	315-0274-00			RES.,FXD,COMP:270K OHM,5%,0.25W	01121	CB2745
R250	315-0242-00			RES.,FXD,COMP:2.4 OHM,5%,0.25W	01121	CB2425
R252	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R253	315-0272-00			RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725
R255	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R256	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R262	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R263	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R265	315-0222-00			RES.,FXD,COMP:2.2K OHM,5%,0.25W	01121	CB2225
R266	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R271	315-0270-00			RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R272	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R280	315-0331-00			RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R282	315-0751-00			RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R283	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R285	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R286	315-0910-00			RES.,FXD,COMP:91 OHM,5%,0.25W	01121	CB9105
R290	317-0271-00			RES.,FXD,COMP:270 OHM,5%,0.125W	01121	BB2715
R292	315-0100-00			RES.,FXD,COMP:10 OHM,5%,0.25W	01121	CB1005
R294	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R295	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R300	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R302	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R304	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R305	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R310	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R312	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R314	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R316	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R318	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R320	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R322	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R324	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R325	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R330	315-0150-00			RES.,FXD,COMP:15 OHM,5%,0.25W	01121	CB1505
R331	315-0131-00			RES.,FXD,COMP:130 OHM,5%,0.25W	01121	CB1315
R333	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R335	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R350	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R352	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R355	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R358	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R360	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R362	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R366	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R368	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R370	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R372	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R380	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R381	315-0122-00			RES.,FXD,COMP:1.2K OHM,5%,0.25W	01121	CB1225
R383	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R384	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R385	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R387	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R390	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R391	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R393	315-0182-00			RES.,FXD,COMP:1.8 OHM,5%,0.25W	01121	CB1825
R394	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R396	315-0270-00			RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R398	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715

Electrical Parts List—TG 501

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
	Part No.	Eff	Dscont			
R400	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R405	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R406	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R408	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R410	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R412	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R413	315-0242-00			RES.,FXD,COMP:2.4 OHM,5%,0.25W	01121	CB2425
R415	315-0390-00			RES.,FXD,COMP:39 OHM,5%,0.25W	01121	CB3905
R417	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R420	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R430	315-0270-00			RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R432	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R435	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R437	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R439	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R440	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R445	311-1565-00			RES.,VAR,NONWIR:250 OHM,20%,0.5W	73138	91A-250R0M
R447	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R450	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R451	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R452	315-0181-00			RES.,FXD,COMP:180 OHM,5%,0.25W	01121	CB1815
R478	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R480	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R481	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R482	315-0431-00			RES.,FXD,COMP:430 OHM,5%,0.25W	01121	CB4315
R484	315-0392-00			RES.,FXD,COMP:3.9K OHM,5%,0.25W	01121	CB3925
R486	315-0820-00			RES.,FXD,COMP:82 OHM,5%,0.25W	01121	CB8205
R488	315-0200-00			RES.,FXD,COMP:20 OHM,5%,0.25W	01121	CB2005
R489	315-0241-00			RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R500	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R553	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R554	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R555	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R556	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R557	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R558	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R559	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R570	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R573	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R574	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R575	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R576	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R577	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R578	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R579	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R600	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R601	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R603	315-0682-00			RES.,FXD,COMP:6.8K OHM,5%,0.25W	01121	CB6825
R605	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	75042	CEAT0-2431F
R607	315-0821-00			RES.,FXD,COMP:820 OHM,5%,0.25W	01121	CB8215
R610	302-0560-00			RES.,FXD,COMP:56 OHM,10%,0.50W	01121	EB5601
R612	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R614	308-0703-00			RES.,FXD,WW:1.8 OHM,5%,2W	75042	BWH1R80J
R616	321-0237-00			RES.,FXD,FILM:2.87K OHM,1%,0.125W	75042	CEAT0-2871F
R620	315-0270-00			RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R621	308-0702-00			RES.,FXD,WW:0.33 OHM,5%,2W	75042	BWH-R3300J
R623	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	75042	CEAT0-1002F
R624	321-0262-00			RES.,FXD,FILM:5.23K OHM,1%,0.125W	75042	CEAT0-5231F
R626	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R628	315-0272-00			RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R629	315-0100-00			RES.,FXD,COMP:10 OHM,5%,0.25W	01121	CB1005
R634	302-0121-00			RES.,FXD,COMP:120 OHM,10%,0.50W	01121	EB1211
R635	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R640	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
S1	260-0817-00			SWITCH,MAG REED:SPDT	12617	1152235160
S350	263-1008-00			ACTR ASSY,CAM S-MARKER (SEC)	80009	263-1008-00
S450A, B,C	260-1571-00			SWITCH,PUSH:5NS/2NS/1NS	71590	2KBC030000-XXX
T450	120-0870-00			XMFR,TOROID:2 WINDINGS	80009	120-0870-00
U50 ¹	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U100 ²	156-0113-00			INTEGRATED CKT:QUAD 2-INPUT POS NAND GATE	01295	SN74L00N
U110	156-0043-00			INTEGRATED CKT:2-INPUT NOR GATE	01295	SN7402N
U115	156-0030-00			INTEGRATED CKT:QUAD 2-INPUT NAND GATE	01295	SN7400N
U150	156-0039-00			INTEGRATED CKT:DUAL 15 MHZ J-K M/S FF	04713	MC7473P
U160	156-0067-00			INTEGRATED CKT:OPERATIONAL AMPLIFIER	07263	UA741
U180	156-0129-00			INTEGRATED CKT:QUAD 2-INPUT AND GATE	01295	SN7408N
U185	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U190	156-0043-00			INTEGRATED CKT:2-INPUT NOR GATE	01295	SN7402N
U195	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U200	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U210	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U212	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U215	156-0041-00			INTEGRATED CKT:DUAL D FLIP-FLOP	27014	DM7474N
U218	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U220	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U225	156-0038-00			INTEGRATED CKT:J-K MASTER SLAVE FLIP-FLOP	01295	SN7472N
U230	156-0039-00			INTEGRATED CKT:DUAL 15 MHZ J-K M/S FF	04713	MC7473P
U235	156-0030-00			INTEGRATED CKT:QUAD 2-INPUT NAND GATE	01295	SN7400N
U250	156-0067-00			INTEGRATED CKT:OPERATIONAL AMPLIFIER	07263	UA741
U290	156-0205-00			INTEGRATED CKT:QUAD 2-INPUT POS NOR GATE	04713	MC10102L
U300	156-0205-00			INTEGRATED CKT:QUAD 2-INPUT POS NOR GATE	04713	MC10102L
U310	156-0230-00			INTEGRATED CKT:DUAL D M/S FLIP-FLOP	04713	MC10131L
U315	156-0230-00			INTEGRATED CKT:DUAL D M/S FLIP-FLOP	04713	MC10131L
U320	156-0100-00			INTEGRATED CKT:J-K FLIP-FLOP	01295	SN74H102N
U325	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U330	156-0043-00			INTEGRATED CKT:2-INPUT NOR GATE	01295	SN7402N
U335	156-0178-00			INTEGRATED CKT:TRIPLE 3-INPUT NOR GATE	01295	SN7427N
U350	156-0030-00			INTEGRATED CKT:QUAD 2-INPUT NAND GATE	01295	SN7400N
U355	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U360	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U362	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U364	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U366	156-0043-00			INTEGRATED CKT:2-INPUT NOR GATE	01295	SN7402N
U368	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U370	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U372	156-0079-00			INTEGRATED CKT:DECADE COUNTER,TTL	01295	SN7490AN
U450	156-0252-00			INTEGRATED CKT:TRIPLE 4-3-3 INPUT NOR GATE	04713	MC10106L
U455	156-0033-00			INTEGRATED CKT:RF/IF AMPLIFIER	86684	CA3028A
U550	156-0379-00			INTEGRATED CKT:BCD TO 7 SEGMENT DCDR/DRVR	18324	N8T06B
U570	156-0379-00			INTEGRATED CKT:BCD TO 7 SEGMENT DCDR/DRVR	18324	N8T06B
U625	156-0067-00			INTEGRATED CKT:OPERATIONAL AMPLIFIER	07263	UA741
VR140	152-0280-00			SEMICONV DEVICE:ZENER,0.4W,6.2V,5%	04713	1N753A
VR250	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR255	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR282	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR600	152-0278-00			SEMICONV DEVICE:ZENER,0.4W,3V,5%	07910	1N4372A
VR605	152-0280-00			SEMICONV DEVICE:ZENER,0.4W,5.2V,5%	04713	1N753A
VR640	152-0280-00			SEMICONV DEVICE:ZENER,0.4W,5.2V,5%	04713	1N753A
Y50 ¹	119-0262-00			OSCILLATOR,RF:XTAL CONTROLLER,5MHZ ADJ	80009	119-0262-00
Y100 ²	158-0079-00			XTAL UNIT,QTZ:1MHZ,+/-0.001%	13571	ER-1241

¹Option 1 only.
²Standard only.

MECHANICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

1	2	3	4	5	<i>Name & Description</i>
					<i>Assembly and/or Component</i>
					<i>Attaching parts for Assembly and/or Component</i>
					--- * ---
					<i>Detail Part of Assembly and/or Component</i>
					<i>Attaching parts for Detail Part</i>
					--- * ---
					<i>Parts of Detail Part</i>
					<i>Attaching parts for Parts of Detail Part</i>
					--- * ---

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

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
0000C	Gettig Engineering and Manufacturing Co.		Springmill, PA 16875
08261	Spectra-Strip Corp.	7100 Lampson Ave.	Garden Grove, CA 92642
22526	Berg Electronics, Inc.	Youk Expressway	New Cumberland, PA 17070
23499	Gavitt Wire and Cable, Division of Amerace Esna Corp.	455 N. Quince St.	Escondido, CA 92025
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
45722	USM Corp., Parker-Kalon Fastener Div.	1 PeeRay Drive	Clifton, NJ 07014
70276	Allen Mfg. Co.	Box 570	Hartford, CT 06101
71590	Centralab Electronics, Div. of Globe-Union, Inc.	5757 N. Green Bay Ave.	Milwaukee, WI 53201
71785	TRW Electronic Components, Cinch Div.	1501 Morse Ave.	Elk Grove Village, IL 60007
73743	Fischer Special Mfg. Co.	446 Morgan St.	Cincinnati, OH 45206
74445	Holo-Krome Co.	31 Brook St. West	Hartford, CT 06110
78189	Illinois Tool Works, Inc. Shakeproof Division	St. Charles Road	Elgin, IL 60126
79807	Wrought Washer Mfg. Co.	2100 S. O Bay St.	Milwaukee, WI 53207
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97005
82647	Texas Instruments, Inc., Control Products Div.	34 Forest St.	Attleboro, MA 02703
83385	Central Screw Co.	2530 Crescent Dr.	Broadview, IL 60153
83501	Gavitt Wire and Cable, Division of Amerace Esna Corp.	Central St.	Brookfield, MA 01506
97464	Industrial Retaining Ring Co.	57 Cordier St.	Irvington, NJ 07111

FIGURE 1 EXPLODED

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number	
1-1	337-1399-00			2						SHIELD, ELECTRICAL:SIDE	80009	337-1399-00	
-2	366-1166-00			1						KNOB:RED, W/SETSCREW	80009	366-1166-00	
	213-0153-00			1						SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD	
-3	366-1509-00			1						KNOB:GRAY, W/SETSCREW	80009	366-1509-00	
	213-0153-00			2						SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD	
-4	358-0029-00			1						BUSH,MACH,THD:0.50 INCH LONG,BRS (ATTACHING PARTS)	80009	358-0029-00	
-5	210-0590-00			1						NUT,PLAIN,HEX:0.375-32 X 0.438 INCH,STL	73743	2X28269-402	
-6	210-0012-00			1						WASHER,LOCK:INTL,0.375 ID X 0.50" OD,STL - - - * - - -	78189	1220-02-00-0541	
-7	366-1489-33			1						PUSH BUTTON:--5NS	80009	366-1489-33	
-8	366-1489-34			1						PUSH BUTTON:--2NS	80009	366-1489-34	
-9	366-1489-35			1						PUSH BUTTON:--1NS	80009	366-1489-35	
-10	426-0681-00			3						FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00	
-11	214-1840-00			1						PIN,SECURING:KNOB	80009	214-1840-00	
-12	366-1422-01			1						KNOB:LATCH 80009 366-1422-01			
-13	131-1315-00			3						CONN,RCPT,ELEC:FEMALE BNC,WITH HARDWARE	24931	28JR235-1	
-14	333-1778-00			1						PANEL,FRONT: (ATTACHING PARTS)	80009	333-1778-00	
-15	213-0055-00			2						SCR,TAP.,THD FO:2-32 X 0.188 INCH,PNH STL - - - * - - -	83385	OBD	
-16	378-0742-00			1						LENS IND LIGHT:CLEAR	80009	378-0742-00	
-17	214-1513-01			1						LATCH,RETAINING:PLUG IN (ATTACHING PARTS)	80009	214-1513-01	
-18	213-0254-00			1						SCR,TPG,THD CUT:2-56 X 0.25"100 DEG,FLH STL - - - * - - -	45722	OBD	
-19	386-2673-00			1						SUBPANEL,FRONT:PLASTIC (ATTACHING PARTS)	80009	386-2673-00	
-20	213-0229-00			4						SCR,TPG,THD FOR:6-20 X 0.375 INCH,FLH STL - - - * - - -	83385	OBD	
-21	-----			1						CKT BOARD ASSY:--TIMING READOUT (SEE A2 EPL) (ATTACHING PARTS)			
-22	213-0138-00			4						SCR,TAP.,THD FO:4-40 X 0.188 INCH,PNH STL - - - * - - -	83385	OBD	
-23	131-0608-00			6						CKT BOARD ASSY INCLUDES: TERMINAL,PIN:0.365 INCH LONG	22526	47357	
-24	136-0252-04			40						SOCKET,PIN CONN:0.188 INCH LONG	22526	75060-001	
-25	337-1873-00			1						SHLD,ELECTRICAL:FRONT SUBPANEL	80009	337-1873-00	
-26	337-1915-00			1						SHLD,ELECTRICAL:COVER	80009	337-1915-00	
-27	-----			1						CKT BOARD ASSY:--MULTIPLIER (SEE A3 EPL) (ATTACHING PARTS)			
-28	211-0014-00			2						SCREW,MACHINE:4-40 X 0.50 INCH PNH STL	83385	OBD	
-29	211-0116-00			4						SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS - - - * - - -	83385	OBD	
-30	136-0252-04			39						CKT BOARD ASSY INCLUDES: SOCKET,PIN CONN:0.188 INCH LONG	22526	75060-001	
-31	131-1003-00			3						CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00	
-32	260-1571-00			1						SWITCH,PUSH:3 SECTION	71590	2KBC030000-XXX	
-33	361-0383-00			4						SPACER,SLEEVE:CHARCOAL,0.330 INCH LONG	80009	361-0383-00	
-34	337-1436-00			1						SHLD,ELECTRICAL:REED SWITCH	80009	337-1436-00	
-35	337-1894-00			2						SHLD,ELECTRICAL:3.9 X 0.60"HIGH,STRAIGHT	80009	337-1894-00	
-36	337-1892-00			1						SHLD,ELECTRICAL:2.48 X 1.26 X 0.6"U SHAPE	80009	337-1892-00	
-37	337-1891-00			1						SHLD,ELECTRICAL:2.96 X 2.53 X 0.6"U SHAPE	80009	337-1891-00	
-38	337-1895-00			2						SHLD,ELECTRICAL:4.2 X 0.24"HIGH,STRAIGHT	80009	337-1895-00	
-39	337-1893-00			1						SHLD,ELECTRICAL:2.48 X 1.26 X 0.24"U SHAPE	80009	337-1893-00	
-40	337-1890-00			1						SHLD,ELECTRICAL:2.50 X 2.96 X 0.24"U SHAPE	80009	337-1890-00	
-41	337-1875-00			1						SHLD,ELECTRICAL:CIRCUIT BOARD (ATTACHING PARTS)	80009	337-1875-00	
-42	211-0008-00			2						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD	
	672-0068-00			1						CKT BOARD ASSY:--SWITCH,TIMING	80009	672-0068-00	
	672-0068-01 ¹			1						CKT BOARD ASSY:--SWITCH TIMING (ATTACHING PARTS)	80009	672-0068-01	
-43	211-0008-00			2						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD	
-44	129-0123-00			2						POST,METALLIC:0.688 INCH LONG	80009	129-0123-00	
-45	213-0146-00			2						SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL - - - * - - -	83385	OBD	
-46	384-1219-00			1						CKT BOARD ASSY INCLUDES: EXTENSION,SHAFT:8.2 INCHES LONG	80009	384-1219-00	
-47	214-1190-00			1						EXTENDER-RETRAC:SWITCH,ACTUATOR EXTENDER-RETRACTOR INCLUDES:	80009	214-1190-00	
	213-0075-00			1						SETSCREW:4-40 X 0.094 INCH,HEX SOC,STL	70276	OBD	
	213-0239-00			1						SETSCREW:3-48 X 0.062 INCH,HEX SOC,STL	70276	OBD	

