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TM504A MOD WQ

EXCERPT FROM
TS-4353/U
OPERATORS

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070-7813-01
Product Group 75

Serial Number _____

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INSTRUMENT SERIAL NUMBERS

Each instrument manufactured by Tektronix has a serial number pm a panel insert, tag, or stamped on the chassis. The letter at the beginning of 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
G100000 – Tektronix Guernsey, Ltd., Channel Islands
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.)

WARRANTY

Tektronix warrants that the products that it manufactures and sells, of the types listed below, 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.

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Section 5 TM 504A Power Module

OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

As Marked 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.

SYMBOLS

In This Manual

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

As Marked on Equipment

DANGER – High voltage.

Protective ground (earth) terminal.

ATTENTION – Refer to manual.

Refer to manual.

Power Source

This product is intended to operate in a power module connected to 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.

Grounding the Product

This product is grounded through the grounding conductor of the power module power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

Use The Proper Fuse

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

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Do Not Operate Plug-In Unit Without Covers

To avoid personal injury, do not operate this product without covers or panels installed. Do not apply power to the plug-in via a plug-in extender.

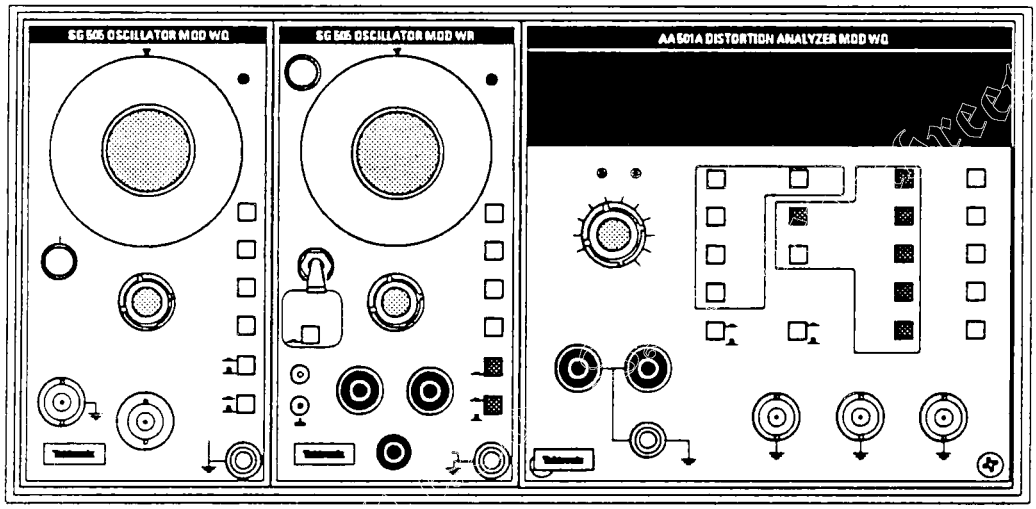


Figure 5.1.1. TM 504A Mod WQ Power Module with Plug-Ins.

SPECIFICATION

INTRODUCTION

Description

The TM 504A Mod WQ is a four-wide power module compatible with all TM 500 plug-ins. It provides unregulated dc and ac supplies and non-dedicated power transistors for plug-in usage. Rear interface connections allow interconnection of signals between plug-ins.

Performance Conditions

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

Table 5.1.1
Electrical Characteristics

Characteristics	Performance Requirements	Supplemental Information
SUPPLIES		
+33.5 Vdc		
Tolerance[a]		+23.7 V to +40.0 V.
PARD (Periodic and Random Deviation)		≤2.5 V pp.
Maximum load		350 mA.
Maximum load di/dt		10 mA/μs.
-33.5 Vdc		
Tolerance[a]		-23.7 V to -40.0 V.
PARD		≤2.5 V pp.
Maximum load		350 mA.
Maximum load di/dt		10 mA/μs.
+11.5 Vdc[b]		
Tolerance[a]		+7.6 V to +16.0 V.
PARD		≤2.5 V pp.
Maximum load		
Standard compartment		1.3 A.
High-power compartment		4.0 A.
Maximum load di/dt		20 mA/μs.
25 Vac (2 each)		
Range		25.0 V rms +10%, -15% floating.
Maximum load		
Standard compartment		25 VA.
High-power compartment		60 VA.
Maximum floating voltage		350 V peak.

