

Instruction Manual



TM 502A Power Module

070-6502-01

Warning

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the Safety Summary prior to performing service.

Please check for change information at the rear of this manual.

First Printing: January 1993

Revised Printing: December 1993

Instrument Serial Numbers

Each instrument manufactured by Tektronix has a serial number on a panel insert or tag, or stamped on the chassis. The first letter in the serial number designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B010000	Tektronix, Inc., Beaverton, Oregon, USA
E200000	Tektronix United Kingdom, Ltd., London
J300000	Sony/Tektronix, Japan
H700000	Tektronix Holland, NV, Heerenveen, The Netherlands

Instruments manufactured for Tektronix by external vendors outside the United States are assigned a two digit alpha code to identify the country of manufacture (e.g., JP for Japan, HK for Hong Kong, IL for Israel, etc.).

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

Printed in U.S.A.

Copyright © Tektronix, Inc., 1993. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. The following are registered trademarks: TEKTRONIX, TEK, TEKPROBE, and SCOPE-MOBILE.

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Contents

Operators Safety Summary	iii
Service Safety Summary	v

Specification

Specification	1-1
Instrument Description	1-1
Performance Conditions	1-1

Operating Instructions

Operating Instructions	2-1
Power Source	2-1
Power Usage/ Loading Considerations	2-1
Line Voltage Selection/Fuse Replacement	2-1
Handle/Tilt Stand Installation	2-3
Operating Temperature	2-4
Power Modules	2-4
Family Compatibility	2-4
Module Installation	2-4
Plug-in Retainer Clip Information	2-5
Power-on Procedure	2-5

Maintenance

Maintenance	3-1
Static Sensitive Components	3-1
Cleaning	3-2
Obtaining Replacement Parts	3-3
Preventive Maintenance and Calibration	3-3
Soldering Techniques	3-4
Removing the Cabinet	3-4
Removing the Circuit Board	3-4
Removing the Voltage Selector/Fuse Holder Assembly	3-5
Replacing the Series Pass Transistor	3-5
Packaging information	3-6

Options

Replaceable Electrical Parts

Diagrams and Circuit Board Illustrations

Symbols	6-1
Component Values	6-1
Graphic Items and Special Symbols Used in This Manual ...	6-2
Component Locator Diagrams	6-2

Replaceable Mechanical Parts

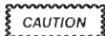
Index

Operators Safety Summary

Please take a moment to review these safety precautions. They are provided for your protection and to prevent damage to the power module. This safety information applies to all operators and service personnel.

Symbols and Terms

These two terms appear in manuals:

-  statements identify conditions or practices that could result in damage to the equipment or other property.
-  statements identify conditions or practices that could result in personal injury or loss of life.

These two terms appear on equipment:

- *CAUTION* indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.
- *DANGER* indicates a personal injury hazard immediately accessible as one reads the marking.

This symbol appears in manuals:



Static-Sensitive Devices



This symbol indicates where applicable cautionary or other information is to be found.

These symbols appear on equipment:



DANGER
High Voltage



Protective
ground (earth)
terminal



ATTENTION
Refer to
manual

Specific Precautions

Observe all of these precautions to ensure your personal safety and to prevent damage to either the power module or equipment connected to it.

Power Source

The power module is intended to operate from a power source that will not apply more than 250 V_{rms} between the supply conductors or between either supply conductor and ground. A protective ground connection, through the grounding conductor in the power cord, is essential for safe system operation.

Grounding the Power Module

The power module is grounded through the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle where earth ground has been verified by a qualified service person. Do this before making connections to the input or output terminals of the power module.

Without the protective ground connection, all parts of the power module are potential shock hazards. This includes knobs and controls that may appear to be insulators.

Use the Proper Power Cord

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified in the parts list for your product, matched by type, voltage rating, and current rating.

Do Not Remove Covers or Panels

To avoid personal injury, do not operate the power module without the panels or covers.

Take Antistatic Precautions

Wear an antistatic grounding wrist strap when working with the input connectors on the power module.

Do Not Operate in Explosive Atmospheres

The power module provides no explosion protection from static discharges or arcing components. Do not operate the power module in an atmosphere of explosive gases.

Service Safety Summary

For Qualified Service Personnel Only

Refer also to the preceding Operators Safety Summary

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages may exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

Power Source

The power module is intended to operate from a power source that will not apply more than 250 V_{rms} between the supply conductors or between either supply conductor and ground. A protective ground connection, through the grounding conductor in the power cord, is essential for safe system operation.

Specification

Instrument Description

The TM 502A is a two compartment-wide power module for the TM 500-series of modular instrumentation. The power module accepts up to two independently functional plug-in modules to form a compact, versatile, and low-cost instrumentation system. The TM 502A is a basic power source for plug-in modules of the TM 500 series family. It provides unregulated dc and ac supplies and nondedicated power transistors for plug-in usage.

Performance Conditions

The values listed in this section are valid only when the instrument is operated at an ambient temperature between 0°C and +50°C.

Table 1-1: Electrical Characteristics

Characteristics	Performance Requirements	Supplemental Information
+33.5 VDC		
Tolerance ^a		+23.7 V to +40.0 V
PARD ^b		$\leq 2.5 V_{p-p}$
Maximum load		350 mA
Maximum load $\frac{di}{dt}$		10 mA/ μ s
−33.5 VDC		
Tolerance ^a		−23.7 V to −40.0 V
PARD ^b		$\leq 2.5 V_{p-p}$
Maximum load		350 mA
Maximum load $\frac{di}{dt}$		10 mA/ μ s
+11.5 VDC		
Tolerance ^a		+7.6 V to +16.0 V
PARD ^b		$\leq 2.5 V_{p-p}$
Maximum load		1.3 A, shared with 17.5 VAC winding
Maximum load $\frac{di}{dt}$		20 mA/ μ s
25 VAC (2 each compartment)		
Range		25.0 V_{rms} + 10%, −15% floating
Maximum load		25 VA
Maximum floating voltage		350 V_{peak}
17.5 V		
Range		20.5 V + 10%, −20% with grounded center tap
Maximum load		30 VA, shared with 11.5 VDC supply
Maximum plug-in power ^c draw from mainframe		35 watts DC or 75 VA_{AC}
Combined power draw ^c Sharing Limitation		$VA_{AC} + 2.1 \text{ (watts}_{DC}) \leq 75$

Table 1-1: Electrical Characteristics (Cont.)

Characteristics	Performance Requirements	Supplemental Information
Total Power from Mainframe		
Total power draw ^c (all compartments combined)		$V_{AC} + 2.1 \text{ (watts}_{DC}) \leq 75$
Series Pass Transistors		
Type		One NPN and PNP per compartment
Maximum dissipation		7.5 W each, 15 W total
Source Power Requirements		
Voltage Ranges		Selectable: 100 V, 120 V, 220 V, and 240 V nominal line $\pm 10\%$
Line Frequency		50/60 Hz
Maximum Power Consumption		Approximately 120 W
Fuse Data		
100 V, 120 V ranges		1.0 A, 3 AG, slow blow, 250 V
220 V, 240 V ranges		0.5 A, 3 AG, slow blow, 250 V
Miscellaneous		
Maximum recommended plug-in power dissipation		
One-wide		10 to 15 W
Two-wide		25 to 35 W
Recommended adjustment interval		1000 hours or 6 months

^aWorst case: Low line with full load and high line with no load. These limits include PARD.

^bPeriodic and Random Deviation. See National Electrical Manufacturers Association (NEMA) Standards Publication No. PY1-1972.

^cAt nominal line voltage.

