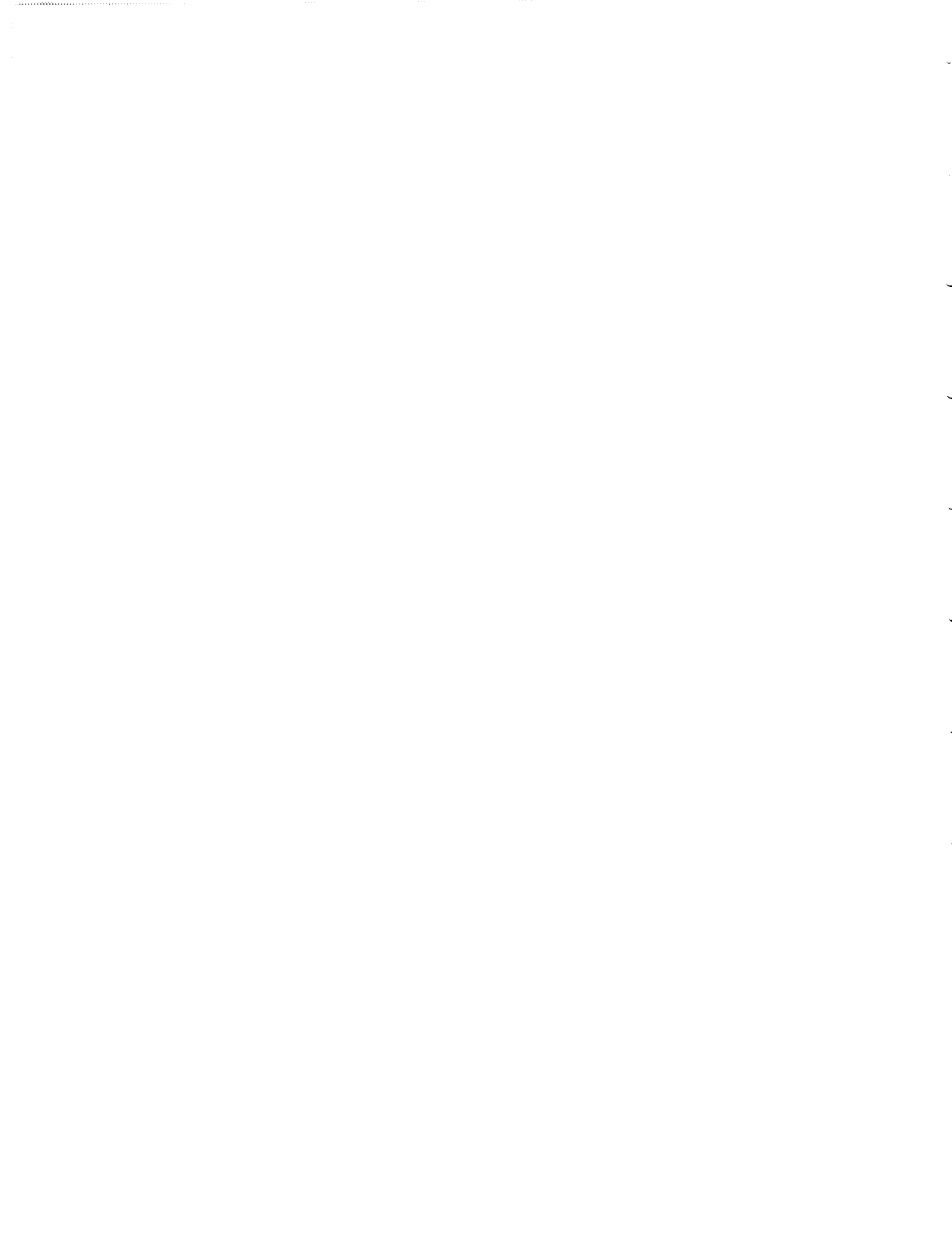


Tektronix®

**TM 506A
POWER MODULE**

INSTRUCTION MANUAL





**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

TM 506A POWER MODULE

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077
070-6929-00
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	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

TABLE OF CONTENTS

WARNING

OPERATORS SAFETY SUMMARY iv
SERVICE SAFETY SUMMARY..... v

OPERATORS PART

Section 1 SPECIFICATION

INTRODUCTION 1-1
 Description 1-1
 Accessories 1-1
 Standard Accessories 1-1
 Options 1-1
 Performance Conditions 1-1

ELECTRICAL CHARACTERISTICS.. 1-2
 Table 1-1. Voltage Supplies..... 1-2
 Table 1-2. Total Power Draw from
 Mainframe 1-3
 Table 1-3. Series Pass Transistors 1-3
 Table 1-4. Source Power
 Requirements..... 1-3
 Table 1-5. Miscellaneous..... 1-3

PHYSICAL CHARACTERISTICS.... 1-4
 Table 1-6. Environmental..... 1-4
 Table 1-7. Mechanical 1-4

Section 2 OPERATING INSTRUCTIONS

Power Source..... 2-1
 Power Usage/Loading
 Considerations..... 2-1
 Fuse Replacement 2-1
 Line Voltage Selection 2-1
 Operating Temperatures..... 2-2
 Cabling 2-3
 Table Top Use..... 2-3
 Rackmounting Instructions..... 2-3
 Plug-in Installation and Removal .. 2-6
 Family Compatibility 2-10
 Customizing the Interface 2-10
 Rear Panel 2-10
 Option 02 2-11
 Plug-in Retainer Clip Installation .. 2-11
 Turn-On Procedure..... 2-11
 Repackaging Information..... 2-11

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

SERVICE PART

Section 3 MAINTENANCE

Introduction 3-1
 Static Sensitive Components 3-1
 Cleaning..... 3-1
 Multipin Connections..... 3-1
 Instrument Disassembly 3-1
 Troubleshooting..... 3-5

Section 4 OPTIONS

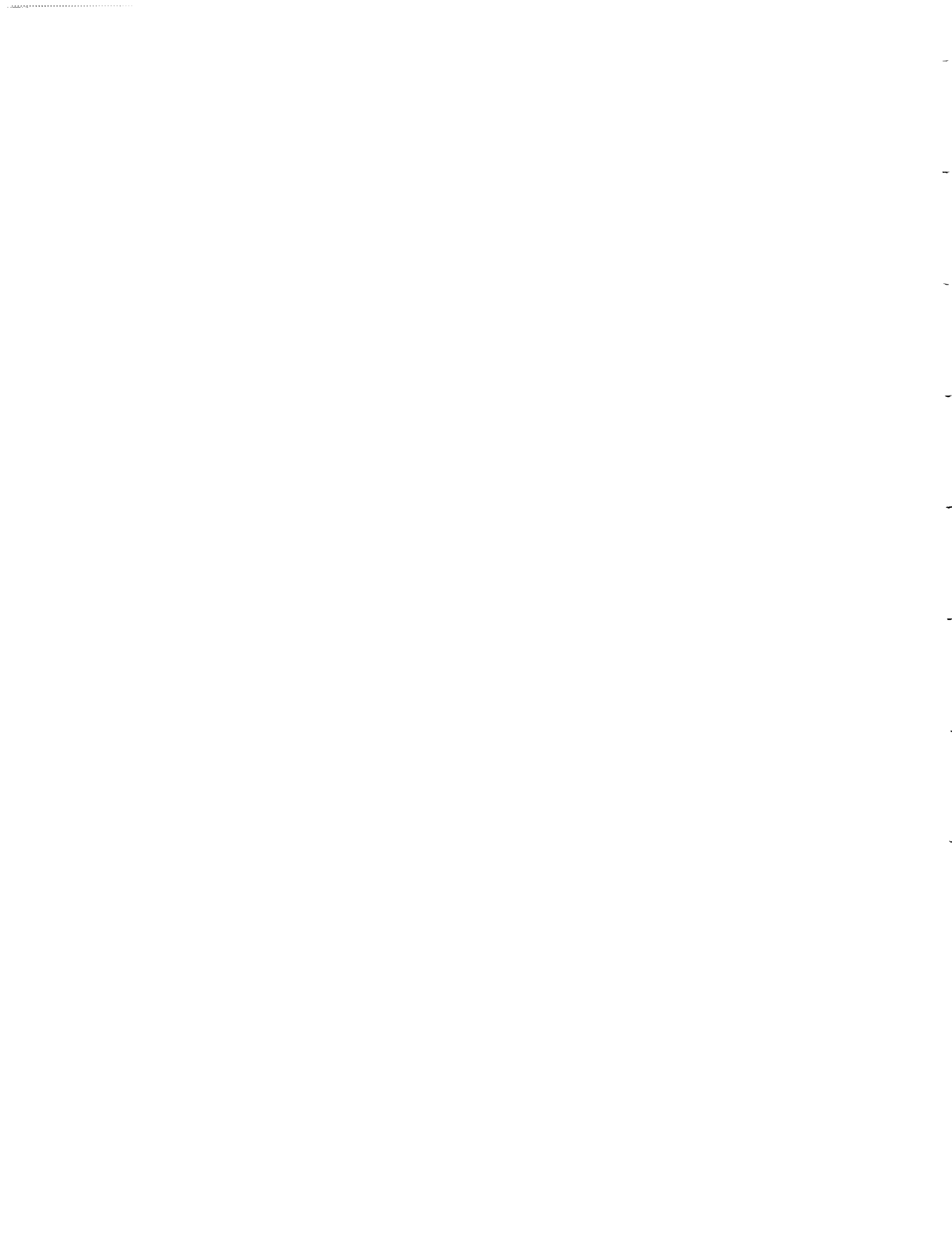
Introduction..... 4-1
 Option 02..... 4-1
 System Design Directions..... 4-1
 Wire Use 4-1

Section 5 REPLACEABLE ELECTRICAL PARTS

Section 6 DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Section 7 REPLACEABLE MECHANICAL PARTS
 Accessories

Change Information



LIST OF ILLUSTRATIONS

Figure No.		Page
2-1	Line Voltage Selection and Main Fuse Replacement	2-2
2-2	TM 506A front panel	2-3
2-3	TM 506A rear view	2-4
2-4	TM 506A, overall dimensions	2-5
2-5	Rack latch hole	2-6
2-6	Dimensions and positioning of TM 506A, Option 10, in standard rack	2-7
2-7	Rackmount slide detail. If the rack has tapped holes, the bar nuts are not required	2-8
2-8	Rackmounting slide details	2-8
2-9	Removing and installing TM 506A in rack slides	2-9
2-10	Plug-in installation and removal	2-10
2-11	Keying assignments for family functions. One of the many possible sequence combinations	2-11
3-1	Orientation and disassembly of multipin connectors	3-2
3-2	Outer panel removal	3-2
3-3	Guide rail and air baffle removal	3-3
3-4	Removal of the interface circuit board support	3-4
3-5	Rear panel removal	3-4
3-6	Location of screws holding the dc power supply circuit board to the mainframe chassis	3-5
3-7	Series pass transistor locations.	3-6
3-8	Attaching screws on bottom of mainframe	3-7
3-9	Transformer assembly attaching screws	3-8

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.