Table 5.1.1 (cont)

Characteristics	Performance Requirements	Supplemental Information
SUPPLIES (cont)		
17.5 Vac[b]		
Range		With a grounded center tap 20.5 V rms +10%, -20%.
Maximum load		
Standard compartment		30 VA.
High-power compartment		95 VA.
Maximum plug-in power drawn from mainframe[c]		
Standard compartment		35 Wdc or 75 VAac.
High-power compartment		45 Wdc or 125 VAac.
Combined power drawn sharing limitation[c]		
Standard compartment		VAac + 2.1 (Wdc) <75 VAac.
High-power compartment		VAac + 2.1 (Wdc) <150 VAac.
Fuse data		
+33.5 Vdc		2.5 A, 3 AG, fast blow.
-33.5 Vdc		2.5 A, 3 AG, fast blow.
+11.5 Vdc		7.5 A, 3 AG, fast blow.
-11.5 Vdc, high power		5 A, 3 AG, slow blow.
SERIES PASS TRANSISTORS		
Type		One each NPN or PNP per compartment.
Maximum dissipation		
Standard compartment		7.5 W each, 15 W total.
High-power compartment		30 W each, 50 W total.
SOURCE POWER REQUIREMENTS		
Voltage ranges		Selectable 100 V, 110 V, 120 V, 200 V, 220 V, and 240 V nominal line ± 10%.
Line frequency		48 Hz to 440 Hz.
Max power consumption		Approximately 320 W.
Fuse data		
100 V, 110 V, 120 V ranges		4 A, 3 AG, slow blow.
220 V, 220 V, 240 V ranges		2 A, 3 AG slow blow.

Table 5.1.1 (cont)

Characteristics	Performance Requirements	Supplemental Information
	MISCELLANEOUS	
Maximum recommended plug-in power dissipation		
One-wide		10 to 15 W.
Two-wide		25 to 35 W.

[a] Worst case; low line-full load and high line-no load values including PARD.
[b] Floating in high-power compartment, 350 V peak.
[c] At nominal line voltage.