Table 1-2: Environmental Characteristics^a

Characteristics	Description	
Temperature		Meets MIL-T-28800D, class 5.
Operating	0°C to +50°C	
Non-operating	–55°C to +75°C	
Humidity ^b	95% RH, 0°C to 30°C non-condensing	Exceeds MIL-T-28800D, class 5.
Altitude		Exceeds MIL-T-28800D, class 5.
Operating	15,000 ft (4.6 km)	
Non-operating	50,000 ft (15 km)	
Vibration	0.010" (0.25 mm) peak-to-peak, 5 Hz to 55 Hz, 75 minutes	Meets MIL-T-28800D, class 5 with- out plug-ins (0.015" displacement, 30 g's shock).
Shock	20 g's (1/2 sine) 11 ms duration, 3 shocks in each direction along 3 major axes, 18 total shocks	Meets MIL-T-28800D, class 5 with- out plug-ins (0.015" displacement, 30 g's shock)
Bench Handling	12 drops from 45° 4" or equilibrium, whichever occurs first.	Meets MIL-T-28800D, class 5.
Transportation	Qualified under National Safe Transit Association Preshipment Test Procedures 1A–B-1 and 1A–B-2	
EMC	Electro-mechanical compatibility within limits of F.C.C. Regulations, Part 15, Subpart J, Class A.	
Electrical Discharge	20 kV maximum charge applied to instrument case.	

^aWith plug-ins

Table 1-3: Physical Characteristics

Characteristics	Description
Nominal weight (without plug-ins)	8.75 lbs (4.0 kg)
Overall dimensions	
Height	5.5 inches (14.0 cm)
Width	5.7 inches (14.5 cm)
Length	16.6 inches (40.7 cm)

Operating Instructions

This section of the manual tells how to prepare the power module for use, and install plug-in modules.

The TM 502A Power Module is calibrated and ready for use when received. A list of standard accessories (and part numbers) is located in the back of this manual.

Power Source

The TM 502A Power Module 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 to operate from two phases of a multi-phase system.

Power Usage/ Loading Considerations

With two plug-in modules installed, the TM 502A Power Module can require up to 120 W of power at the upper limits of the high-line voltage ranges. Actual power consumption depends on the particular module combination and operating mode selected at any one time.

The power capability of the TM 502A Power Module can best be used by carefully planning the plug-in configuration, the external loads, and the resulting power distributions. The power module will work best if you do the following:

1. Use equal loads in both compartments.
2. Dissipate as much power as possible in the external loads.
3. Operate the system in an ambient temperature near 25°C.

Each plug-in has access to a pair of heat-sinked, series-pass transistors—one NPN and the other PNP. These transistors enable the plug-in to operate in power ranges not possible if the power were to dissipate within the plug-ins.

Line Voltage Selection/Fuse Replacement

The line voltage selector is part of the line cord plug assembly, located in the rear of the power module. Verify that the voltage shown in the selector window is correct for the line voltage available.

If the displayed voltage selection is incorrect, or the fuse needs replacement, perform the following procedure while referring to Figure 2-1.

1. Ensure that the power switch on the rear of the module is turned off and that the line cord is not plugged into the line voltage connector.

2. Remove the voltage selector/fuse holder by pushing the latch/release bar toward the selection window. The selector/fuse holder should release and move slightly out of the socket. Remove the voltage selector/fuse holder from the assembly.
3. Pull the fuse block and fuse from the voltage selector/fuse holder. Remove the fuse from the fuse block. Make certain a replacement fuse has the proper ratings for the selected line voltage (refer to *Specifications* for the fuse rating). Insert the fuse into the fuse holder.
4. The line voltage selections are printed on the end of the fuse box. Rotate the fuse box and reinstall it so that the proper line voltage selection is visible through the selection window.
5. Reinstall the voltage selector/fuse holder.
6. Verify that the correct line voltage is visible through the line voltage selector window.

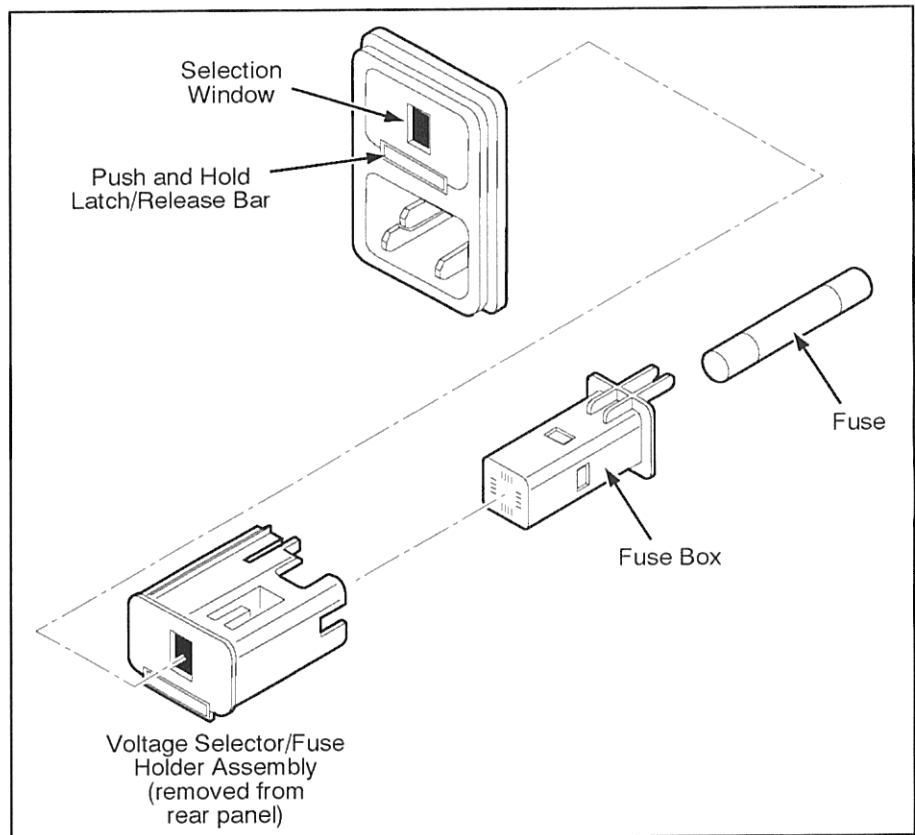


Figure 2-1: Line voltage selection/fuse replacement

Handle/Tilt Stand Installation

Before you install the handle, check the handle kit contents against the following list:

- 2 Phillips screws
- 2 metal washers
- 2 lock washers
- 2 plastic locking buttons
- 1 metal handle

A Phillips screwdriver is the only tool required.

Perform the following steps to install the handle/tilt stand.

1. Turn off the power switch and disconnect the line cord.

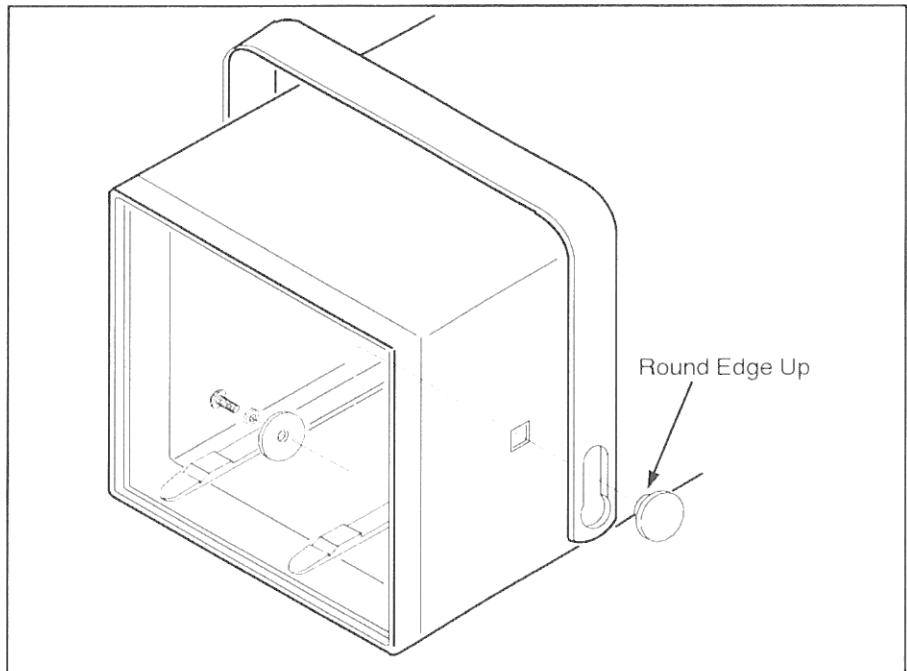


Figure 2-2: Handle installation

2. Remove any plug-in modules.
3. On each side of the power module (approximately 2 inches (5 cm) from the front edge) is a black plug. Remove each plug by pushing it out from the inside of the power module.
4. From outside of the power module, place the plastic locking button in the handle slot and into the square hole in the side panel, as shown in Figure 2-2. Note that the rounded edges of the button must face the top and bottom panels of the power module as shown in the illustration.