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.

Grounding the Product

This product is grounded through the grounding conductor of the 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 Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

For detailed information on power cords and connectors, see maintenance section.

Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

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

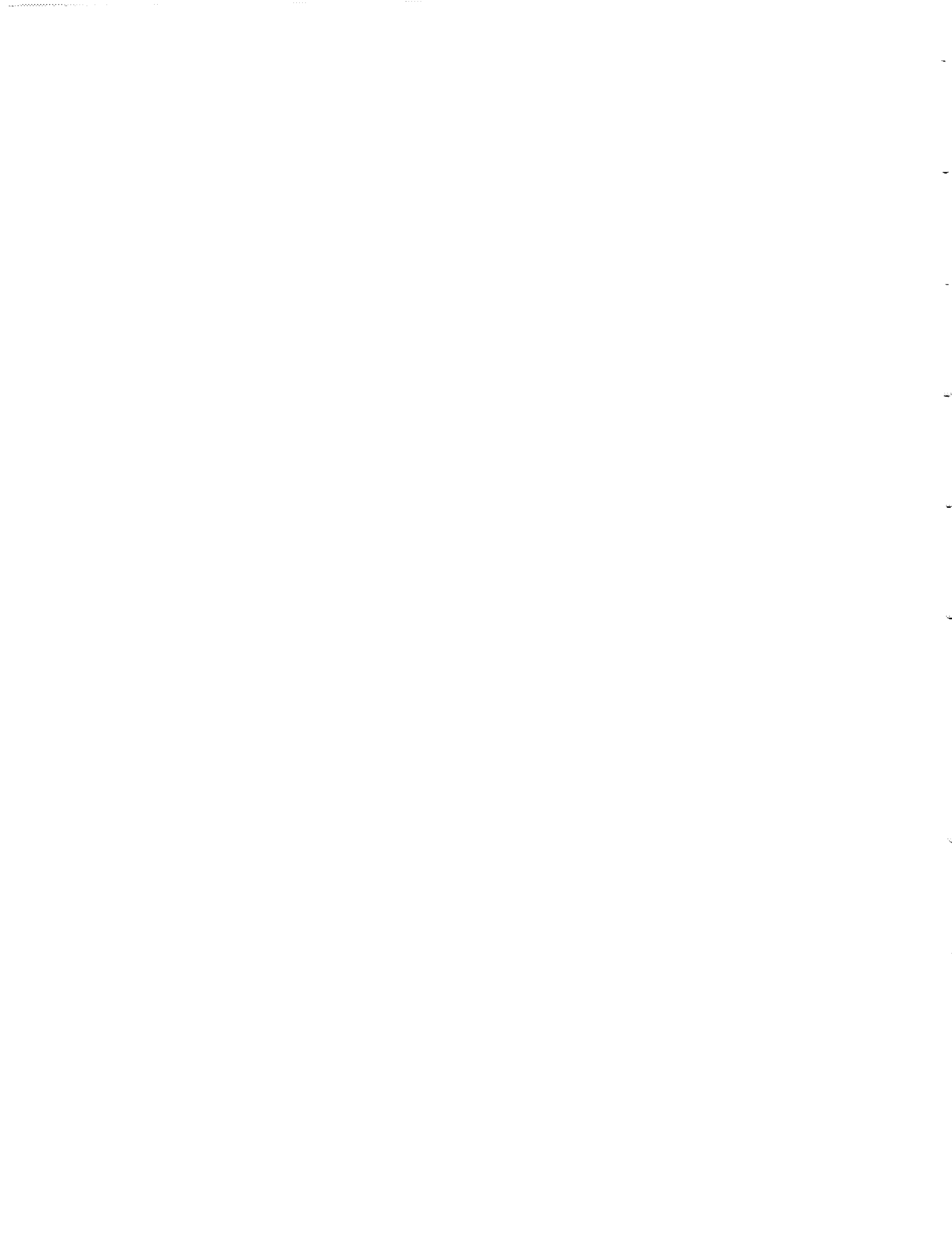
Refer fuse replacement to qualified service personnel.

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 Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.



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.

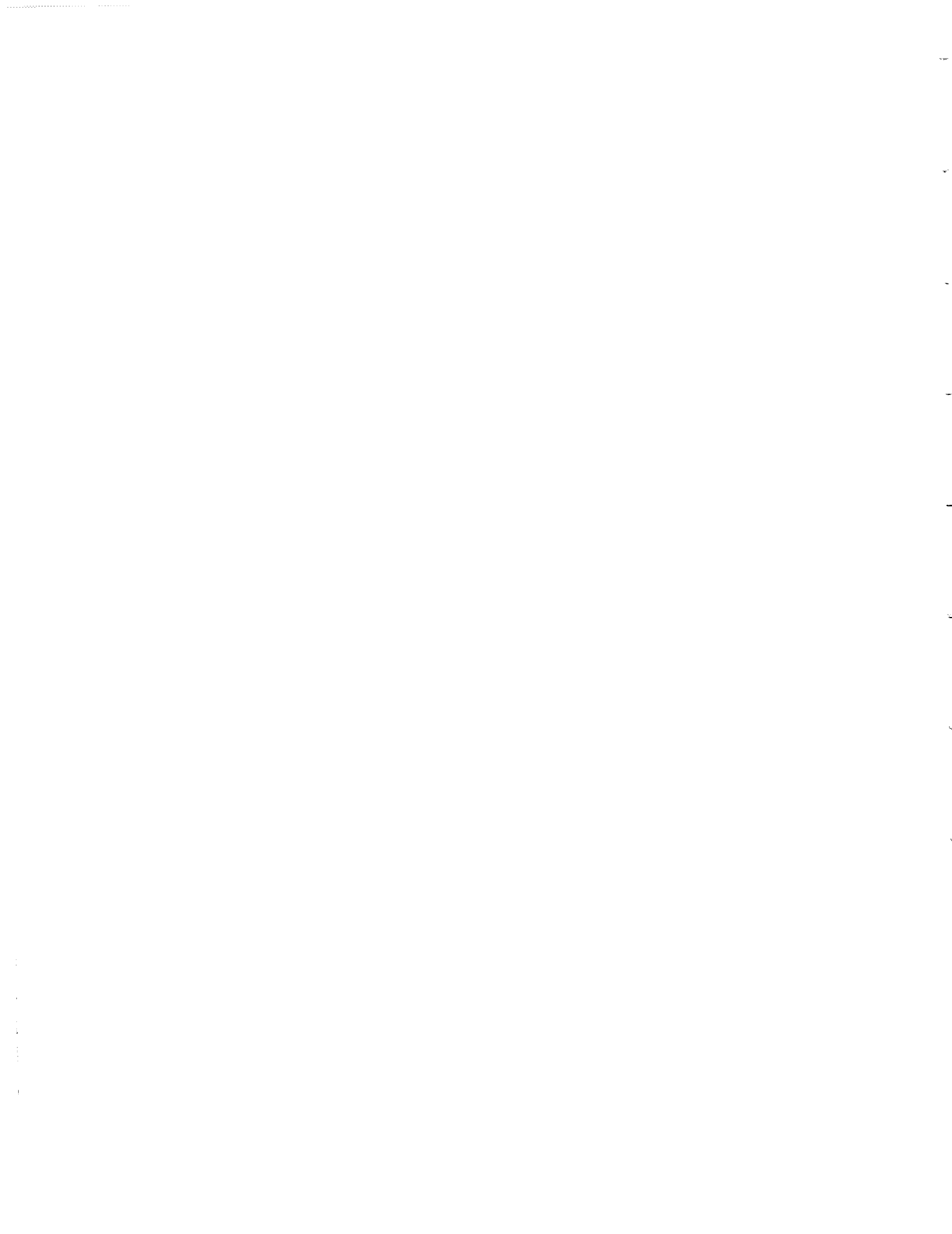
Disconnect power before removing protective panels, soldering, or replacing components.

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.

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.