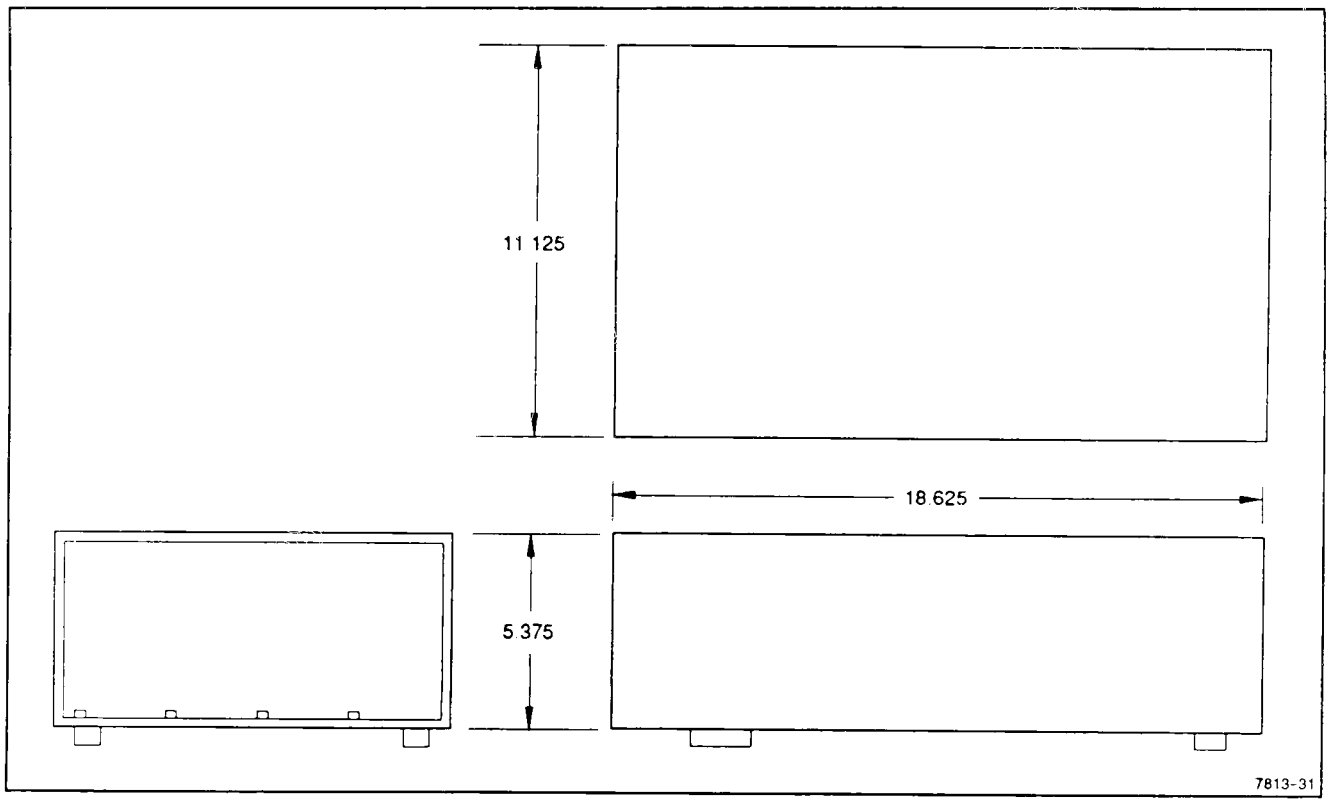


Fig 5.1.2. TM 504A Mod WQ Outline Drawing.

Table 5.1.2
Physical Characteristics

Characteristics	Supplemental Information
ENVIRONMENTAL	
Overall	Meets or exceeds MIL-T-28800B, Class 5 requirements.
Temperature	
Operating	0°C to +50°C.
Non-operating	-55°C to +75°C.
Humidity	90-95% RH for 5 days cycled to +50°C.
Altitude	
Operating	4.6 km (15,000 ft).
Non-operating	15 km (50,000 ft).
Vibration	0.38 mm (0.015"), 5 Hz to 55 Hz, 75 minutes
Shock	20 g's (1/2 sine), 11 ms, 18 shocks.
Bench handling	45°, 4", or equilibrium, whichever occurs first.
Transportation	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.
MECHANICAL	
Net Weight	
TM 504A	18.5 lbs (8.4 kg).
Overall dimensions	
TM 504A	5.4 in (13.7 cm) H, 11.1 in (28.2 cm) W, 18.6 in (47.2 cm) L.

OPERATING INSTRUCTIONS

GENERAL

Installation

For full installation instructions refer to the procedure at the end of this section.

Power Source

The TM 504A Mod WQ 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 multi-phase system.

Power Usage

With four plug-ins installed, the TM 504A Mod WQ may require up to 220 watts at the upper limits of high line voltage ranges. Actual power consumption depends on the particular plug-in configuration and operating modes selected.

High Power Compartment. Some TM 500 series plug-in modules require high power to operate at their maximum capabilities. To meet this requirement the TM 504A Mod WQ has a high power compartment. When viewed from the front this compartment is on the extreme right side of the unit.

Loading Considerations. The power capability of the TM 504A Mod WQ 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 all 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 in the plug-ins themselves.

Line Voltage Selection/Fuse Replacement

The line voltage selector, fuse, and power switch are all 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 (the voltage is indicated by the red-marked window) or the fuses need replacement, perform the following procedure. Refer to Fig. 5.2.1.

Fuse Replacement

1. Make certain that the power module power switch (located below the plug-in housing on the front) is turned off and the line cord is not plugged into the line voltage connector.

2. To check or replace the main power fuses, press downward on the tab located on the Line Voltage Selector just above the power cord receptacle. The door will open, and the fuses can be inspected or replaced.

3. Close the door to reconnect the fuse.

Line Voltage Selection

1. Assure that the power module power switch is turned off and the line cord is not plugged into the line voltage connector.

2. See Figure 5.2.1. Press downward on the tab located on the Line Voltage Selector just above the power cord receptacle. this opens the selector door.

3. Using a small screwdriver, gently pry, first on one edge, then the other, to remove the line selector cards. This etched circuit card is approximately 3/4" square and 1/8" thick.

4. Note that on each edge of the selector card there is a red mark, but that the mark is in a different position on the edge.

