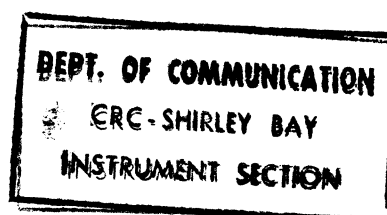


INSTRUCTION MANUAL



POWER MODULE

TM 501

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 repairs 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.

Specifications and price change privileges reserved.

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INSTALLATION PROCEDURE

Before you start...

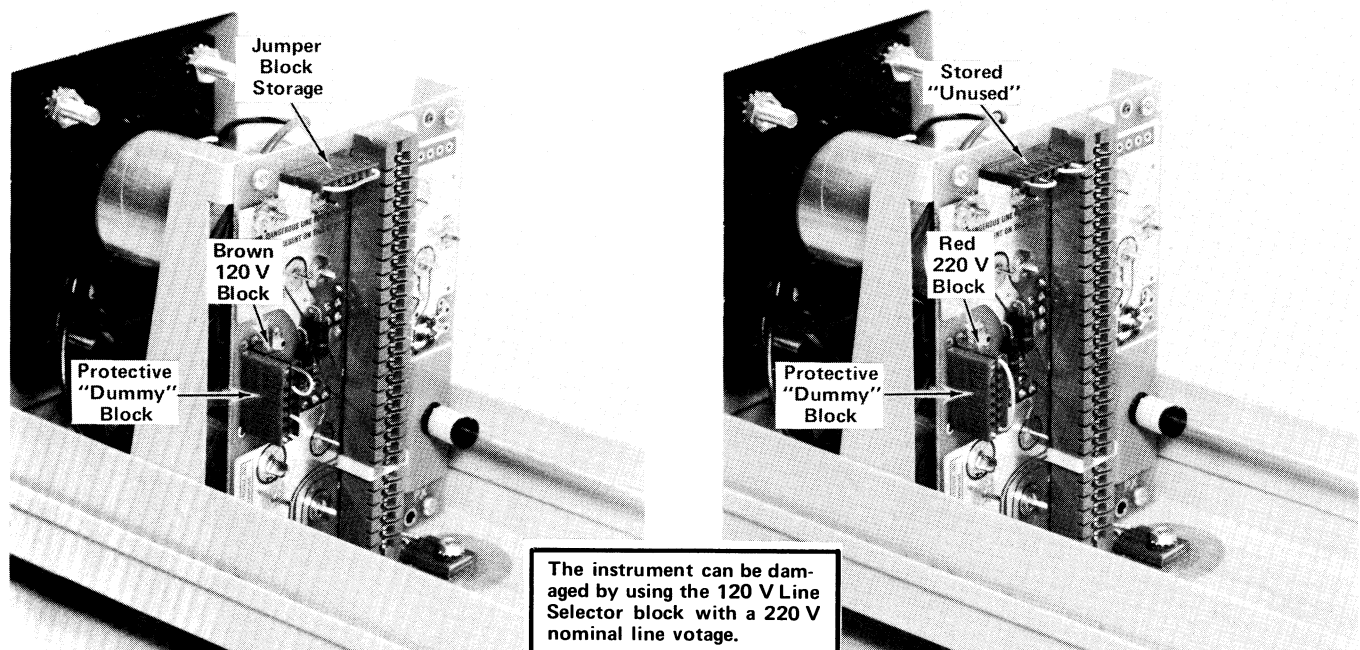
1. Check the rear panel markings. If the factory settings are compatible with the available line voltage and frequency, insert the desired plug-ins. Use the bail to raise the front of the instrument.

...go to Operating Instructions...

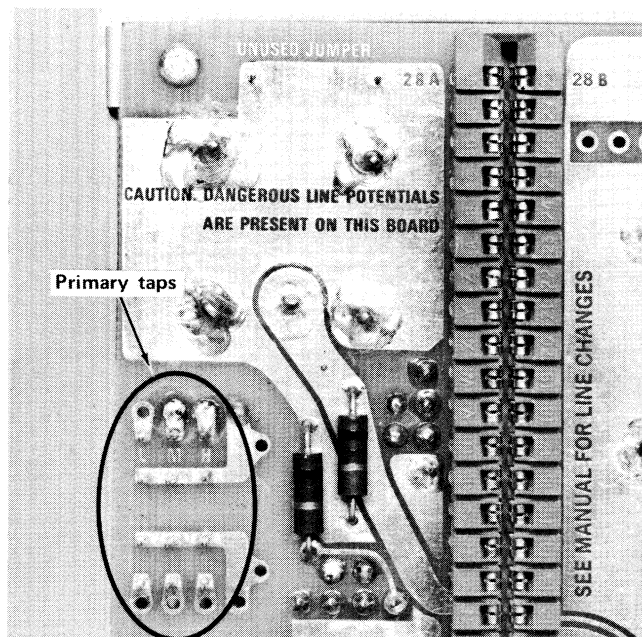
2. If a change is needed, follow these steps:

a. Line Selector Block(s)

Remove the two hold-down screws on the top of the dust cover cabinet and lift the cabinet off. This gives easy access to the Line Selector blocks located on the main circuit board.



b. Line Range Taps



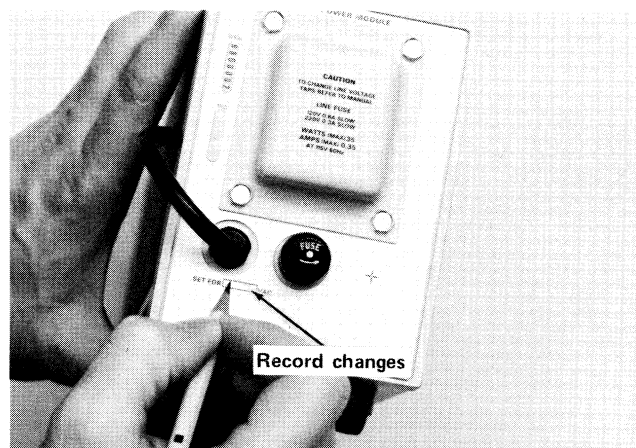
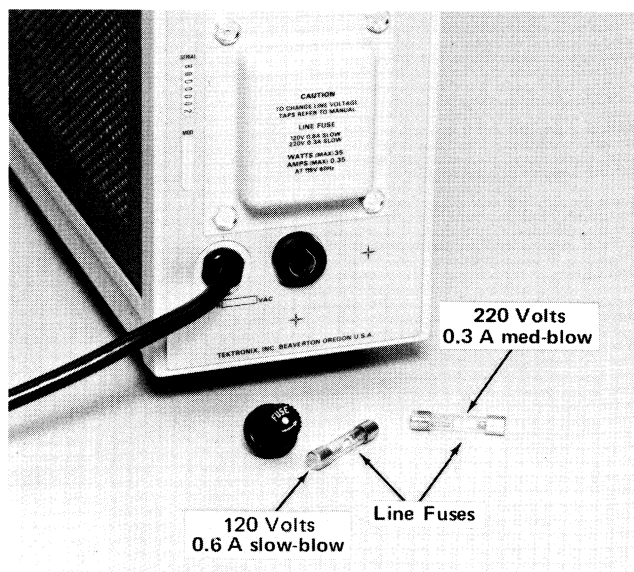
Standard Transformer (SN BO50000 - below)

Line Selector Block Position	Regulating Ranges
L Do not use	Internally disconnected
M (110 V Nominal)	99 VAC to 121 VAC
H (120 V Nominal)	108 VAC to 132 VAC

Universal Transformer (SN BO50000-up)

