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Am-RAm

TM 502A
POWER MODULE

INSTRUCTION MANUAL

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

070-6502-00
Product Group 75

Serial Number _____

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INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter 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:

B000000	Tektonix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Lslands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektonix, Japan
700000	Tektonix Holland, NV, Heerenveen, The Netherlands

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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 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

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

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SPECIFICATION

INTRODUCTION

Description

The TEKTRONIX TM 502A Power Module is a two-compartment-wide mainframe for the TM 500—Series of modular instrumentation. It 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 non-dedicated power transistors for plug-in usage.

Accessories

Refer to the accessories list in the Replaceable Mechanical Parts list at the rear of this manual for part numbers.

Standard Accessories

1 Instruction Manual
1 Plug-in Retainer Clip
1 Handle/Tilt Stand
1 Power Cord (U.S.)

Options

Refer to the Options section of this manual for information on instrument options.

Performance Conditions

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

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ELECTRICAL CHARACTERISTICS

Table 1-1
SUPPLIES PER COMPARTMENT

Characteristics	Performance Requirements	Supplemental Information
+33.5 Vdc		
Tolerance[a]		+23.7 V to +40.0 V
PARD[b]		<2.5 V p to p.
Maximum Load		350 mA.
Maximum Load di/dt		10 mA/μs
−33.5 Vdc		
Tolerance[a]		−23.7 V to −40.0 V
PARD[b]		<2.5 V p to p.
Maximum Load		350 mA.
Maximum Load di/dt		10 mA/μs
+11.5 Vdc		
Tolerance[a]		+7.6 V to +16.0 V
PARD[b]		<2.5 V p to p.
Maximum Load		1.3 A, shared with 17.5 Vac winding.
Maximum Load di/dt		20 mA/μs
25 Vac (2 each)		
Range		25.0 V rms +10%, −15% floating
Maximum Load		25 VA
Maximum Floating V		350 V peak
17.5 Vac		
Range		20.5 V +10%, −20% grounded center tap
Maximum Load		30 VA, shared with 11.5 Vdc supply.
MAXIMUM PLUG-IN POWER[c] DRAW FROM MAINFRAME		35 W dc or 75 VA ac
COMBINED POWER DRAW[c] SHARING LIMITATION		VA ac + 2.1 (Watts dc) < 75.

[a]Worst case low line full load and high line - no load values including PARD.
[b]Periodic and Random Deviation. See: Nema Standards Publication PY1-1972.
[c]At nominal line voltage.

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Table 1-2
TOTAL POWER DRAW FROM MAINFRAME

Characteristics	Performance Requirements	Supplemental Information
TOTAL POWER DRAW[a] (all compartments combined)		VA ac + (watts dc) <75.

[a]At nominal line voltage.

Table 1-3
SERIES PASS TRANSISTORS

Characteristics	Performance Requirements	Supplemental Information
TYPE		One each NPN and PNP per compartment.
MAXIMUM DISSIPATION		7.5 W each, 15 W total

Table 1-4
SOURCE POWER REQUIREMENTS

Characteristics	Performance Requirements	Supplemental Information
VOLTAGE RANGES		Selectable 100 V, 120 V, 220 V, and 240 V nominal line ±10%.
LINE FREQUENCY		48 Hz to 400 Hz.
MAXIMUM POWER CONSUMPTION		Approximately 90 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.

Table 1-5
MISCELLANEOUS

Characteristics	Performance Requirements	Supplemental Information
MAXIMUM RECOMMENDED PLUG-IN POWER DISSIPATION		
One-Wide		10 to 15 W.
Two-Wide		25 to 35 W.

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PHYSICAL CHARACTERISTICS

Table 1-6
ENVIRONMENTAL[a]

Characteristics	Description	
TEMPERATURE		Meets MIL-T-28800D, class 5.
Operating:	0°C to +50°C	
Non-Operating:	−55°C to +75°C	
HUMIDITY:	95% RH, 0°C to 50°C, non-condensing.	Exceeds MIL-T-28800D, class 5.
ALTITUDE		
Operating:	4.6 km (15,000 ft.)	Exceeds MIL-T-28800D, class 5.
Non-operating:	15 km (50,000 ft)	
VIBRATION:	0.25 mm (0.010″) peak to peak, 5 Hz to 55 Hz, 75 minutes.	See footnote b.
SHOCK:	20 g's (1/2 sine) 11 ms duration, 3 shocks in each direction along 3 major axes, 18 total shocks.	See footnote b.
BENCH HANDLING:	12 drops from 45 degrees, 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 compatability within limits of F.C.C. Regulations, Part 15, Subpart J, Class A.	
ELECTRICAL DISCHARGE:	20 kV maximum discharge applied to instrument case.	

[a]With plug-ins.
[b]Meets MIL-T-28800D, class 5 without plug-ins (0.015″ displacement, 30 g's shock).

Table 1-7
MECHANICAL

Characteristics	Description
NOMINAL WEIGHT (Without Plug-ins)	8.75 lbs (4.0 kg)
OVERALL DIMENSIONS	
Length:	40.7 cm (16.6 in.)
Width:	14.5 cm (5.7 in.)
Height:	14.0 cm (5.5 in.)