5. Place the metal washer inside the side panel over the hole in the button.
 6. Install and tighten the Phillips screw.
- Repeat the procedure for the other end of the handle.

Operating Temperature

The TM 502A Power Module can operate in an ambient air temperature range of 0°C to +50°C (32°F to +122°F). Since the TM 502A Power Module can be stored in temperatures between -55°C and +75°C (-67°F to +167°F), allow the instrument chassis to return to within the temperature operating limits before applying power.

Power Modules

It is not necessary to use both plug-in compartments to operate the power module.



Turn the power module off before inserting or removing the plug-in; otherwise, damage can occur to the plug-in circuitry.

Family Compatibility

Mechanically, the TM 500-series plug-in modules are very similar to other Tektronix product families. However, they are not *electrically* compatible. Therefore, the TM 502A interface has barriers on the mating connectors between pins 6 and 7 to ensure that incompatible plug-ins cannot be inserted. (Pin 1 is on the connector end near the bottom side of the power module.) 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.

Module Installation

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 of classes, of which there may be several plug-in module members. For example, 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 502A can "program" one or both compartments to accept only members of that family by installing a second barrier in the interface connector to match the module's slot location. Contact the nearest Tektronix field office to order additional barriers.

Perform the following steps to install a module in the TM 502A Power Module.

1. Check the location of the plastic barriers on the TM 502A interconnecting jack to ensure that their locations match the slots in the edge of the plug-in module's main circuit board. If they do not match, refer the qualified service personnel to the Maintenance section of this manual for more information.
2. Align the plug-in module chassis with the upper and lower guides of the selected 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 release latch in the lower left corner of the plug-in module.)

Plug-in Retainer Clip Information

The retainer clip is used to ensure that an installed plug-in module can not come out of the power module while it is moved or transported. Note that plug-in modules cannot be removed or inserted with the retainer clip installed.

1. Perform the following steps to install the retainer clip:
2. Stand the power module on end.
3. Remove the round-head Phillips screw located on the bottom side of the TM 502A Power Module just behind the front casting.
4. Align the hole in the retainer clip with the following: the chassis hole, the clip extending forward and into the module opening, and the bottom edge of the plug-in module(s).
5. Reinstall the screw.

Power-on Procedure

After completing the power module preparation and plug-in module installation instructions, install the power cord and connect the power cord to the proper power outlet. Turn on the power switch on the rear of the power module. Some plug-ins have independent power switches, usually labeled "OUTPUT," that control power from the mainframe power to the plug-in.

WARNING

The following servicing instructions are for use only by qualified personnel. To avoid personal injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer to the Operator's Safety Summary and the Service Safety Summary prior to performing any service.

Maintenance

This section provides maintenance and service information for the TM 502A power module.

Static Sensitive Components

CAUTION

Static discharge can damage any semiconductor component in this instrument.

This instrument contains electrical components that are susceptible to damage from static discharge. See Table 3-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Table 3-1: Relative Susceptibility to Static Discharge Damage

Semiconductor Classes	Relative Susceptibility Levels ^a
MOS or CMOS microcircuits, or discrete or linear microcircuits with MOS inputs (Most Sensitive)	1
ECL	2
Schottky signal diodes	3
Schottky TTL	4
High-frequency bipolar transistors	5
JFETs	6
Linear microcircuits	7
Low-power Schottky TTL	8
TTL (Least Sensitive)	9

^aVoltage equivalent for levels:

1 = 100 to 500 V	4 = 500 V	7 = 400 to 1000 V (est.)
2 = 200 to 500 V	5 = 400 to 600 V	8 = 900 V
3 = 250 V	6 = 600 to 800 V	9 = 1200 V

(Voltage discharged from a 100 pF capacitor through a resistance of 100 Ω).

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special antistatic suction type or wick type desoldering tools.

Cleaning

This instrument should be cleaned as often as operating conditions require. Loose dust accumulated on the outside of the instrument can be removed with a soft cloth or small brush. Remove dirt that remains with a soft cloth dampened in a mild detergent and water solution. Do not use abrasive cleaners.

The best way to clean the interior is to blow off the accumulated dust with dry, low-velocity air (approximately 5 lb/in²) or use a soft brush or cloth dampened with a mild detergent and water solution.



Circuit boards and components must be dry before applying power.

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

Obtaining Replacement Parts

Electrical and mechanical parts can be obtained through your local Tektronix field office or representative. However, it may be possible to obtain many of the standard electronic components from a local commercial source. Before purchasing or ordering a part from a source other than Tektronix, Inc., check the Replaceable Electrical Parts List for the proper value, rating, tolerance, and description.

NOTE

When selecting replacement parts, remember that the physical size and shape of a component may affect its performance in the instrument.

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 instrument have been manufactured by Tektronix. To determine the manufacturer, refer to the Replaceable Parts List and the Cross Reference index, Mfr. Code Number to Manufacturer.

When ordering replacement parts from Tektronix, include the following information:

1. Instrument type and option number.
2. Instrument serial number.
3. A description of the part (if electrical, include complete circuit number).
4. Tektronix part number.

Preventive Maintenance and Calibration

The TM 502A power module does not require preventive maintenance or calibration.

WARNING

Dangerous voltages exist at several points throughout the power module. If you must operate the power module with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect power before removing the cabinet and cleaning or replacing parts.

Soldering Techniques

WARNING

To avoid electric-shock hazard, disconnect the instrument from the power source before soldering.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques which apply to maintenance of any precision electronic equipment should be used when working on this instrument. Use only 60/40 rosin-core, electronic grade solder. The choice of soldering iron is determined by the repair to be made.

When soldering on circuit boards or small wiring, use only a 15 watt, pencil type soldering iron. A higher wattage soldering iron can cause the etched circuit wiring to separate from the board base material and melt the insulation from small wiring. Always keep the soldering iron tip properly tinned to ensure the best heat transfer to the solder joint. Apply only enough heat to remove the component or to make a good solder joint. To protect heat sensitive components, hold the component lead with a pair of long-nose pliers between the component body and the solder joint. Use a solder removing wick to remove excess solder from connections or to clean circuit board pads.

Removing the Cabinet

Before removing the cabinet, turn the power switch off and disconnect the power cord. Remove any plug-in modules and the handle assembly.

Use the following steps to remove the cabinet:

1. Remove the two screws on the side and one screw on the bottom holding the cabinet to the TM 502A front casting.
2. Remove the four screws on the bottom and one screw on the back holding the power supply to the cabinet.
3. Slide the power supply assembly out through the front of the cabinet.
4. Reinstall the cabinet to remove any shock hazards and to protect the interior from dust.

Removing the Circuit Board

Use the following procedure to remove the circuit board from the TM 502A power module.

1. Remove the power supply assembly from the power module. Refer to *Removing the Cabinet* earlier in this section for instructions on removing the cabinet.

2. On the power supply assembly, remove the screws on each side that secure the series-pass transistor clamp; remove the clamp.
3. Remove the four screws on the interface connector side of the power supply assembly that secure the circuit board to the chassis.
4. Disconnect the two connectors going to the transformer from the circuit board.
5. Slide the circuit board out of the power supply assembly.

Removing the Voltage Selector/Fuse Holder Assembly

Use the following procedure to remove the voltage selector/fuse holder assembly.

1. Remove the cabinet and the circuit board. Refer to *Removing the Cabinet* and *Removing the Circuit Board* earlier in this section.
2. Disconnect the connectors from the terminals on the back of the voltage selector/fuse holder assembly and label each wire.



Do not apply excessive force to the locking tabs. Excessive pressure will break or reduce the strength of the plastic.

3. The assembly has a locking tab on two sides that secure it in the chassis hole. Push one tab in carefully, pulling gently on the assembly from the outside, until the side releases.
4. Repeat the previous step to release the other side.
5. Pull the assembly through the chassis hole to the outside while taking care not to damage the capacitors.