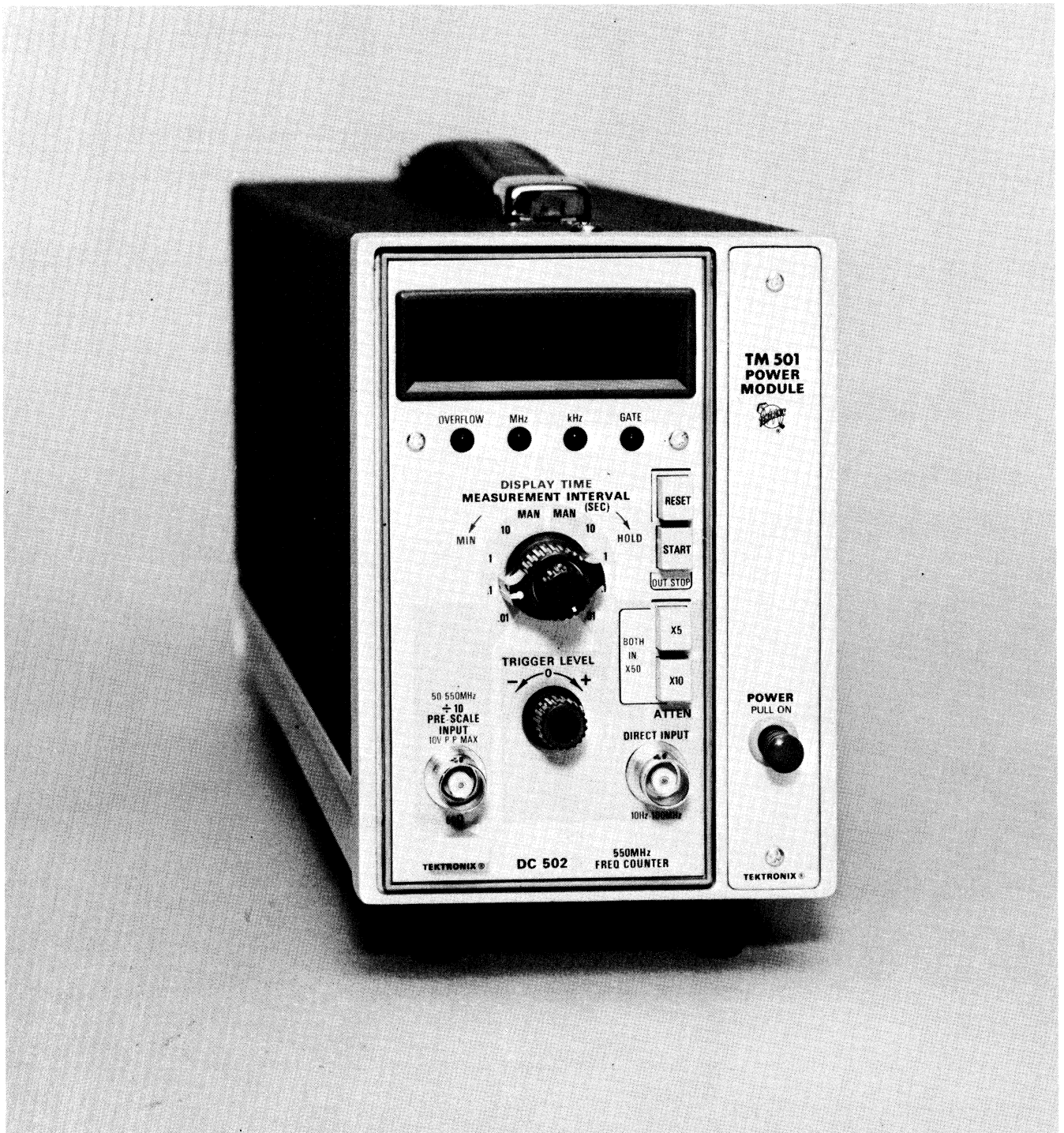
Line Selector Block Position	Regulating Ranges	
	120-Volts Nominal	220-Volts Nominal
L	90 VAC to 110 VAC	180 VAC to 220 VAC
M	99 VAC to 121 VAC	198 VAC to 242 VAC
H	108 VAC to 132 VAC	216 VAC to 264 VAC
Line Fuse Data	0.6 A slow-blow	0.3 A med-blow

c. Rear Panel



3. Replace the cabinet.
4. If necessary, change the line cord power plug to match the power source receptacle or use an adapter.
5. Plug the cord into the power source.
6. Insert the desired plug-ins.
7. Use the bail to raise the front of the instrument.

...go to Operating Instructions...



TM 501 Power Module with plug-in.

TM 501 OPERATING INSTRUCTIONS

INTRODUCTION

Description

The TEKTRONIX TM 501 Power Module is a single-compartment wide mainframe for the TM 500 Series of Modular Instrumentation. It is a basic power source for the many plug-in module members of the TM 500 Series family. Factory options allow customer modification using signal access at the plug-in module/power module interface to provide rear panel inputs and outputs.

Power Source

This instrument is designed to operate from a power source with its neutral at or near earth (ground) potential with a separate safety-earth conductor. It is not intended for operation from two phases of a multi-phase system, or across the legs of a single-phase, three-wire system.

Power Usage

The TM 501 can require up to 35 W of power at the upper limits of the high line voltage ranges. Actual power consumption depends on the particular module and operating mode selected.

Operating Temperatures

The TM 501 is designed to operate in ambient temperatures between 0°C and +50°C. Before operating the TM 501 after storage in temperatures within the specified storage range, allow the chassis to return to room ambient before applying power.

POWERING UP

Plug-in Modules

It is recommended that the TM 501 be turned off before inserting or removing any module. Arcing at the connector terminals can reduce contact life. However, no internal damage will result if a module is inserted into a live Power Module.

Module Installation

1. Check the location of the white plastic barriers on the interconnecting jack to insure that their locations match the slots in the edge of the plug-in module's circuit board.

2. Align the plug-in module chassis with the upper and lower guides of the compartment. Push the module in and press firmly to seat the circuit board in the interconnecting jack. (Remove the plug-in module by pulling on the white release latch located in the lower left corner of each module.)

3. Pull the POWER button on the right side of the TM 501. Some plug-in modules have independent power switches, usually labeled OUTPUT, controlling application of mainframe power to the module itself. Push this button to activate the plug-in module.

Loading Considerations

The TM 501 can require up to 35 W of power from the line at high-line voltage range settings. Actual power consumed, of course, depends on the particular module selected. This power capability can best be utilized by carefully planning the external loads and the resulting power distributions. Optimum conditions would dissipated as much power as possible in external loads in an ambient temperature around +25°C.

The TM 501 provides the plug-in module with access to a pair of heat-sinked, chassis-mounted transistors, one NPN and one PNP. These Series-Pass transistors allow plug-in modules to operate in power ranges not possible if the power had to be dissipated in the modules themselves.

BUILDING A SYSTEM

Family Compatibility

Mechanically, the plug-in modules are very similar to other TEKTRONIX product families. However, they are not **electrically** compatible. Therefore, the TM 501 interface has barriers on the mating connectors between pins 6 and 7 to insure that incompatible plug-ins cannot be inserted. See Figure 1. A compatible module will have a matching slot between pins 6 and 7 of its main circuit board edge connector. This slot and barrier combination is the primary keying assignment.

Another identifier for TM 500-compatible plug-in modules is the white color of the release latch.

Customizing the Interface

The modularity of this instrumentation system provides for a host of functions to be performed by the plug-in modules. Specific functions are grouped into families or classes, of which there may be several plug-in module members. For instance, some classes are Power Supplies,

Signal Sources, Measurement and so forth. Each modular member of a functional family will have a second slot peculiar to its family assignment located in its edge connector. The TM 501 user can "program" the Power Module to accept only members of a certain family by installing a second barrier in the interface connector to match the module's slot location. For extra barriers, order TEKTRONIX Part Number 214-1543-02.

Rear Panel

The rear sub-panel is punched for BNC and multi-pin connector mountings. Customer- or factory-installed connectors and wiring (see following description of catalog Option 2) could provide external access to the interface for external I/O control. This feature makes the TM 500 Series Modular Instrumentation System very flexible.