SPECIFICATION

INTRODUCTION

Description

The TEKTRONIX TM 506A Power Module is a six-compartment mainframe for the TM 500—Series of modular instrumentation. It accepts up to six independently functional plug-in modules to form a compact, versatile and low cost instrumentation system. The TM 506A 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

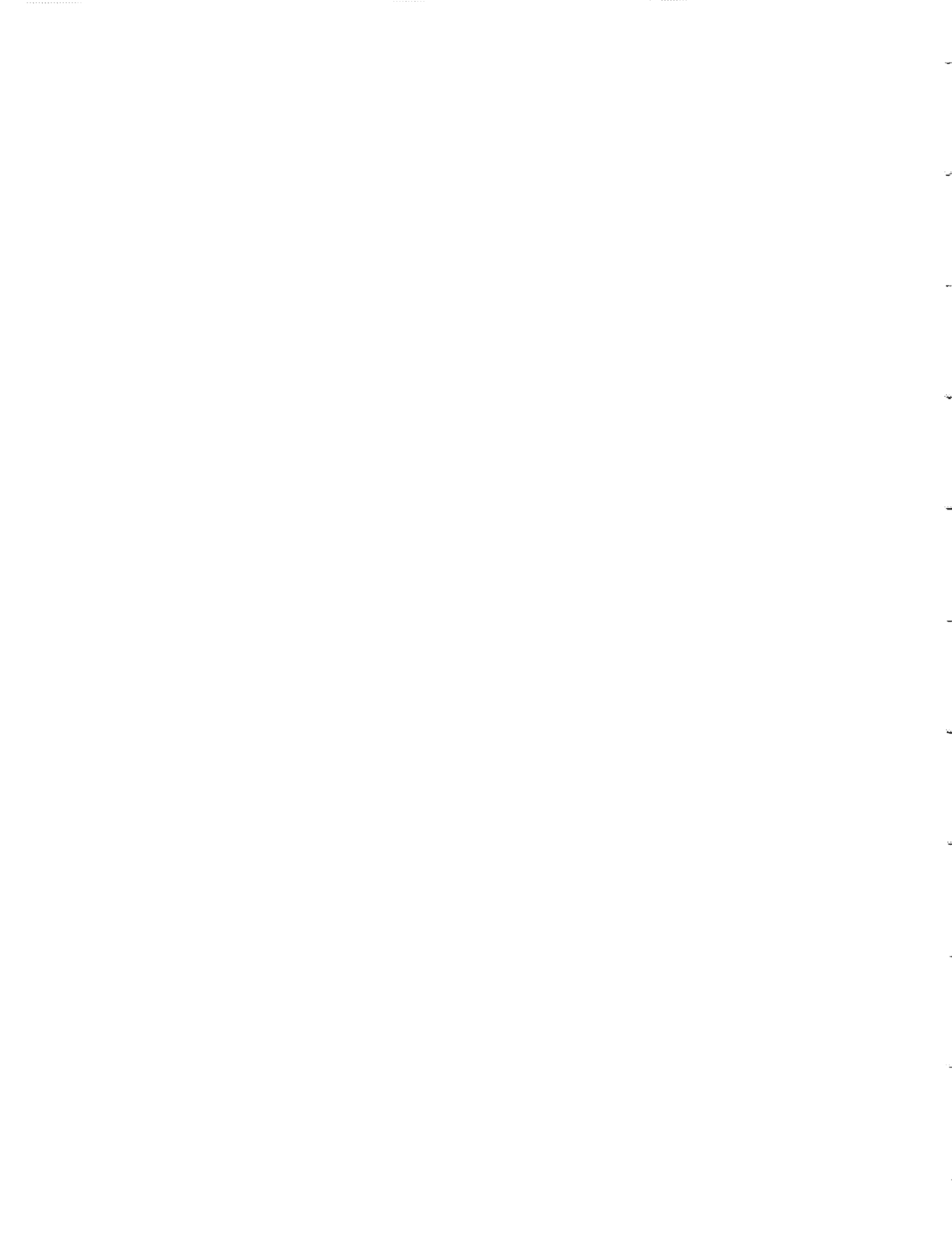
- 1 Instruction Manual
- 1 Power Cord (U.S.)

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.



**ELECTRICAL CHARACTERISTICS
PER/COMPARTMENT**

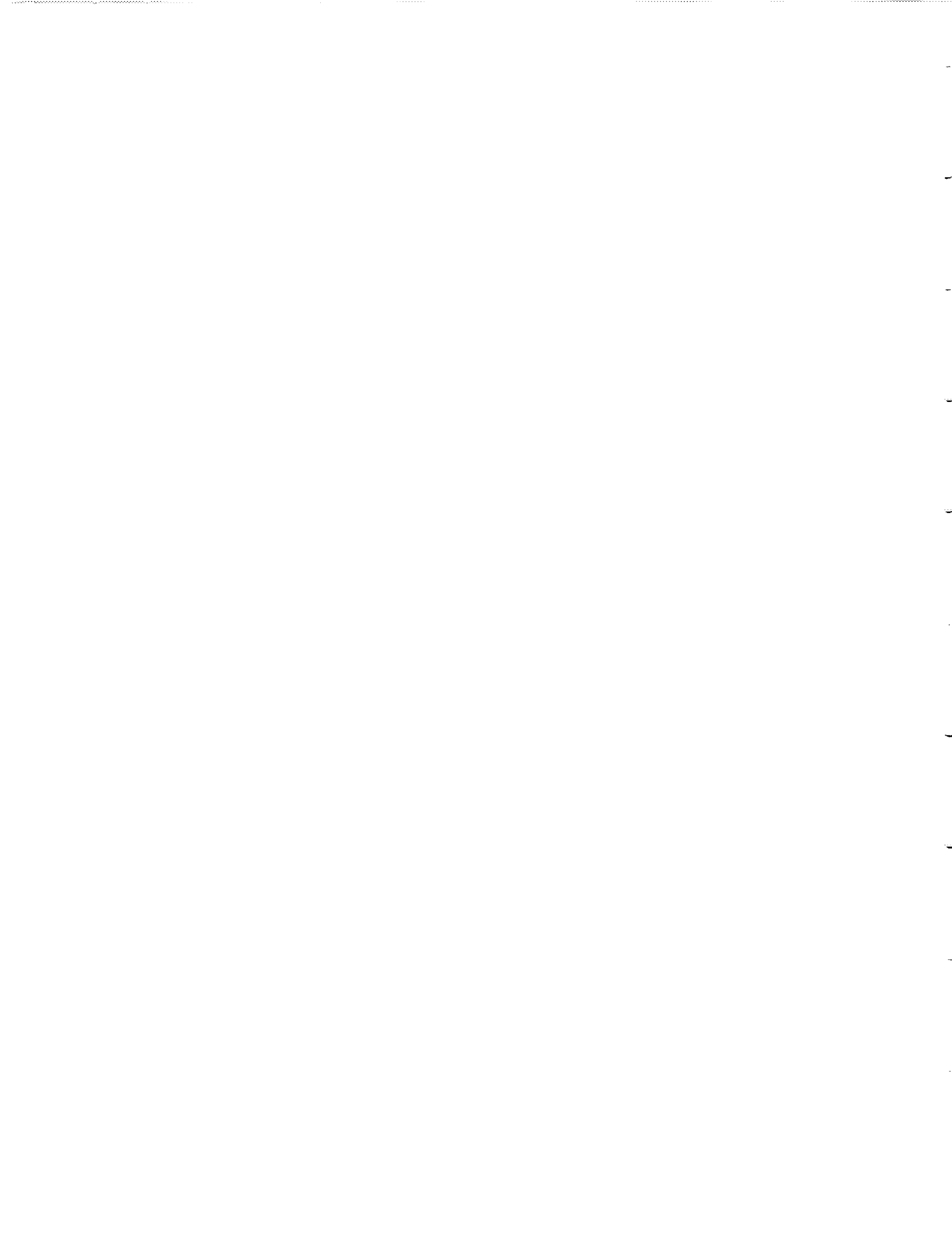
**Table 1-1
VOLTAGE SUPPLIES**

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		3 A per compartment, 10 A total
Maximum Load di/dt		20 mA/μs
25 Vac (3 each)		
Range		25.0 V rms +10%, -15% floating
Maximum Load		
Standard compartment		25 VA
High power compartment		62.5 VA
Maximum Floating V		350 V peak
17.5 Vac		
Range		20.5 V +10%, -20% grounded center tap
Maximum Load		350 mA rms
MAXIMUM PLUG-IN POWER^c DRAW FROM MAINFRAME		
Standard compartment		30 W dc or 50 VA ac
High power compartment		30 W dc or 125 VA
COMBINED POWER DRAW^c SHARING LIMITATION		
Standard compartment		VA ac + 2.1 (Watts dc) ≤50.
High power compartment		

^aWorst case low line full load and high line - no load values including PARD.

^bPeriodic and Random Deviation. See: Nema Standards Publication PY1-1972.

^cAt nominal line voltage.



**Table 1-2
TOTAL POWER DRAW FROM MAINFRAME**

Characteristics	Performance Requirements	Supplemental Information
TOTAL POWER DRAW* (all compartments combined)		VA ac + 2.1 (watts dc) \leq 375.

*At nominal line voltage.