Replacing the Series Pass Transistor

Use the following procedure to replace the series pass transistor.

NOTE

You must apply a new adhesive insulator plate to the transistor before installing it. Do not use the insulating plate from the old transistor to maintain the proper insulating characteristics.

1. If you have not already done so, remove the cabinet and the circuit board as described earlier in this section.
2. Unsolder and remove the transistor from the circuit board.

3. Carefully bend the new transistor leads according to the dimensions in Figure 3-1. The illustration shows the actual size of the leads so that you can physically compare the lead angles.

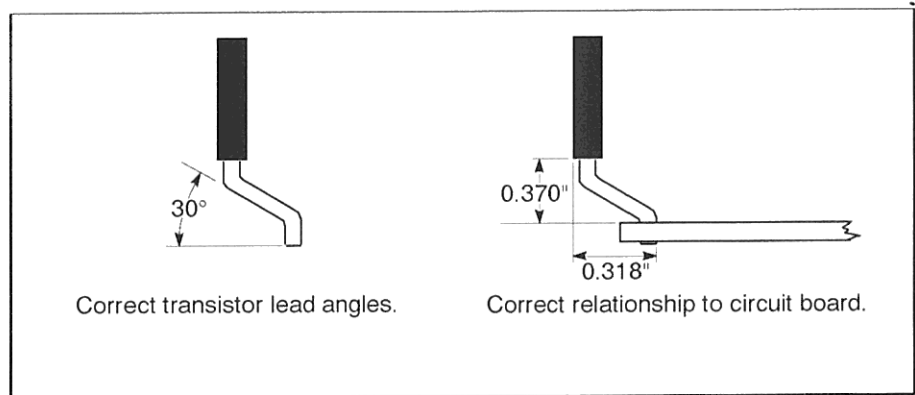


Figure 3-1: Series pass transistor replacement (actual size)

4. Apply the new adhesive insulator plate to the transistor side with the exposed metal.
5. Reinstall the circuit board into the power supply assembly.
6. Insert the leads of the replacement transistor into the circuit board holes with the insulating plate facing the metal chassis.
7. Reinstall the transistor clamp.
8. Solder the transistor onto the board while applying minimum heat with the soldering iron.
9. Reinstall the assembly into the power module cabinet.
10. Reinstall the power module handle assembly.

Packaging information

A list of standard accessories and part numbers is located at the end of the Replaceable Mechanical Parts list.

If the TM 502A power module is to be shipped to a Tektronix service center for service or repair, attach a tag showing the name and address of the owner and the name of an individual at your firm that can be contacted. Include the complete instrument serial number and a description of the required service.

Save and use the packaging in which your instrument was originally shipped. If the original packaging is unfit for use or is not available, repack-age the instrument using the following steps:

1. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

2. Obtain a carton of corrugated cardboard of the correct carton strength (275 pounds per square inch) with the inside dimensions of no less than six inches more than the instrument dimensions.
3. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between the carton and the instrument on all sides.
4. Seal the carton with shipping tape or an industrial stapler.

Options

The following options are available for the TM 502A Power Module.

Option 11 – deletes handle/tilt stand

Option 13 – adds storage plug-in

Option A1 – changes the power to Universal European (230 V, 10 A, 50 Hz)

Option A2 – changes the power to United Kingdom (230 V, 10 A, 50 Hz)

Option A3 – changes the power to Australian (230 V, 10 A, 50 Hz)

Option A4 – changes the power to North American (230 V, 10 A, 60 Hz)

Option A5 – changes the power to Switzerland (230 V, 10 A, 50 Hz)

Replaceable Electrical Parts

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc. field office or representative.

When ordering parts, include the following information in your order: part number, instrument type or number, serial number, and modification number if applicable.

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

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

List of Assemblies

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

Cross Index-Mfr. Code Number to Manufacturer

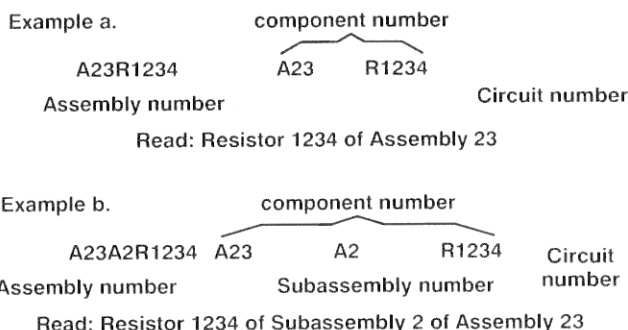
The Mfg. Code Number to Manufacturer Cross Index for the electrical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the electrical parts list.

Abbreviations

Abbreviations conform to American National Standard Y1.1.

Component Number

(column 1 of the parts list)



The circuit component's number appears on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the mechanical parts list. The component number is obtained by adding the assembly number prefix to the circuit number.

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

Chassis-mounted parts have no assembly number prefix and are located at the end of the electrical parts list.

Tektronix Part No.

(column 2 of the parts list)

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

Serial No.

(columns 3 & 4 of the parts list)

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

Name & Description

(column five of the parts list)

In the parts list, an item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. For further item name identification, the U.S. Federal Catalog handbook H6-1 can be utilized where possible.

Mfr. Code

(column 6 of the parts list)

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

Mfr. Part No.

(column 7 of the parts list)

Indicates actual manufacturer's part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS
TK1997	COLUMBIA GORGE CENTER	2940 THOMPSEN RD	HOOD RIVER OR 97031
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
03508	GENERAL ELECTRIC CO SEMI- CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
14936	GENERAL INSTRUMENT CORP DISCRETE SEMI CONDUCTOR DIV	600 W JOHN ST	HICKSVILLE NY 11802
18796	MURATA ERIE NORTH AMERICAN INC STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801-2723
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
26742	METHODE ELECTRONICS INC	7447 W WILSON AVE	CHICAGO IL 60656-4548
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952-1152
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035-1219
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632
95238	CONTINENTAL CONNECTOR CORP	34-63 56TH ST PO BOX 879	WOODSIDE NY 11377-2121