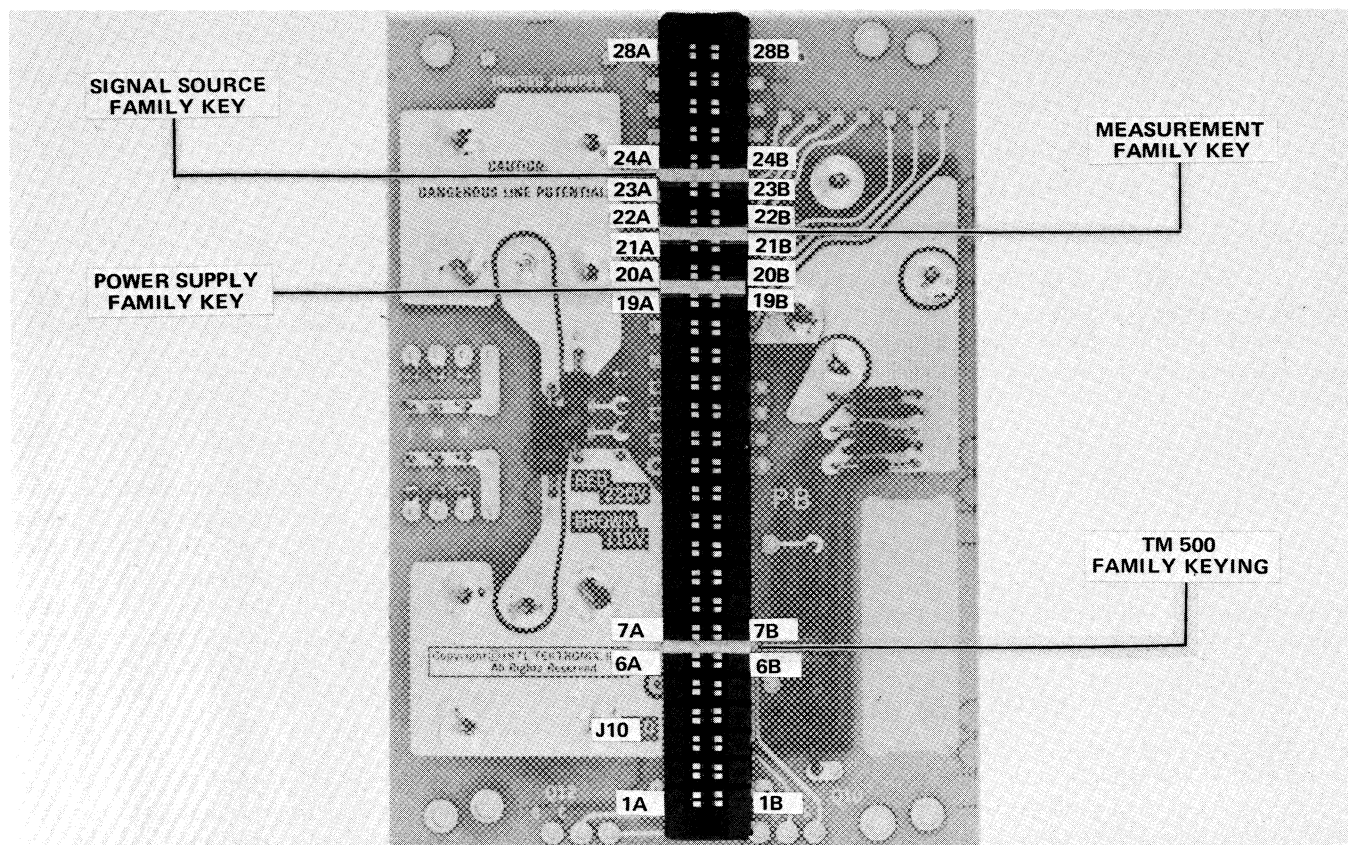


Figure 1. Keying assignments for family functions.

Option 2. This factory-installed option adds 25-mil squarepin connectors to the rear of the interconnecting jack at all pin locations from pins 14A and B through pins 28A and B. This will keep the interface flexible by making it easy and fast to change customized wiring using prepared wires with squarepin receptacles and long-nose pliers or

tweezers. It also protects the circuit board from damage by repeated soldering and unsoldering of jumper wires. This option also adds a BNC connector and a 50-pin connector to the rear panel. These connectors are **not** pre-wired in order to give a system designer as much flexibility as possible. Instead, prepared jumpers, coax cables, and interconnection jack barriers are included in a kit.

SPECIFICATIONS

Power Requirements

Line Voltage Ranges. Universal Transformer. 100, 110, 120, 200, 220, 240 VAC, all within 10%. Range changing for transformer accomplished with quick-change line-selector blocks.

Line Frequency Ranges. Universal Transformer: 48 Hz to 440 Hz.

Power Consumption. Maximum primary power approximately 35 W at high line. Actual power consumption depends on plug-in selection and operating modes.

Supplies (Unregulated)

Two 25 VAC windings, 500 mA each.

+33.5 V and -33.5 V, 500 mA, maximum.

17.5 VAC and +11.5 V, 1.0 A, maximum, shared in any combination between these two supplies.

NOTE

Current and voltage ratings are for main frame maintenance only. In practice, not all available power may be used at once. More detailed information is supplied with kit 040-0652-00 (TM 500-plug-in).

Temperature Range

Operating: 0°C to +50°C. Nonoperating: -40°C to +75°C.

Altitude Range

Operating: To 15,000 feet. Nonoperating: To 50,000 feet.

Other

Dimensions with Feet and Bail: H 6.0 in., W 3.9 in., L 15.3 in.

Weight without Plug-ins: Approximately 6.0 lb.

TM 501 SYSTEM MAINTENANCE

GENERAL

Introduction

This section of the manual is meant to support the entire TM 500 Series family of modules with a general coverage of the most commonly-needed service information pertinent to preventive maintenance, troubleshooting, ordering parts, and replacing components and sub-assemblies.

Cabinet Removal

WARNING

Dangerous potentials exist at several points throughout the system. When the system must be operated with the cabinet removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect power before cleaning the system or replacing parts.

Two screws on the top secure the cabinet to the TM 501 frame. Remove them and lift the cabinet straight up. Do not operate the system with the cabinet removed any longer than necessary for troubleshooting and calibration. Re-install the cabinet to protect the interior from dust and to remove personnel shock hazards.

Cleaning

CAUTION

Avoid using chemical cleaning agents which might damage plastic parts. Avoid chemicals containing benzene, toluene, xylene, acetone, or similar solvents.

Exterior. Loose dust may be removed with a soft cloth or a dry brush. Water and a mild detergent may be used; however, abrasive cleaners should not be used.

Interior. Cleaning the interior of a unit should precede calibration since the cleaning processes could alter the settings of calibration adjustments. Use low-velocity compressed air to blow off accumulated dust. Hardened dirt can be removed with a soft, dry brush, cotton-tipped swab, or a cloth dampened in a solution of water and mild detergent.

Preventive Maintenance

Preventive maintenance steps performed on a regular basis will enhance the reliability of the instrumentation system. However, periodic checks of the semiconductors in the absence of a malfunction are not recommended as preventive maintenance measures. See the semiconductor checking information under Troubleshooting Techniques which follow. A convenient time to perform preventive maintenance is just before instrument calibration.

Calibration

To insure accurate signal generation and measurement, the performance of individual units comprising the system should be checked periodically. Refer to the Instruction Manual for each unit for complete calibration and verification procedures.

TROUBLESHOOTING AIDS

Introduction

The following is provided to augment information contained elsewhere in this and other TM 500 Series family manuals when troubleshooting becomes necessary.

Circuit Descriptions

Each manual has a section devoted to explaining circuit operating theory. Used conjointly with the schematics, this can be a powerful analytic tool.

Diagrams

Block diagrams and detailed circuit schematics are located on foldout pages in the service section of most of the TM 500 Series family manuals. The schematic diagrams show the component values and assigned circuit reference numbers of each part necessary to the circuit design. Usually the first page of the service sections defines the circuit symbols and reference designators used in that particular instrument. Major circuits are usually identifiable by a series of component numbers. Important waveforms and voltages may be shown within the diagrams or on adjoining aprons. Those portions of the circuits located on circuit boards are enclosed with a blue tint outline.

Cam Switch Charts

Cam switches shown on the diagrams are coded in comprehensive charts to locate the cam number of the switch contact in the complete switch assembly, counting from the front, or knob end, toward the rear of the switch. The charts also indicate with a solid dot when each contact is closed.

Circuit Board Illustrations

Line illustrations showing component locations keyed with a grid scheme for each circuit board are usually placed on the back of a foldout page and sequenced as close as possible to an associated schematic. The GRID LOC column in the Electrical Parts Lists keys each component to the Location illustrations.

Component and Wiring Color Codes

Colored stripes or dots on electrical components signify electrical values, tolerances, etc., according to EIA standards. Components not color-coded usually have information printed on the body. The wiring coding follows the same EIA standards with the exception of the AC power cord of the Power Modules. It is coded like this:

Black	Line
White	Neutral
Green with a Yellow stripe	Safety Earth or Ground

Testing Equipment

Generally, a wide-band oscilloscope, a probe, and a multimeter are all that is needed to perform basic waveform and voltage checks for diagnostic purposes. The calibration procedures in the manual for each plug-in module list specific test equipment and the features necessary to adequately check out that particular module.

TROUBLESHOOTING TECHNIQUES

Introduction

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding to extensive troubleshooting.

Control Settings

Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control, see the Operating Instructions section of the manual for the instrument involved.

System and Associated Equipment

Before proceeding with troubleshooting the TM 500 Series system, check that the instruments in the system are operating correctly. Check for proper interconnection between the power module and the plug-in module. Check the line voltage at the power source. Check that the signal is properly connected and that the interconnecting cables and the signal source are not defective.

The associated plug-in modules can be checked for proper operation quickly by substituting other like units known to be operating properly. If the trouble persists after substitution, then the power module is probably at fault.

Visual Check

Inspect the portion of the system in which the trouble is suspected. Many troubles can be located by visual clues such as unsoldered connections, broken wires, damaged circuit boards, damaged components, etc.

Instrument Calibration

Check the calibration of the suspected plug-in module or the affected circuit if the trouble is obviously in a certain circuit. The trouble may only be a result of misadjustment or may be corrected by re-calibration. Complete calibration instructions are given in the manual for each instrument in the system.

Circuit Isolation

Note the symptom. It often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by making waveform and voltage measurements.

Incorrect operation of all circuits often means trouble in the power supplies. Using a multimeter, check first for correct voltages of the individual regulated supplies according to the plug-in module schematics and calibration procedures. Then check the unregulated supplies of the power module. Defective components elsewhere in the instruments can appear as power supply problems. In these instances, suspected circuits should be disconnected from apparently bad power supplies one at a time to narrow the search.

Voltages and Waveforms

Often defective components can be located by using waveform and voltage indications when they appear on the schematic or in the calibration procedures. Such waveforms and voltage labels are typical indications and will vary between instruments. To obtain operating conditions similar to those used to take these readings, refer to the first diagram in the service sections.

Component Checking

If a component cannot be disconnected from its circuit, then the effects of the associated circuitry must be considered when evaluating the measurement. Each for soldered-in transistors and integrated circuits most components can be lifted at one end from the circuit board.

Transistors and IC's. Turn the power switch off before removing or replacing any semiconductor.