**Table 1-3
SERIES PASS TRANSISTORS**

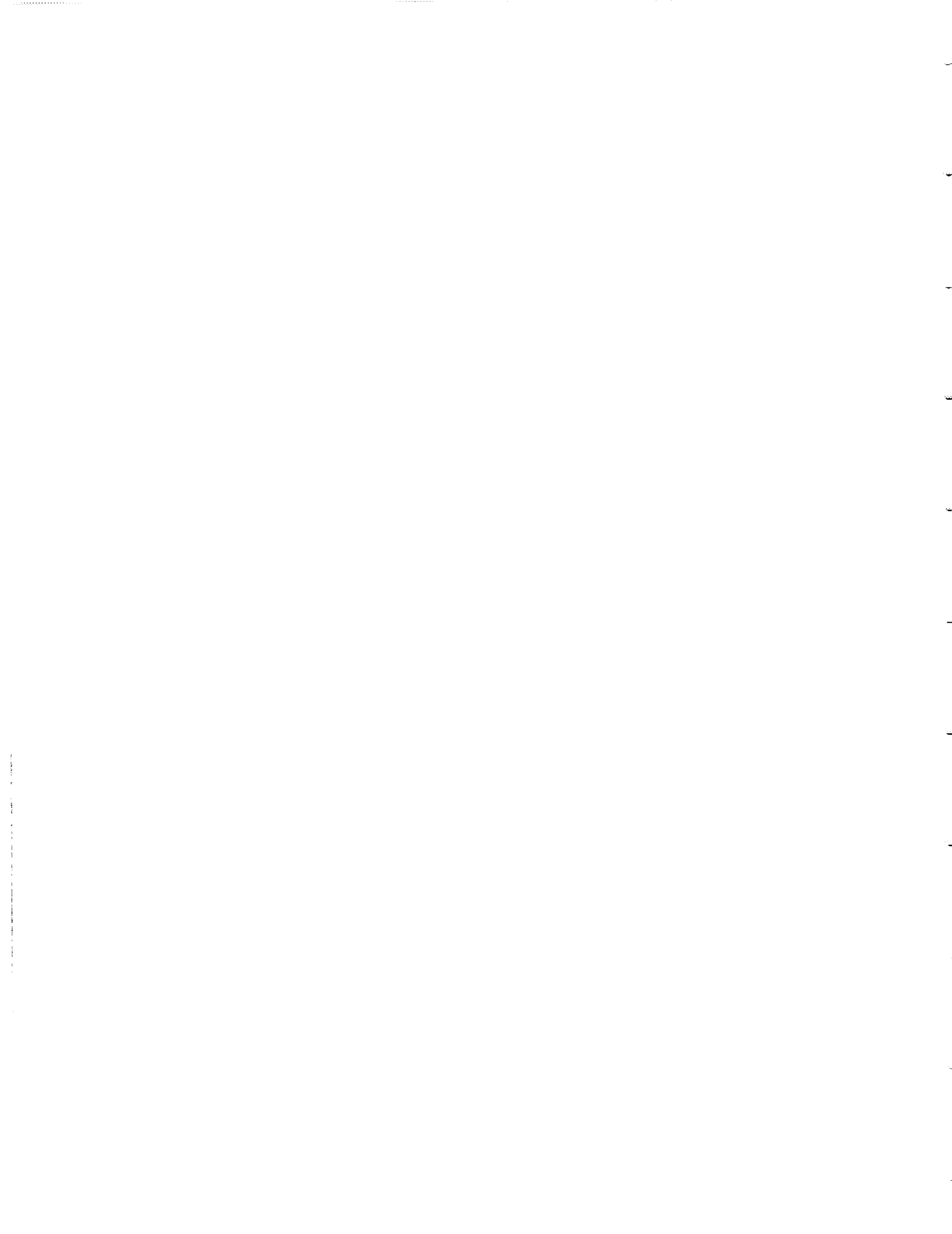
Characteristics	Performance Requirements	Supplemental Information
TYPE		One each NPN and PNP per compartment.
MAXIMUM DISSIPATION Standard compartment High power compartment		7.5 W each, 15 W total 30 W each, 50 W total

**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 \pm 10%.
LINE FREQUENCY		48 Hz to 66 Hz.
MAXIMUM POWER CONSUMPTION		Approximately 400 W.
FUSE DATA		
100 V, 120 V Ranges		4 A, 3 AG, slow blow, 250 V.
220 V, 240 V Ranges		2 A, 3 AG, slow blow, 250 V.

**Table 1-5
MISCELLANEOUS**

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



PHYSICAL CHARACTERISTICS

**Table 1-6
ENVIRONMENTAL^a**

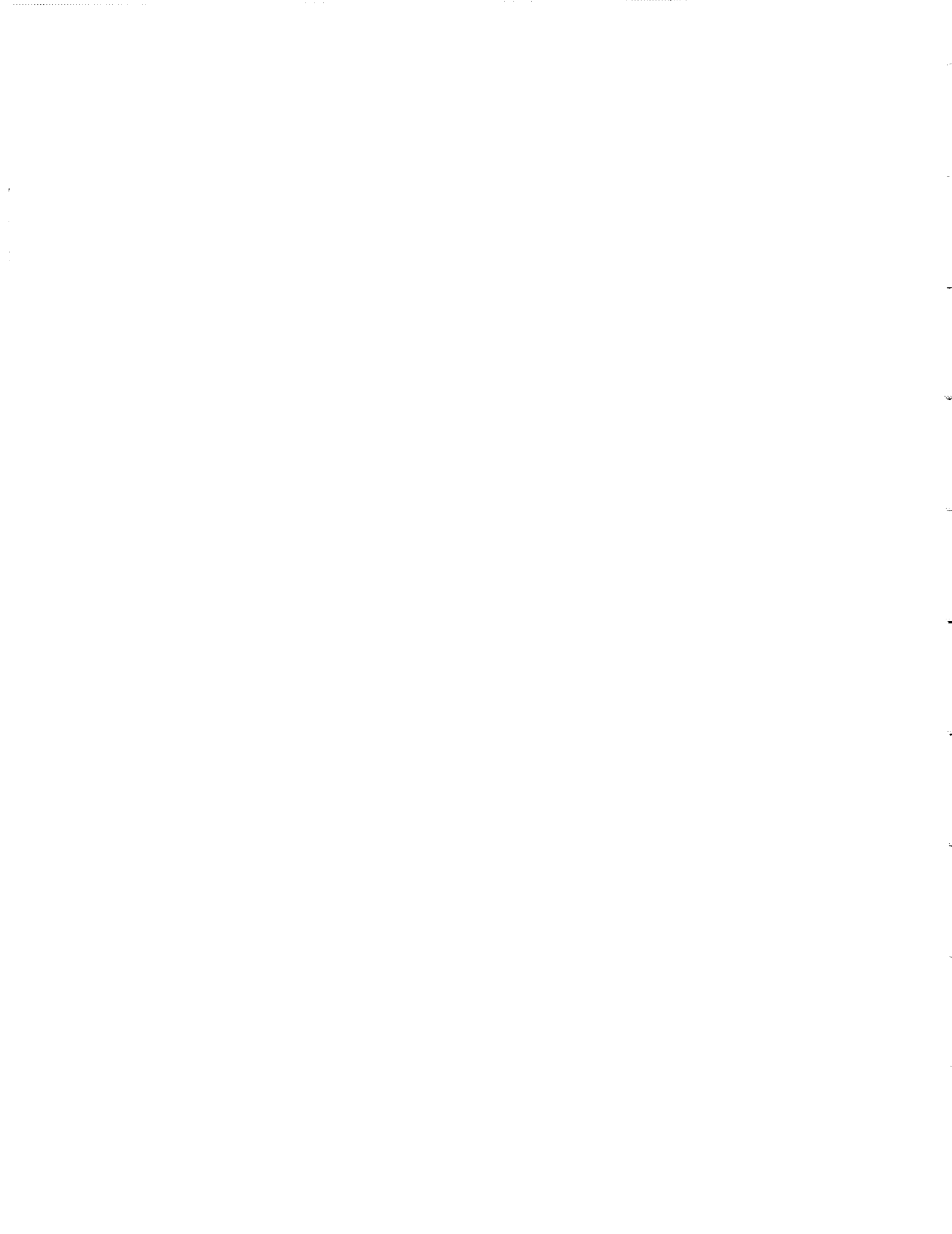
Characteristics	Description
TEMPERATURE Operating ^b : Non-Operating:	Meets MIL-T-28800D, class 5. 0°C to +50°C -55°C to +75°C
HUMIDITY ^b :	95% RH, 0°C to 50°C Exceeds MIL-T-28800D, class 5.
ALTITUDE Operating ^b : Non-operating:	Exceeds MIL-T-28800D, class 5. 4.6 km (15,000 ft.) 15 km (50,000 ft)
VIBRATION:	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.

^aWith plug-ins.

^bMeets MIL-T-28800D, class 5 with plug-ins (0.015" displacement, 30 g's shock).

**Table 1-7
MECHANICAL**

Characteristics	Description
NOMINAL WEIGHT (Without Plug-ins)	12.3 kg (27 lbs)
OVERALL DIMENSIONS Length: Width: Height:	48.958 cm (19.275 in.) 44.473 cm (17.509 in.) 19.38 cm (7.63 in.)



OPERATING INSTRUCTIONS

INTRODUCTION

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

Power Source

The TM 506A 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.

WARNING

AC POWER SOURCE AND CONNECTION. *This instrument operates from a single-phase power source. It has a three-wire power cord and two-pole, three-terminal grounding-type plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage, 250 V.*

Before making connection to the power source, determine that the instrument is adjusted to match the voltage of the power source, and has a suitable two-pole, three-terminal grounding-type plug. Refer any changes to qualified service personnel.

GROUNDING. *This instrument is safety class I equipment (IEC designation). All accessible conductive parts are directly connected through the grounding conductor of the power cord to the grounding contact of the power plug.*

The power input plug must only be inserted in a mating receptacle with a grounding contact. Do not defeat the grounding connection. Any interruption of the grounding connection can create an electric shock hazard.

For electric shock protection, the grounding connection must be made before making connection to the instrument's input or output terminals.

Power Usage/Loading Considerations

With six plug-in modules installed, the TM 506A can require up to 375 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 506A 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 within the plug-ins.