Component Number	Tektronix Part No.	Serial No. Effective Dscont		Name & Description	Mfr. Code	Mfr. Part No.
A1	671-0211-00	B010100	B013420	CIRCUIT BD ASSY:POWER SUPPLY	80009	671021100
A1	671-0211-01	B013421		CIRCUIT BD ASSY:POWER SUPPLY	80009	671021101
A1C2010	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1C2020	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1C2025	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1C2030	290-1186-00			CAP,FXD,ELCTLT:4700UF,20%,50WVDC	24165	81D472M050KD5
A1C2040	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1C4010	290-1187-00			CAP,FXD,ELCTLT:18000UF,20%,16WVDCSNAP MT	24165	81D183M016KD5
A1C4040	290-1186-00			CAP,FXD,ELCTLT:4700UF,20%,50WVDC	24165	81D472M050KD5
A1C5010	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1C5050	281-0774-00			CAP,FXD,CER DI:0.022MFD,20%,100V	04222	SA101E223MAA
A1CR3010	152-0198-00			SEMICON DVC,DI:RECT,SI,200V,3A,A2491N4721	03508	1N5624
A1CR3015	152-0198-00			SEMICON DVC,DI:RECT,SI,200V,3A,A2491N4721	03508	1N5624
A1CR3020	152-0198-00			SEMICON DVC,DI:RECT,SI,200V,3A,A2491N4721	03508	1N5624
A1CR3030	152-0666-00			DIODE,RECT:BRIDGE,800V,IF=.75A @ 85 DEG C	14936	W08G-1
A1CR4030	152-0198-00			SEMICON DVC,DI:RECT,SI,200V,3A,A2491N4721	03508	1N5624
A1CR4040	152-0198-00			SEMICON DVC,DI:RECT,SI,200V,3A,A2491N4721	03508	1N5624
A1J1010	131-2527-00			CONN,HDR PWR:PCB,;MALE,STR,1 X 7,0.156 CTR	26742	3107-11-207-01
A1J1040	131-2484-00			CONN,HDR PWR:PCB,;MALE,STR,1 X 8,0.156 CTR	26742	3109-11-208-01
A1J3020	131-1078-00			CONN,EDGE CARD:PCB,;STR,2 X 28,0.156 CTR	95238	X600-11-56Y25GD
A1J3050	131-1078-00			CONN,EDGE CARD:PCB,;STR,2 X 28,0.156 CTR	95238	X600-11-56Y25GD
A1R3020	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R3030	303-0202-00			RES,FXD,CMPSN:2K OHM,5%,1W	91637	CMF65-42 2 K OH
A1R3035	303-0202-00			RES,FXD,CMPSN:2K OHM,5%,1W	91637	CMF65-42 2 K OH
A1R5030	303-0511-00			RES,FXD,CMPSN:510 OHM,5%,1W	91637	CMF65-42 510 OH
CHASSIS PARTS						
C100	283-0959-00			CAP,FXD,CER DI:0.01UF,20%,250VAC (PART OF P100)	18796	DE7150F103MVA1-
C200	283-0959-00			CAP,FXD,CER DI:0.01UF,20%,250VAC (PART OF P100)	18796	DE7150F103MVA1-
F100	159-0019-00			FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW (STANDARD ONLY)	71400	MDL 1
F100	159-0032-00			FUSE,CARTRIDGE:3AG,0.5A,250V,SLOW BLOW (OPTION A1,A2,A3,A4,A5 ONLY)	71400	MDL 1/2
P100	119-2679-00	B010100	B010807	PWR,ENTRY MDL::PNL,SNAP-IN;MALE,IEC,15 AM	S3629	KEC4303.0093 AN
P100	119-2679-01	B010808	B011482	PWR,ENTRY MDL::PNL,SNAP-IN;MALE,IEC,15 AMP	TK1997	119-2679-01
P100	119-3357-01	B011483		PWR,ENTRY MDL::PNL,SNAP-IN;MALE,IEC,15 AMP	TK1997	119-3357-01
	119-3358-00			DRAWER,FUSE:FUSE DRAWER AND VOLTAGE (PART OF P100)	61935	4303.2814.01
Q2010	151-0373-00	B010100	B013420	TRANSISTOR:PNP,SI,TO-127	04713	SJE925
Q2010	151-0938-00	B013421		TRANSISTOR,PWR:BIPOLAR,PNP;90V,10A,2.5 MHZ	04713	MJF2955
Q2050	151-0373-00	B010100	B013420	TRANSISTOR:PNP,SI,TO-127	04713	SJE925

Component Number	Tektronix Part No.	Serial No.		Name & Description	Mfr. Code	Mfr. Part No.
		Effective	Dscont			
Q2050	151-0938-00	B013421		TRANSISTOR,PWR:BIPOLAR,PNP;90V,10A,2.5 MHZ	04713	MJF2955
Q3010	151-0436-00	B010100	B013420	TRANSISTOR:NPN,SI,SEL,TO-127	04713	SJE966
Q3010	151-0937-00	B013421		TRANSISTOR,PWR:BIPOLAR,NPN;90V,10A,2.5 MHZ	04713	MJF3055
Q3050	151-0436-00	B010100	B013420	TRANSISTOR:NPN,SI,SEL,TO-127	04713	SJE966
Q3050	151-0937-00	B013421		TRANSISTOR,PWR:BIPOLAR,NPN;90V,10A,2.5 MHZ	04713	MJF3055
S100	260-1961-00			SWITCH,ROCKER:DPST,6(4)A,250V	7W718	1802.1121
T100	120-1759-00	B010100	B016000	TRANSFORMER,PWR:PRIM TAPPED	75498	128-7003-00
T100	120-1759-01	B016001	B023538	TRANSFORMER,PWR:PRIM TAPPED,48-440HZ	75498	128-7003-01
T100	120-1759-02	B023539		TRANSFORMER,PWR:PRIM TAPPED,48-440HZ	75498	128-7003-02
W100	196-3176-00	B010100	B012966	LEAD,ELECTRICAL:18 AWG,5.0 L,5-4	0J7N9	ORDER BY DESC
W100	196-3176-01	B012967	B023538	LEAD,ELECTRICAL:18 AWG,5.25 L,5-4	0J7N9	ORDER BY DESC
W100	196-3176-02	B023539		LEAD,ELECTRICAL:18 AWG,5.25 L,5-4	0J7N9	ORDER BY DESC
W200	196-3175-00			LEAD,ELECTRICAL:18 AWG,5.0 L,9-N (PART OF P100)	80009	196317500
W300	196-3175-01			LEAD,ELECTRICAL:18 AWG,5.0 L,0-N (PART OF P100)	TK1997	ORDER BY DESC
W400	196-3175-01			LEAD,ELECTRICAL:18 AWG,5.0 L,0-N (PART OF P100)	TK1997	ORDER BY DESC

Diagrams and Circuit Board Illustrations

This section contains the, block diagrams, circuit board illustrations, component locator tables, and schematic diagrams for the TM502A.

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975. Abbreviations are based on ANSI Y1.1-1972.

Logic symbology is based on ANSI/IEEE Standard 91-1984 in terms of positive logic. Logic symbols depict the logic function performed and can differ from the manufacturer's data.

The tilde (~) preceding a signal name indicates that the signal performs its intended function when in the low state.

Other standards used in the preparation of diagrams by Tektronix, Inc., include the following:

- Tektronix Standard 062-2476 Symbols and Practices for Schematic Drafting
- ANSI Y14.159-1971 Interconnection Diagrams
- ANSI Y32.16-1975 Reference Designations for Electronic Equipment
- MIL-HDBK-63038-1A Military Standard Technical Manual Writing Handbook

Component Values

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

Capacitors: Values one or greater are in picofarads (pF). Values less than one are in microfarads (μ F).

Resistors: Values are in Ohms (Ω).

Graphic Items and Special Symbols Used in This Manual

Each assembly in the instrument is assigned an assembly identifier (for example, MAIN or A3). The assembly identifier appears on the circuit board outline on the diagram (see Figure 6-1), in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assembly in numerical sequence; the components are listed by component number.

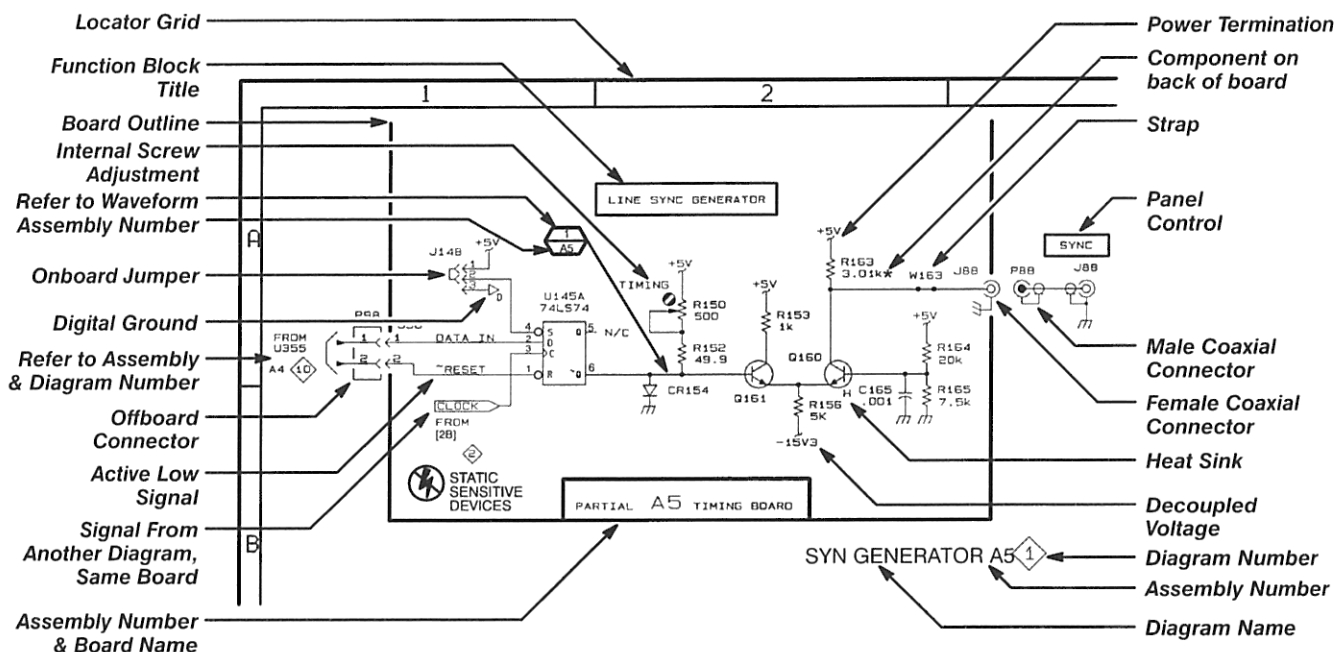


Figure 6-1: Graphic Items and Special Symbols Used in This Manual

Component Locator Diagrams

The schematic diagram and circuit board component location illustrations have grids marked on them. The component lookup tables refer to these grids to help you locate a component. The circuit board illustration appears only once; its lookup table lists the diagram number of all diagrams on which the circuitry appears.