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OPERATING INSTRUCTIONS

PREPARATION

This section of the manual contains instructions on preparing the power module for use, and installing plug-in modules.

Power Source

The TM 502A 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.

Power Usage/Loading Considerations

With two plug-in modules installed, the TM 502A can require up to 90 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 can best be used by carefully planning the plug-in configuration, the external loads, and the resulting power distributions. Optimum conditions may be obtained by:

1. Having equal loads in both compartments.

2. Dissipating as much power as possible in the external loads.

3. Operating the system in an ambient temperature near 25°C.

Each plug-in is provided 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 be dissipated within the plug-ins.

Line Voltage Selection/Fuse Replacement

The line voltage selector is part of the line cord plug assembly, located on 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. Refer to Fig. 2-1.

1. Make certain that the power module power switch (on rear of power module) is turned off and 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 fuse rating). Insert fuse into fuse block.

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 value is visible through the line voltage selector window.

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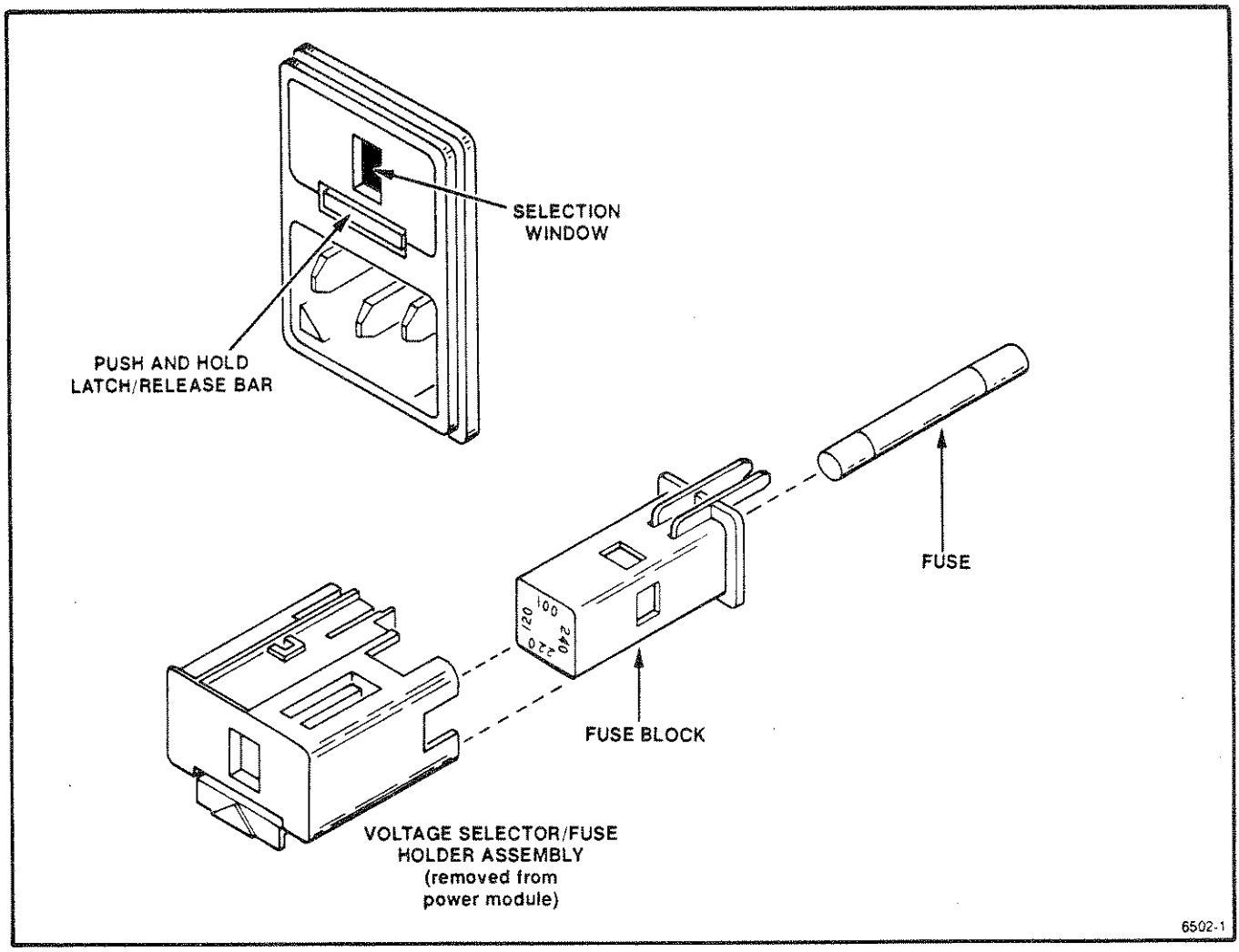


Fig. 2-1. Line voltage selection/fuse replacement.