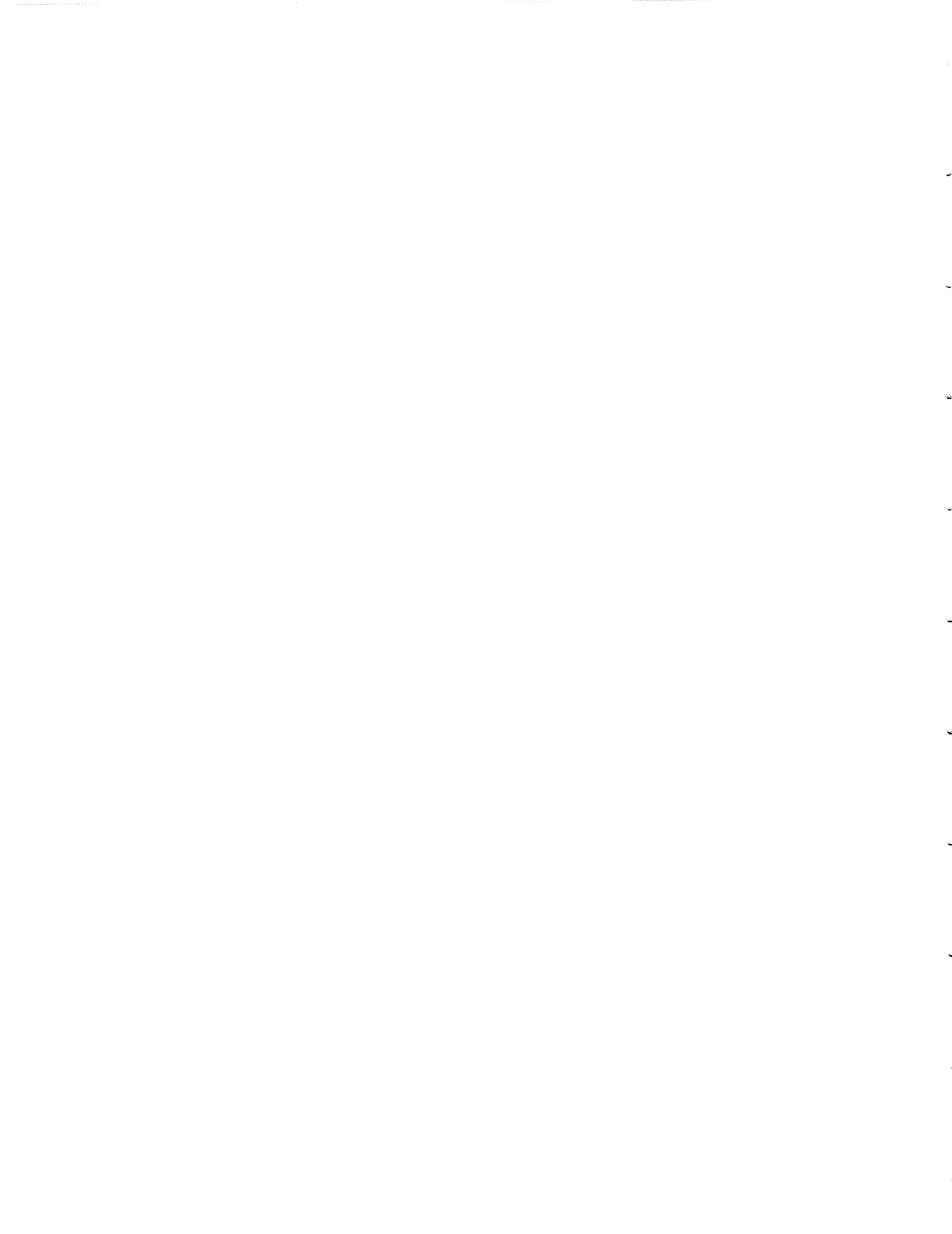
Fuse Replacement

To check or replace a fuse, perform the following:

1. Turn off the power to the power module, and disconnect the power cord from the instrument.
2. See Fig. 2-1. To check or replace the Main Power Fuse, press downward on the tab located on the Line Voltage Selector just above the power cord receptacle. The door will open, and the fuse can be inspected or replaced.
3. Close the door to reconnect the fuse.
4. To check Power Supply fuses, use a small screwdriver to remove each of the three fuseholders, located on the rear panel, on the right-hand side when viewing the rear panel. Remove and replace fuses as required.

NOTE

The fuse value labeling on the instrument rear panel should read: "4A SLOW and 2A SLOW".



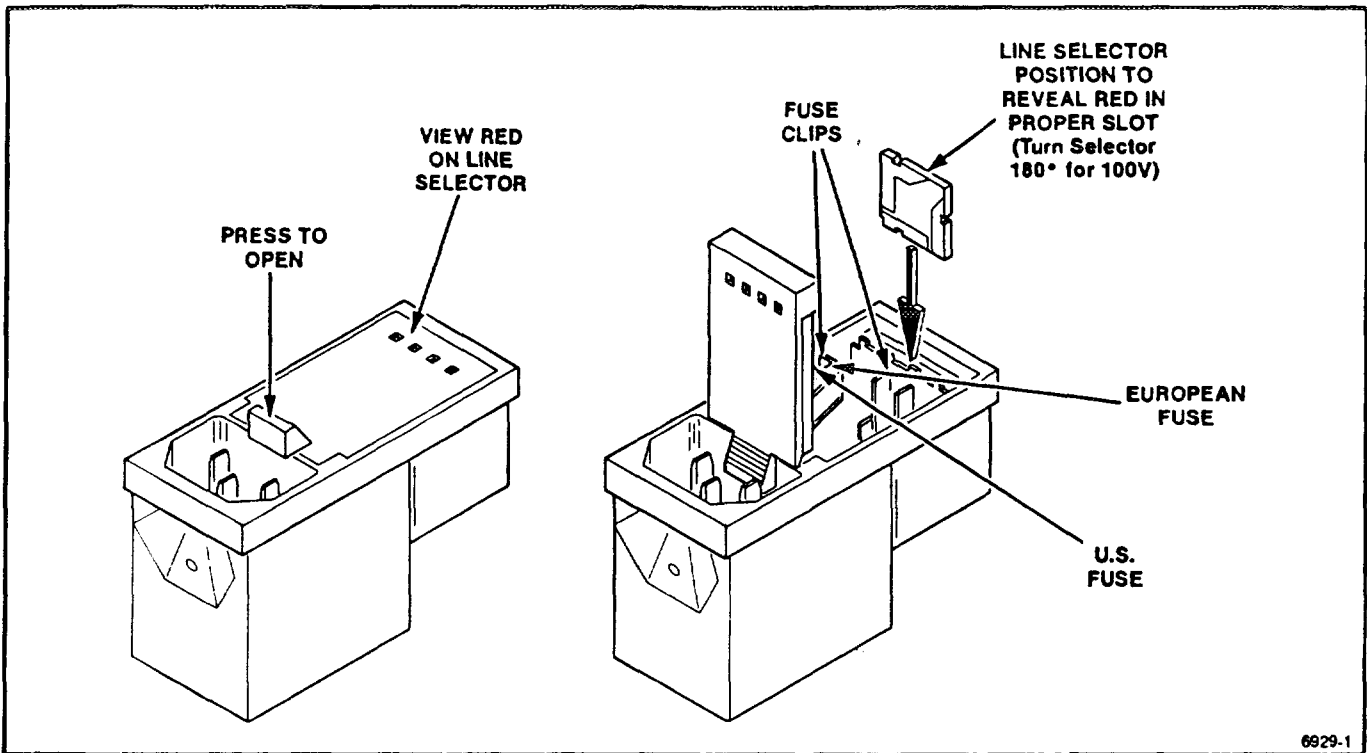


Fig. 2-1. Line Voltage Selection and Main Fuse Replacement.

Line Voltage Selection

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.

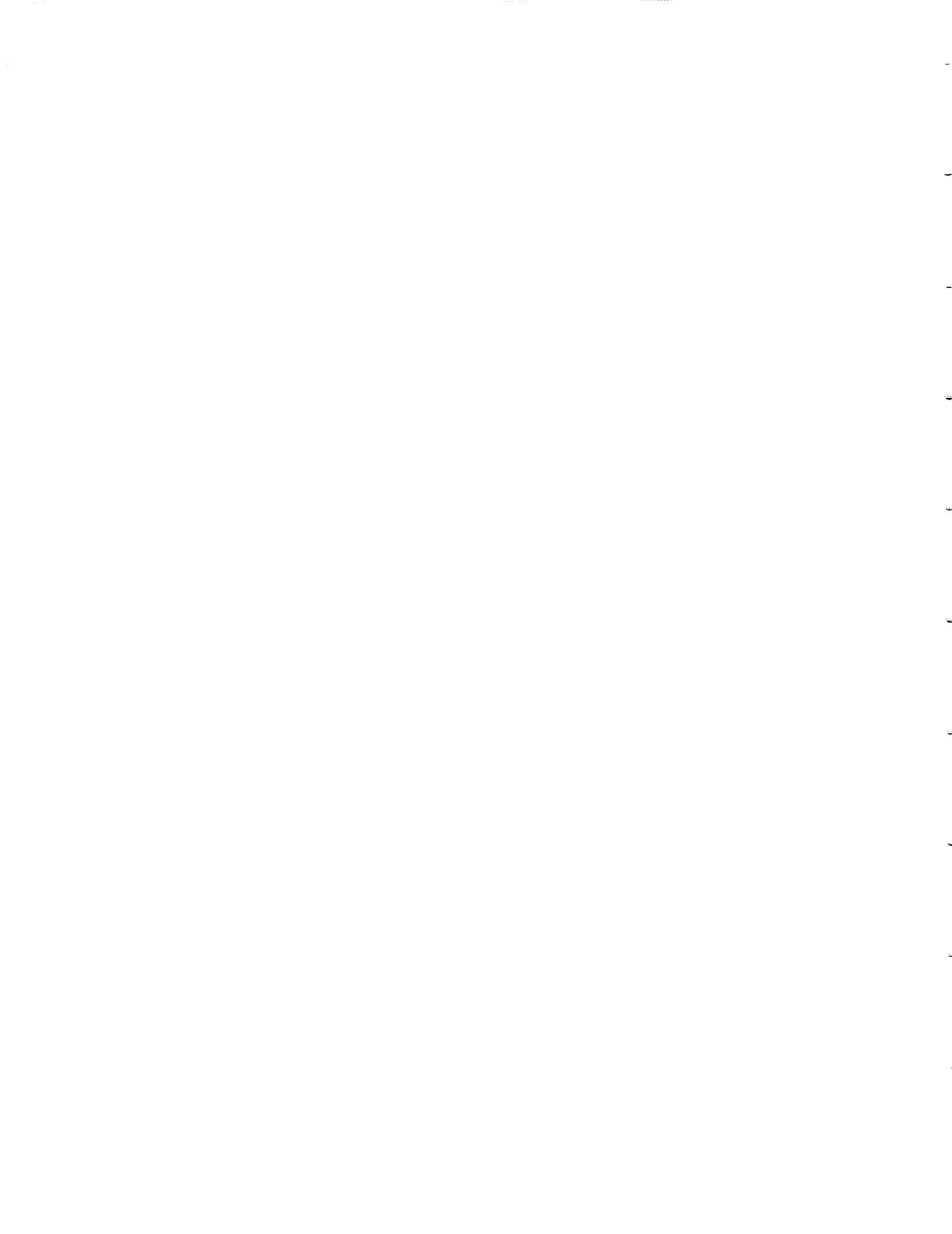
If the displayed voltage selection is incorrect or the fuse needs replacement, perform the following procedure. Refer to Fig. 2-1. (The voltage is indicated by the red-marked window.)