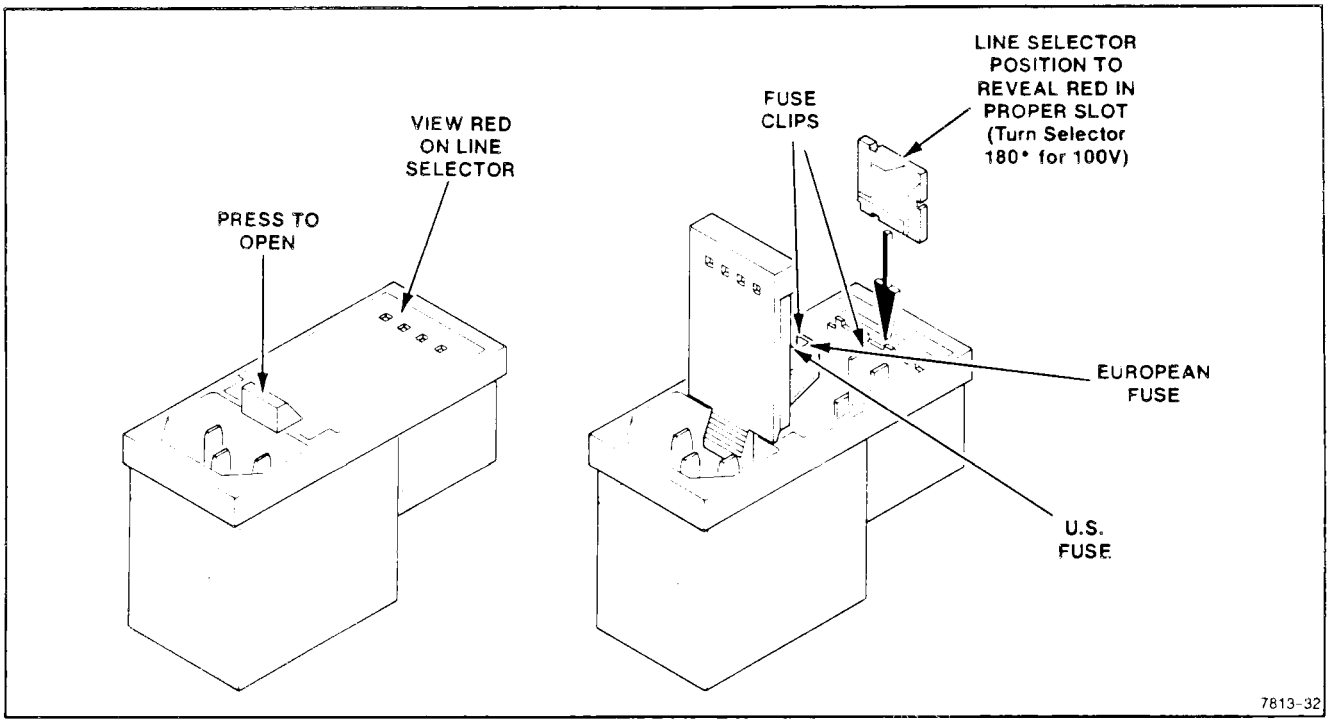


Fig. 5.2.1. Line voltage selection/fuse replacement.

5. Orient the selector card for the desired voltage range, and press the card into its receptacle.

6. Ensure that the installed fuse matches the range selected.

7. Close the selector door. The proper range should show through the correct window.

8. Reconnect the power cord. The TM 504A Mod WQ is ready for use.

Operating Temperatures

The TM 504A Mod WQ can be operated in an ambient air temperature of 0°C to 50°C. Thermal cutout devices protect the system by disconnecting the power to the TM 504A Mod WQ Power Module when internal temperatures rise above a safe operating level. These devices automatically return power to the unit when the internal temperatures return to a safe level.

Since the TM 504A Mod WQ can be stored in temperatures between −40°C and +75°C, allow the instrument's chassis to return to within the operating limits before applying power.

Power Modules

It is not necessary that all the plug-in compartments be utilized in order to operate the Power Module. The only modules needed are those necessary to complete the task.

CAUTION

Turn the Power Module off before inserting the plug-in; otherwise damage may occur to the plug-in circuitry.

Module Installation

1. Check the location of the white plastic barrier keys on the TM 504A Mod WQ interconnecting jack to ensure 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 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 white release latch in the lower left corner of each module.)

3. Install the plug-in module retaining bar.

Plug-In Module Retainer Bar Installation

The plug-in module retaining bar is used to ensure that the installed plug-in modules cannot 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 bar installed.