The following table describes the power module interface pin assignments as viewed from the front panel.

A Side		B Side	
Pin Description	Pin #	Pin #	Pin Description
No permanent I/O assignments. Refer to plug-in module manuals for specific assignments.	28	28	No permanent I/O assignments. Refer to plug-in module manuals for specific assignments.
	27	27	
	26	26	
	25	25	
	24	24	
	23	23	
	22	22	
	21	21	
	20	20	
	19	19	
	18	18	
	17	17	
	16	16	
	15	15	
	14	14	
	13	13	
25 Vac winding	12	12	25 Vac winding
+35.5 V filter	11	11	+35.5 V filter
Base lead of PNP Series-Pass.	10	10	Collector lead of PNP Series-Pass
Emitter lead of PNP Series-Pass	9	9	± 33.5 V common return
± 33.5 V common return	8	8	± 33.5 V common return
–35.5 V filtered dc	7	7	–35.5 V filtered dc
Emmitter lead of NPN Series-Pass	6	6	Collector lead of NPN Series-Pass
Base lead of NPN Series-Pass	5	5	No connection
17.5 Vac winding	4	4	17.5 Vac winding
+11.5 V common return	3	3	+11.5 V common return
+11.5 V common return	2	2	+11.5 V common return
+11.5 V filtered dc	1	1	+11.5 V filtered dc
25 Vac winding			25 Vac winding

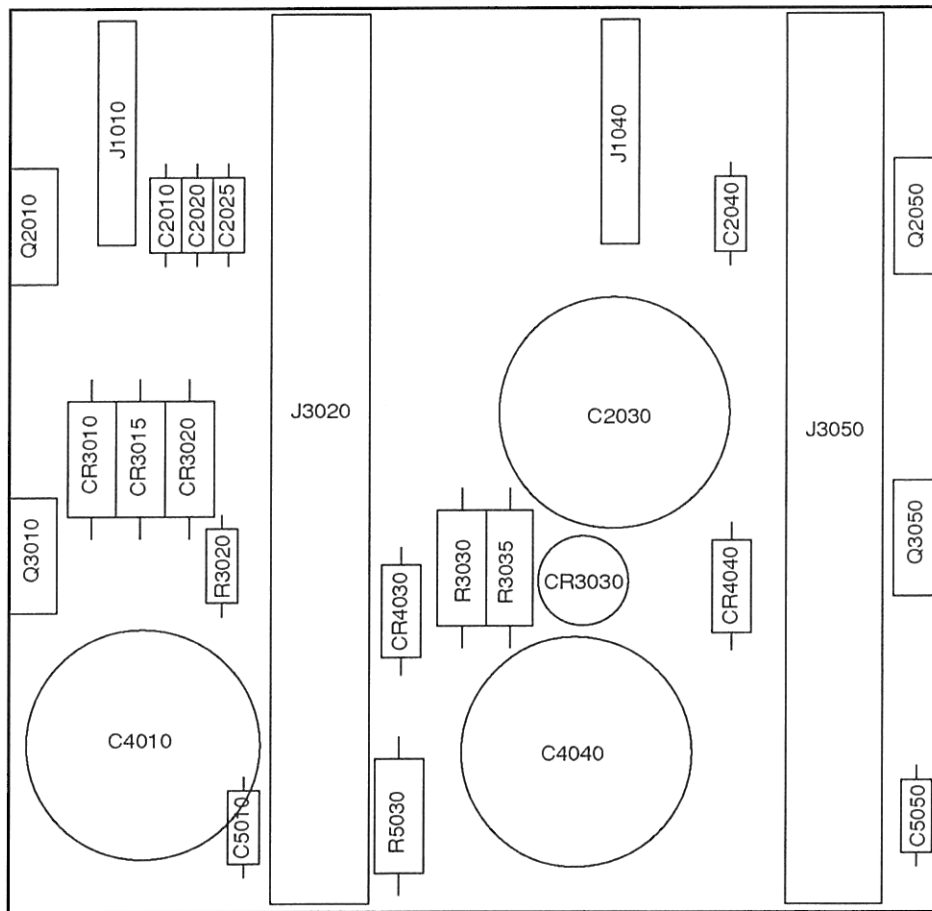


Figure 6-2: A1-Power Supply circuit board assembly

Replaceable Mechanical Parts

This section contains a list of the mechanical components that are replaceable for the TM502A. As described below, use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., service center 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. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If a part you order has been replaced with a different or improved part, your local Tektronix service center or representative will contact you concerning any change in the part number.

Using the Replaceable Parts List

The tabular information in the Replaceable Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find the all the information you need for ordering replacement parts.

Item Names

In the Replaceable 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, U.S. Federal Cataloging Handbook H6-1 can be used where possible.

Indentation System

This parts list is indented to show the relationship between items. The following example is of the indentation system used in the Description column:

1	2	3	4	5	Name & Description
					<i>Assembly and/or Component</i>
					<i>Attaching parts for Assembly and/or Component</i>
					<i>(END ATTACHING PARTS)</i>
					<i>Detail Part of Assembly and/or Component</i>
					<i>Attaching parts for Detail Part</i>
					<i>(END ATTACHING PARTS)</i>
					<i>Parts of Detail Part</i>
					<i>Attaching parts for Parts of Detail Part</i>
					<i>(END ATTACHING PARTS)</i>

Attaching parts always appear at 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. Attaching parts must be purchased separately, unless otherwise specified.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0977	ELECTRICAL INSULATION SUPPLIERS, INC – (DIST)	3549 N W YEON	PORTLAND OR 97210
TK1569	GERHART STAMPING INC	1116 W ISABEL ST	BURBANK CA 91506
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND ROAD NE	SALEM OR 97303
TK1997	COLUMBIA GORGE CENTER	2940 THOMPSEN RD	HOOD RIVER OR 97031
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661–2999
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE	FOREST GROVE OR 97116
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008–4229
07416	NELSON NAME PLATE CO	3191 CASITAS	LOS ANGELES CA 90039–2410
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125–4632
18796	MURATA ERIE NORTH AMERICAN INC STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801–2723
2K262	BOYD CORP	6136 NE 87th AVE PO BOX 20038	PORTLAND OR 97220
26742	METHODE ELECTRONICS INC	7447 W WILSON AVE	CHICAGO IL 60656–4548
29870	VICTOR CORP	618 MAIN STREET	WEST WARWICK RI 02893
55285	BERGQUIST CO INC THE	5300 EDINA INDUSTRIAL BLVD	MINNEAPOLIS MN 55435–3707
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952–1152
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035–1219
72228	AMCA INTERNATIONAL CORP CONTINENTAL SCREW CO DIV	459 MT PLEASANT	NEW BEDFORD MA 02742
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201–2431
95238	CONTINENTAL CONNECTOR CORP	34–63 56TH ST PO BOX 879	WOODSIDE NY 11377–2121