1. Make certain that the power module power switch is turned off and the line cord is not plugged into the line voltage connector.
2. See Fig. 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 card. 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.
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 one of the four windows.
8. Reconnect the power cord. The TM 506A is ready for use.

Operating Temperatures

The TM 506A can be operated in an ambient air temperature range of 0°C to +50°C. Since the TM 506A 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.



Cabling

CAUTION

Remove power cord before attempting cable installation.

For convenience, cabling from the front of the power module to the rear panel may be run through the air intake and cable raceway as shown in Fig. 2-2. To install this cabling, first remove the access panel on the rear of the power module. See Fig. 2-3. Next remove the two bottom panel retainer screws and the bottom panel retainers. Slide the bottom panel out from the rear of the instrument. Pass the cable through the front air intake, across the bottom of the plug-in support rails and out the access panel. Replace the power module bottom cover.

CAUTION

To ensure proper cooling, do not operate the power module with any cover removed.

Table Top Use

The power module may be operated with the front raised. To raise the front of the instrument extend the front bail as shown in Fig. 2-4.

Rackmounting Instructions

Cooling. At least 1-inch clearance is recommended above and below the power module. This is necessary to insure proper cooling.

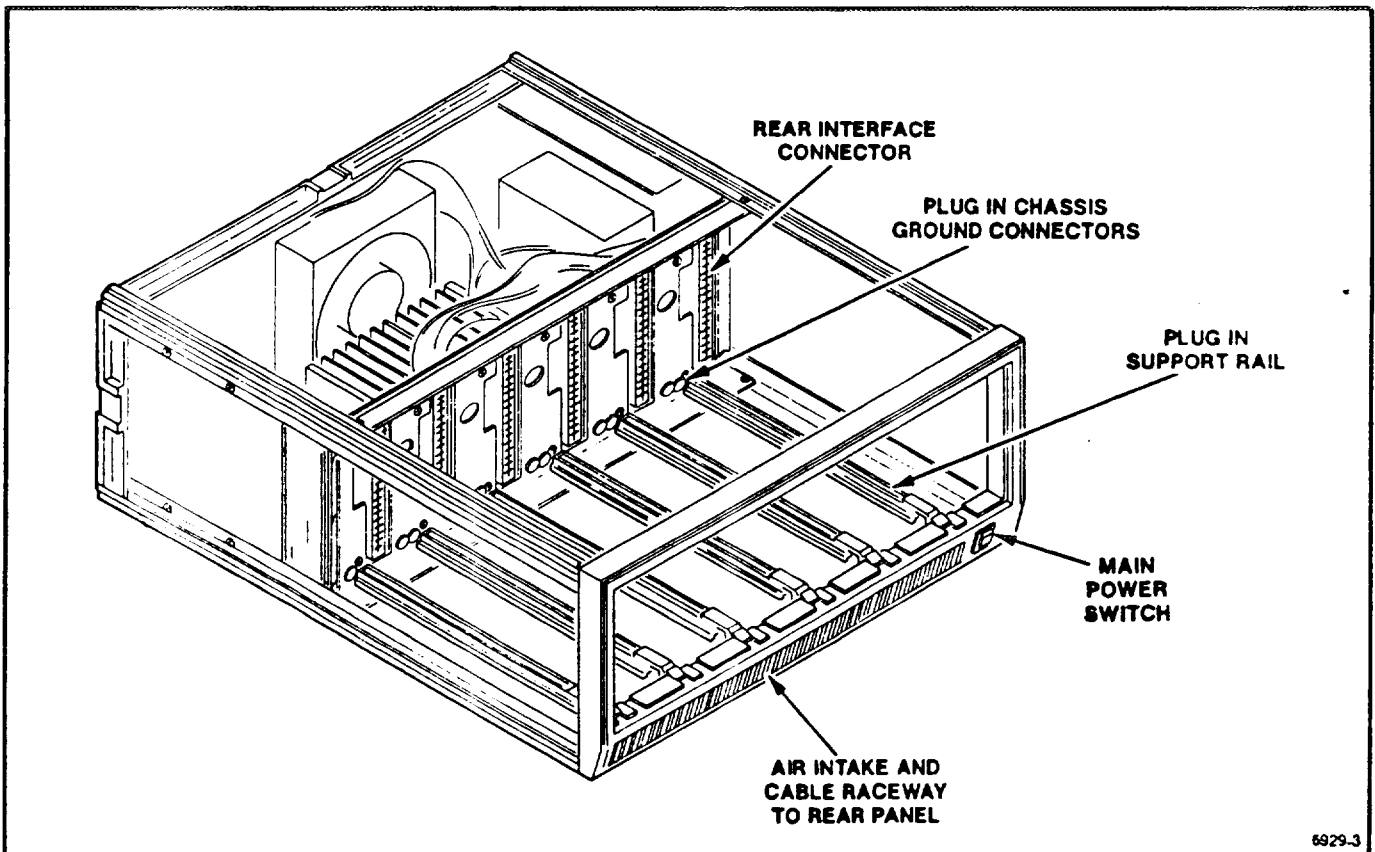
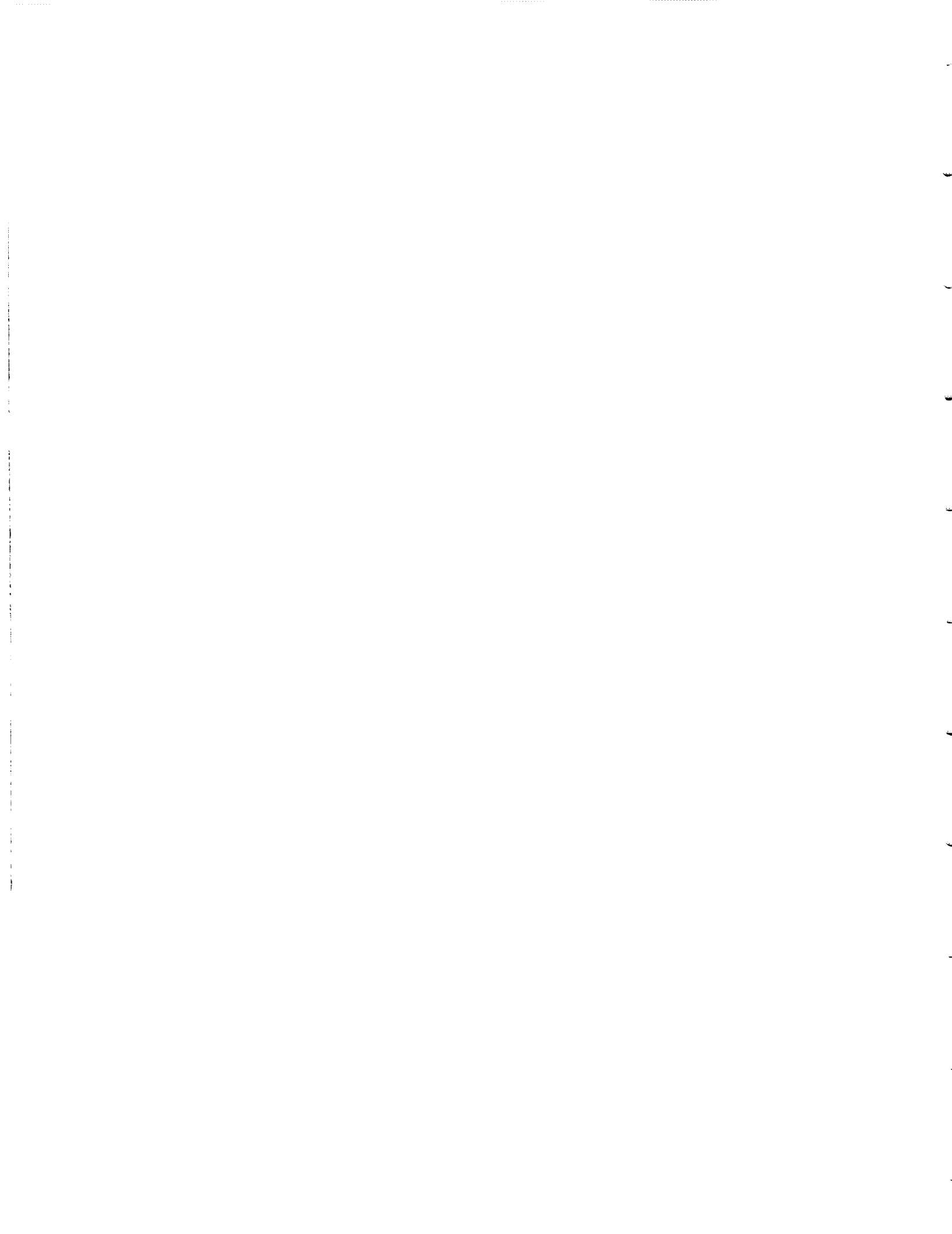


Fig. 2-2. TM 506A front view.