Handle/Tilt Stand Installation

Before starting handle installation, check the handle kit contents against the list below:

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

A Phillips screwdriver is the only tool required. The following steps outline handle installation:

a. Turn off the power module power switch and disconnect the line cord.

b. Remove any plug-in modules.

c. On each side of the power module (about 2 inches from the front edge) is a black plug. Remove each plug by pushing it out from inside of the power module.

d. From outside the power module, place the plastic locking button in the handle slot and into the square hole in the side panel, as shown in Fig. 2-2. Note that the rounded edges of the button must be facing the top and bottom panels of the power module, as shown in the illustration.

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e. Place the metal washer inside the side panel, over the hole in the button.

f. Install the Phillips screw.

Repeat this procedure for the other end of the handle.

CAUTION

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

Operating Temperatures

The TM 502A can be operated in an ambient air temperature range of 0°C to +50°C. Since the TM 502A can be stored in temperatures between −55°C and +75°C, allow the instrument's chassis to return to within the temperature operating limits before applying power.

Power Modules

It is not necessary that both plug-in compartments be utilized in order to operate the power module.

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.

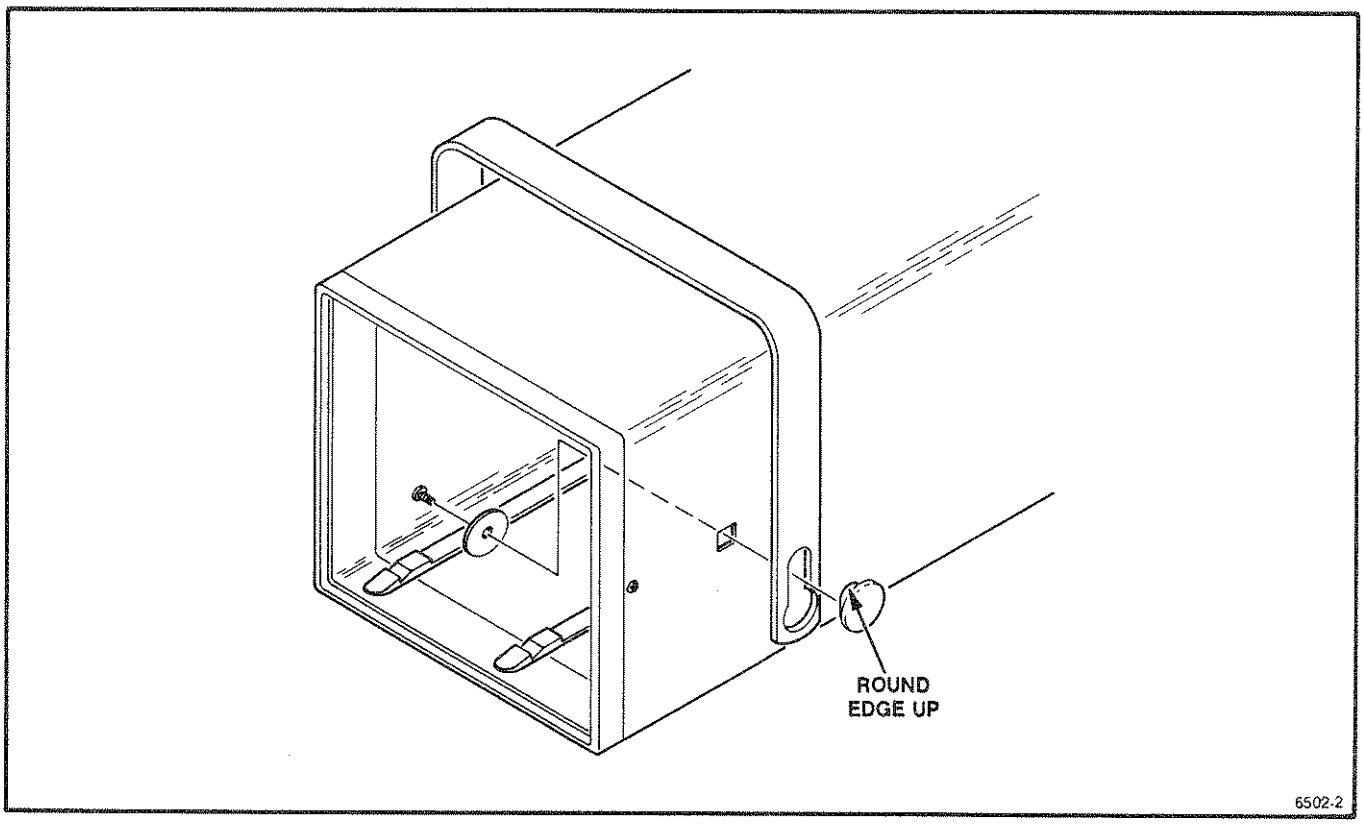


Fig. 2-2. Handle installation.

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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 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 502A user 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.

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 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 Installation

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

To install the retainer clip, stand the power module on end. Remove the round-head Phillips screw located on the bottom side of the TM 502A just behind the front casting. Align the hole in the retainer clip with the chassis hole, with the clip extending forward and into the module opening, over the bottom edge of the plug-in module(s). Re-install the screw.

Turn-On Procedure

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

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