A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which has been checked previously). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions. A suction-type desoldering tool must be used to remove soldered-in transistors; see component replacement procedure for details.

Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit description is essential to troubleshooting circuits using IC's. Operating waveforms, logic levels, and other operating information for the IC's are given in the circuit description information of the appropriate manual. Use care when checking voltages and waveforms around the IC's so that adjacent leads are not shorted together. A convenient means of clipping a test probe to the 14- and 16-pin in-line IC's is with an integrated-circuit test clip. This device also doubles as an extraction tool.

Diodes. Do not use an ohmmeter that has a high internal current. High currents may damage the diode.

A diode may be checked for an open or shorted condition by measuring the resistance between terminals. With an ohmmeter scale having an internal source of between 800 mV and 3 V, the resistance should be very high in one direction and very low when the leads are reversed.

Resistors. Check the resistors with an ohmmeter. Resistor tolerances are given in the Electrical Parts List in every manual. Resistors do not normally need to be replaced unless the measured value varies widely from the specified value.

Capacitors. A leaky or shorted capacitor can be detected by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter which will not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacity meter, or by checking whether it passes AC signals.

PARTS ORDERING AND REPLACING

Ordering

Standard Parts. All electrical and mechanical replacement parts can be obtained through the local TEKTRONIX Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the Parts Lists for value, tolerance, rating, and description. When selecting replacement parts, it is important to remember that the physical size and shape of the component may affect its performance in an instrument. All replacement parts should be direct replacements unless it is known that a different component will not adversely affect the instrument performance.

Special Parts. Some parts are manufactured or selected by Tektronix, Inc., to satisfy particular requirements, or are manufactured for Tektronix, Inc., to our specifications. Most of the mechanical parts used in this system have been manufactured by Tektronix, Inc. Order all special parts directly from the local TEKTRONIX Field Office or representative.

Ordering Procedure. When ordering replacement parts from Tektronix, Inc., please include the following minimum information:

1. Instrument Type (PS 501, SG 502, DC 501, etc.)
2. Instrument Serial Number (For example, B010250)
3. A description of the part (if electrical, include the circuit number)
4. TEKTRONIX part number

Please do not return any instruments or parts before receiving directions from Tektronix, Inc.

A listing of TEKTRONIX Field Offices, Service Centers, and Representatives can be found in the TEKTRONIX Product Catalog and Supplements and in the rear of the Power Module manuals.

Replacing

The exploded view drawings associated with the Mechanical Parts Lists, located to the rear of most manuals,

may be especially helpful when disassembling or re-assembling individual components or sub-assemblies.

Circuit Boards. If a circuit board is damaged beyond repair the entire assembly including all soldered-on components, can be replaced. Part numbers are given in the mechanical parts list for the completely wired (670 prefix) board (388 prefix).

To remove or replace a board, proceed as follows:

1. Disconnect all leads connected to the board (both soldered lead connections and solderless pin connections).
2. Remove all screws holding the board to the chassis or other mounting surface. Some boards may be held fast by plastic mounting clips around the board edges. For these, push the mounting clips away from the circuit board edges to free the board. Also, remove any knobs, etc., that would prevent the board from being lifted out of the instrument.
3. Lift the circuit board out of the unit. Do not force or bend the board.
4. To replace the board, reverse the order of removal. Use care when replacing pin connectors; if forced into place incorrectly positioned, the pin connectors may be damaged.

Transistors and IC's. Transistors and IC's should not be replaced unless they are actually defective. If removed from their sockets during routine maintenance return them to their original sockets. Unnecessary replacement or switching of semiconductor devices may affect the calibration of the instruments. When a transistor is replaced, check the operation of the part of the instrument that may be affected.

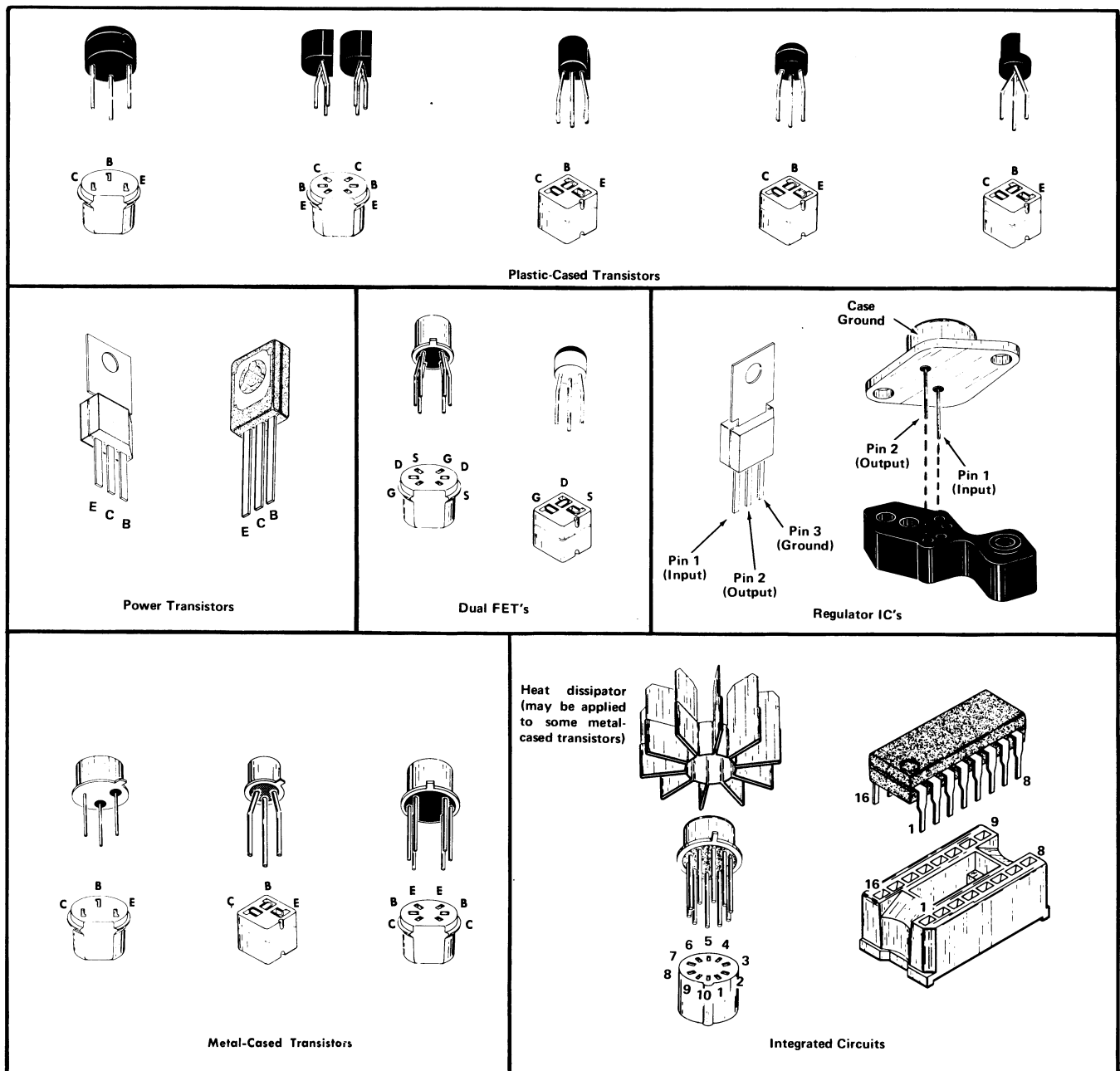


Figure 2. Semiconductor device lead configurations found in the TM 500 family.

Replacement semiconductors should be of the original type or a direct replacement. Figure 2 shows the lead configuration of the semiconductors used in this instrument system. When removing soldered-in transistors, use a suction-type de-soldering tool to remove the solder from the holes in the circuit board.

An extracting tool should be used to remove the 14- and 16-pin integrated circuits to prevent damage to the pins. This tool is available from Tektronix, Inc. Order TEKTRONIX Part No. 003-0619-00. If an extracting tool is

not available, use care to avoid damaging the pins. Pull slowly and evenly on both ends of the IC. Try to avoid having one end of the IC disengage from the socket before the other end.

To replace one of the power transistors mounted on the Power Module chassis adjacent to the interface circuit board, first unsolder the leads. Then, loosen the nuts which clamp the transistor to the chassis. Remove the defective transistor. When replacing the transistor, use a mica washer on the metal tab to increase heat transfer from the transistor to the chassis.

Interconnecting Pins. To replace a pin which is mounted on a circuit board, first disconnect any pin connectors. Then, unsolder the damaged pin and pull it out of the board with a pair of pliers. Be careful not to damage the wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Remove the ferrule from the new interconnecting pin and press the new pin into the hole in the circuit board. Position the pin in the same manner as the old pin. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

NOTE

A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Order TEKTRONIX Part No. 040-0542-00.

Cam Switches. Repair of cam-type switches should be undertaken only by experienced maintenance personnel. Switch alignment and spring tension of the contacts must be carefully maintained for proper operation of the switch. For assistance, contact your local TEKTRONIX Field Office or representative.