¹Option 1 only

Mechanical Parts List—TG 501

FIGURE 1 EXPLODED (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-48	214-1136-00		1		ACTUATOR,SLIDE:SWITCH	80009	214-1136-00
-49	-----		1		RESISTOR VAR:(SEE R135 EPL) (ATTACHING PARTS)		
-50	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402
-51	210-0046-00		1		WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL	78189	1214-05-00-0541C
-52	210-0940-00		1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
-53	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402
-54	407-1393-00		1		BRACKET,CMPNT:RESISTOR - - - * - - -	80009	407-1393-00
-	263-1008-0C		1		ACTR ASSY CAM S:TIMING (ATTACHING PARTS)	80009	263-1008-00
-55	211-0116-00		4		SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS - - - * - - -	83385	OBD
-	-----		-		ACTUATOR ASSY INCLUDES:		
-56	200-1571-00		1		COVER,CAM SW:	80009	200-1571-00
-57	354-0391-00		1		RING,RETAINING:0.395"FREE IDX 0.025"STL	97464	3100-43-CD
-58	214-1139-03		1		SPRING,FLAT:RED COLORED	80009	214-1139-03
-59	214-1139-00		1		SPRING,FLAT:GOLD COLORED	80009	214-1139-00
-60	214-1127-00		2		ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
-61	210-0406-00		6		NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-62	131-0963-00		2		CONTACT,ELEC:GROUNDING	80009	131-0963-00
-63	401-0082-01		1		BEARING,CAM SW:FRONT	80009	401-0082-01
-64	105-0424-00		1		DRUM,CAM SW:	80009	105-0424-00
-65	401-0146-00		1		BEARING,CAM SW:REAR	80009	401-0146-00
-66	-----		1		CKT BOARD ASSY:-- TIME MARK GEN(SEE A1 EPL) - - - * - - -		
-	-----		-		CKT BOARD ASSY INCLUDES:		
-67	131-1003-00		3		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-68	136-0514-00		3		SOCKET,IC:8 PIN	82647	C930802
-69	136-0269-00 ¹		27		SKT,SEMICONDE:14 PIN DUAL INLINE	71785	133-59-02-073
	136-0269-00 ¹		26		SKT,SEMICONDE:14 PIN DUAL INLINE	71785	133-59-02-073
-70	136-0252-04		109		SOCKET,PIN CONN:0.188 INCH LONG	22526	75060-001
-71	131-0608-00		6		TERMINAL,PIN:0.365 INCH LONG	22526	47357
-72	131-0604-00		16		CONTACT,ELEC:0.025 SQ X 0.365 INCH LONG	80009	131-0604-00
-73	344-0154-00		2		CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSES	80009	344-0154-00
-74	131-0566-00		1		LINK,TERM.CONN:0.086 DIA X 2.375 INCH L	0000C	L-2007-1
-75	351-0180-00		1		SLIDE,GUIDE:SWITCH ACTUATOR	80009	351-0180-00
-76	426-0724-04		1		FR SECT,BOTTOM:	80009	426-0724-04
-77	214-1061-00		1		SPRING,GROUND:FLAT	80009	214-1061-00
-78	426-0725-05		1		FRAME,SECT,TOP:	80009	426-0725-05
-79	131-0707-00		20		CONNECTOR TERM.:0.48"L,22-26 AWG WIRE	22526	47439
-80	175-0827-00		FT		WIRE,ELECTRICAL:4 WIRE RIBBON	08261	TEK-175-0827-00
-81	175-0829-00		FT		WIRE,ELECTRICAL:6 WIRE RIBBON	83501	TEK-175-0829-00
-82	175-0833-00		FT		WIRE,ELECTRICAL:10 WIRE RIBBON	23499	TEK-175-0833-00
-83	210-0774-00		4		EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
-84	210-0775-00		4		EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-85	352-0162-01		1		HOLDER,TERM.CON:4 WIRE,BROWN	80009	352-0162-01
-86	352-0164-02		1		HOLDER,TERM.CON:6 WIRE,PED	80009	352-0164-02
-87	352-0168-0C		1		HOLDER,TERM.CON:10 WIRE BLACK	80009	352-0168-00

¹Option 1 only.

REAR CONNECTOR PIN ASSIGNMENTS

TABLE 2-1

	B		A	
Trigger Out Common	28		28	Will drive 10 TTL loads
Trigger Out	27		27	
	26	Signal source barrier slot	26	
External Clock Input Common	25		25	
External Clock Input	24		24	
Not Used	23		23	
Not Used	22		22	
Not Used	21		21	
Not Used	20	Reserved }	20	Not Used
Not Used	19		19	Not Used
Not Used	18		18	Not Used
Not Used	17		17	Not Used
Not Used	16		16	Not Used
Not Used	15		15	Not Used
Not Used	14		14	Not Used
25 VAC Winding	13		13	25 VAC Winding
*+33.5 V Filtered DC	12		12	*+33.5 V Filtered DC
*Collector of Series Pass Transistor	11		11	*Base of Series Pass Transistor
Transformer Shield	10	10	*Emitter of Series Pass Transistor	
*33.5 V Common	9		*33.5 V Common	
-33.5 V Filtered DC	8	TM 500 barrier slot	-33.5 V Filtered DC	
*Collector of Series Pass Transistor	7		*Emitter of Series Pass Transistor	
Not Used	6		*Base of Series Transistor	
17.5 VAC Winding	5		17.5 VAC Winding	
+11.5 V Common	4		+11.5 V Common	
*+11.5 V Common	3		*+11.5 V Common	
*+11.5 V Filtered DC	2		*+11.5 V Filtered DC	
25 VAC Winding	1		25 VAC Winding	
	B		A	

Rear-view of plug-in

Assignments listed for pins 1A–13A and 1B–13B are available in all power modules; however only those pins marked with an asterisk (*) are used by the TG 501.

ADJUSTMENTS

Equipment Required

1. Correctly functioning TM 500-Series Power Module.
2. Plug-In Extension. Tektronix Calibration Fixture 067-0645-01.
3. Sampling Test Oscilloscope. Must have an equivalent bandpass of at least 1 GHz and a deflection factor of 0.2 V/div. For example a 5403/D40 Oscilloscope with a 5S14N Dual Trace Delayed Sweep Sampler.

Preliminary Procedure

NOTE

The performance of this instrument can be checked at any temperature within the 0°C to +50°C range. Make any adjustment at a temperature of +25°C ±5°C.

- a. Check that the correct nominal line-selector block (110 VAC or 220 VAC) has been installed on the line selector pins and that the regulating range selected includes the input line voltage, see Installation section of Power Module manual.

- b. Remove the TG 501 side covers and connect the Time Mark Generator to the Power Module using the plug-in extension.

- c. Connect the Power Module to the line voltage source and apply power to the TG 501.

- d. Set the following controls:

MARKER	521N
5 ns (pushbutton)	Pushed in

5. Adjust 1 ns/2 ns Output Amplitude C515

With the coaxial cable from the sampling test oscilloscope connected to MARKER OUT and the 2 ns pushbutton depressed as stated in steps 2, 3, and 4, adjust C515 so that amplitude of 2 ns markers is at least 1 V. Disconnect cable from MARKER OUT and connect it to 1 ns ONLY. Depress 1 ns pushbutton. The amplitude of 1 ns markers should be at least 0.5 V. If not, adjust C515 again, then switch the cable back to MARKER OUT, depress 2 ns pushbutton and verify that the amplitude is at least 1 V.

Set C515 so that the amplitudes of both the 2 ns markers and 1 ns markers are proportional.

6. Adjust 1 ns Tuned Stub Filter C517, C518, C519, and C520

Depress the TG 501 1 ns pushbutton.

Connect the sampling test oscilloscope to the TG 501 1 ns ONLY connector using a coaxial cable. Set the test oscilloscope vertical sensitivity for 0.2 V/div,

time/div to 1 ns and the triggering controls for an internal triggered display.

Adjust C517, C518, C519, and C520 in the order of the arrow for maximum marker amplitude on the sampling test oscilloscope.

Disconnect the test oscilloscope.

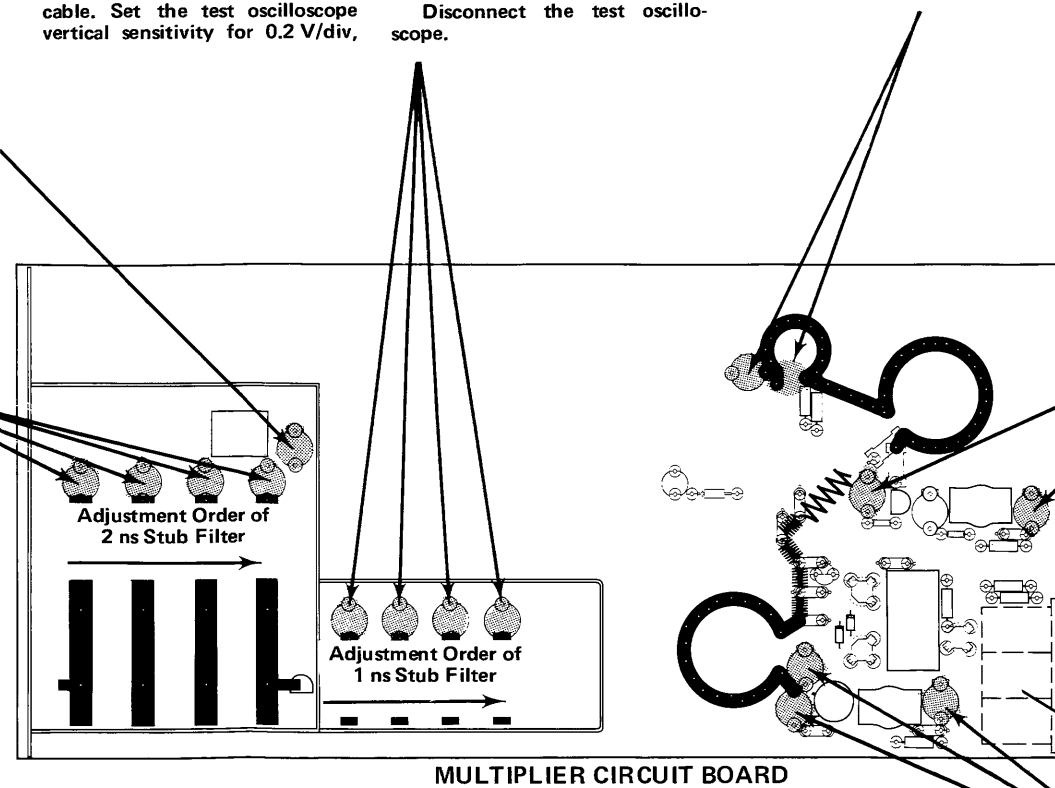
3. Adjust 2 ns Ring Circuit Capacitors C505 and C504

With sampling test oscilloscope still connected and controls set as in step 2, adjust C505 and C504 for maximum marker amplitude on the test oscilloscope.

4. Adjust 2 ns Tuned Stub Filter C510, C511, C512, and C513

Sampling test oscilloscope is still connected and controls set as stated in steps 2 and 3.

Adjust C510, C511, C512, and C513 in the order of the arrow for maximum marker amplitude on the sampling test oscilloscope.



NOTE

Step 1 on the main circuit board adjustments foldout must be accomplished before proceeding with the adjustments on this foldout.

2. Adjust 2 ns Output Tank Capacitance C498 and Amp Bias R482.

With the sampling test oscilloscope still connected as in step 1, depress the TG 501 2 ns pushbutton. Set the sampling test oscilloscope time/div switch to 2 ns and adjust the triggering controls for a stable display.

Adjust C498 and R482 for maximum marker amplitude on the sampling test oscilloscope.

1. Adjust 5 ns Output Tank Capacitance C465, 5 ns Output Series Capacitance C467, and 5 ns 100 MHz Drive Tank Capacitance C450

Connect the TG 501 MARKER OUT connector to the vertical input of the sampling test oscilloscope using a coaxial cable. Connect a coaxial cable from the TRIGGER OUT connector of the TG 501 to external trigger input of the test oscilloscope. Set the sampling test oscilloscope vertical sensitivity for 0.2 V/div, time/div to 5 ns and the triggering controls for an externally triggered display.

Adjust C450, C465, and C467 for maximum marker amplitude on the sampling test oscilloscope.

THEORY OF OPERATION

DIAGRAMS 1 & 2

PHASE LOCK LOOP

1 MHz Crystal Reference and Enable Gate

The reference frequency is supplied by the 1 MHz crystal reference circuitry of Y100, U100 and U350A. The output of the crystal reference circuit is supplied to pin 12 of U110D, which is part of the enable gate circuit. The enable gate circuit, which determines whether the 1 MHz crystal reference or the 1 MHz variable clock is connected to the phase lock loop, is composed of U110A, U110B, U110D, and U115D. When the VARIABLE TIMING (OUT) knob is pushed in and locked, a low is on pin 11 of U110D, allowing the crystal reference oscillator to be available at pin 13 of U110D. A low is also created at pins 12 and 13 of U115D, resulting in a high at pin 11 of U115D and at pin 3 of U110A. The high at pin 3 of U110A causes a low at pin 5 of U110B, which allows U110B to pass the crystal reference oscillator signal to pin 1 of U230A.

100 MHz Voltage Controlled Oscillator, Divide-By-Five Counter ECL-To T²L Translator, and Divide-By-Two Counter

The voltage controlled oscillator is composed of an astable multivibrator Q280-Q285-Q290, etched capacitor, and Q272, which supplies the charge current for the etched circuit board capacitor. U290D acts as a buffer for the voltage controlled oscillator. The NOR output of U290D is connected to the Divide-By-Five Counter. The ÷5 counter contains U310A, U310B, and U315A. The output of the ÷5 counter is translated from ECL into T²L logic levels by Q330, then supplied to ÷2 counter U320.

Divide-By-Five counter, Divide-By-Two counter, Phase Comparator, and Loop Amplifier/Filter

The output of ÷2 counter U320 is supplied to the input of U325. The output, pin 11 of U325 is applied to ÷2 counter U225 pin 12. The Q output of U225 is supplied to pin 5 of U230B.

U230A pin 1 receives 1 MHz from either the crystal reference or the variable clock. U230B pin 5 receives the counted down (÷100) 100 MHz signal from the VCO (Voltage-Controlled Oscillator). Pin 9 and 12 of U230 go high if the negative edges of the input signals coincide; this occurs when the 100 MHz VCO is operating on frequency. The high inputs to U235A produces a low output that clears U230A and U230B. The transition to a low that occurs at pin 12 of U230A is integrated by R231 and C231; the transition to a high level that occurs at pin 8 of U230B is integrated by R239 and C239. The two integrated output levels are summed by R234 and R239. This summation is then fed to the negative input of the loop amplifier/filter.

The input signal to the loop amplifier/filter is amplified and inverted by operational amplifier U250. The output of U250 is kept from changing rapidly by C250 and C251. The slow change in the output of U250 causes it to be an apparent DC level. VR250 level-shifts the output of U250 to a level that can be used to control the current flow through Q272.

Frequency Regulation of the 100 MHz Voltage Controlled Oscillator

Assume that the frequency has been correct up to this cycle, and that pins 9 and 12 of U230 are low. When the 100 MHz VCO frequency is slower than 100 MHz the negative edge to the phase comparator will toggle U230A first. This results in a high at pins 8 and 12 of U230 and a more negative voltage at the output of U250. This more negative voltage causes Q272 to conduct harder, which allows the etched circuit board capacitor to charge more quickly, to increase the oscillator frequency.