Fig. & Index No.	Tektronix Part No.	Serial No. Effective Dscont		Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	426-2214-01			1	FRAME,PNL,CAB.:FINISHED ATTACHING PARTS	TK1943	ORDER BY DESC
-2	211-0503-00			3	SCREW,MACHINE:6-32 X 0.188,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESC
-3	351-0286-08			2	GUIDE,PL-IN UNI:LOWER,NYLON ATTACHING PARTS	0JR05	ORDER BY DESC
-4	213-0813-00			2	SCREW,TPG,TF:4-20,0.312L,PLASTITE,FLH,STL END ATTACHING PARTS	72228	ORDER BY DESC
-5	367-0381-00	B010100	B010464	1	HANDLE,BOW:0.125 X 0.75,ALUMINUM	80009	367-0381-00
	367-0381-01	B010465	B022458	1	HANDLE,BOW:0.125 X 0.75,ALUMINUM	TK1943	ORDER BY DESC
	367-0381-02	B022459		1	HANDLE,BOW:0.125 X 0.75,ALUMINUM (REMOVE FOR OPTION 11) ATTACHING PARTS	TK1943	ORDER BY DESC
-6	134-0196-01	B010100	B010464	2	KNOB ASSEMBLY:REPLACEMENT	80009	134-0196-01
	134-0196-02	B010465		2	KNOB ASSEMBLY:TM502A	0KBZ5	ORDER BY DESC
-7	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	TK0435	ORDER BY DESC
-7.1	210-1307-00			2	WASHER,LOCK:0.115 ID,SPLIT,0.025 THK,SI BRZ	0KB01	ORDER BY DESC
-8	210-0993-00			2	WASHER,FLAT:0.143 ID X 0.75 OD X 0.051,BRS END ATTACHING PARTS	86928	ORDER BY DESC
-9	441-1813-00	B010100	B023538	1	CHAS,PWR SUPPLY:ALUMINUM	TK1943	441-1813-00
	441-1813-01	B023539		1	CHAS,PWR SUPPLY:ALUMINUM ATTACHING PARTS	TK1943	441-1813-01
-10	212-0023-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-11	211-0504-00			1	SCREW,MACHINE:6-32 X 0.250,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESC
-12	348-0640-00			4	GROMMET,PLASTIC:BLACK,ROUND,0.188 ID	0JR05	ORDER BY DESC
-13	214-3026-00			4	SPRING,GROUND:CU BE	TK1569	ORDER BY DESC
-14	348-0430-00			5	BUMPER,PLASTIC:BLACK POLYURETHANE	2K262	ORDER BY DESC
-15	407-3641-00	B010100	B012110	2	BRKT,CLAMP:ALUMINUM	TK1943	407-3641-00
	407-3641-01	B012111	B013420	2	BRACKET,CLAMP:TM502A/TM503A	TK1943	ORDER BY DESC
	214-4289-01	B013421		2	HEAT SINK,XSTR:ALUMINUM ATTACHING PARTS	TK1943	ORDER BY DESC
-16	211-0102-00			4	SCREW,MACHINE:4-40 X 0.5,FLH,100 DEG,STL END ATTACHING PARTS	TK0435	ORDER BY DESC
-17	----	B010100	B013420	1	CIRCUIT BD ASSY:POWER SUPPLY		
	----	B013421		1	CIRCUIT BD ASSY:POWER SUPPLY (SEE A1 REPL) ATTACHING PARTS		
-18	211-0008-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL END ATTACHING PARTS CKT BD ASSY INCLUDES:	TK0435	ORDER BY DESC
-19	----			2	.CONN,EDGE CARD:PCB,;STR,2 X 28,0.156 CTR (SEE A1J3020,A1J3050 REPL)		
-20	214-1593-02			2	.KEY,CONN PLZN:CKT BOARD CONN	0JR05	ORDER BY DESC
-21	----			1	.CONN,HDR PWR:PCB,;MALE,STR,1 X 7,0.156 (SEE A1J1010 REPL)		
-22	----			1	.CONN,HDR PWR:PCB,;MALE,STR,1 X 8,0 (SEE A1J1040 REPL)		
-22.1	175-4306-00	B013421		4	.CA ASSY,SPELEC:3,22 AWG,4.0 L,RIBBON	80009	175-4306-00

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Discont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-23	-----	B010100	B013420	2	TRANSISTOR:PNP,SI,TO-127		
	-----	B013421		2	TRANSISTOR,PWR:BIPOLAR,PNP;90V,10A (SEE Q2010,Q2050 REPL)		
	-----	B010100	B013420	2	TRANSISTOR:NPN,SI,SEL,TO-127		
	-----	B013421		2	TRANSISTOR,PWR:BIPOLAR,NPN;90V,10A,2.5 (SEE Q3010,Q3050 REPL)		
-24	342-0831-00	B010100	B013420	4	INSULATOR,PLATE:TRANSISTOR TO-220	55285	K6AC-54
	342-0902-00	B013421		4	INSULATOR,PLATE:TRANSISTOR,Q PAD	55285	#QII AC-54
-25	-----	B010100	B012966	1	LEAD,ELECTRICAL:18 AWG,5.0 L,5-4		
	-----	B012967	B023538	1	LEAD,ELECTRICAL:18 AWG,5.25 L,5-4		
	-----	B023539		1	LEAD,ELECTRICAL:18 AWG,5.25 L,5-4 (SEE W100 REPL) ATTACHING PARTS		
-26	210-0586-00	B010100	B023538	2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	210-0457-00	B023539		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL END ATTACHING PARTS	TK0435	ORDER BY DESC
-26.1	334-3379-00			1	MARKER,IDENT:MARKED GROUND SYMBOL	07416	ORDER BY DESC
-27	-----	B010100	B016000	1	TRANSFORMER,PWR:PRIM TAPPED		
	-----	B016001	B023538	1	TRANSFORMER,PWR:PRIM TAPPED		
	-----	B023539		1	TRANSFORMER,PWR:PRIM TAPPED (SEE T100 REPL) ATTACHING PARTS		
-28	212-0516-00			4	SCREW,MACHINE:10-32 X 2.0,HEX HD,STL	TK0435	ORDER BY DESC
-29	210-0805-00			4	WASHER,FLAT:0.204 ID X 0.438 OD X 0.032,STL	12327	ORDER BY DESC
-30	210-0102-00			4	WASHER,FLAT:0.202 ID X 0.343 OD X 0.030THK	0KB01	ORDER BY DESC
-31	166-0227-00			4	INSUL SLVG,ELEC:0.187 ID X 1.5 L,MYLAR END ATTACHING PARTS	TK0977	ORDER BY DESC
-32	-----	B010100	B010807	1	PWR,ENTRY MDL:PNL,SNAP-IN:MALE,IEC		
	-----	B010808	B011482	1	PWR,ENTRY MDL:PNL,SNAP-IN:MALE,IEC		
	-----	B011483		1	PWR,ENTRY MDL:PNL,SNAP-IN:MALE,IEC (SEE P100 REPL)		
-32.1	-----			1	DRAWER,FUSE:FUSE DRAWER AND VOLTAGE (PART OF P100)		
-33	-----			2	CAP,FXD,CER DI:0.01UF,20%,250VAC (SEE C100,C200 REPL)		
-34	-----				LEAD,ELECTRICAL:18 AWG,5.0 L,9-N (SEE W200 REPL)		
-34.1	-----			2	LEAD,ELECTRICAL:18 AWG,5.0 L,0-N (SEE W300,W400 REPL)		
-35	-----			1	SWITCH,ROCKER:DPST,6(4)A,250V (SEE S100 REPL)		
-36	200-3467-00			1	COVER,PLUG-IN:ALUMINUM	TK1943	ORDER BY DESC
-37	348-0430-00			4	BUMPER,PLASTIC:BLACK POLYURETHANE	2K262	ORDER BY DESC
-38	134-0197-00			2	PLUG,HOLE:VINYL,BLACK (OPTION 11 ONLY)	OKBZ5	ORDER BY DESC