6929-3



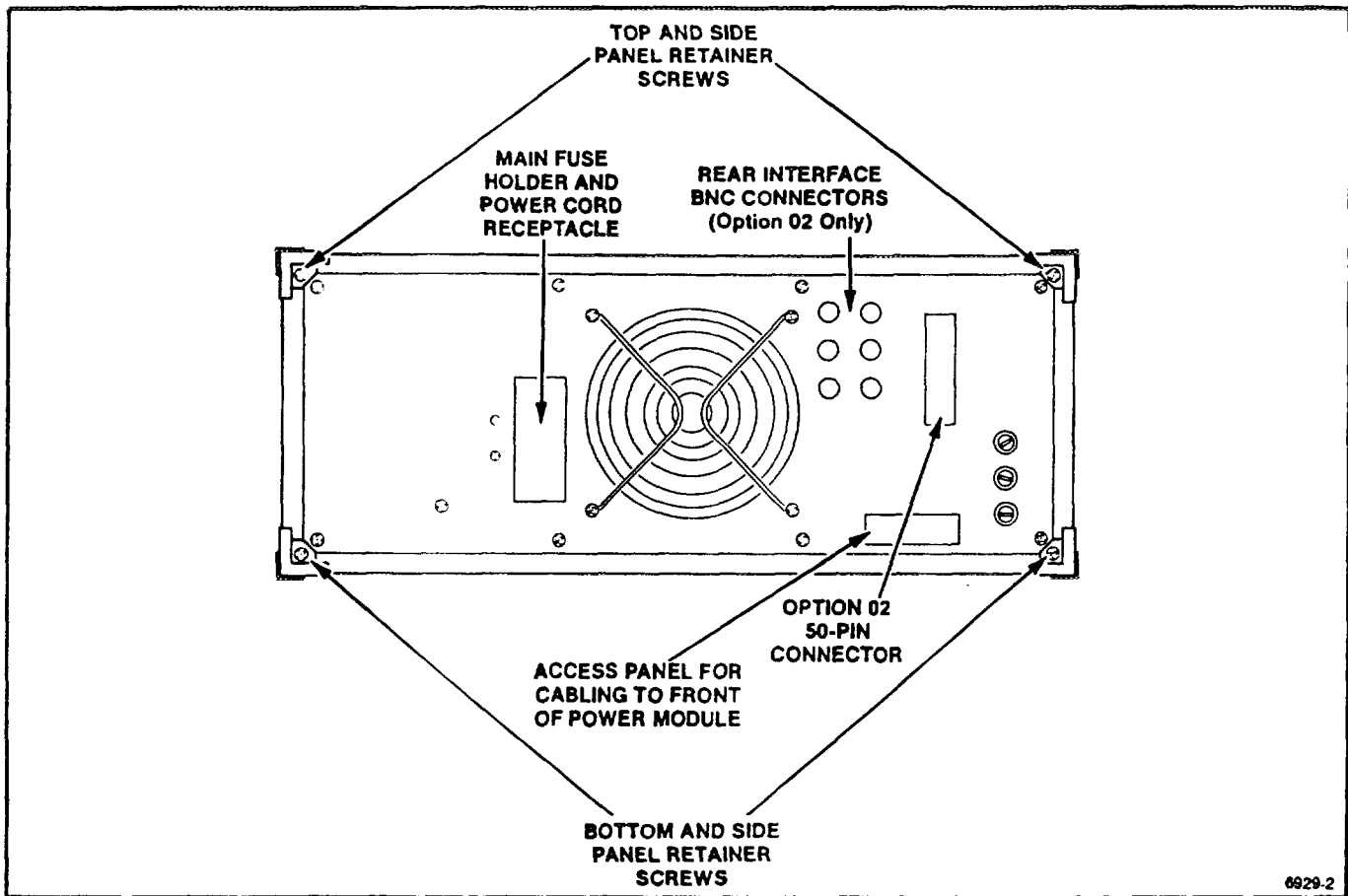


Fig. 2-3. TM 506A rear panel.

If the rack has positive internal pressure for cooling purposes, the mainframes must have all compartments filled with plug-ins or blank front panels (available from Tektronix, Inc.) must be installed in the unused plug-in openings. If greater internal air flow is desired in a relatively highly pressurized rack, the grill opening at the bottom front of the TM 506A may also be blocked.

Rack Dimensions. The TM 506A, Option 10, is shipped from the factory ready for rack mounting. Figure 2-4 shows major dimensions. Figure 2-5 shows the spring-latch cutout in the stationary section.

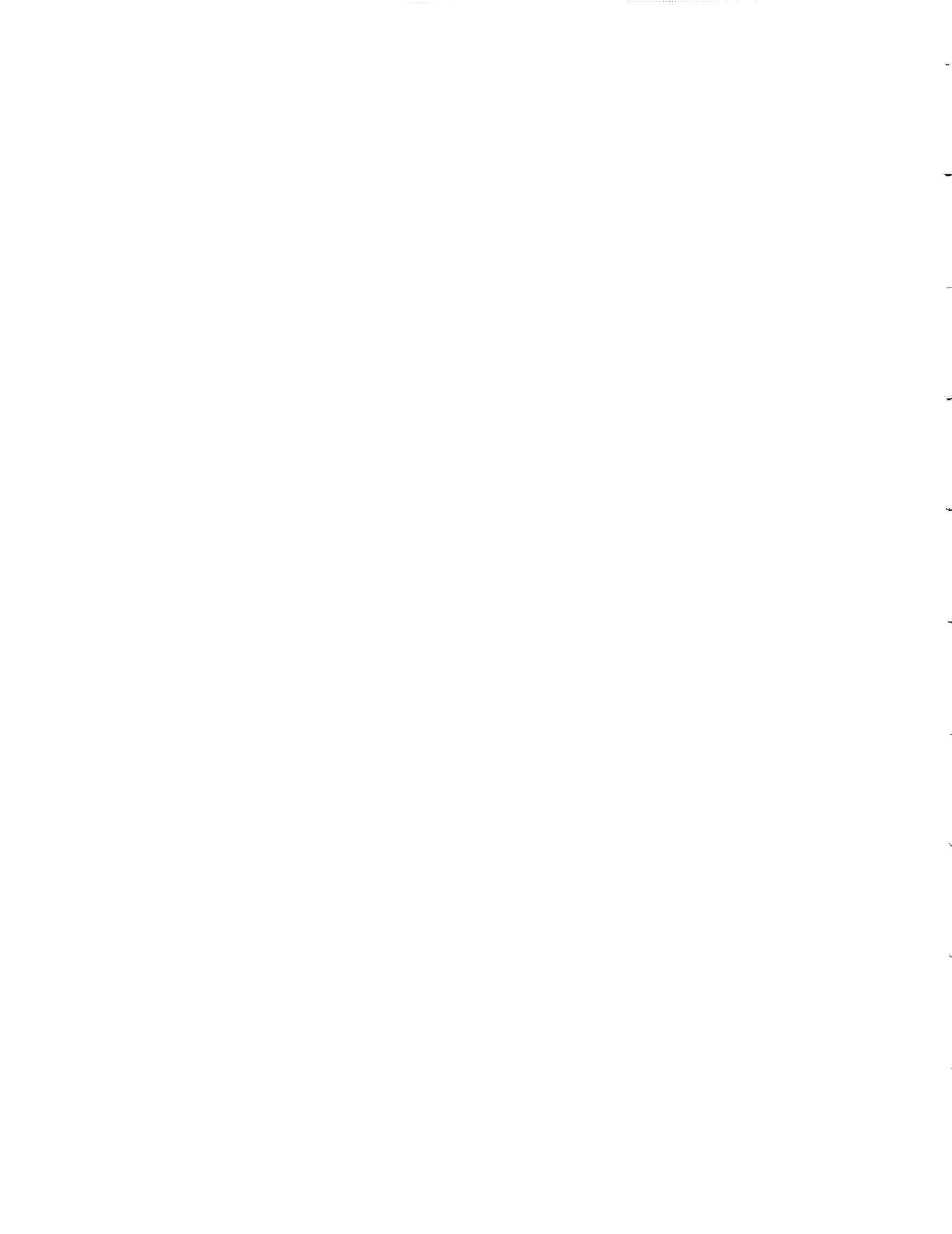
NOTE

The slide tracks supplied with the TM 506A, Option 10, have holes in the stationary sections to accommodate the spring latches. The TM 506A, Option 10, should not be mounted with rack slides that do not have the rack-latch holes.

The TM 506A, Option 10, fits a standard 19-inch side cabinet, rack or console. Spacing inside the front rails must be at least 17 3/4 inches. This allows clearance for the stationary section of the slide-out tracks to permit the assembly to slide freely on the slid-out tracks.

The slide-out tracks, with existing hardware supplied, will conveniently mount in any rack with the front and rear rails spaced from 10 1/2 inches to 24 1/2 inches.

Mounting the Slide Tracks. Locate the proper rack holes for mounting as shown in Fig. 2-6. Notice that the hole spacing in the racks varies. When installing the slides in the EIA type racks, make certain the slides are attached to the 1/2-inch spaced holes. Figure 2-6 also shows details for determining position of the slides in the rack. Mount the rails using enclosed hardware as shown in Fig. 2-7 and 2-8. Figures 2-8B and C show rail-mounting details for deep and shallow racks. Make sure the stationary sections are horizontally aligned so they are level and parallel with each other.