Again assume that the frequency has been correct up to this cycle, but this time the voltage controlled oscillator is faster than 100 MHz. The negative edge of the next cycle will toggle U230B first, resulting in a low at pins 8 and 12 of U230. This in turn causes a more positive voltage at the output of U250 which reduces the conduction of Q272. The etched circuit board capacitor now requires longer to charge since its available charging current has been reduced by Q272.

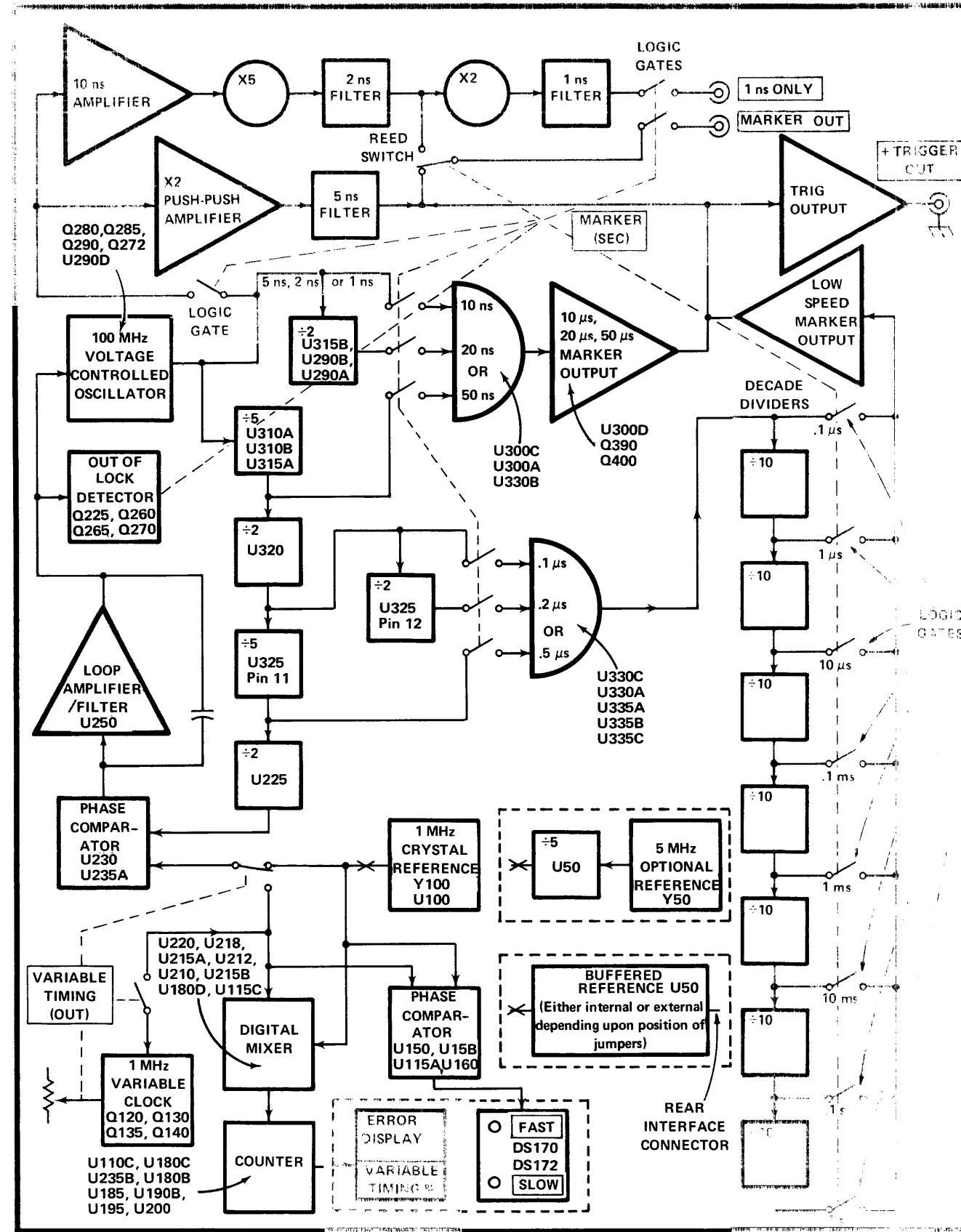
Out of Lock Detector

Ground via the cam switch for all the marker output enable logic gates is via Q270. If the 100 MHz voltage controlled oscillator is running quite slowly (out of specifications), the voltage at the output of the loop amplifier/filter operational amplifier U250 will be quite high. This high voltage will turn off normally conducting Q265, which in turn will turn off Q270, breaking the ground on the enable logic gates ground. Without ground there is no marker output.

On the other hand, if the 100 MHz VCO is running very fast (out of specifications), the voltage at the output of U250 will be very low. This low voltage will turn on Q255 and Q260, which will turn off Q270, stopping the marker output.

**20 ns AND .2 μs DIVIDE-BY-TWO COUNTERS,
10 ns, 20 ns, or 50 ns AND .1 μs, OR .5 μs
ENABLE GATES**

The 20 ns ÷2 counter contains U315B, U290B and 4290A. The input to the counter is the output of the



100 MHz VCO. The 20 ns coupled to enable gate U330A.

The .2 μs ÷2 counter output is pin 12 of the in to enable gate U330A.

Enable gates for the 1 U300C, U300B, and U300A gates for the .1 μs, .2 μs U330A, and U335A-U335C gate that couples the sel to the decade dividers.

1 MHz VA

The 1 MHz variable c astable multivibrator. Tei Q120, which is the sam Q135, establishes the pc vibrator. Q130, Q135 transistors, with Q130 available to timing capac shifting for the Q130 frequency of the multivi tion of Q130. The lo frequency end while the Variable Timing Center, multivibrator to 1 MHz v midrange position.

PHASE COMPARATC

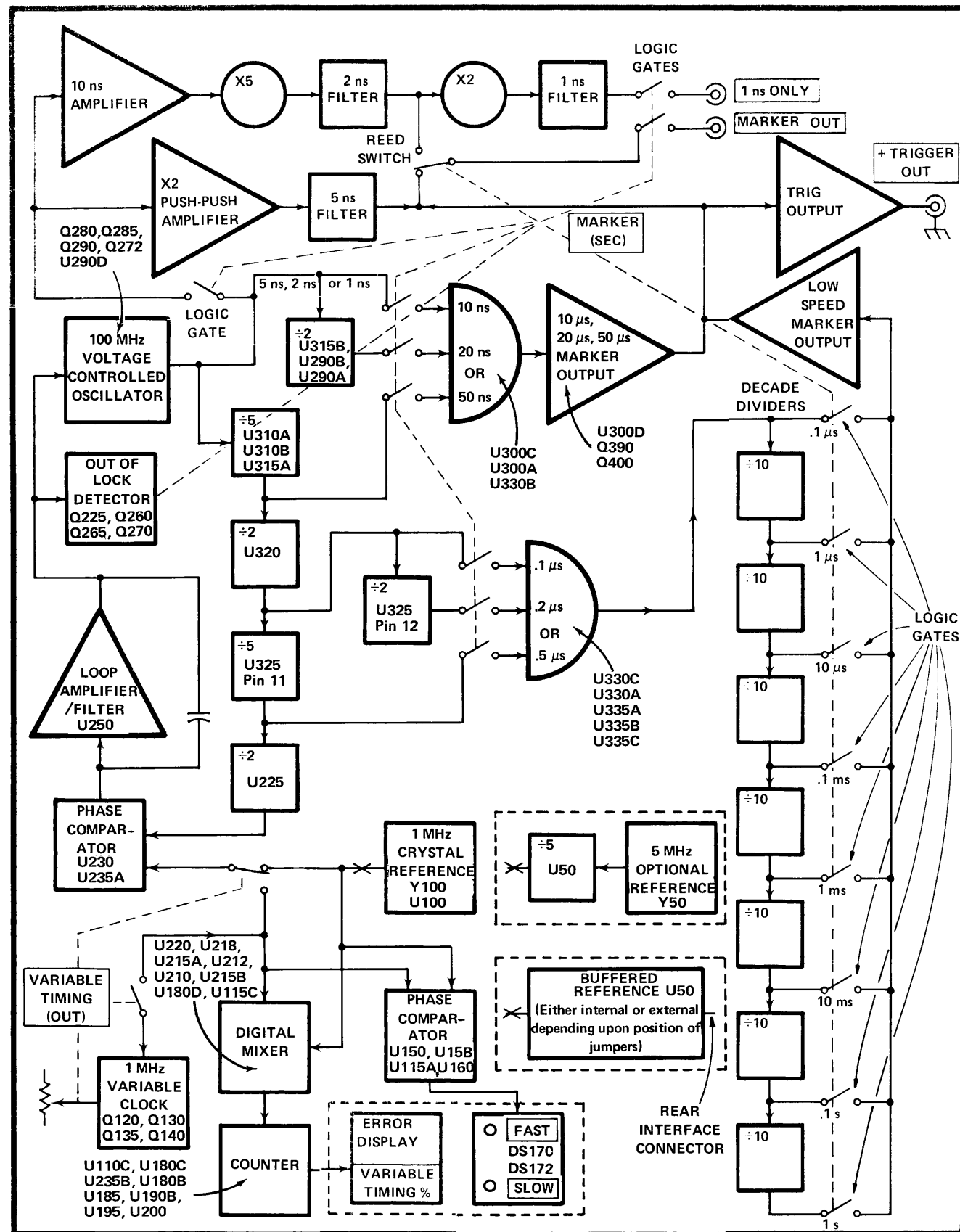
Description

1 MHz is fed to pin reference or the variable is fed to pin 5 of U150 high if the negative edge coincide. This occurs wh frequency. With these in that clears U150A and U150B and the high now by R152 and R153. The then fed to the negative in

The input signal to U the operational amplifie from changing rapidly the output of U160 caus U115B has been enable TIMING (OUT) control, applied to the junction of

THEORY OF OPERATION

DIAGRAMS 1 & 2



100 MHz VCO. The 20 ns markers from the ÷2 counter are coupled to enable gate U300B.

The .2 μs ÷2 counter is part of U325. The ÷2 counter output is pin 12 of the integrated circuit, which is supplied to enable gate U330A.

Enable gates for the 10 ns, 20 ns, and 50 ns markers are U300C, U300B, and U300A respectively, while the enable gates for the .1 μs, .2 μs, and 15 μs markers are U330C, U330A, and U335A-U335B respectively. U335C is an OR gate that couples the selected .1 μs, .2 μs, or .5 μs markers to the decade dividers.

1 MHz VARIABLE CLOCK

The 1 MHz variable clock circuit is an emitter-coupled multivibrator. Temperature compensation transistor Q120, which is the same type of transistor of Q130 and Q135, establishes the power supply voltage for the multivibrator. Q130, Q135 and Q140 are the multivibrator transistors, with Q130 controlling the charge current available to timing capacitor C127. VR140 provides level shifting for the Q130 base voltage. R135 controls the frequency of the multivibrator by controlling the conduction of Q130. The lower end of R135 is the higher frequency end while the top reduces the frequency. R145, Variable Timing Center, is used to set the frequency of the multivibrator to 1 MHz when R135 is set to its mechanical midrange position.

PHASE COMPARATOR AND FAST-SLOW LED'S

Description

1 MHz is fed to pin 1 of U150B by either the crystal reference or the variable clock. The 1 MHz crystal reference is fed to pin 5 of U150A. Pins 12 and 9 of U150 will go high if the negative edges of the two 1 MHz input signals coincide. This occurs when the 1 MHz variable clock is on frequency. With these inputs high, U115A produces a low that clears U150A and U150B. The low now at pin 9 of U150B and the high now at pin 13 of U150A are summed by R152 and R153. The output of the summing resistors is then fed to the negative input of amplifier U160.

The input signal to U160 is amplified and inverted by the operational amplifier. The output of U160 is kept from changing rapidly by C160. The slow change in the output of U160 causes it to be an apparent DC level. If U115B has been enabled by releasing the VARIABLE TIMING (OUT) control, the output voltage level of U160 is applied to the junction of DS170 and DS172.

Fast-Slow Indication (VARIABLE TIMING (OUT) Control released)

Assume that the frequency has been correct up this cycle, pins 9 and 12 of U150 are low. When the 1 MHz variable clock frequency is slower than 1 MHz, the negative edge to the phase comparator will toggle U150A first. This results in a high at pins 9 and 13 of U150 and a more positive voltage at the output of U115B. This more positive voltage causes DS172 to conduct and become illuminated.

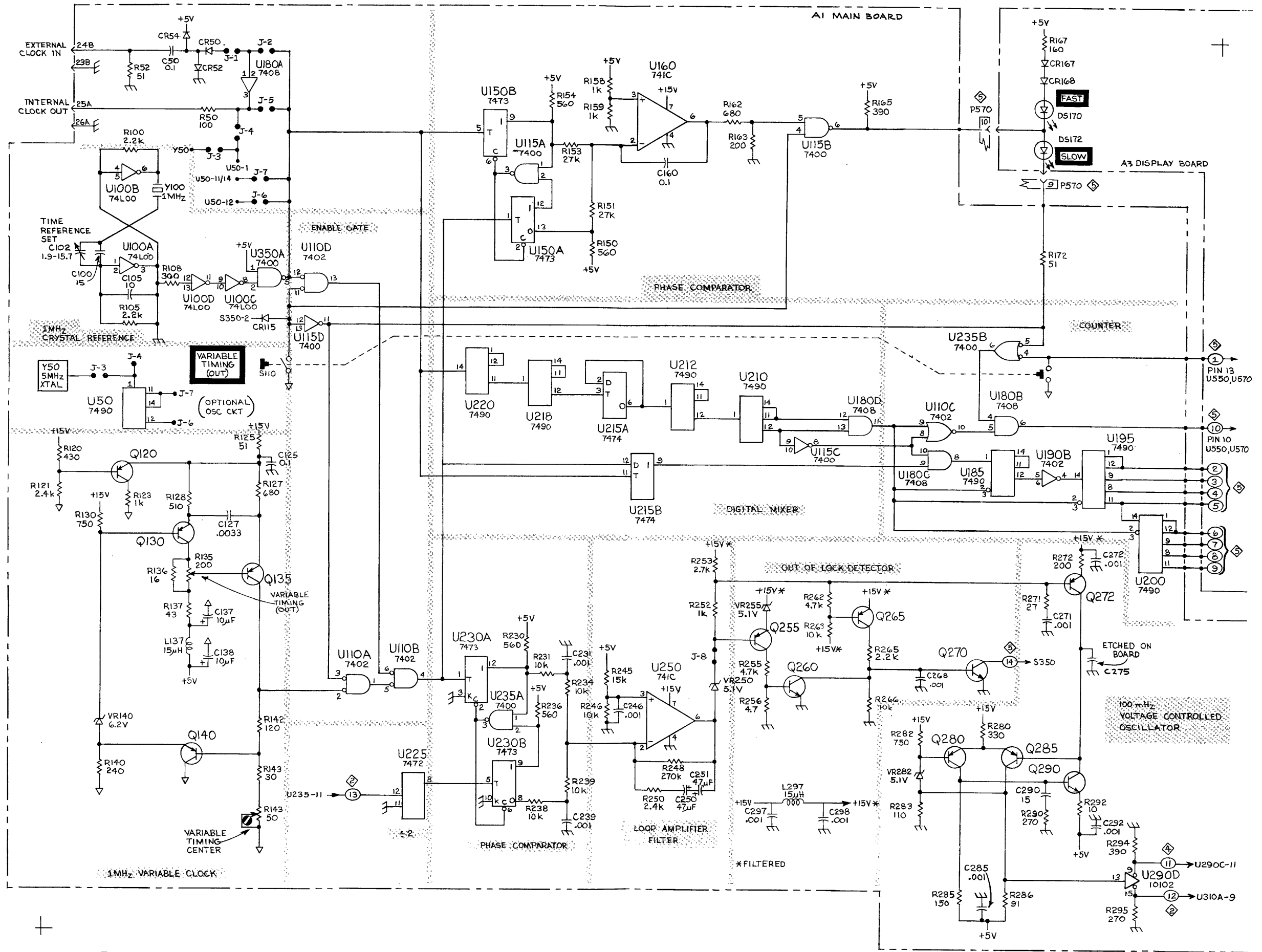
Again assume that the frequency has been correct up to this cycle, but this time the 1 MHz variable clock frequency is faster than 1 MHz. The negative edge of the next cycle will toggle U150A first, resulting in a low at pins 9 and 13 of U150. This in turn causes a more negative voltage at the output of U115B, which results in the conduction and illumination of DS170.