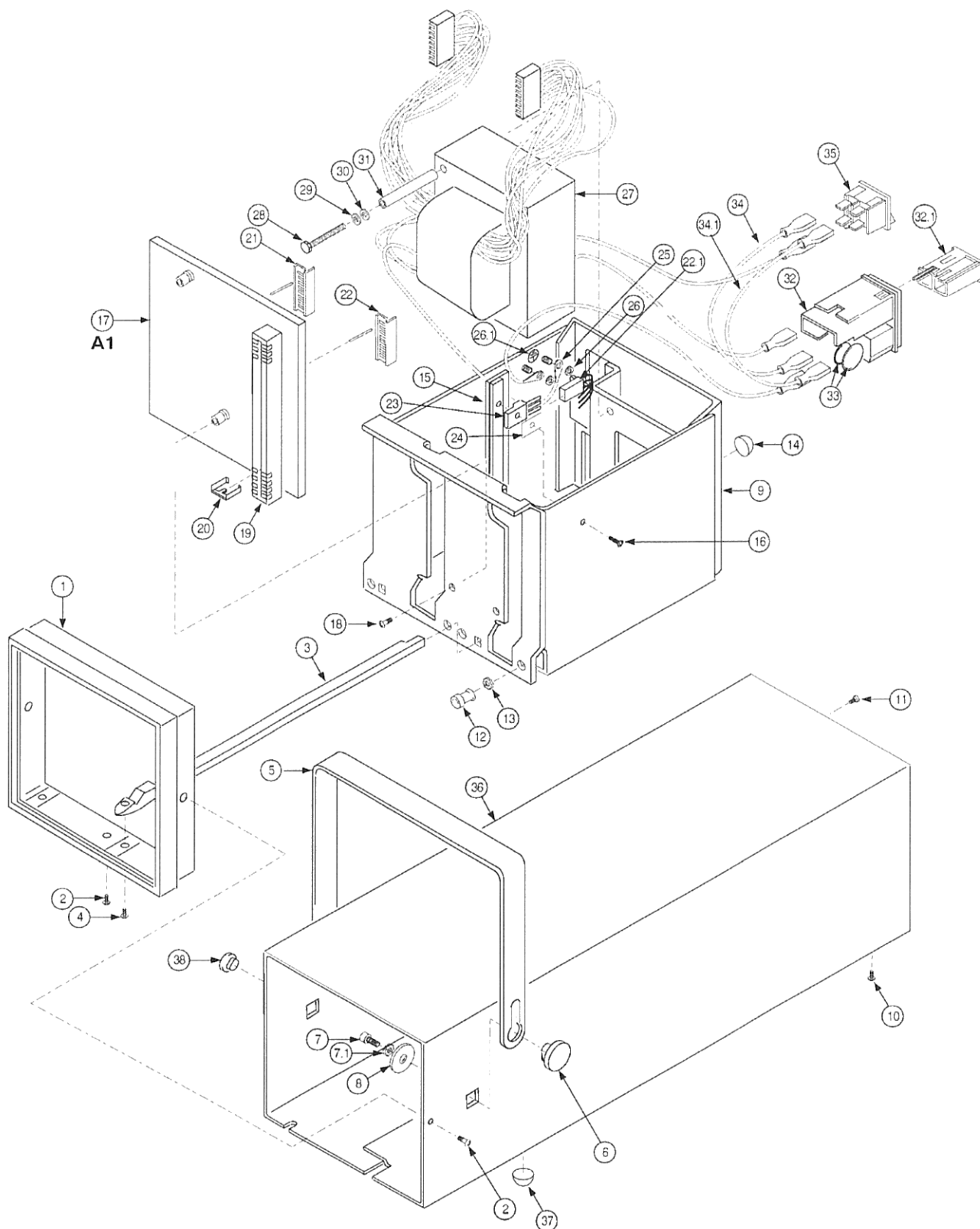


Figure 1: TM502A Cabinet and Chassis

Fig. & Index No.	Tektronix Part No.	Serial No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
STANDARD ACCESSORIES						
2-1	407-3658-00		1	BRKT, PL-IN LOCK; STAINLESS STL	TK1943	407-3658-00
-2	161-0066-09		1	CABLE ASSY, PWR.; 3, 0.75MM SQ, 220V, 99.0 (OPTION A1 ONLY)	S3109	86511000
-3	161-0066-10		1	CABLE ASSY, PWR.; 3, 0.1MM SQ, 250VOLT, 2.5 (OPTION A2 ONLY)	S3109	BS/13-H05VVF3G0
-4	161-0066-11		1	CABLE ASSY, PWR.; 3, 1.00MM SQ, 250V, 10AMP (OPTION A3 ONLY)	S3109	SAA/3-OD3CCFC3X
-5	161-0066-12		1	CABLE ASSY, PWR.; 3, 18 AWG, 98 L, SVT, GREY/BLK (OPTION A4 ONLY)	29870	ORDER BY DESC
-6	161-0154-00		1	CABLE ASSY, PWR.; 3, 1.00MM SQ, 250V, 10A (OPTION A5 ONLY)	S3109	12-H05VVF3G 00-
-7	161-0066-00		1	CABLE ASSY, PWR.; 3, 18AWG, 98 (STANDARD ONLY)	0B445	ECM-161-0066-00
	016-0362-02		1	TOOL BOX (OPTION 13 ONLY)	80009	016-0362-02
	070-6502-01		1	MANUAL, TECH: INSTR, TM502A POWER MODULE	80009	070-6502-01

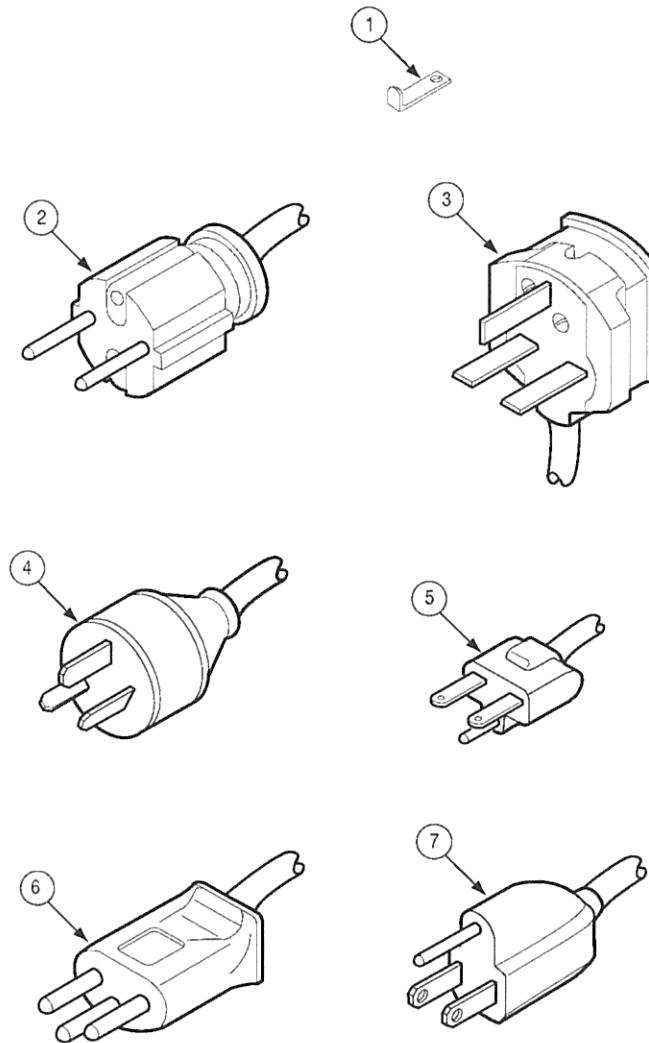


Figure 2: Accessories

Index

C

cabinet removal, 3-4

calibration, 3-3

CAUTION

statement in manuals, *iii*

statement on equipment, *iii*

circuit board removal, 3-4

Cleaning, exterior, 3-2

cleaning, interior, 3-2

D

DANGER, statement on equipment, *iii*

E

Electrical Parts List, 5-1

exterior cleaning, 3-2

I

interior cleaning, 3-2

M

maintenance

preventive, 3-3

soldering, 3-4

Mechanical Parts List, 7-1

O

obtaining replacement parts, 3-3

P

packaging information, 3-6

Parts List

Electrical, 5-1

Mechanical, 7-1

preventive maintenance, 3-3

R

removing the cabinet, 3-4

removing the circuit board, 3-4

removing the voltage selector/fuse holder, 3-5

replacing the series pass transistor, 3-5

S

Safety, *iii*

Symbols, *iii*

series pass transistor replacement, 3-5

soldering techniques, 3-4

static handling, 3-1

V

voltage selector/fuse holder removal, 3-5

W

WARNING, statement in manual, *iii*