NOTE

A cam-type switch repair kit including necessary tools, instructions, and replacement contacts is available from Tektronix, Inc. Order TEKTRONIX Part No. 040-0541-00.

The cam-type switches consist of rotating cam drums which are turned by front-panel knobs, and sets of spring-leaf contacts mounted on adjacent circuit boards. The contacts are actuated by lobes on the cams. These switches can be disassembled for inspection, cleaning, repair, or replacement as follows:

1. Remove the screws which hold the metal cover on the switch, and lift the cover off the switch. The switch is now open for inspection or cleaning.

2. To completely remove a switch from the circuit board, first remove any knobs or shaft extensions. Loosen the coupling at the potentiometer at the rear of the switch, and pull the long shaft out of the switch assembly.

3. Remove the screws (from the opposite side of the circuit board) which hold the cam drum to the board.

4. To remove the cam drum from the front support block, remove the retaining ring from the shaft on the front of the switch and slide the cam drum out of the support block. Be careful not to lose the small detent roller.

5. To replace defective switch contacts, follow the instructions given in the switch repair kit.

6. To re-install the switch assembly, reverse the above procedure.

Pushbutton Switches. The pushbutton switches are not repairable and should be replaced as a unit if defective. Use a suction-type de-soldering tool to remove solder from the circuit board when removing these switches.

Incandescent Bulbs. Most of these light bulbs are mounted on the sub-panel using plastic sleeve stand-offs. Unsolder the lead wires and pull the bulb out of the sleeve from the rear of the sub-panel.

Light-Emitting Diodes. LED's used as indicators are mounted on the sub-panels with plastic sleeve sockets similar to the incandescent bulb mountings or they are soldered directly to a sub-assembly and so mounted that they protrude through holes in the panel. In these cases, the sub-assembly must be exposed and the anode and cathode lead orientations carefully noted before unsoldering the defective LED. See Figure 3 for LED lead identifying information.

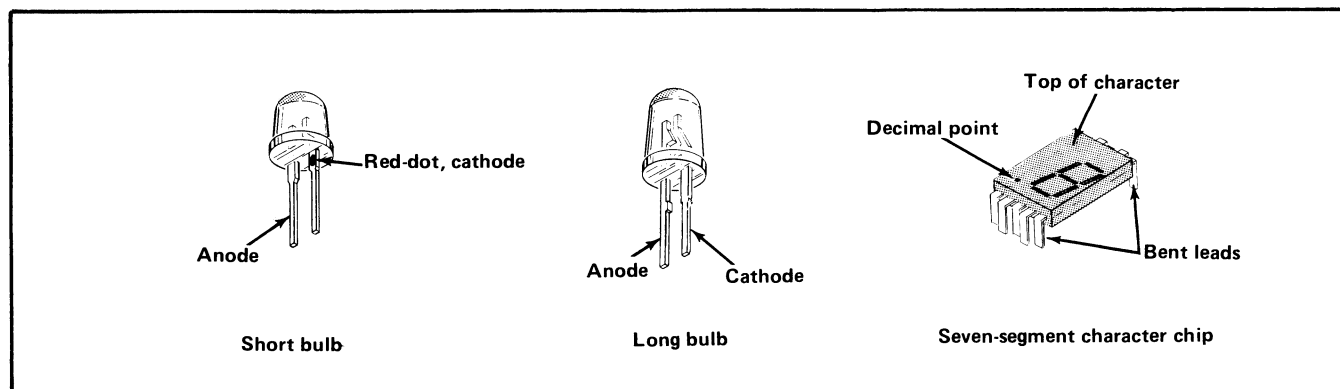


Figure 3. Light-emitting diode (LED) lead orientation illustration.

Power Transformer. Replace the transformer only with a TEKTRONIX direct replacement transformer. Refer to the exploded view drawing at the rear of the Power Module manuals for disassembly of the rear panel to expose the

power transformer. Refer to the schematic diagram color-coding information for correct wiring. After replacement, check out the power supply voltages before installing a plug-in module.

DIAGRAMS, PARTS LISTS, AND ILLUSTRATIONS

Symbols and Reference Designators

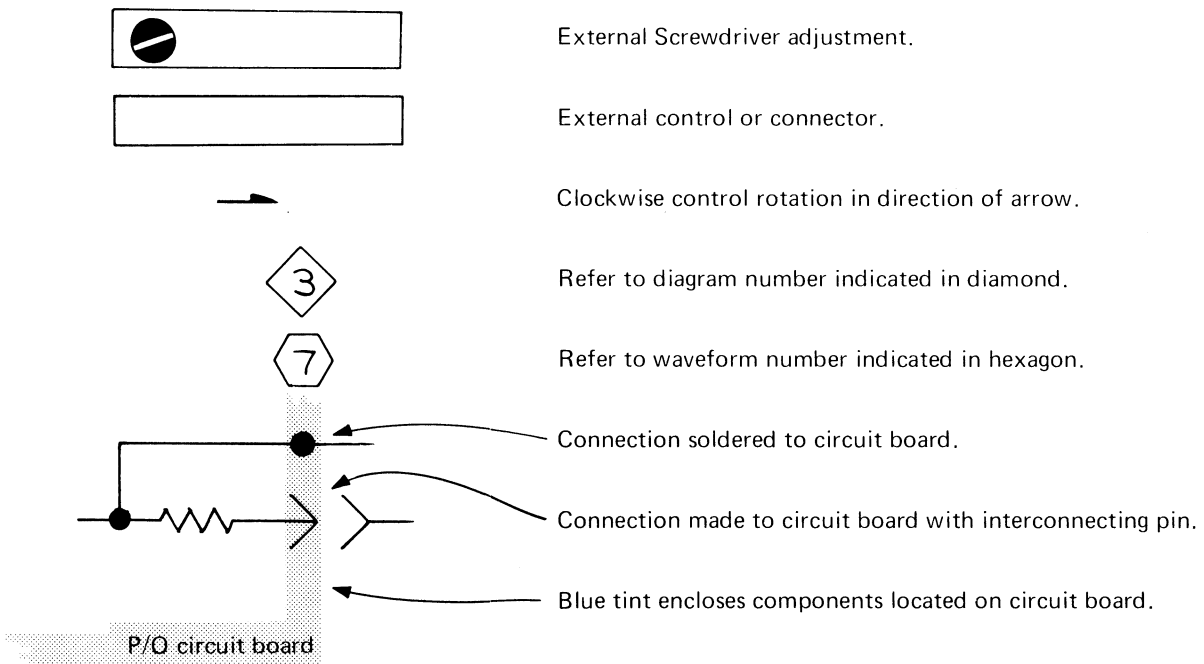
Electrical components shown on the diagrams are in the following units unless noted otherwise:

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

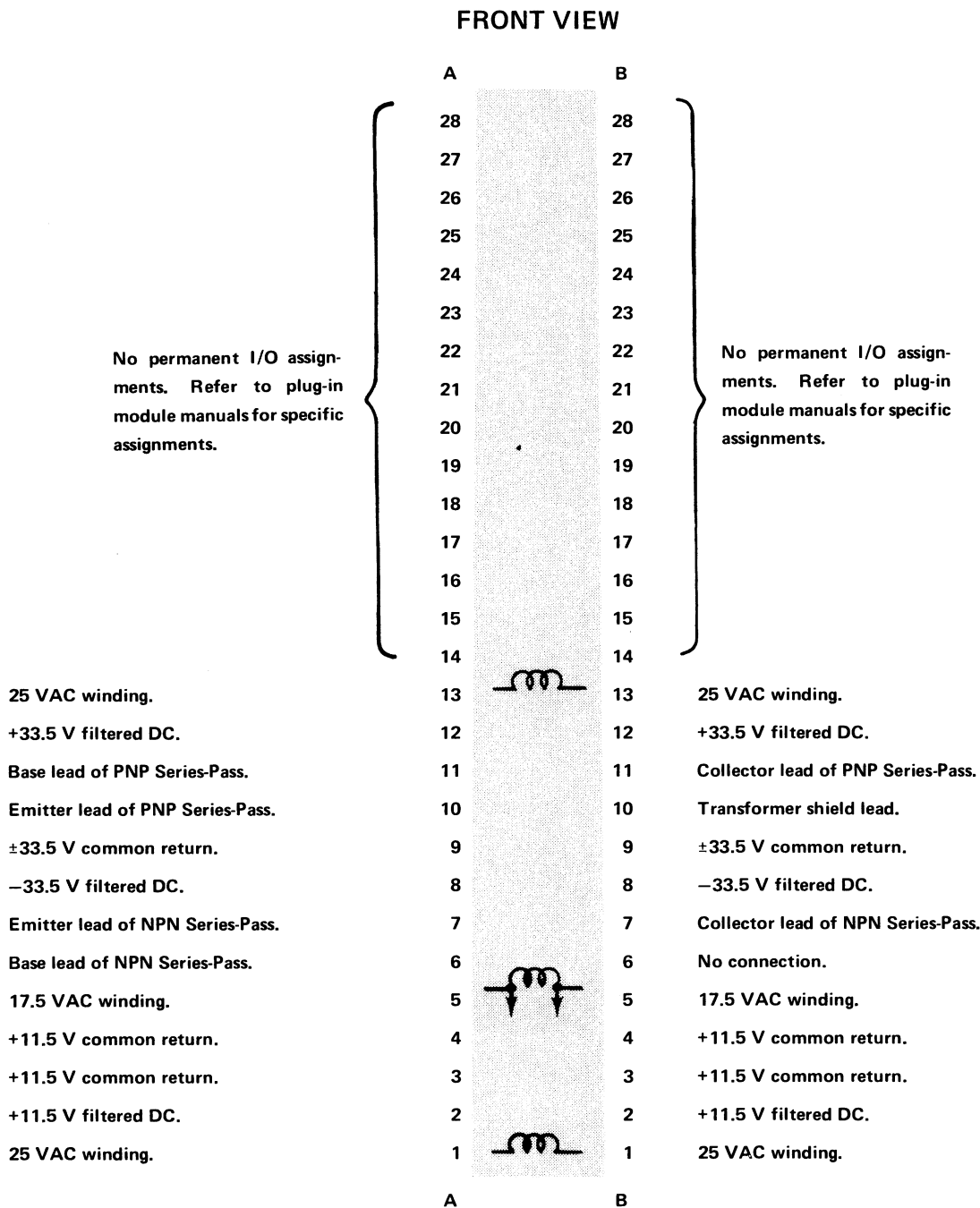
Symbols used on the diagrams are based on ANSI Y32.2 – 1970.