DIGITAL MIXER AND COUNTER

The 1 MHz Crystal reference is counted down by 2 X 10⁴ using gate chain interval decade counters U220, U218, U212, and U210 and flip-flop U215A. The resultant 50 Hz gate frequency (20 ms gate period) available at the outputs of U210 is used to control the VARIABLE TIMING % LED display time. Pin 11 of U210 is the ÷5 output; pin 12 is the ÷2 output. The two outputs of U210 are ANDed by U180D to produce a 2 ms pulse, which is used to clear BCD counters U185 (0.01% digit, which is not displayed), U195 (0.1% digit) and U200 (units % digit).

The 1 MHz Crystal Reference and the 1 MHz variable clock output frequencies are compared by digital mixer U215B, with only the frequency difference of the two input frequencies appearing at the output. The output of U215B is ANDed in U180C with the inverted ÷2 output (10 ms wide gate) of U210. The output of U180C goes to the first of the three BCD counters. Inverter U190B, located between U185 and U195, provides averaging so that U195 (0.1% digit) changes on the count of five instead of nine.

The 2 ms output pulse of U180D and the 10 ms output pulse of U115C go to NOR gate U110C. The output of U110C (which is an 8 ms pulse that determines LED display time) is one input to AND gate U180B. The other input to U180B must be a high from U235B to enable U180B and cause the LED display to be unblanked. A high out of U235B is caused by either depressing the VARIABLE TIMING % Control fully in to check the LEDs, or by releasing the VARIABLE TIMING % control to its out position. The low to pin 5 of U235B in the out position of the VARIABLE TIMING % control is from pull-up resistor R450 via CR115 and inverter U115D. In the 521N position of the MARKER Control, the cathode of CR115 is connected to ground via S350 to disable the variable timing circuit, since the 1 ns, 2 ns, or 5 ns markers are not variable.

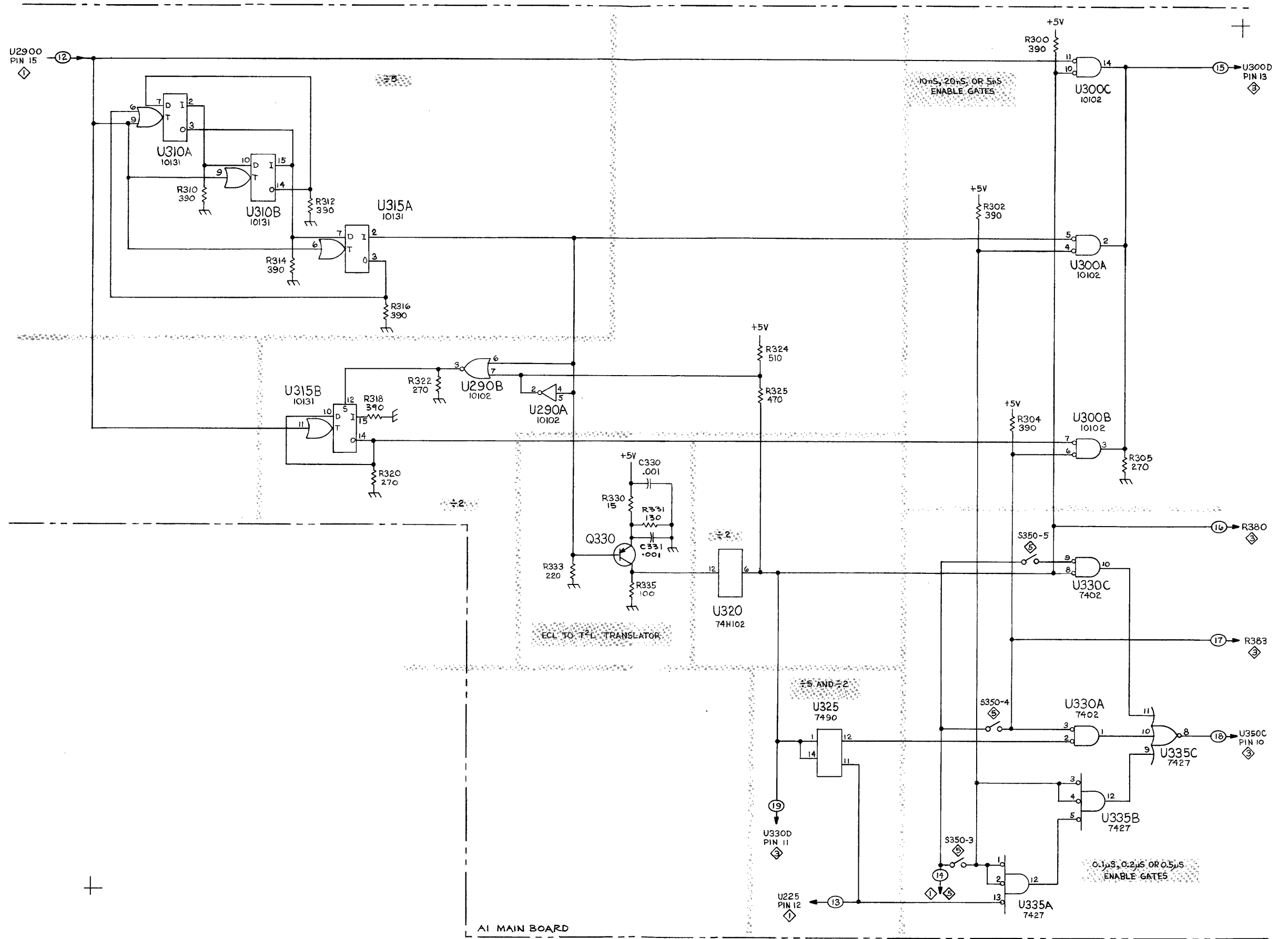


TG501

(A)

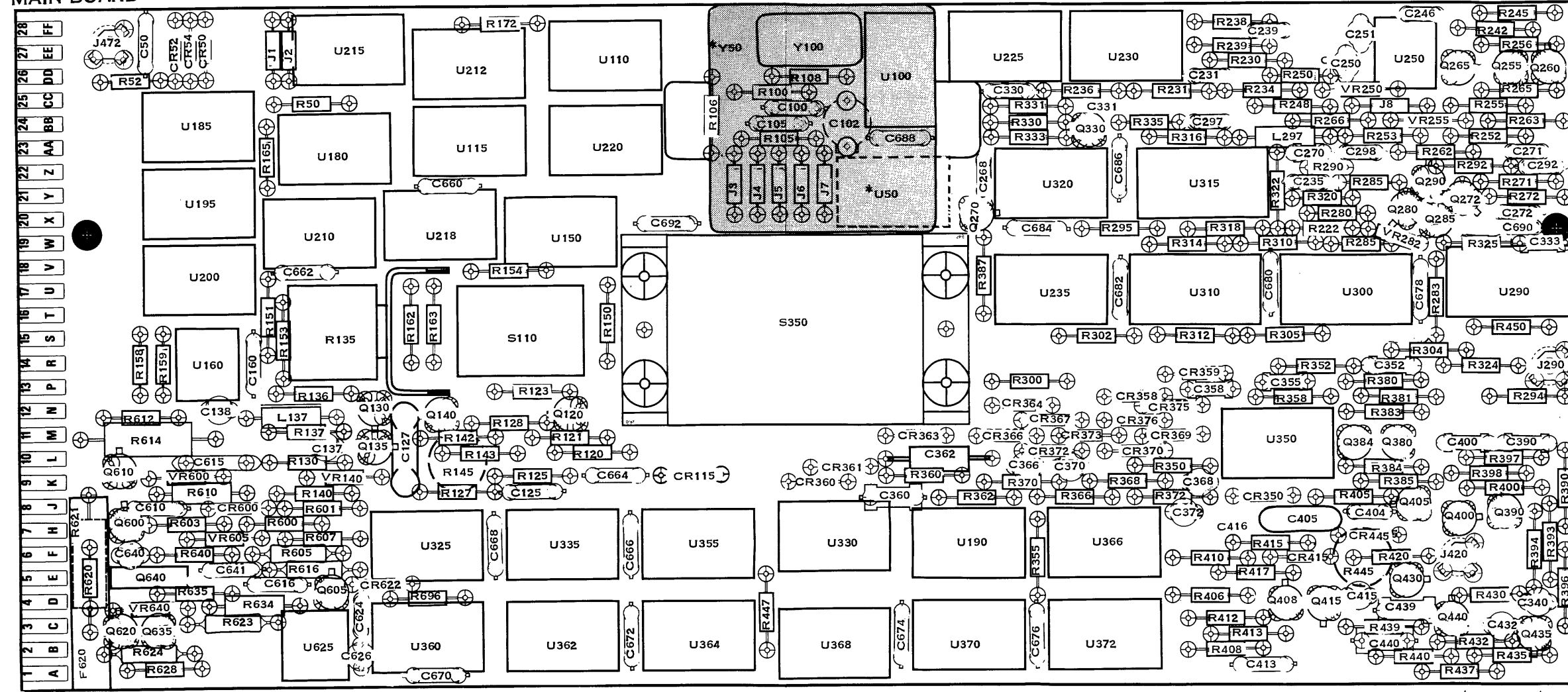
REFERENCES, READOUT LOGIC, & PHASE-LOCK LOOP

973 JEN



PARTS LOCATION GRID

MAIN BOARD

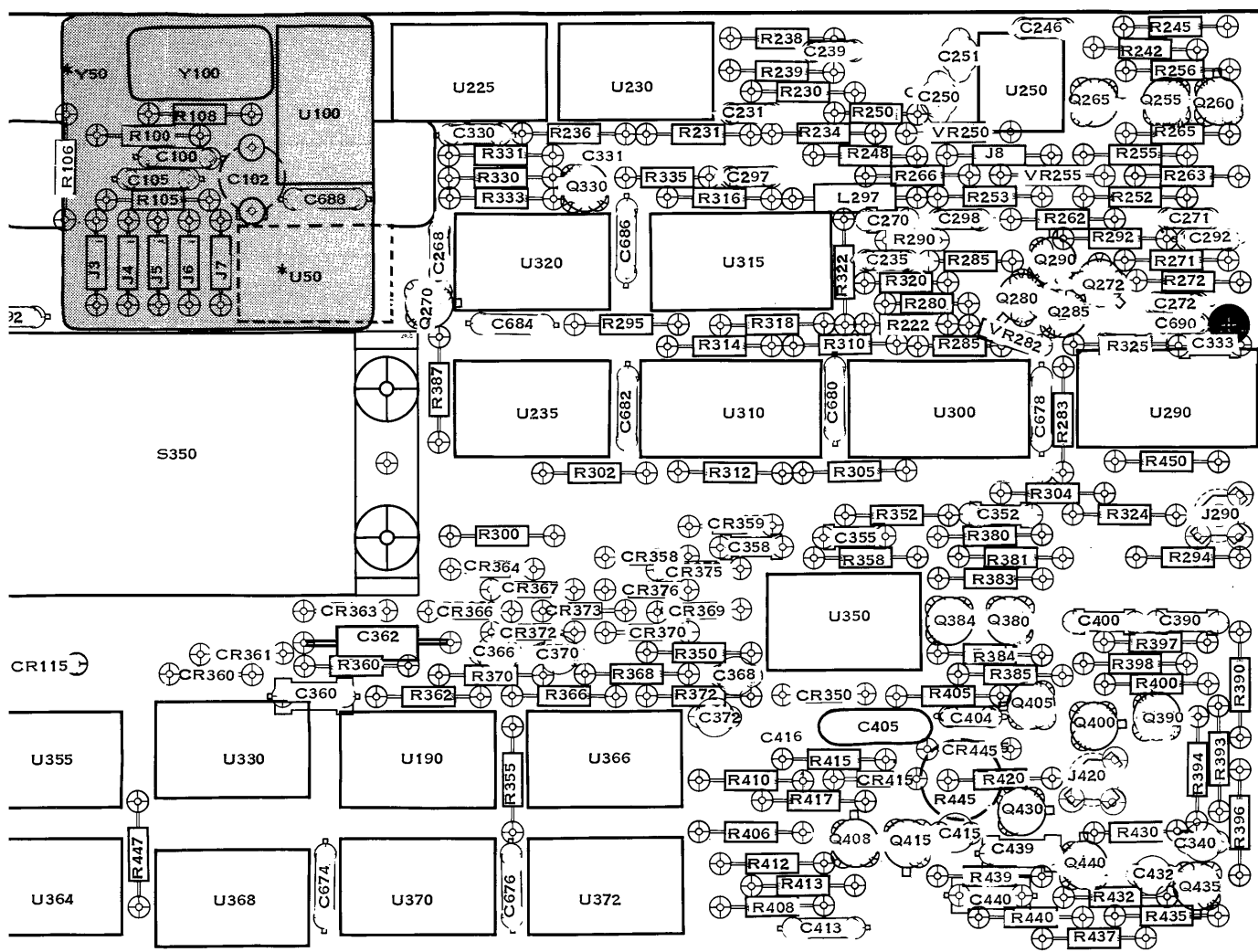


NOTE: COMPONENTS SHOWN WITH DASHED LINES ARE LOCATED ON BACK SIDE OF BOARD.

FOR OPTION 1, COMPONENTS IN SHADED AREA ARE REPLACED BY *Y50 AND *U50, *U50 IS INSTALLED ON THE BACK SIDE OF BOARD.

CKT NO	GRID LOC	CKT NO
C50	B-1	C672
C100	G-2	C674
C102	G-2	C676
C105	G-2	C678
C125	E-5	C680
C127	D-4	C682
C137	C-4	C684
C138	B-4	C686
C160	C-4	C688
C231	J-1	C690
C235	K-2	C692
C239	K-1	
C246	L-1	CR50
C250	K-1	CR52
C251	K-1	CR54
C268	H-2	CR115
C270	K-2	CR350
C271	M-2	CR358
C272	M-2	CR359
C297	J-2	CR360
C298	K-2	CR361
C330	I-1	CR363
C333	M-3	CR364
C340	M-5	CR366
C352	L-4	CR367
C355	K-4	CR369
C358	J-4	CR370
C360	H-5	CR372
C362	H-4	CR373
C366	I-4	CR375
C368	J-4	CR376
C370	I-4	CR415
C372	J-5	CR445
C390	M-4	CR600
C400	L-4	CR622
C404	K-5	
C405	K-5	F620
C413	K-6	
C415	K-5	
C440	L-6	J1
C432	M-6	J2
C610	B-5	J3
C615	B-4	J4
C616	C-5	J5
C624	C-6	J6
C626	C-6	J7
C640	B-5	J8
C641	B-5	J290
C660	D-2	J420
C662	C-3	J472
C664	E-4	
C666	F-5	
C668	D-5	L137
C670	D-6	L297