To install the plug-in module retaining bar, stand the power module on its rear-end. Remove the round-head Phillips screws (holding the top cabinet cover) located on each side of the TM 504A Mod WQ just behind the front casting. Align the holes on each side of the retainer bar with the chassis holes, with the plug-in module retaining bar extending forward and into the module opening, over the bottom edge of the plug-in module. Reinstall the screws.

Turn-On Procedure

After completing the installation procedure, found at the end of this section, and installing the plug-ins, turn on the POWER switch on the TM 504A Mod WQ.

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 504A Mod WQ interface has barriers on the mating connectors between pins 6 and 7 to ensure that incompatible modules cannot be inserted. See Fig. 5.2.2. 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.

INSTALLATION AND PRE TURN ON PROCEDURE

Check the rear panel markings. If the factory settings are compatible with the available line voltage and frequency, remove the plug-in retaining bar from the TM 504A Mod WQ and insert the desired plug-ins. Use the bail to raise the front of the instrument. If a line voltage change is needed, refer a qualified service person to the procedure in the Maintenance section of this manual.

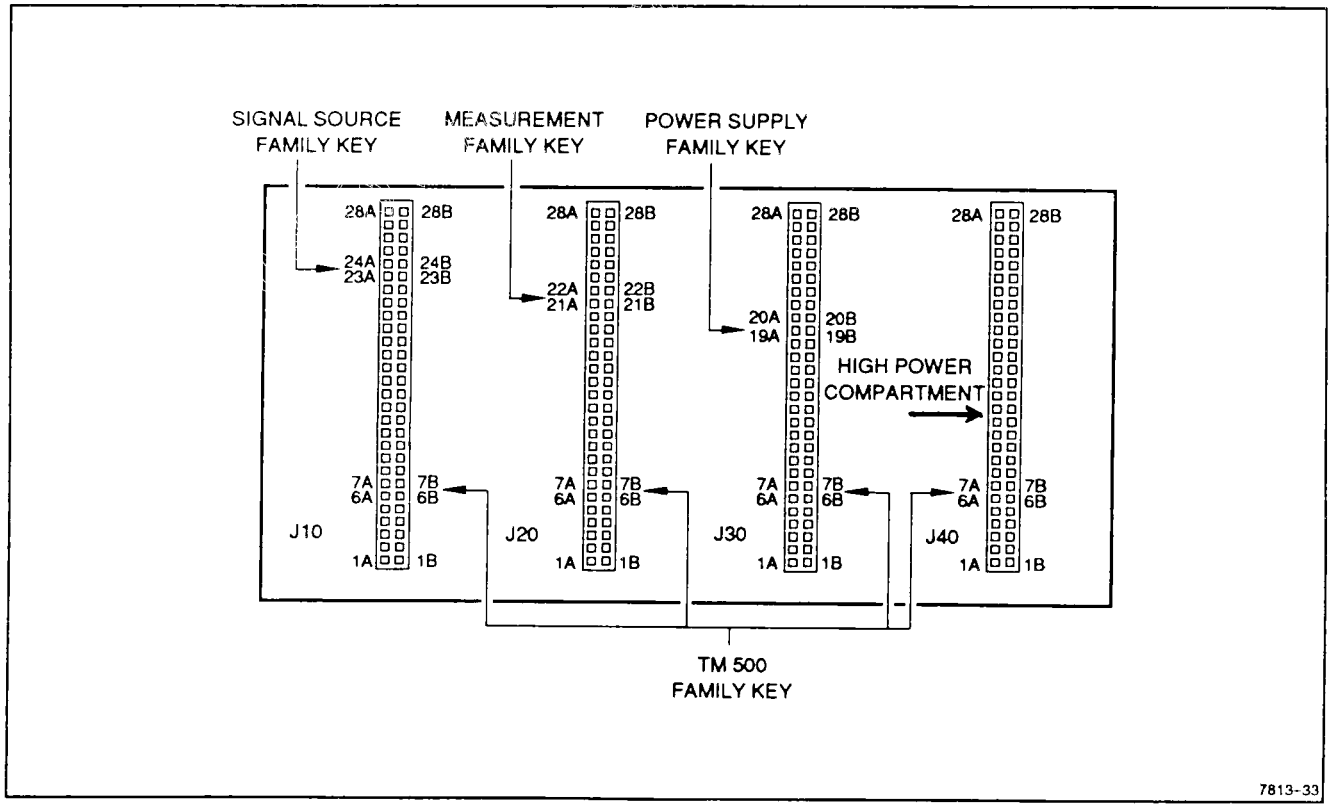
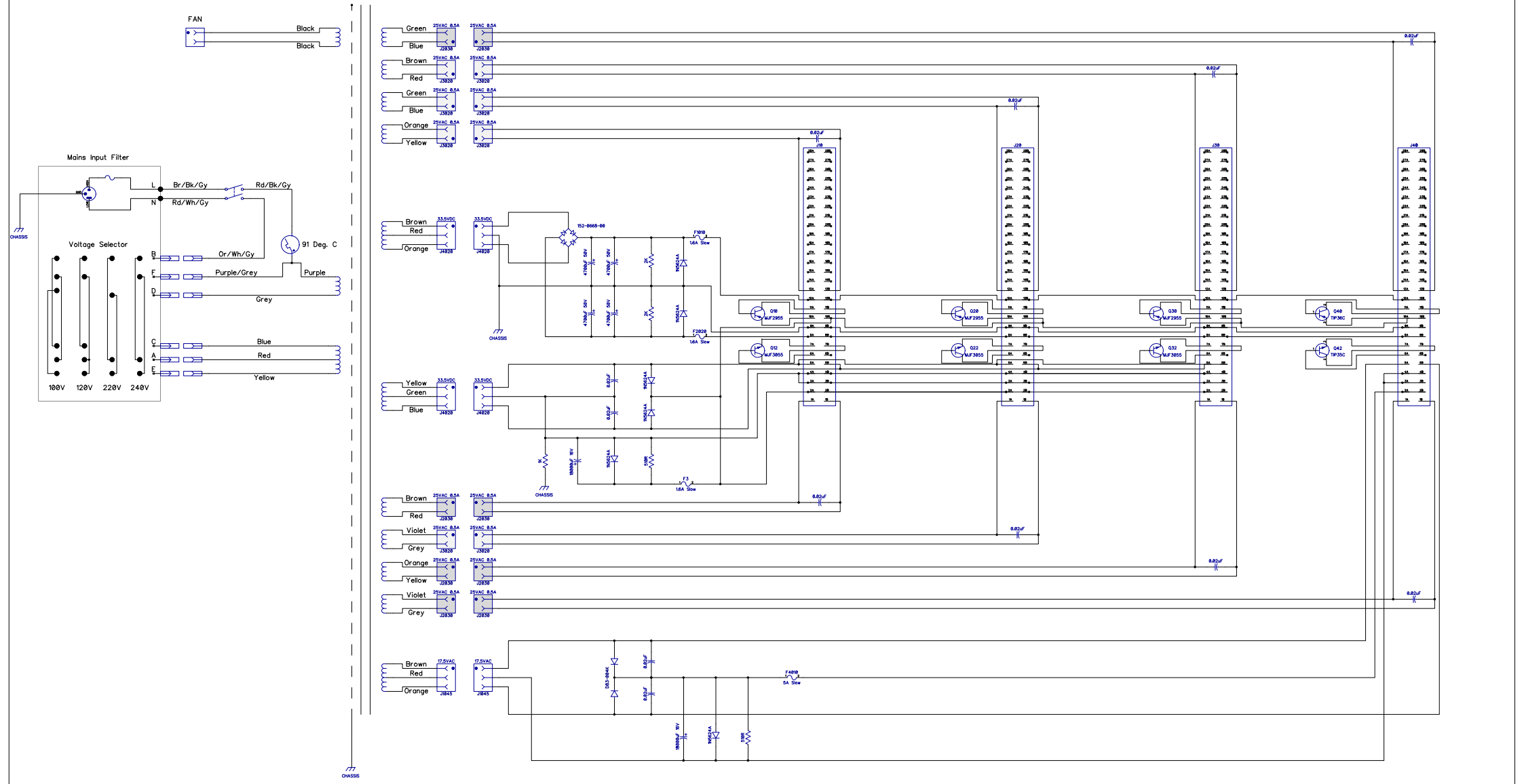


Fig 5.2.2. Keying assignments for family functions. One of many possible sequence combinations.



Tektronix TM504A Schematic		
Size		Rev
A1	www.youtube.com/c/NearFarMedia	1.0
2021/08	Jared Cabot	
	Sheet 1 of 1	