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.

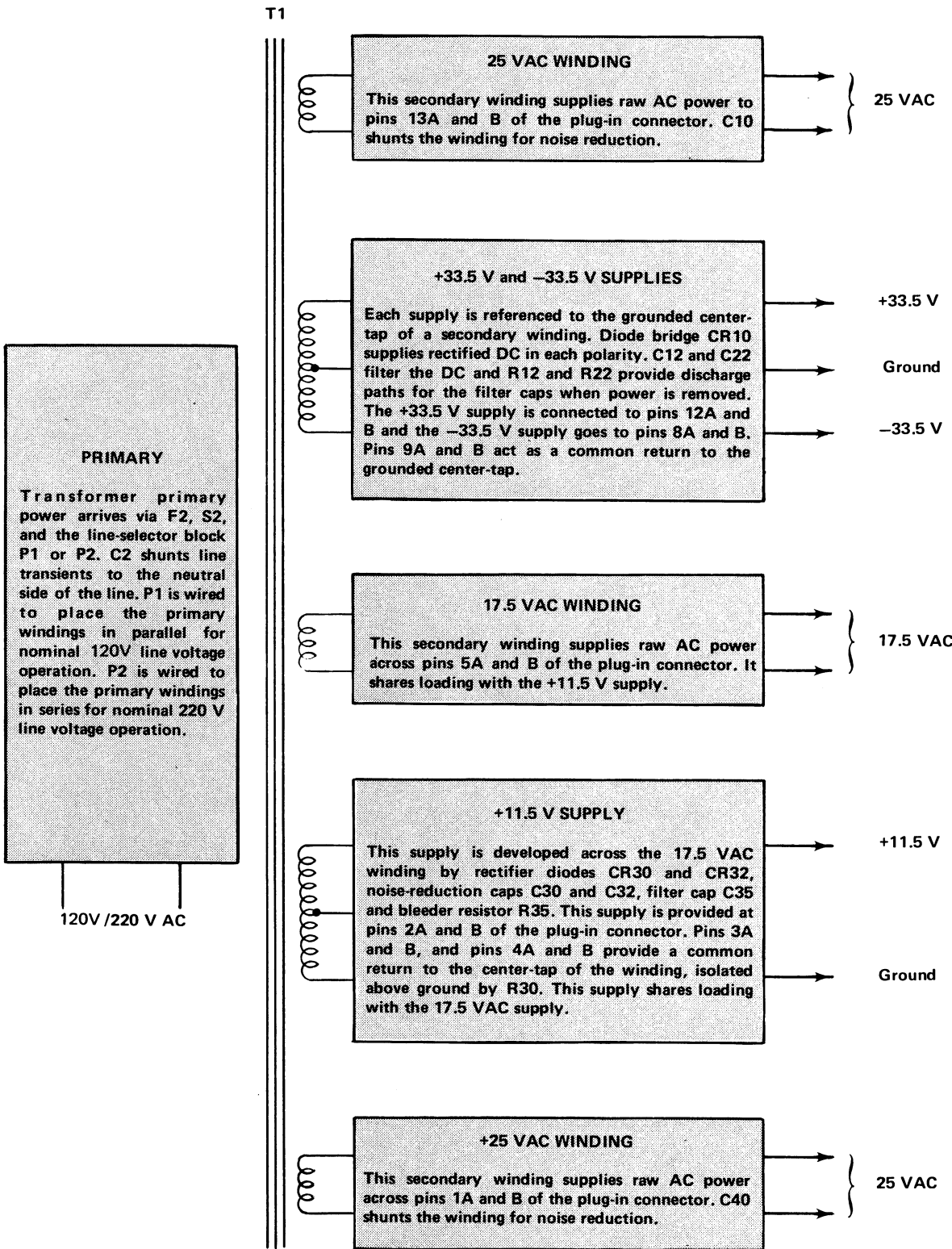
The following special symbols are used on the diagrams:



POWER MODULE INTERFACE
PIN ASSIGNMENTS

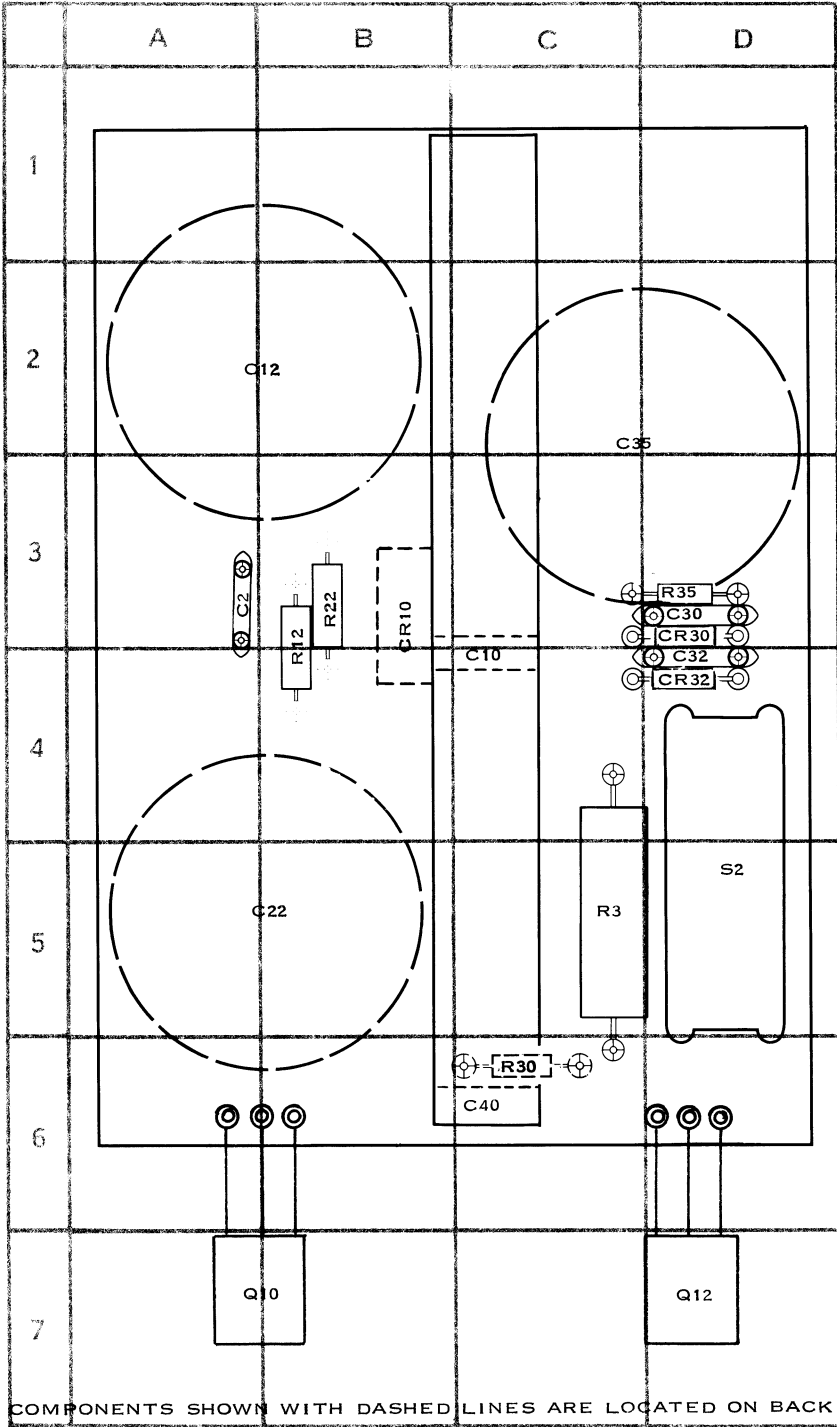


DETAILED BLOCK DIAGRAM



INTERFACE ASSIGNMENTS
& BLOCK DIAGRAM

PARTS LOCATION GRID



ELECTRICAL PARTS LIST

Replacement parts should be ordered from the Tektronix Field Office or Representative in your area. Changes to Tektronix products give you the benefit of improved circuits and components. Please include the instrument type number and serial number with each order for parts or service.