S LOCATION GRID



OF BOARD. FOR OPTION 1, COMPONENTS IN SHADED AREA ARE REPLACED BY *Y50 AND *U50.
 *U50 IS INSTALLED ON THE BACK SIDE OF BOARD.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C50	B-1	C672	F-6	Q120	E-4	R159	B-4	R360	H-4	S110	E-3				
C100	G-2	C674	H-6	Q130	D-4	R162	D-3	R362	H-5	S350	G-3				
C102	G-2	C676	I-6	Q135	D-4	R163	D-3	R366	I-5						
C105	G-2	C678	L-3	Q140	D-4	R165	C-2	R368	J-4	U100	H-1				
C125	E-5	C680	K-3	Q255	M-1	R172	E-1	R370	I-4	U110	E-1				
C127	D-4	C682	I-3	Q260	M-1	R222	K-3	R372	J-5	U115	D-2				
C137	C-4	C684	I-3	Q265	L-1	R230	J-1	R380	L-4	U150	E-3				
C138	B-4	C686	I-2	Q270	H-2	R231	J-1	R381	L-4	U160	B-4				
C160	C-4	C688	H-2	Q272	L-2	R234	K-1	R383	L-4	U180	C-2				
C231	J-1	C690	M-2	Q280	L-2	R236	I-1	R384	L-4	U185	B-2				
C235	K-2	C692	F-2	Q285	L-2	R238	J-1	R385	L-4	U190	H-5				
C239	K-1			Q290	L-2	R239	J-1	R387	H-3	U195	B-2				
C246	L-1	CR50	B-1	Q330	I-2	R242	M-1	R390	M-5	U200	B-3				
C250	K-1	CR52	B-1	Q380	L-4	R245	M-1	R393	M-5	U210	C-3				
C251	K-1	CR54	B-1	Q384	K-4	R248	K-2	R394	M-5	U212	D-1				
C268	H-2	CR115	F-4	Q390	M-5	R250	K-1	R396	M-5	U215	C-1				
C270	K-2	CR350	K-5	Q400	L-5	R252	L-2	R397	L-4	U218	D-3				
C271	M-2	CR358	J-4	Q405	L-5	R253	L-2	R398	L-4	U220	E-2				
C272	M-2	CR359	J-4	Q408	K-5	R255	L-2	R400	M-5	U225	I-1				
C297	J-2	CR360	G-4	Q415	K-5	R256	M-1	R405	K-5	U230	J-1				
C298	K-2	CR361	G-4	Q430	L-5	R262	L-2	R406	J-5	U235	I-3				
C330	I-1	CR363	H-4	Q435	M-6	R263	M-2	R408	J-6	U250	L-1				
C333	M-3	CR364	I-4	Q440	L-6	R265	M-1	R410	J-5	U290	M-3				
C340	M-5	CR366	I-4	Q605	C-5	R266	K-2	R412	J-6	U300	K-3				
C352	L-4	CR367	I-4	Q610	B-4	R271	M-2	R413	J-6	U315	J-2				
C355	K-4	CR369	J-4	Q620	B-6	R272	M-2	R415	K-5	U320	I-2				
C358	J-4	CR370	J-4	Q635	B-6	R280	K-2	R420	L-5	U325	D-5				
C360	H-5	CR372	I-4	Q640	B-5	R283	L-3	R430	L-5	U330	G-5				
C362	H-4	CR373	I-4			R285	K-2	R432	L-6	U335	E-5				
C366	I-4	CR375	J-4	R50	C-1	R290	K-2	R435	M-6	U350	K-4				
C368	J-4	CR376	J-4	R52	B-1	R292	L-2	R437	L-6	U355	F-5				
C370	I-4	CR415	K-5	R100	G-1	R294	M-4	R439	L-6	U360	D-6				
C372	J-5	CR445	K-5	R105	G-2	R295	I-3	R440	L-6	U362	E-6				
C390	M-4	CR600	B-5	R106	F-2	R302	I-3	R445	K-5	U364	F-6				
C400	L-4	CR622	D-5	R108	G-1	R304	L-3	R447	G-5	U366	I-5				
C404	K-5			R120	E-4	R305	K-3	R450	M-3	U368	G-6				
C405	K-5	F620	A-6	R121	E-4	R310	K-3	R600	C-5	U370	H-6				
C413	K-6			R123	E-4	R312	J-3	R601	C-5	U372	I-6				
C415	K-5			R125	E-4	R314	J-3	R603	B-5	U625	C-6				
C440	L-6	J1	C-1	R127	D-5	R316	J-2	R605	C-5						
C432	M-6	J2	C-1	R128	E-4	R318	J-3	R607	C-5						
C610	B-5	J3	F-2	R130	C-4	R320	K-2	R610	B-5						
C615	B-4	J4	G-2	R135	C-3	R322	K-2	R612	B-4						
C616	C-5	J5	G-2	R136	C-4	R324	L-4	R614	B-4	VR140	C-4				
C624	C-6	J6	G-2	R137	C-4	R325	L-3	R616	C-5	VR250	K-1				
C626	C-6	J7	G-2	R140	C-5	R300	I-4	R620	A-5	VR255	L-2				
C640	B-5	J8	L-2	R142	D-4	R330	I-2	R621	A-5	VR282	L-3				
C641	B-5	J290	M-4	R143	D-4	R331	I-2	R623	B-6	VR600	B-4				
C660	D-2	J420	L-5	R145	D-4	R333	I-2	R624	B-6	VR605	B-5				
C662	C-3	J472	B-1	R150	E-3	R335	J-2	R628	B-6	VR640	B-5				
C664	E-4			R151	C-3	R350	J-4	R634	C-5						
C666	F-5			R153	C-3	R352	K-4	R635	B-5						
C668	D-5	L137	C-4	R154	E-3	R355	I-5	R640	B-5						
C670	D-6	L297	K-2	R158	B-4	R358	K-4	R696	D-5	Y100	G-1				

THEORY OF OPERATION

DIAGRAM 3

DECADE DIVIDERS

The decade dividers operate continuously; however, the output is selected by enabling the appropriate enable logic gate with a low via the cam switch S350. The $\div 10$ dividers are U355, U360, U362, U364, U368, and U372. The NAND enable logic gates are U330B, U350C, U190A-C-D and U366A-B-C-D. The square-wave pulse from the logic gates is differentiated by an RC circuit using capacitors C358, C360, C362, C366, C368, C370 and C372. The resistance for the RC circuit is selected by cam switch S350 via the 5-2-1 sequence logic gates, depending upon the timing position in the 5-2-1 sequence.

The selection of the resistance for the RC circuit determines the slope of the falling edge of the marker and hence controls the marker brightness. R385, the largest resistance, is selected in all positions of the 5-2-1 sequence. In the 2 position, a low from the 5-2-1 sequence logic gate turns on Q384 and connects R384 in parallel with R385, reducing the resistance and the marker brightness. In the 1 position, Q380 turns on and R381 parallels R385 to reduce the resistance and brightness from that obtained in the 2 position.

Q405 provides a stage of isolation between the decade dividers and the low speed marker output amplitude. The isolation stage increases the impedance seen by the input to the low speed marker output operational amplifier.

LOW SPEED MARKER OUTPUT AMPLIFIER

The low speed marker output amplifier is an operational amplifier having a gain of 1.5. The amplifier consists of Q408 and Q415 with R406 and R410 being the input resistor and feedback resistor respectively.

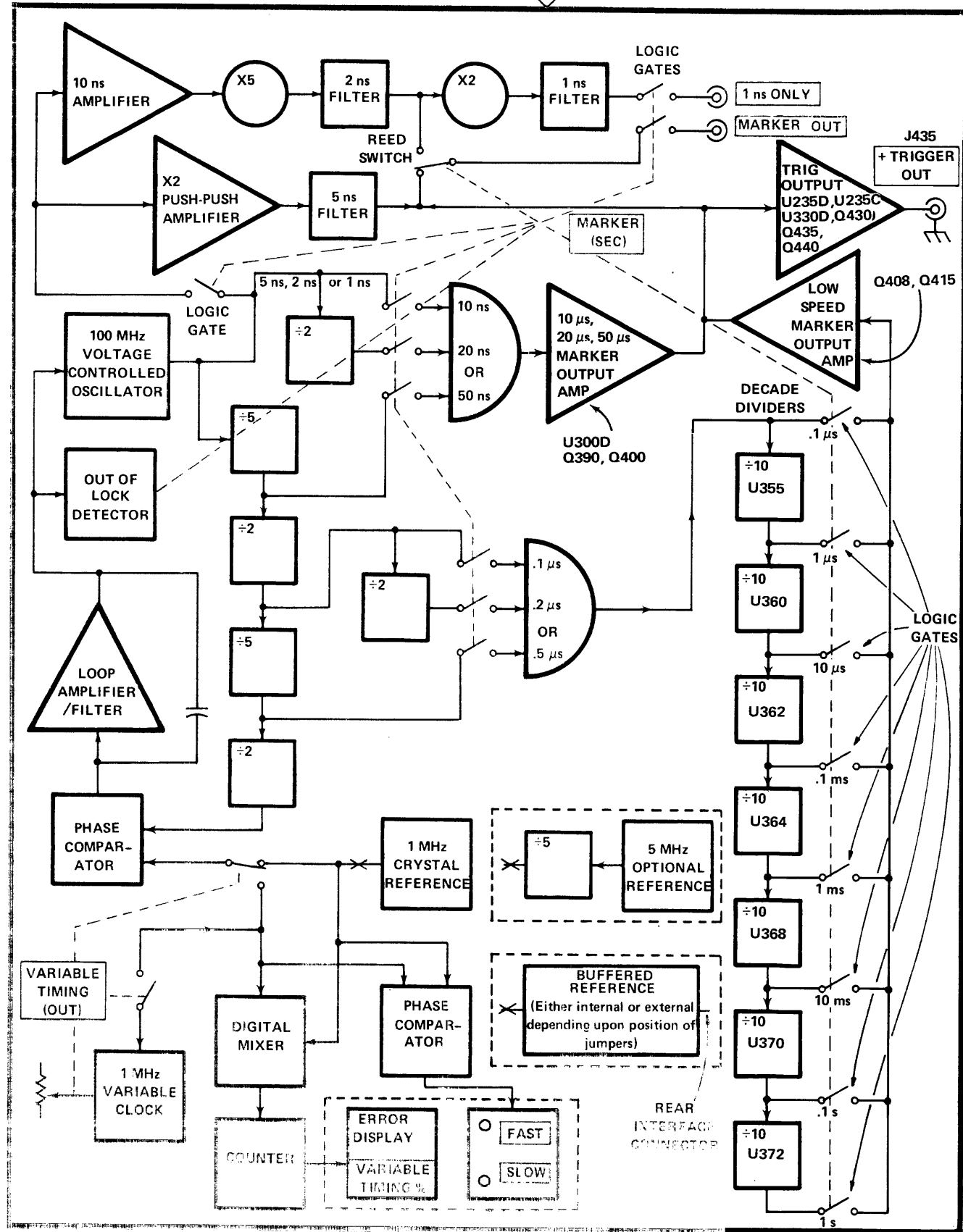
10 ns, 20 ns, 50 ns MARKER OUTPUT AMPLIFIER

Q390 and Q400 form an emitter coupled switch which is controlled by U300D, an ECL enable logic gate. U300D requires a low from the 10 ns, 20 ns, or 50 ns logic gate to pass the square-wave. The square-wave at output pins 15 and 9 of U300D is differentiated by RC networks C390-R394 and C400-R400. The differentiated signal is coupled through Q400 as long as pin 13 of U300D remains low. The output from Q400 is summed with the output from the low speed marker output amplifier and supplied to the MARKER OUT connector J470.

TRIGGER OUTPUT

At MARKER Control settings of 5 s through $.1 \mu\text{s}$ the marker available at the MARKER OUT connector is used as a slave trigger. The slave trigger from the low speed marker output amplifier is coupled through emitter followers Q430 and Q435 and made available at + TRIGGER OUT connector J435.

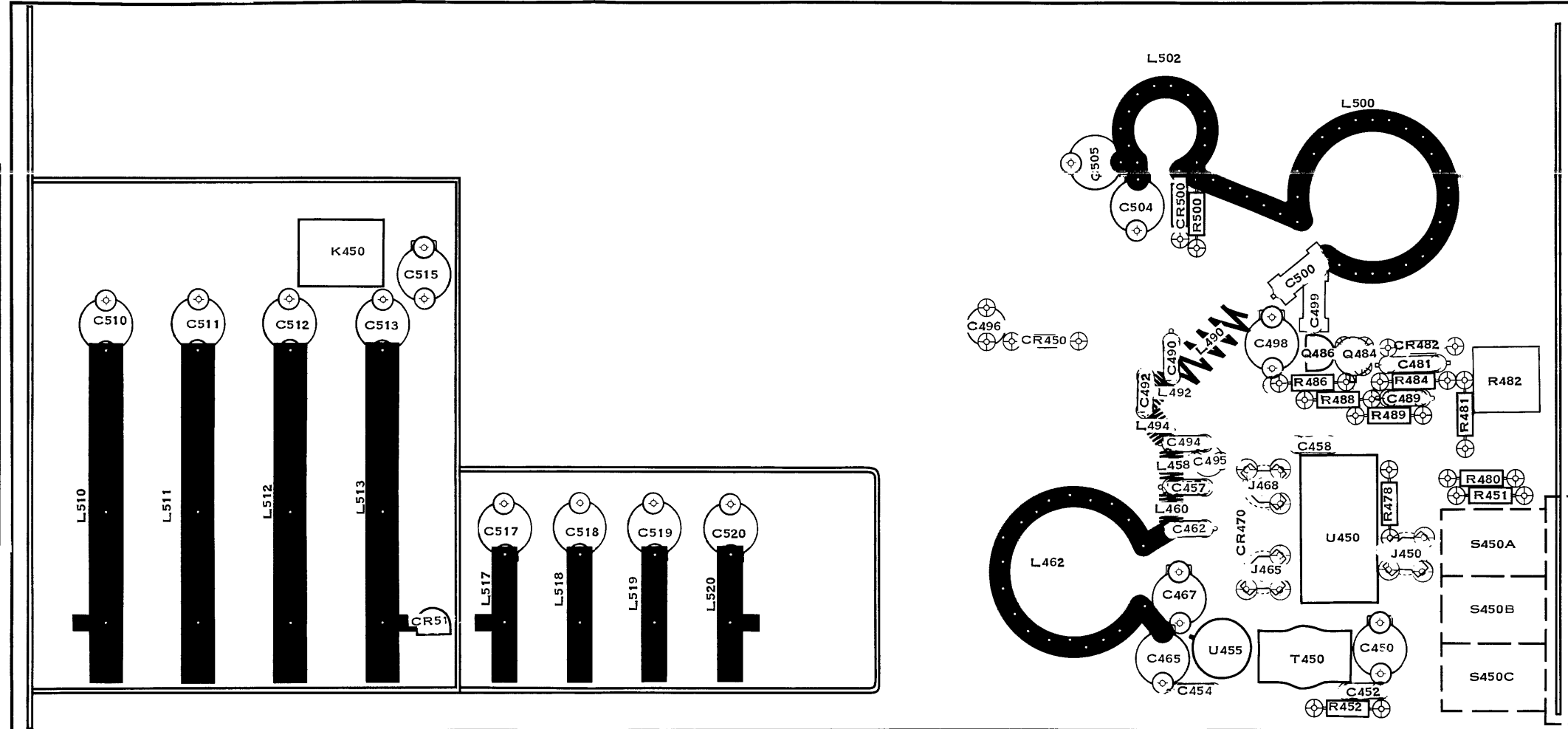
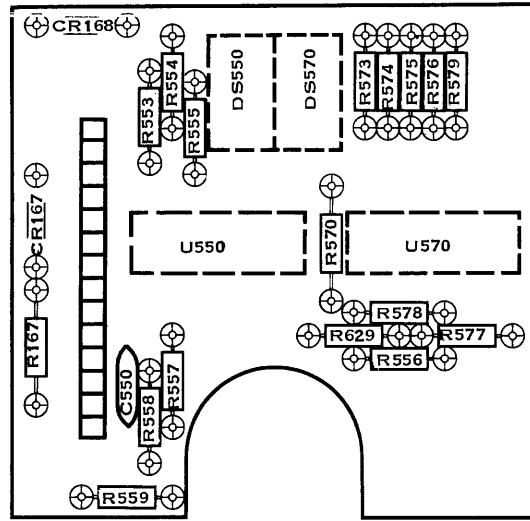
At Marker Control settings of 50 ns and faster, the trigger signal rate available at the + TRIGGER OUT connector remains $.1 \mu\text{s}$. The $1 \mu\text{s}$ output is obtained by enabling logic gates U235C and U330D. Enabling U330D allows the output square-wave from U320 to be differentiated by RC network R400-R445-C440, then amplified by Q440 before being coupled to the + TRIGGER OUT connector via emitter follower Q435. The RC network determines the width and amplitude of the trigger signal, while R439-C439 network in the emitter of Q440 controls the signal gain. R445 High Speed trigger amplitude provides a means of adjusting the high speed trigger amplitude to match the low speed trigger amplitude.



PARTS LOCATION GRID

MULTIPLIER BOARD

DISPLAY BOARD



NOTE: COMPONENTS SHOWN WITH DASHED LINES ARE LOCATED ON BACK SIDE OF BOARD.

X2 PUSH-PUSH AI

Placing the MARK enables ECL logic gate signal to pass to J450. ECL logic gate U450 signal to the primary of

T450 is a toroidal primary and secondary frequency of the T450 of T450 connects to effectively acts as a freq connects to the 5 ns resonant (as seen at th L462, part of the etch used to tune the tank as an amplitude adjust output of the 5 ns filt MARKER OUT connec

10 ns AMPLIFIE

Placing the Marker ECL logic gate U290C, pass to J450. Pushing ECL logic gate U450C, to the base of Q484.

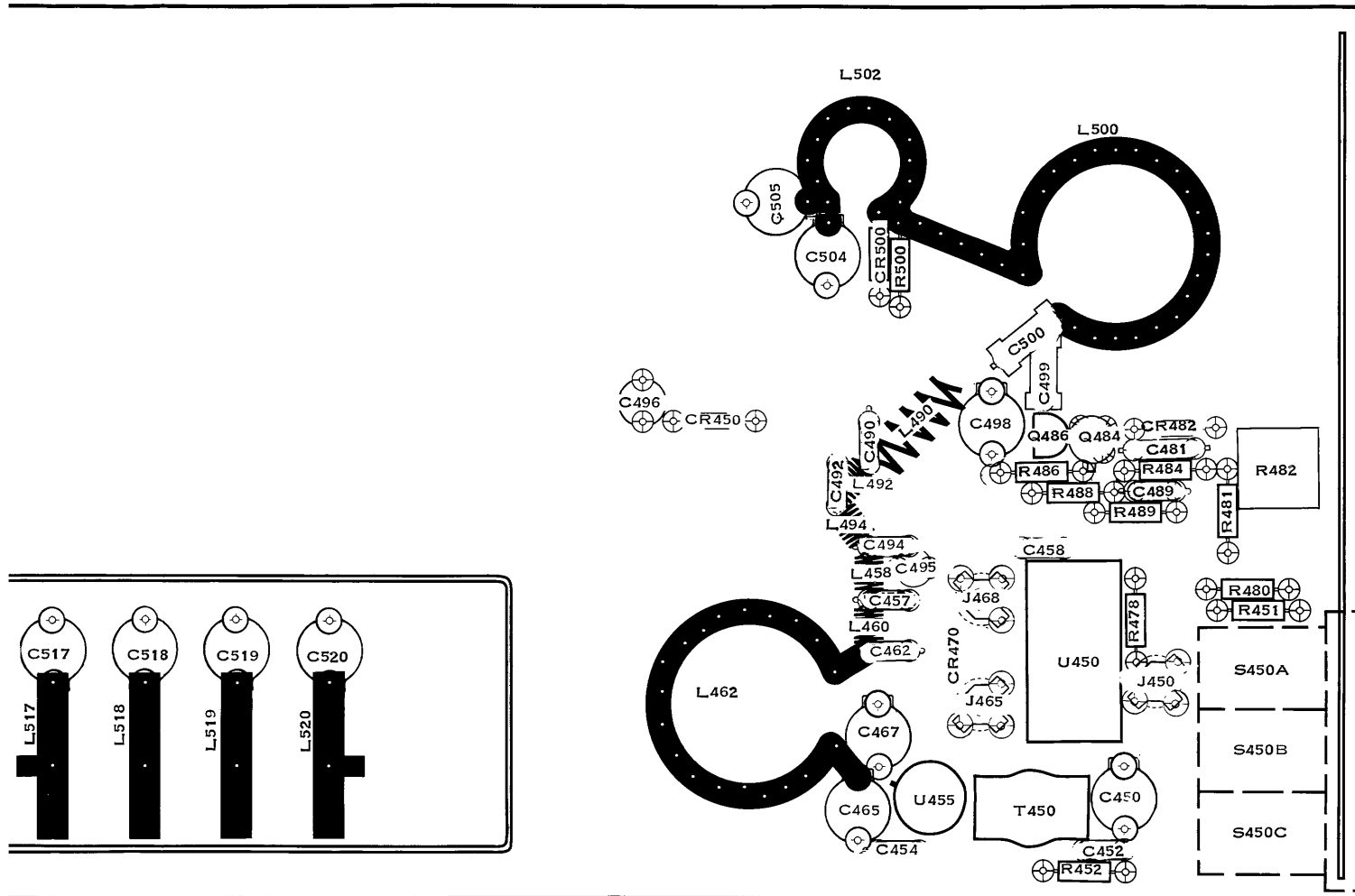
Q484 and Q486 cc CR482, and U450C m network for the amplifi the amplifier gain.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C450	M-5	C492	K-3	C515	F-3	DS550	B-2	L492	L-3	Q486	M-3	R553	A-2	R629	B-4
C452	M-6	C494	L-4	C517	G-4	DS570	B-2	L494	L-4	R167	A-4	R554	A-2	R578	C-3
C454	L-5	C495	L-4	C518	G-4			L500	M-2	R451	N-4	R555	A-2	R579	C-2
C457	L-4	C496	J-3	C519	H-4	J450	M-5	L502	L-1	R452	M-6	R556	C-4	S450A	N-5
C458	M-4	C498	L-3	C520	H-4	J465	L-5	L510	D-4	R478	M-4	R557	A-4	S450B	N-5
C462	L-4	C499	M-3	C550	A-4	J468	L-4	L511	E-4	R480	N-4	R558	A-4	S450C	N-5
C465	L-5	C500	L-3	CR51	F-5			L512	E-4	R481	N-4	R559	A-4		
C467	L-5	C504	K-2	CR167	A-3	K450	F-2	L513	F-4	R482	N-3	R570	B-3	T450	M-5
C481	M-3	C505	K-2	CR168	A-2			L517	G-5	R484	M-3	R573	B-2		
C489	M3	C510	D-3	CR450	K-3	L458	L-4	L518	G-5	R486	M-3	R574	B-2	U450	M-4
C490	L-3	C511	E-3	CR470	L-5	L460	L-4	L519	H-5	R488	M-3	R575	C-2	U455	L-5
		C512	E-3	CR482	M-3	L462	K-5	L520	H-5	R489	M-4	R576	C-2	U550	B-3
		C513	F-3	CR500	L-2	L490	L-3	Q484	M-3	R500	L-2	R577	C-4	U570	C-3

THEORY OF OPERATION

DIAGRAM 4

LOCATION GRID



ARE LOCATED ON BACK SIDE OF BOARD.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
S550	B-2	L492	L-3	Q486	M-3	R553	A-2	R629	B-4
S570	B-2	L494	L-4	R167	A-4	R554	A-2	R578	C-3
		L500	M-2	R451	N-4	R555	A-2	R579	C-2
U450	M-5	L502	L-1	R452	M-6	R556	C-4	S450A	N-5
U465	L-5	L510	D-4	R478	M-4	R557	A-4	S450B	N-5
U468	L-4	L511	E-4	R480	N-4	R558	A-4	S450C	N-5
		L512	E-4	R481	N-4	R559	A-4		
U450	F-2	L513	F-4	R482	N-3	R570	B-3	T450	M-5
		L517	G-5	R484	M-3	R573	B-2		
U458	L-4	L518	G-5	R486	M-3	R574	B-2	U450	M-4
U460	L-4	L519	H-5	R488	M-3	R575	C-2	U455	L-5
U462	K-5	L520	H-5	R489	M-4	R576	C-2	U550	B-3
U490	L-3	Q484	M-3	R500	L-2	R577	C-4	U570	C-3

X2 PUSH-PUSH AMPLIFIER AND 5 ns FILTER

Placing the MARKER Control at its 521N position enables ECL logic gate U290C, which allows the 100 MHz signal to pass to J450. Pushing the 5 ns pushbutton enables ECL logic gate U450B, applying the 100 MHz (10 ns) signal to the primary of T450.

T450 is a toroidal transformer having a center-tapped primary and secondary winding. C450 tunes the resonance frequency of the T450 primary to 100 MHz. The secondary of T450 connects to a push-push amplifier U455, which effectively acts as a frequency doubler. The output of U455 connects to the 5 ns filter, which contains a parallel resonant (as seen at the output) tank circuit consisting of L462, part of the etched circuit board, and C465. C467 acts as an amplitude adjustment for the 5 ns markers. From the output of the 5 ns filter, the 5 ns markers connect to the MARKER OUT connector, J470.

amplifier, Q486, while the other half of the transformer secondary is used for neutralization to compensate for amplifier instability. R486 and CR486 make up a temperature compensation network for amplifier Q486.

The output of the amplifier connects to a parallel resonant tank circuit consisting of L490 and C498. C498 is used to tune the tank circuit to 10 ns (100 MHz). L500, part of the etched circuit board, and C500 make up a matching network for the input to varactor CR500.

CR500 is a snap type varactor, i.e. a varactor that snaps off. The varactor is triggered at a 100 MHz rate. The sudden current change that occurs when CR500 snaps off at its 100 MHz rate causes L502, part of the etched circuit board, and C504 to ring at a 2 ns (500 MHz) rate. C504 tunes the ring circuit to resonant at a 2 ns rate.

The 2 ns filter is a tuned stub comb filter with each stub tuned successively to resonance. The input to the filter is a damped sine-wave, which is then electromagnetically coupled between the sections of the filter.

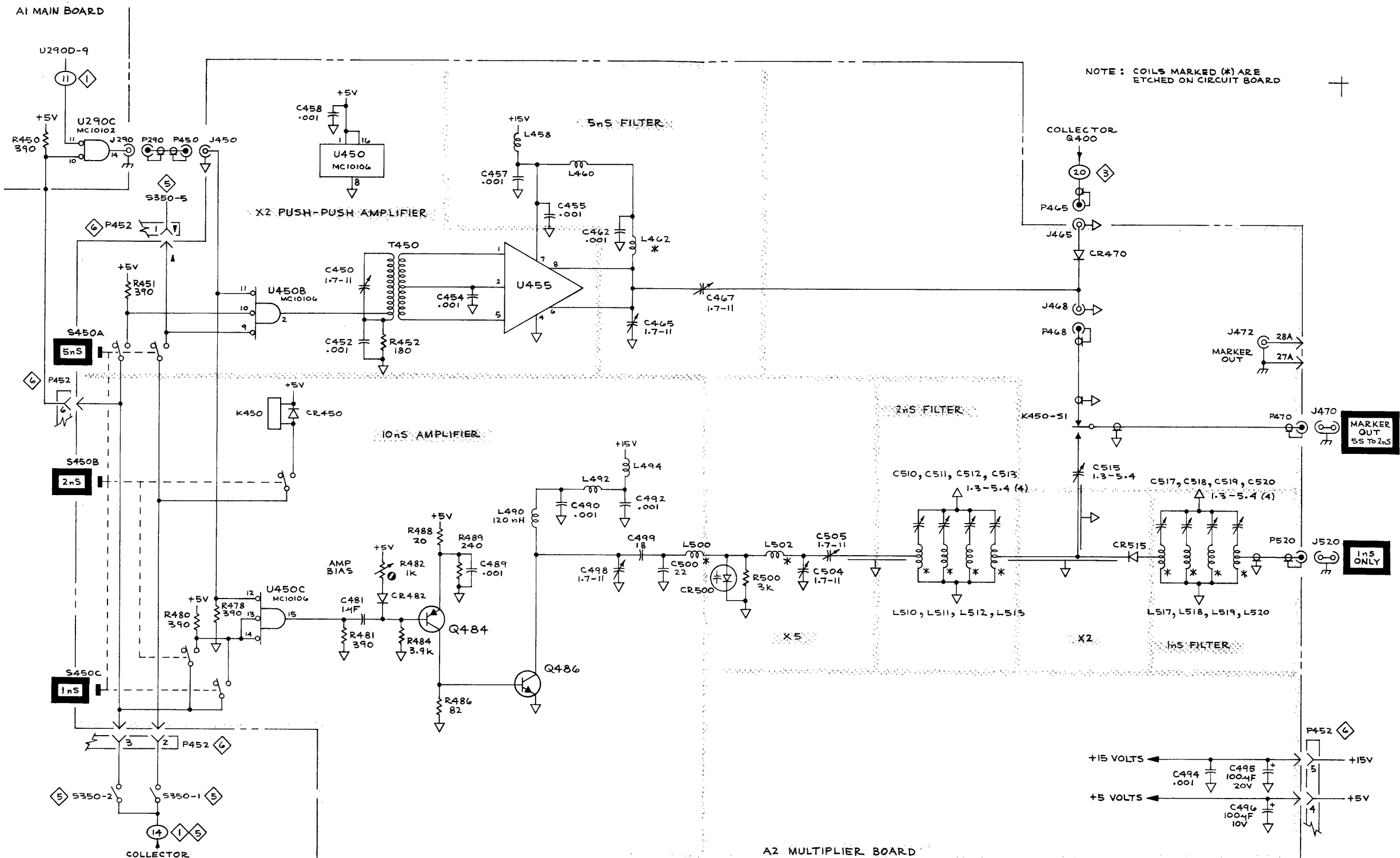
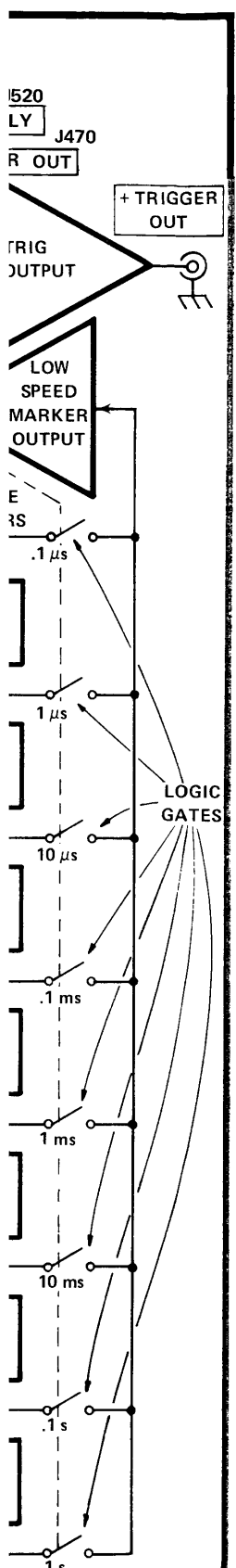
The 2 ns output sine-wave is hard-wired to CR515 and connected to J470 the MARKER OUT connector only if K450 has been enabled by depressing the 2 ns pushbutton.

The 2 ns sine-wave input to CR515 is distorted by the non-linear device (diode) to achieve a 1 ns sinewave. The 1 ns sinewave is then filtered by the 1 ns filter which is similar in operation to the 2 ns filter discussed previously. The output from the filter is available through the 1 ns ONLY connector. The 1 ns markers are available from the 1 ns ONLY connector whenever the MARKER Control is set to 521N and either the 2 ns or 1 ns pushbutton has been depressed.

10 ns AMPLIFIER, X5 2 ns FILTER, X2 and 1 ns FILTER

Placing the Marker control at its 521N position enables ECL logic gate U290C, which allows the 100 MHz signal to pass to J450. Pushing the 2 ns or 1 ns pushbutton enables ECL logic gate U450C, applying the 100 MHz (10 ns) signal to the base of Q484.

Q484 and Q486 compose a Class C amplifier. R482, CR482, and U450C make up a temperature compensation network for the amplifier. R482, Amp Bias, is used to peak the amplifier gain.



NOTE: COILS MARKED (*) ARE ETCHED ON CIRCUIT BOARD

THEORY OF OPERATION

DIAGRAM 6

POWER SUPPLY

+15-Volt Supply

The regulator for the +15 volt supply consists of short circuit protection and error sensing amplifier transistor Q605, error amplifier transistor Q600, Reference Zener diode VR605, and a Darlington transistor pair (Q610 and a series-pass transistor located in the power module mainframe). The supply voltage is established by comparing the supply voltage sample (which is established by the R616-R605 divider at the base of Q605) with the reference voltage established by VR605 at the emitter of Q605. Any difference between the Q605 base and emitter is amplified by Q605 and Q600, and used to change the conduction of the series-pass transistor to correct the output voltage. VR605 is temperature compensated by the base-emitter junction of Q605. R614 provides current limiting for the series pass transistor. R603 and Zener diode VR600 establish the operating voltage range for Q600.