ABBREVIATIONS AND REFERENCE DESIGNATORS

A	Assembly, separable or repairable	FL	Filter	PTM	paper or plastic, tubular molded
AT	Attenuator, fixed or variable	H	Heat dissipating device (heat sink, etc.)	R	Resistor, fixed or variable
B	Motor	HR	Heater	RT	Thermistor
BT	Battery	J	Connector, stationary portion	S	Switch
C	Capacitor, fixed or variable	K	Relay	T	Transformer
Cer	Ceramic	L	Inductor, fixed or variable	TP	Test point
CR	Diode, signal or rectifier	LR	Inductor/resistor combination	U	Assembly, inseparable or non-repairable
CRT	cathode-ray tube	M	Meter	V	Electron tube
DL	Delay line	Q	Transistor or silicon-controlled rectifier	Var	Variable
DS	Indicating device (lamp)	P	Connector, movable portion	VR	Voltage regulator (zener diode, etc.)
Elect.	Electrolytic	PMC	Paper, metal cased	WW	wire-wound
EMC	electrolytic, metal cased	PT	paper, tubular	Y	Crystal
EMT	electrolytic, metal tubular				
F	Fuse				

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
ASSEMBLY				
A1	670-2023-00 ¹			INTERFACE Circuit board Assembly
A1	670-3404-00 ²			INTERFACE Circuit board Assembly
CAPACITORS				
C2	A3	283-0022-00		0.02 μ F, Cer, 900 V/1400 V
C10	C4	283-0004-00		0.02 μ F, Cer, 150 V
C12	B2	290-0577-00		2000 μ F, Elect., 50 V
C22	B5	290-0577-00		2000 μ F, Elect., 50 V
C30	D3	283-0002-00		0.01 μ F, Cer, 500 V
C32	D4	283-0002-00		0.01 μ F, Cer, 500 V
C35	C2	290-0578-00		6000 μ F, Elect., 12 V
C40	C6	283-0004-00		0.02 μ F, Cer, 150 V
DIODES				
CR10	B3	152-0488-00		Silicon, rectifier bridge
CR30	D3	152-0198-00	B010100	Silicon, replaceable by 1N4721
CR30	D3	152-0198-02	B040000	Silicon, replaceable by 1N4721
CR32	D4	152-0198-00	B010100	Silicon, replaceable by 1N4721
CR32	D4	152-0198-02	B040000	Silicon, replaceable by 1N4721
FUSE				
F2	Chassis	159-0043-00		Cartridge, 0.6A, 3AG, slo-blo
CONNECTOR				
J10	Chassis	131-1078-00		Receptacle, electrical, 28/56 contacts
TRANSISTORS				
Q10	A7	151-0373-00		Silicon, PNP, replaceable by MJE2901
Q12	D7	151-0349-00		Silicon, NPN, selected from MJE2801 or replaceable by SJE924

¹Standard Only
²Option 1 Only

ELECTRICAL PARTS LIST (cont)

Ckt No.	Grid Loc	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Description
RESISTORS					
R3	C5	308-0704-00			8.8 Ω , 5 W, WW, 5%
R12	B3	301-0202-00			2 k Ω , 1/2 W, 5%
R22	B3	301-0202-00			2 k Ω , 1/2 W, 5%
R30	C6	302-0102-00			1 k Ω , 1/2 W, 10%
R35	D3	315-0511-00			510 Ω , 1/4 W, 5%
SWITCH					
S2	D5	260-1222-00			Push-pull, POWER
TRANSFORMER					
T1	Chassis	120-0790-00	B010100	B039999	Power
T1	Chassis	120-0791-00	B040000		Power

PI.
120V JUMPER

P2
220V JUMPER

PI
120V JUMPER

120/220V PRIMARY

52
PWR

F2
6A

P5
120 VAC

TI

LO MED HI 84/66/4

11

7.35



* LOCATED ON BACK OF J10

25 VAC

+33.5\

TRANSFORMER SHIELD

Q12

1

+11.5V COMMON

+ 11.5\%

25 VAC

TRANSFORMER SHIELD

REV. C, AUG 1974

TM 501 DEH

POWER SUPPLY



REPLACEABLE MECHANICAL PARTS

DEPT. OF COMMUNICATION
CRC-SHIRLEY BAY
INSTRUMENT SECTION
ON SYSTEM

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number

00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

1	2	3	4	5	Name & Description
---	---	---	---	---	--------------------

Assembly and/or Component

Attaching parts for Assembly and/or Component

— — — ★ — — —

Detail Part of Assembly and/or Component

Attaching parts for Detail Part

— ★ —

Parts of Detail Part

Attaching parts for Parts of Detail Part

— — — ★ — — —

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

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

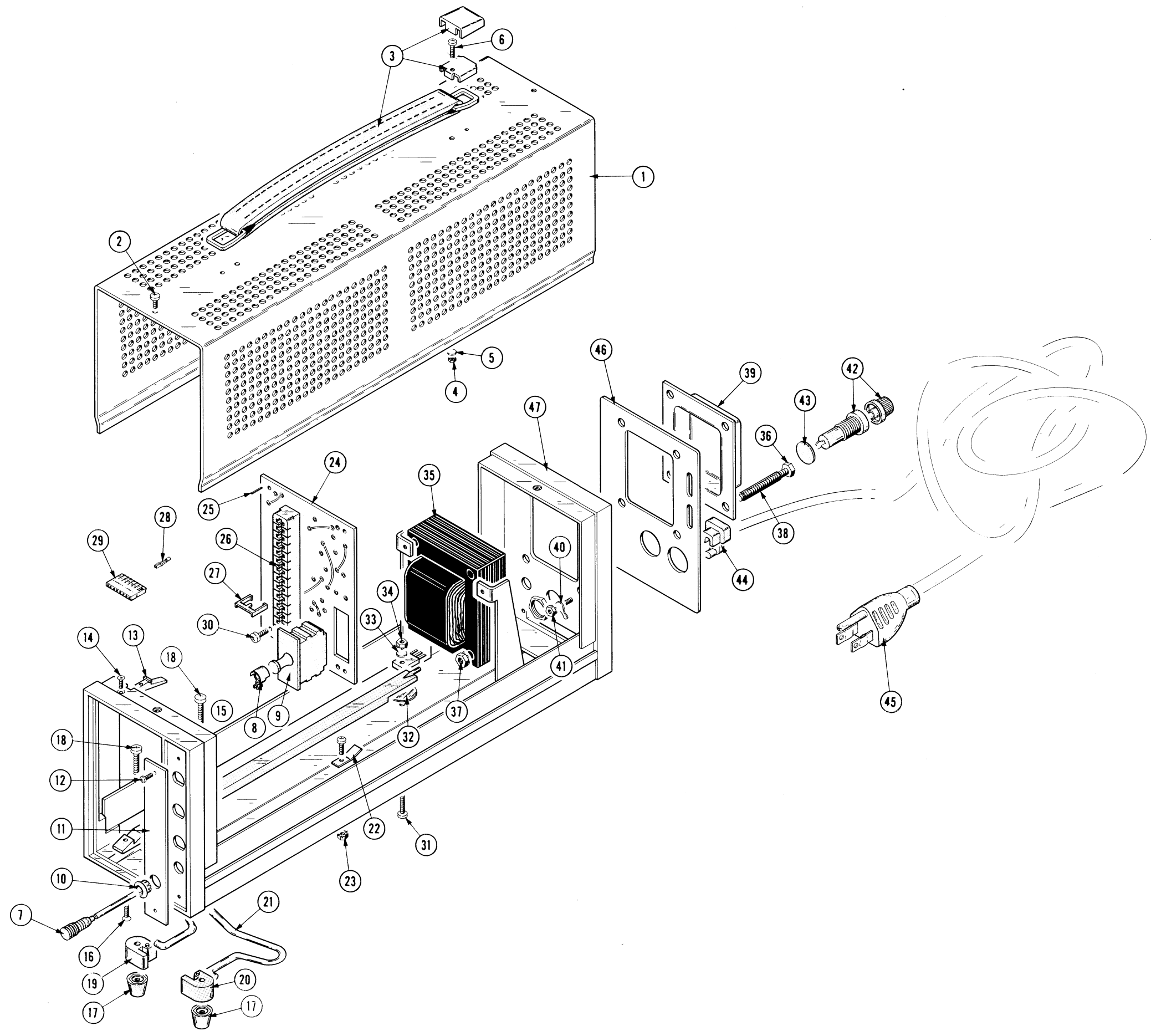
MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
06982	Moore, Howard J., Co.	105 E. 16th St.	New York, NY 10003
22526	Berg Electronics, Inc.	Youk Expressway	New Cumberland, PA 17070
45722	USM Corp., Parker-Kalon Fastener Div.	1 Peekay Drive	Clifton, NJ 07014
70485	Atlantic India Rubber Works, Inc.	571 W. Polk St.	Chicago, IL 60607
75915	Littelfuse, Inc.	800 E. Northwest Hwy	Des Plaines, IL 60016
78189	Illinois Tool Works, Inc.		
	Shakeproof Division	St. Charles Road	Elgin, IL 60120
78471	Tilley Mfg. Co.	900 Industrial Rd.	San Carlos, CA 94070
79807	Wrought Washer Mfg. Co.	2100 S. O Bay St.	Milwaukee, WI 53207
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97077
83385	Central Screw Co.	2530 Crescent Dr.	Broadview, IL 60153
91929	Honeywell, Inc., Micro Switch Div.	Chicago & Spring Sts.	Freeport, IL 61032
95238	Continental Connector Corp.	34-63 56th St.	Woodside, NY 11377