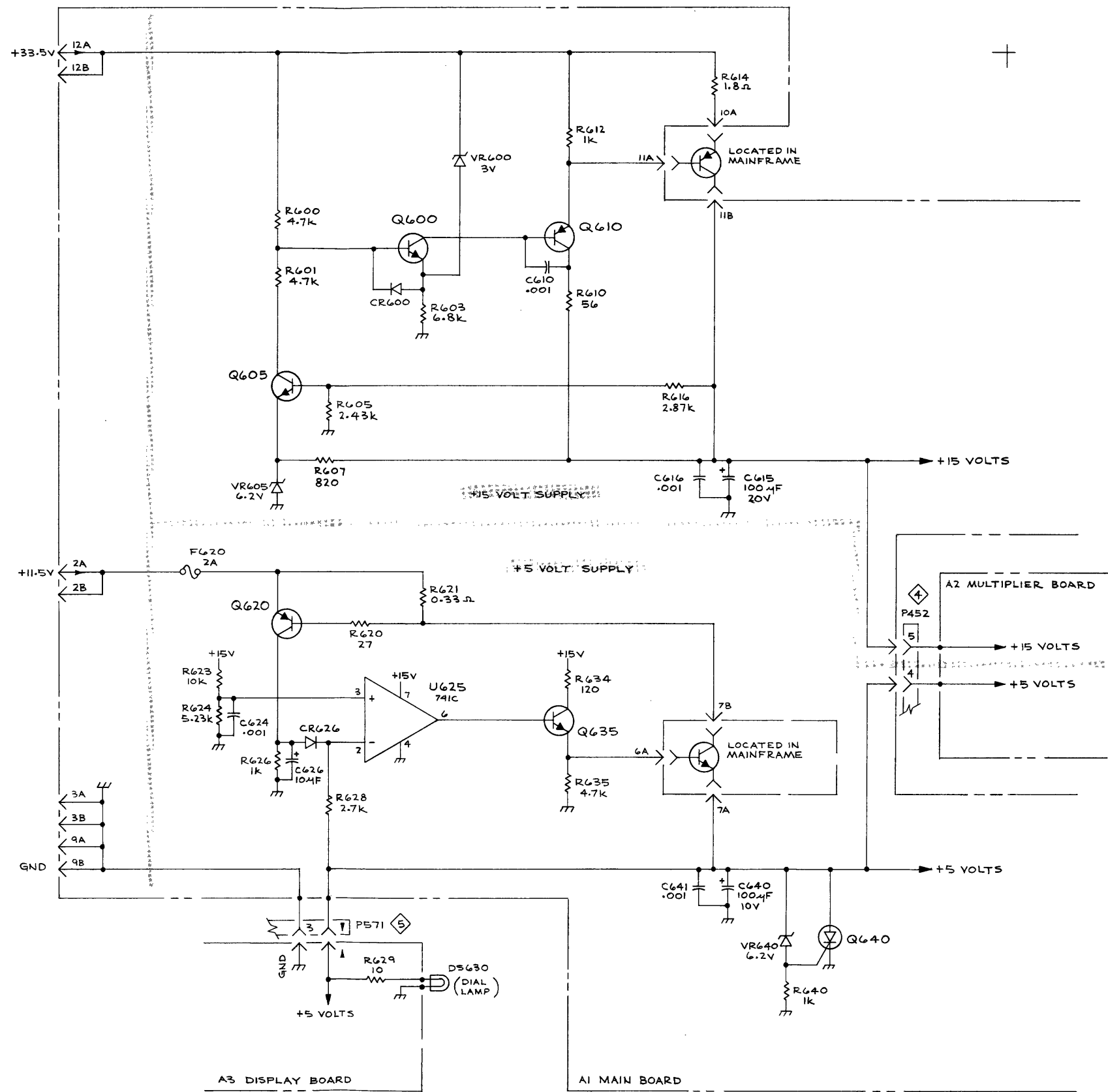
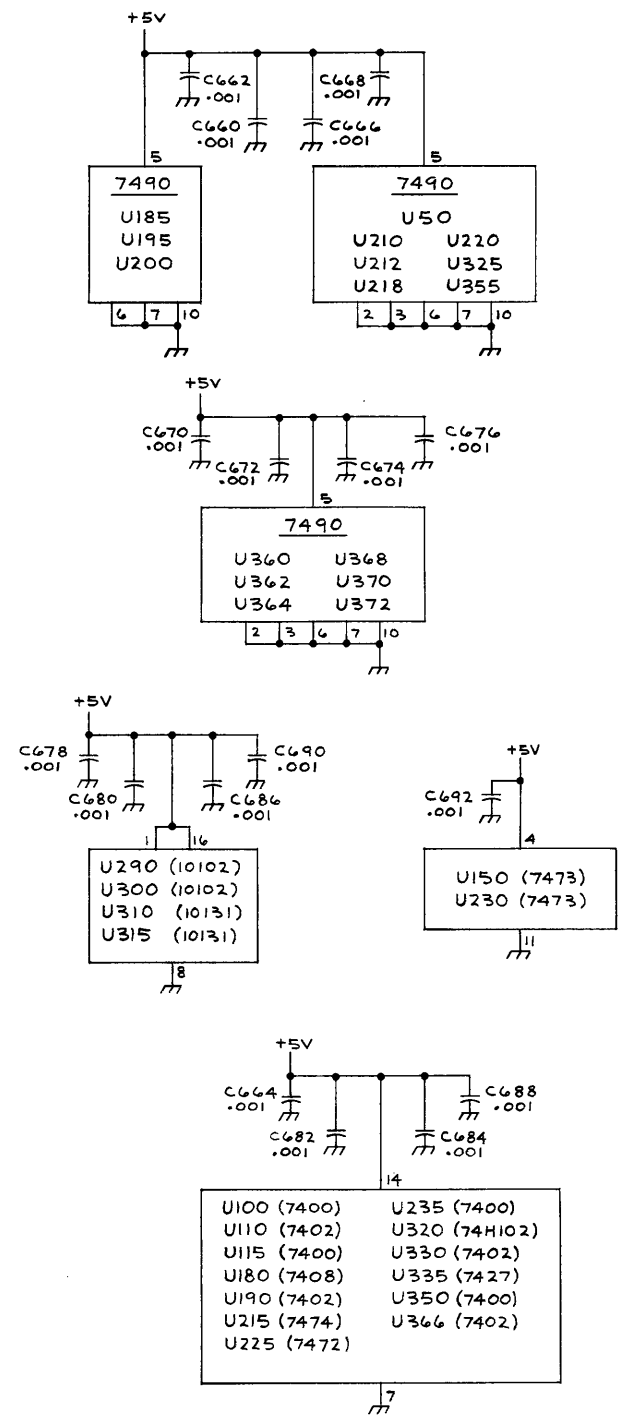
If the +15 V output is shorted (i.e., output goes low), Q605 starts to turn off which pulls the base of Q600 high through R600. Consequently, transistor Q600 saturates against the voltage established by 3 V Zener VR600 and R603. Thus, the voltage at the collector of Q600 is nearly 3 V below the unregulated line. The 3 V is reduced by the voltage drops at the base-emitter of Q610 and the base-emitter of the series-pass transistor in the power module mainframe to a maximum of approximately 1.6 V across R614. The 1.6 V across R614 establishes the maximum current that can be drawn from the +15 V supply.

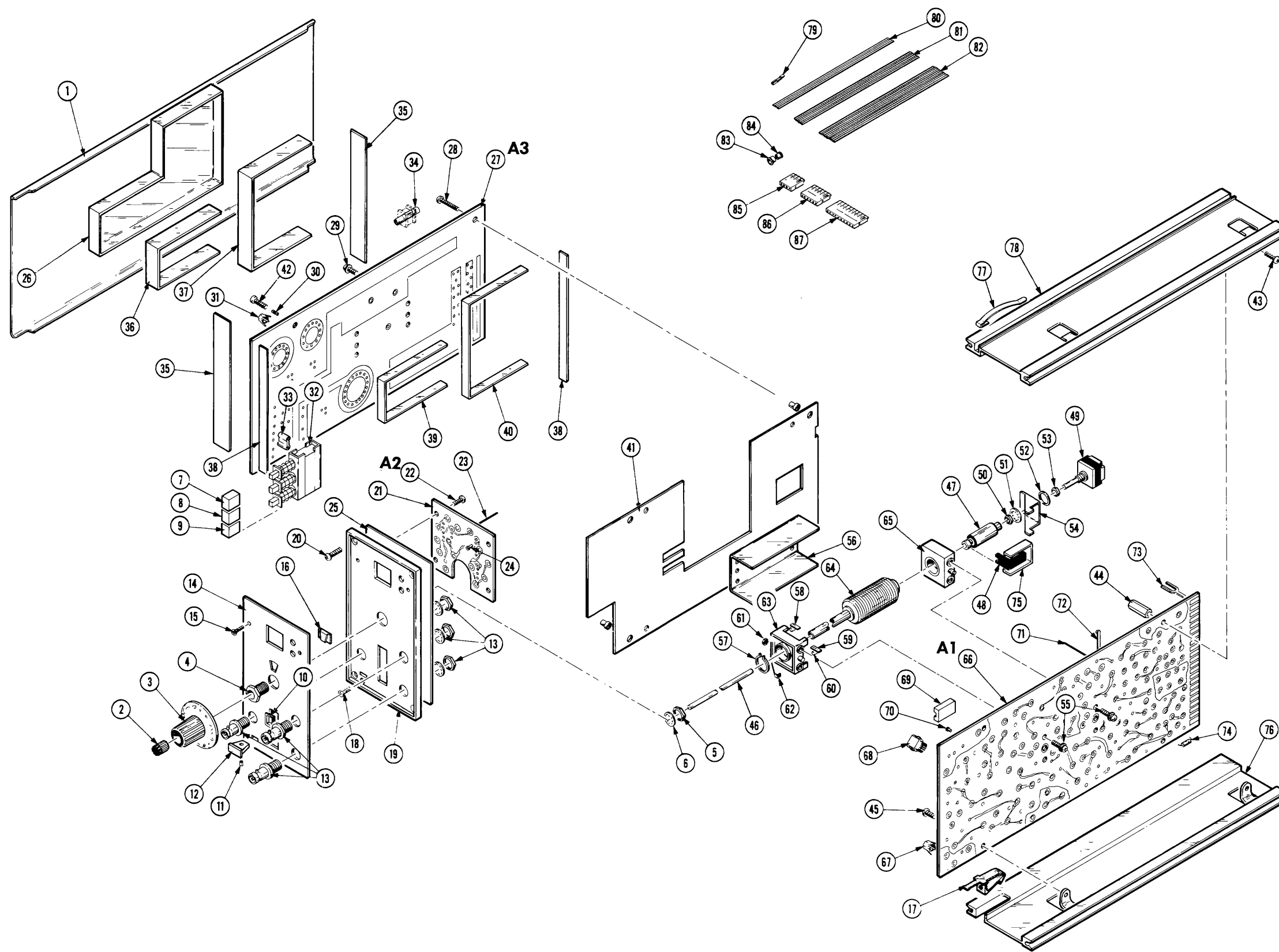
+5-Volt Supply

The regulator for the +5 volt supply consists of error sensing amplifier integrated circuit U625, short circuit protection transistor Q620, over-voltage protection circuit VR640-Q640 and a Darlington transistor pair (Q635 and a series-pass transistor in the power module mainframe). The supply voltage is established by comparing the supply voltage sample at the negative input to U625 with the reference at the positive input to U625. Any difference between the inputs to U625 causes an amplified correction voltage to be sent to the base of Q635, which in turn will cause a change in the conduction of the series pass transistor to correct the output voltage. R621 provides current limiting for the series pass transistor.

If the +5 V output is shorted (i.e., output goes low), the increased voltage drop across R621 causes Q620 to turn on. This pulls the negative input of U625 positive, which turns off Q635 and the series pass transistor. Fuse F620 protects Q620 if the short causes excessive current to be drawn from the supply.

In case the regulator causes the voltage to become more positive (i.e., +7 V or more), silicon controlled rectifier (SCR) will fire and short the +5 V output to ground.





+

ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty						Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont		1	2	3	4	5			
	070-1576-00			1						MANUAL, TECH:SERVICE	80009	070-1576-00

REPACKAGING

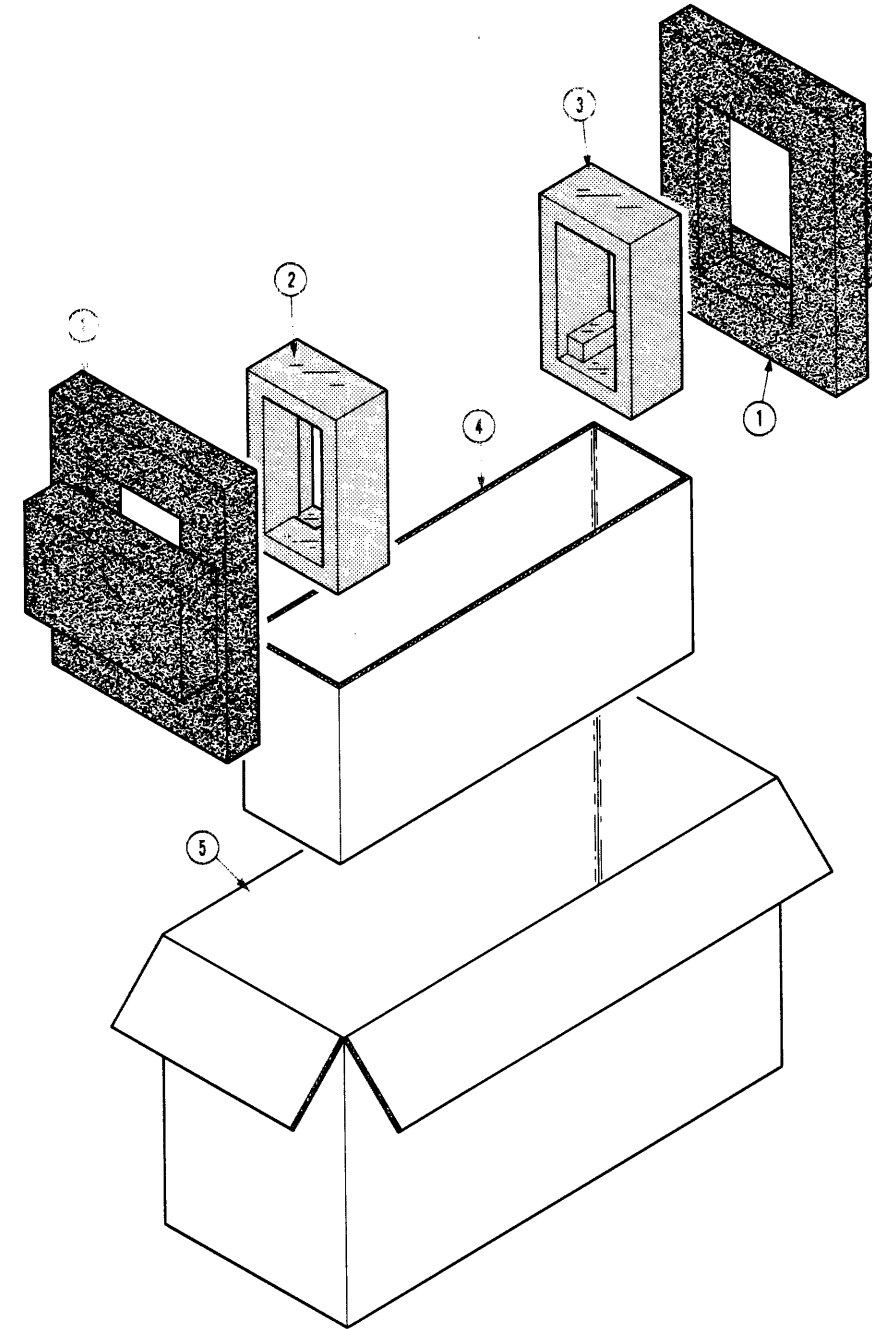
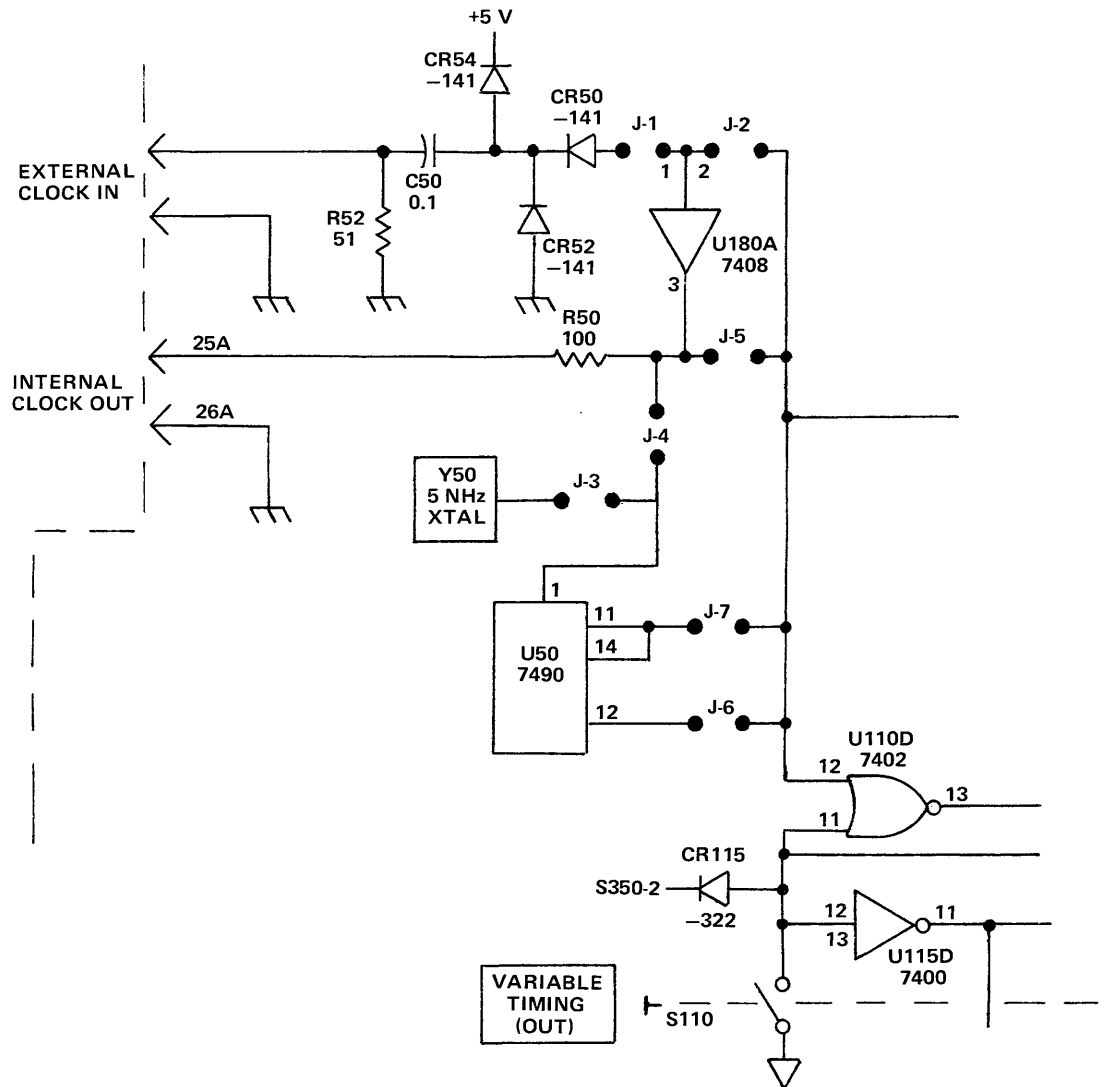


Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty						Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont		1	2	3	4	5			
2-	065-0151-00			1						CARTON ASSEMBLY:	80009	065-0151-00
-	-----			-						CARTON ASSEMBLY INCLUDES:		
-1	004-0282-00			2						FRAME:PLASTIC FOAM	80009	004-0282-00
-2	004-0243-00			1						PAD,CUSHIONING:FRONT	80009	004-0243-00
-3	004-0242-00			1						PAD,CUSHIONING:REAR	80009	004-0242-00
-4	004-1093-00			1						PAD,CUSHIONING:13.375 X 3.25 X 5.625"	80009	004-1093-00
-5	004-0612-00			1						CARTON:16.50 X 6.625 X 9.125 INCHES	80009	004-0612-00

OPTION 1

The TG 501 Option 1 is equipped with a temperature-compensated, 5 MHz crystal oscillator for a highly stable and precise internal clock. U50 provides countdown circuitry for the 5 MHz crystal.

The main circuit board jumpers that must be installed for Option 1 are: J3 and J7 (see Fig. 1-2 for jumper location).



MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Sections of the manual are often printed at different times, so some of the information on the change pages may already be in your manual. Since the change information sheets are carried in the manual until ALL changes are permanently entered, some duplication may occur. If no such change pages appear in this section, your manual is correct as printed.

TG 501 EFF SN B010100-up

TG 501 950A (Option 1)


ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

A1	670-3415-00	CKT BOARD ASSY:--TIME MARK GEN (Option 1)
C500	281-0511-00	CAP,FXD,CER 22 PF, 500 V
C504	281-0153-00	CAP, VAR, AIR, 1.7-10 PF, 250 V
Q486	151-0411-00	TRANSISTOR, SILICON, NPN
R135	311-1416-00	RES, VAR, COMP, 200 Ω , $\pm 20\%$
R484	315-0152-00	RES.,FXD,COMP: 1.5K OHM, 5%, 0.25W
R486	315-0510-00	RES.,FXD,COMP: 51 OHM, 5%, 0.25W
R488	317-0200-00	RES.,FXD,COMP: 20 OHM, 5%, 0.125W

ADD:

R487	317-0220-00	RES.,FXD,COMP: 22 OHM, 5%, 0.125W
------	-------------	-----------------------------------

(R487 is added between the emitter of Q486 and ground located on the MULTIPLIER Diagram )

MECHANICAL PARTS LIST CHANGE

Page 2-13

CHANGE TO:

Fig. 1-42	672-0441-00	1 CKT BOARD ASSY.--SWITCH TIMING (Option 1)
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TEXT CORRECTIONS

SECTION 1

Operating Instructions

Page 1-3

Operating Considerations

REPLACE: All information at the top of the page with the following:

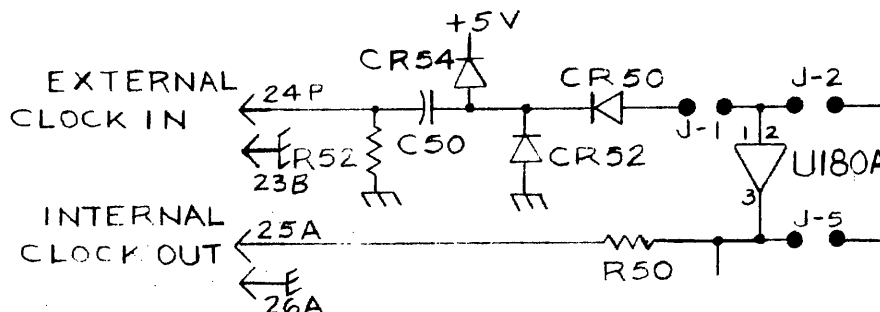
Remove U100 and disconnect Pin 3 of U350 before using external clocks. To disconnect Pin 3 remove U350, bend pin 3 out then insert U350 back into circuit board. Interface connector pin 24B is used for External Clock Input with the associated ground on pin 25B. Fig. 1-2 shows the location on the main circuit board of the jumpers that must be installed to use the TG 501 with the various clock choices. The required jumpers are:

Standard Internal Reference	
1 MHz Crystal	No jumpers required
Buffered Output of Internal	
Clocks	Install J2
External 1 MHz clock	
(Remove U100 disconnect	
Pin 3 of U350)	Install J1, J5
External 5 MHz clock	
(Remove U100, disconnect	
Pin 3 of U350, Add U50)	Install J1, J4, J7
External 10 MHz clock	
(Remove U100, disconnect	
Pin 3 of U350, add U50)	Install J1, J4, J6

If external clock source is TTL output, remove R52.

On Diagram 1 REFERENCE, READOUT LOGIC, & PHASE-LOCK LOOP, U350A, Pin 5 is changed to 3.

On the same diagram CR52 was drawn with the anode and cathode reversed. Correct as shown below:




TG 501 EFF SN B010117-up

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGE

CHANGE TO:

R408 315-0751-00 RES., FXD, COMP:750 OHM, 5%, 0.25W

(R408 is located on the DECADE DIVIDERS & OUTPUT AMPLIFIER diagram )

TG 501 & 950A (Option 1) EFF SN B010183

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGE

ADD:

C416	283-0156-00	CAP., FXD, CER, DI: 1000 pF, +100-0%, 200 V
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CHANGE TO:


C355	281-0516-00	CAP., FXD, CER, 39 pF, 500 V, +3.9 pF
------	-------------	---------------------------------------

R352	315-0151-00	RES, FXD, 150 OHM, 0.25 W, 5%
------	-------------	-------------------------------

R355	315-0151-00	RES, FXD, 150 OHM, 0.25 W, 5%
------	-------------	-------------------------------

R482	311-1225-00	RES, VAR, 1K OHM
------	-------------	------------------

SCHEMATIC CORRECTION

Diagram  REFER, READOUT LOGIC & PHASE-LOCK LOOP

The resistor labeled as R143, 50 Ω

should read R145.

TG 501 EFF SN B010210-up

TG 501 950A EFF SN B010260-up

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGE

CHANGE TO:

R135	311-0169-00	RES.,VAR, NONWIR, 100 OHM, 20%, 0.5 W
R486	315-0151-00	RES.,FXD,COMP: 150 OHM, 5%, 0.25 W

REMOVE: (950A, Option 1 ONLY)

C688	283-0000-00	CAP.,FXD,CER DI: 0.001 μ F, +100-0%, 500 V
------	-------------	--

ADD:

C150	283-0067-00	CAP.,FXD,CER DI: 0.001 μ F, 10%, 200 V
L486	108-0371-00	COIL,FXD: 0.23 μ H

MECHANICAL PARTS LIST CHANGE

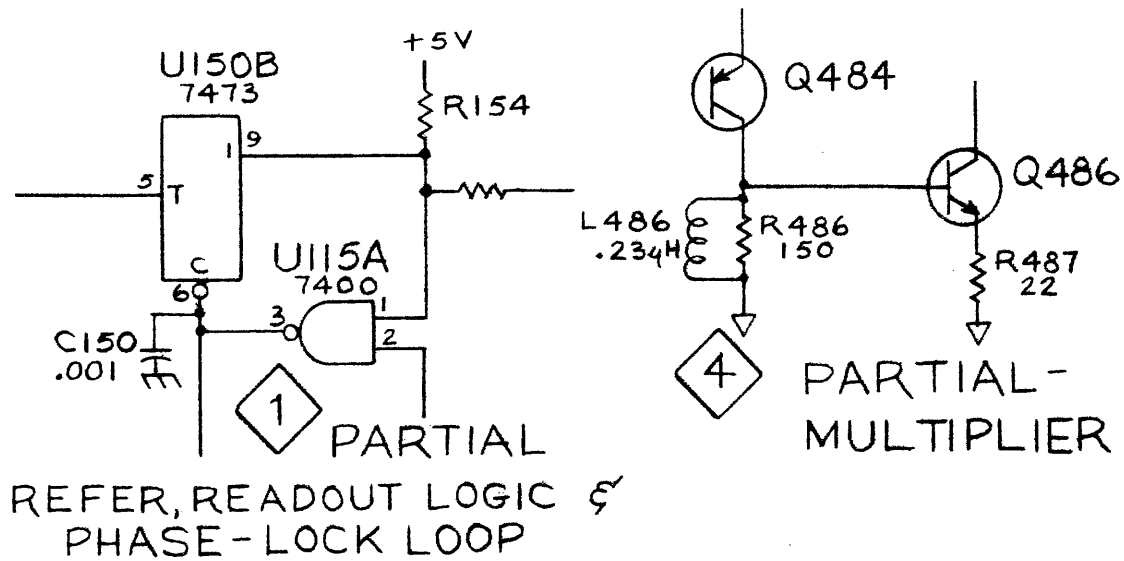
Page 2-13

CHANGE TO:

Fig. 1-1	337-1399-00	1 SHIELD, ELECTRICAL: RIGHT SIDE
	337-1399-02	1 SHIELD, ELECTRICAL: LEFT SIDE

ADD:

337-2107-00	1 SHIELD, ELECTRICAL
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TG 501 EFF SN B010218-up

TG 501-950A EFF SN B010262-up

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGE

CHANGE TO:

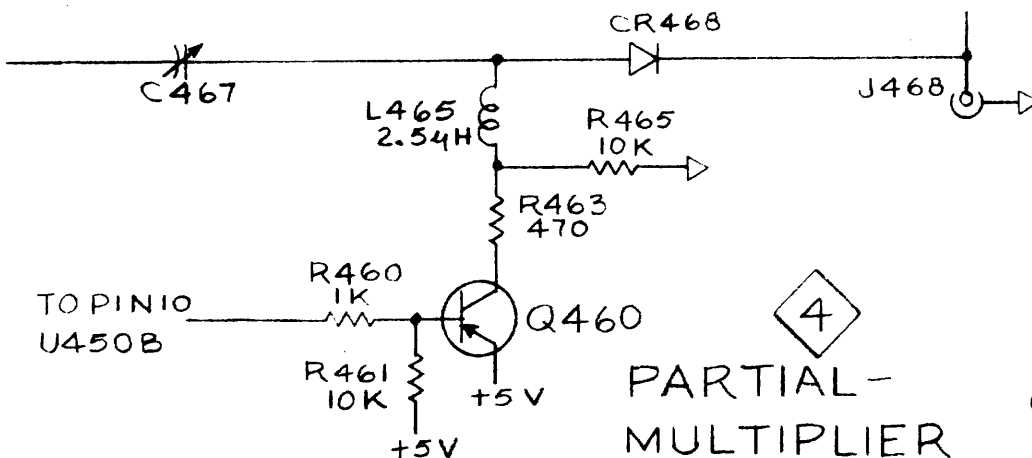
C405	290-0530-00	CAP.,FXD, ELCTLT: 68 μ F, 6V
Q415	151-0221-00	TRANSISTOR,SILICON,PNP S024849
R136	315-0180-00	RES.,FXD,COMP, 18 OHM, 5%, 0.25W
R398	315-0221-00	RES.,FXD,COMP, 220 OHM, 5%, 0.25W
R413	315-0202-00	RES.,FXD,COMP, 2K OHM, 5%, 0.25W
R415	315-0200-00	RES.,FXD,COMP 20 OHM, 5%, 0.25W
R500	311-1559-00	RES.,VAR,NONWIR, 10K OHM, 20%, 0.5W

REMOVE:

C416	283-0156-00	CAP.,FXD,CER DI:1000 PF,+100-0%, 200 V
------	-------------	--

ADD:

CR468	152-0153-00	SEMICONV DEVICE, SILICON,15 V, 50 MZ FD7003
L465	108-0509-00	COIL,FXD: 2.5 μ H
Q460	151-0221-00	TRANSISTOR,SILICON,PNP S024849
R460	315-0102-00	RES.,FXD,COMP, 1K OHM, 5%, 0.25W
R461	315-0103-00	RES.,FXD,COMP 10K OHM, 5%, 0.25W
R463	315-0471-00	RES.,FXD,COMP 470 OHM, 5%, 0.25W
R465	315-0103-00	RES.,FXD,COMP 10K OHM, 5%, 0.25W





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MANUAL CHANGE INFORMATION

PRODUCT TG 501 & TG 501

CHANGE REFERENCE C8/474

EFF SN B010302-up

DATE 4-23-74

CHANGE:

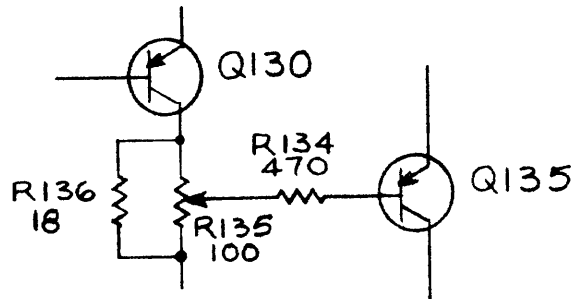
DESCRIPTION

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGE

ADD:

R134 315-0471-00 RES.,FXD,COMP: 470 OHM, 5%, 0.25W

REFER, READOUT LOGIC & PHASE-LOCK LOOP





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MANUAL CHANGE INFORMATION

PRODUCT TG501 & TG501-950A

CHANGE REFERENCE C9/574

EFF SN B010337-up

DATE 5-31-74

CHANGE:

DESCRIPTION

Pilot Change #25 ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

ADD:

R254 315-0102-00 RES.,FXD,COMP: 1K OHM, 5%, 0.25W

DIAGRAM 1 REFER, READOUT LOGIC & PHASE-LOCK LOOP