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	390-0272-00	B010100	B059999	1		CABINET, WRAPAROUND (ATTACHING PARTS)		
-2	211-0503-00			2		SCREW, MACHINE: 6-32 X 0.188 INCH, PNH STL - - - * - - -	83385	OBD
-3	367-0171-00	B010100	B059999	1		HANDLE, CARRYING, W/HARDWARE (ATTACHING PARTS)		
-4	210-0586-00	B010100	B059999	2		NUT, PLAIN, EXT W: 4-40 X 0.25 INCH, STL	78189	OBD
-5	210-0958-00	B010100	B059999	2		WASHER, FLAT: 0.115 ID X 0.469 INCH OD, STL	78471	OBD
-6	211-0012-00	B010100	B059999	2		SCREW, MACHINE: 4-40 X 0.375 INCH, PNH STL	83385	OBD
	390-0272-01	B060000		1		CABINET, WRAPAROUND		
	-----					CABINET WRAPAROUND INCLUDES:		
	376-0171-00	B060000		1		HANDLE, CARRYING		
	210-0783-00	B060000		2		. RIVET, BLIND POP TYPE 0.125 DIA AL W AL STEM		
	210-0993-00	B060000		2		. WSHR, SHOULDERED: 0.143" ID X 0.75" OD, BRS	79807	OBD
	390-0285-00	B060000		1		. CABINET, WRAPAROUND - - - * - - -		
-7	384-1158-00			1		SHAFT, EXTENSION, POWER SWITCH		
-8	376-0127-00			1		COUPLER, SHAFT: PLASTIC	80009	376-0127-00
-9	260-1222-00			1		SWITCH, PUSH-PUL: 10A, 250VAC	91929	2DM301
-10	358-0216-00			1		BUSHING, PLASTIC: 0.257 ID X 0.412 INCH OD	80009	358-0216-00
-11	333-1530-00			1		PANEL, FRONT (ATTACHING PARTS)		
-12	211-0022-00			2		SCREW, MACHINE: 2-56 X 0.188 INCH, PNH STL - - - * - - -	83385	OBD
-13	351-0334-00			1		GUIDE, PLUG-IN UNIT, TOP (ATTACHING PARTS)		
-14	213-0254-00			1		SCR, TPG, THD CTG: 2-56X0.25" 100 DEG, FLH STL	45722	OBD
-15	351-0286-00	B010100	B019999	1		GUIDE, PLUG-IN UNIT, BOTTOM		
	351-0286-01	B020000	B039999	1		GUIDE, PLUG-IN UNIT, BOTTOM		
	351-0286-02	B040000	B059999	1		GUIDE, PLUG-IN UNIT, BOTTOM		
	351-0286-04	B060000		1		GUIDE, PLUG-IN UNIT, BOTTOM (ATTACHING PARTS)		
-16	211-0101-00			1		SCREW, MACHINE: 4-40 X 0.25" 100 DEG, FLH STL - - - * - - -	83385	OBD
-17	348-0187-00			4		FOOT, CABINET (ATTACHING PARTS)		
-18	211-0551-00			1		SCREW MACHINE: 6-32 X 0.562 INCH, PNH STL - - - * - - -	83385	NOTE
-19	348-0026-00			2		FOOT, LEFT		
-20	348-0027-00			2		FOOT, RIGHT		
-21	348-0303-00			1		FLIP-STAND, CABINET		
-22	131-1018-00	B010100	B019999	1		CONTACT, ELEC: PLUG-IN GROUND	80009	131-1018-00
	131-1254-01	B020000		1		CONTACT, ELECTRICAL, PLUG-IN GROUND (ATTACHING PARTS)		
	211-0008-00			1		SCREW, MACHINE: 4-40 X 0.25 INCH, PNH STL	83385	OBD
-23	210-0586-00			1		NUT, PLAIN, EXT W: 4-40 X 0.25 INCH, STL - - - * - - -	78189	OBD
-24	-----			1		CKT BOARD ASSY: INTERFACE (SEE EPL)		
-25	131-0608-00			14		. CONTACT, ELEC: 0.365 INCH LONG	22526	47357
-26	131-1078-00			1		. CONNECTOR, RCPT, :28/56 CONTACT	95238	K600-11-56VA MOD
-27	214-1593-02			1		. KEY, POLARIZING, CONNECTOR		
	131-1200-00			1		. LINK, TERMINAL CONNECTOR, BLOCK (BROWN)		
-28	131-0707-00			2		. . CONTACT, ELEC: 0.48"L, 22-26 AWG WIRE	22526	47439
-29	352-0166-01			1		. . HOLDER, TERM.CON: 8 WIRE BROWN	80009	352-0166-01
	131-1199-00			1		. LINK, TERMINAL, CONNECTOR, BLOCK (RED) OPT. 1 ONLY		
	352-0166-02			1		. . HOLDER, TERM.CON: 8 WIRE RED	80009	352-0166-02
	131-0707-00			2		. . CONTACT, ELEC: 0.48"L, 22-26 AWG WIRE	22526	47439
	352-0166-06			1		. HOLDER, TERM.CON: 8 WIRE BLUE	80009	352-0166-06
						(ATTACHING PARTS)		
-30	213-0088-00			4		SCR, TPG, THD CTG: 4-24 X 0.25 INCH, PNH STL	83385	OBD
-31	211-0012-00			2		SCREW, MACHINE: 4-40 X 0.375 INCH, PNH STL	83385	OBD
-32	342-0136-00			2		INSULATOR, WSHR: 0.812 OD X 0.0025 INCH THK	80009	342-0136-00
-33	210-0071-00			2		WASHER, SPR TNSN:	80009	210-0071-00
-34	210-0586-00			2		NUT, PLAIN, EXT W: 4-40 X 0.25 INCH, STL - - - * - - -	78189	OBD

Mechanical Parts List—TM 501

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-35	-----	-----		1						TRANSFORMER: (ATTACHING PARTS)		
-36	212-0576-00	B010100	B039999	4						SCREW,10-32 X 1.375 INCHES,HSS		
	212-0517-00	B040000		4						SCREW,MACHINE:10-32 X 1.750INCH,HEX HD STL	83385	OBD
	210-0812-00	XB052090		4						WASHER,NONMETAL:#10,FIBER	06982	OBD
-37	220-0410-00			4						NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
-38	166-0226-00			4						TUBE,INSULATING,0.187 ID X 1.112 INCHES LONG - - - * - - -		
-39	200-0376-01			1						COVER,TRANSFORMER		
-40	210-0201-00			1						TERMINAL,LUG:SE #4 (ATTACHING PARTS)	78189	2104-04-00-2520N
-41	210-0586-00			1						NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL - - - * - - -	78189	OBD
-42	352-0076-00	B010100	B049999	1						FUSEHOLDER:W/HARDWARE	75915	342012
	352-0362-00	B050000		1						FUSEHOLDER: W/MOUNTING HARDWARE (ATTACHING PARTS)	75915	345001
-43	210-0873-00			1						WASHER,NONMETAL:0.5 ID X 0.688 INCH OD,NPRN - - - * - - -	70485	OBD
-44	358-0161-00			1						BUSHING,STRAIN RELIEF		
-45	161-0033-04			1						CABLE ASSEMBLY,POWER		
-45	333-1560-00			1						CABLE ASSEMBLY,POWER		
-47	426-0876-00			1						FRAME ASSEMBLY,CABINET		

FIG. 1 EXPLODED



TM501 POWER MODULE

**TEKTRONIX®**committed to
technical excellence

MANUAL CHANGE INFORMATION

PRODUCT TM 501,
TM 501-950BCHANGE REFERENCE M22,352DATE 8-23-74

CHANGE:

DESCRIPTION

TM 501 EFF SN B072631-up

TM 501-950B EFF SN B072700-up

ELECTRICAL PARTS LIST CHANGE

CHANGE TO:

T1 120-0791-01 Power Transformer

DIAGRAM 1 POWER SUPPLY

Change sleeving of terminal labeled 4-N (yellow) to 7-N (violet).