METRIC EQUIVALENCY TABLE

DECIMAL (IN)	.080	6.970	7.630	16.884	17.509	18.740	19.195
METRIC (MM)	2.03	177.04	193.60	428.65	444.73	476.00	487.55

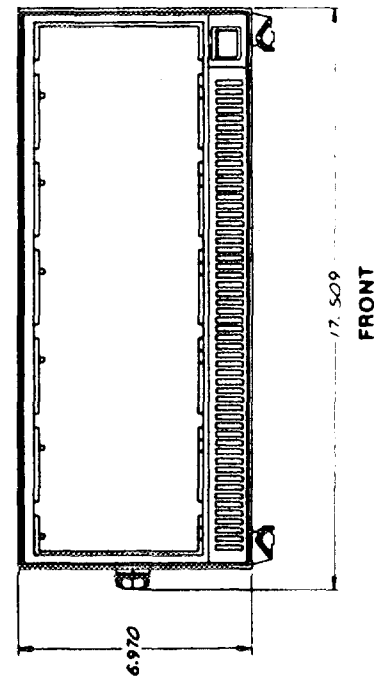
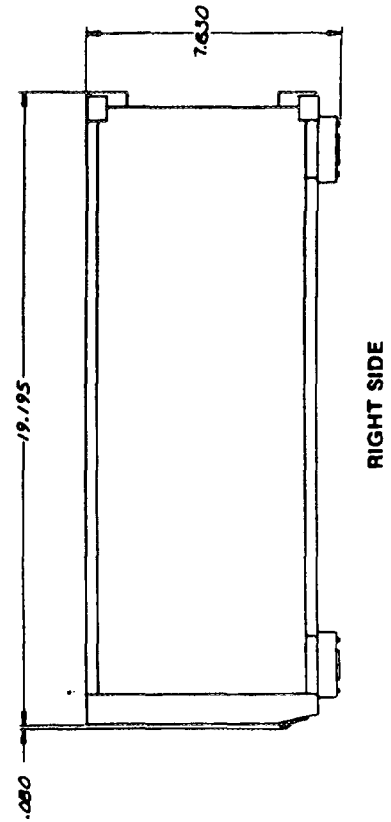
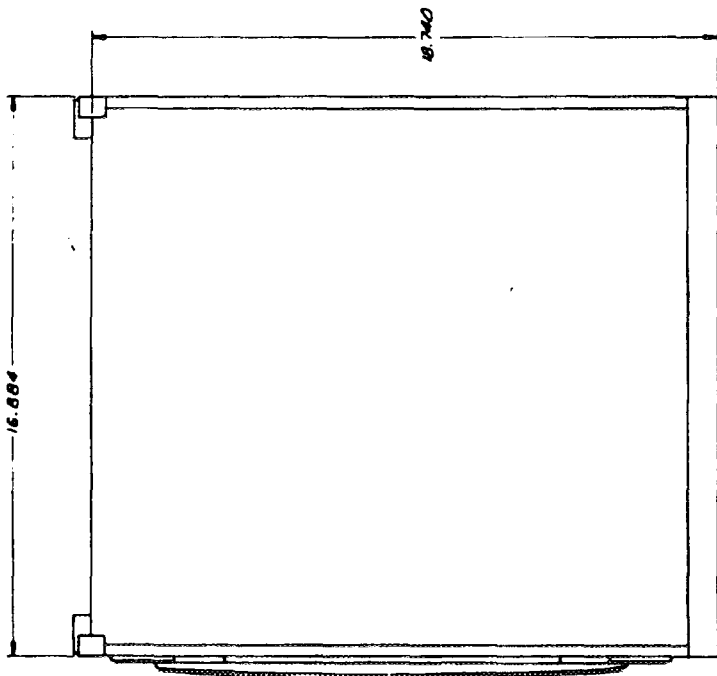
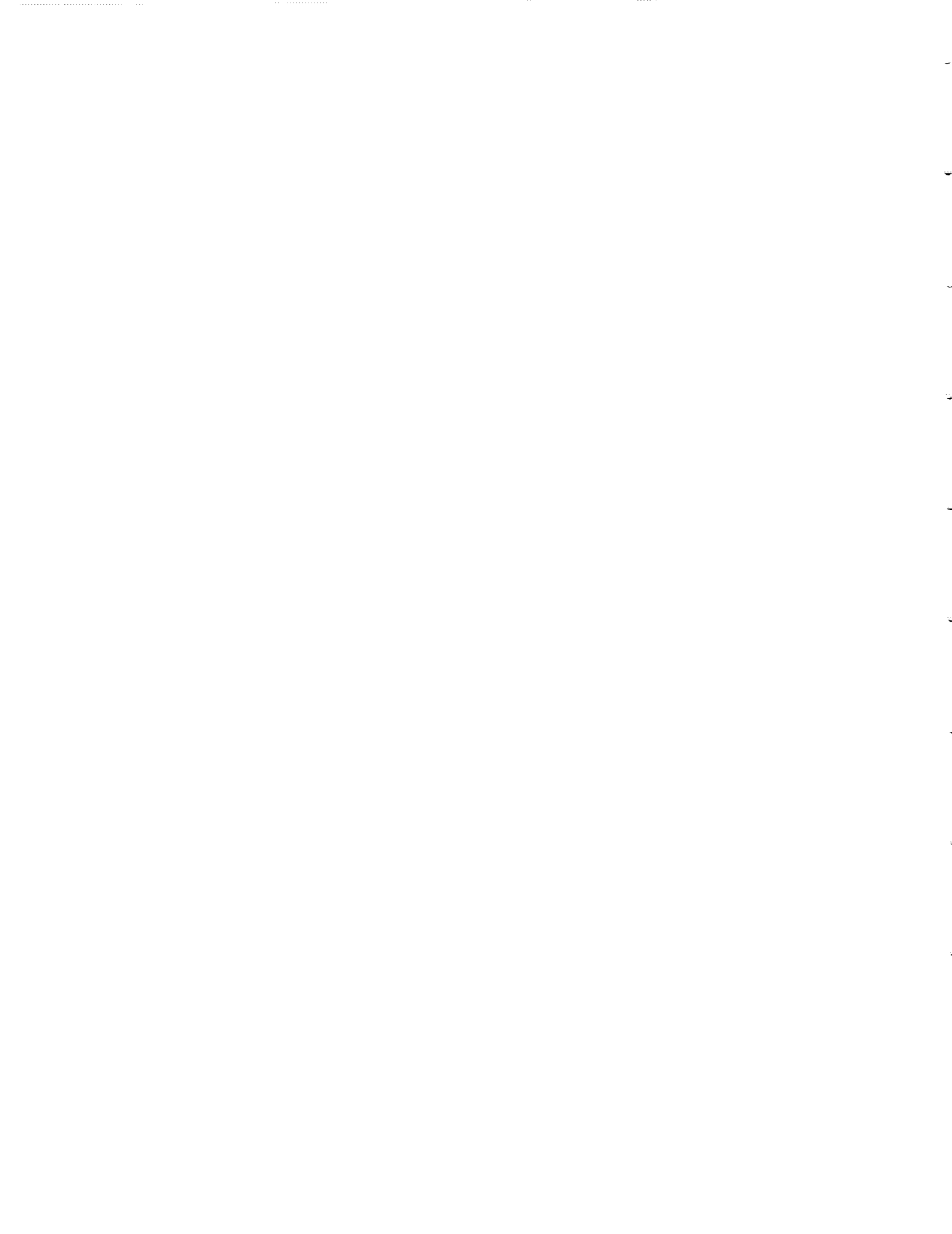


Fig. 2-4. TM 506A, overall dimensions.



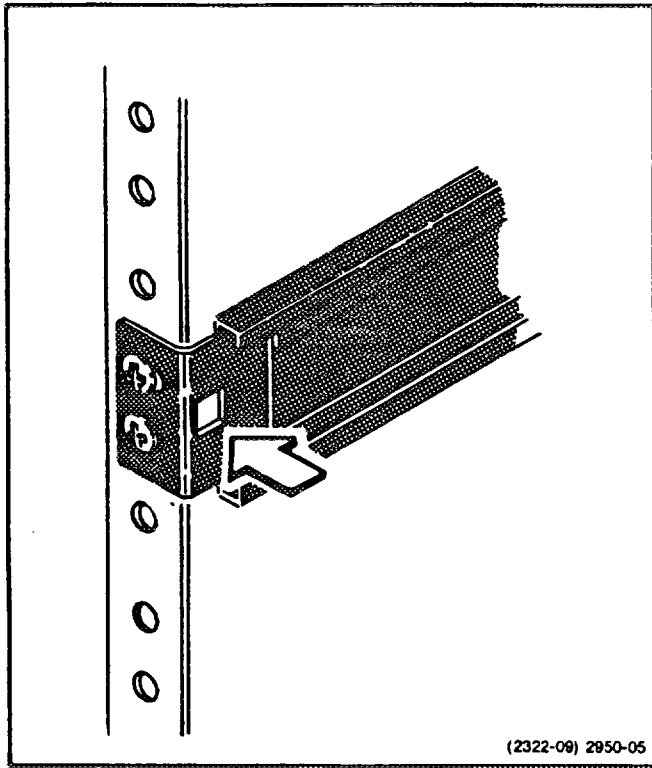


Fig. 2-5. Rack latch hole.

(2322-09) 2950-05

Installing the TM 506A, Option 10, in the Rack Slides. Make certain all plug-ins are removed from the power module. Pull the slide-out track intermediate sections out as far as they will go. See Fig. 2-9. Insert the instrument chassis sections into the intermediate section and push the instrument forward until the instrument chassis section locks into the intermediate section. Now press both buttons protruding from the stop-latch holes in the intermediate sections while pushing the instrument. The instrument can now be pushed into the rack, cabinet, or console. The latches holding the intermediate sections to the stationary sections are automatically operated by the instrument as it is pushed into the rack or cabinet. The quick-release latches automatically engage the rack-latch holes in the stationary sections of the rails as the instrument is pushed fully into the rack.

Removing the Instrument. Remove all plug-ins from power module. Unscrew the two thumb screws at the top of the front panel. Pull the rectangular latches on both sides of the front panel. Using the latches pull the instrument from the enclosure until the slide intermediate sections latch with the instrument sections and the stationary sections. The instrument is firmly held in this position. To completely remove the instrument, press both release-latch buttons visible in the stop-latch holes and carefully slide the instrument from the rack or cabinet.

Rack Adjustments. After installing the instrument in the rack, binding in the rack slides may occur if the slides are not properly adjusted. Slide the instrument from the rack until the front panel is about 10 inches from the front of the rack. Slightly loosen the screws holding the right and left tracks to the front rails. Allow the tracks to seek their normal position. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack.

Rack Slide Maintenance. The slide-out tracks do not require lubrication. The dark gray finish on the tracks is a permanent lubricative coating.

WARNING

During rackmount installation, interchanging the left and right slide-out track assemblies defeats the extension stop (safety latch) feature of the tracks. Equipment could, when extended, come out of the slides and fall from the rack, possibly causing personal injury and equipment damage.

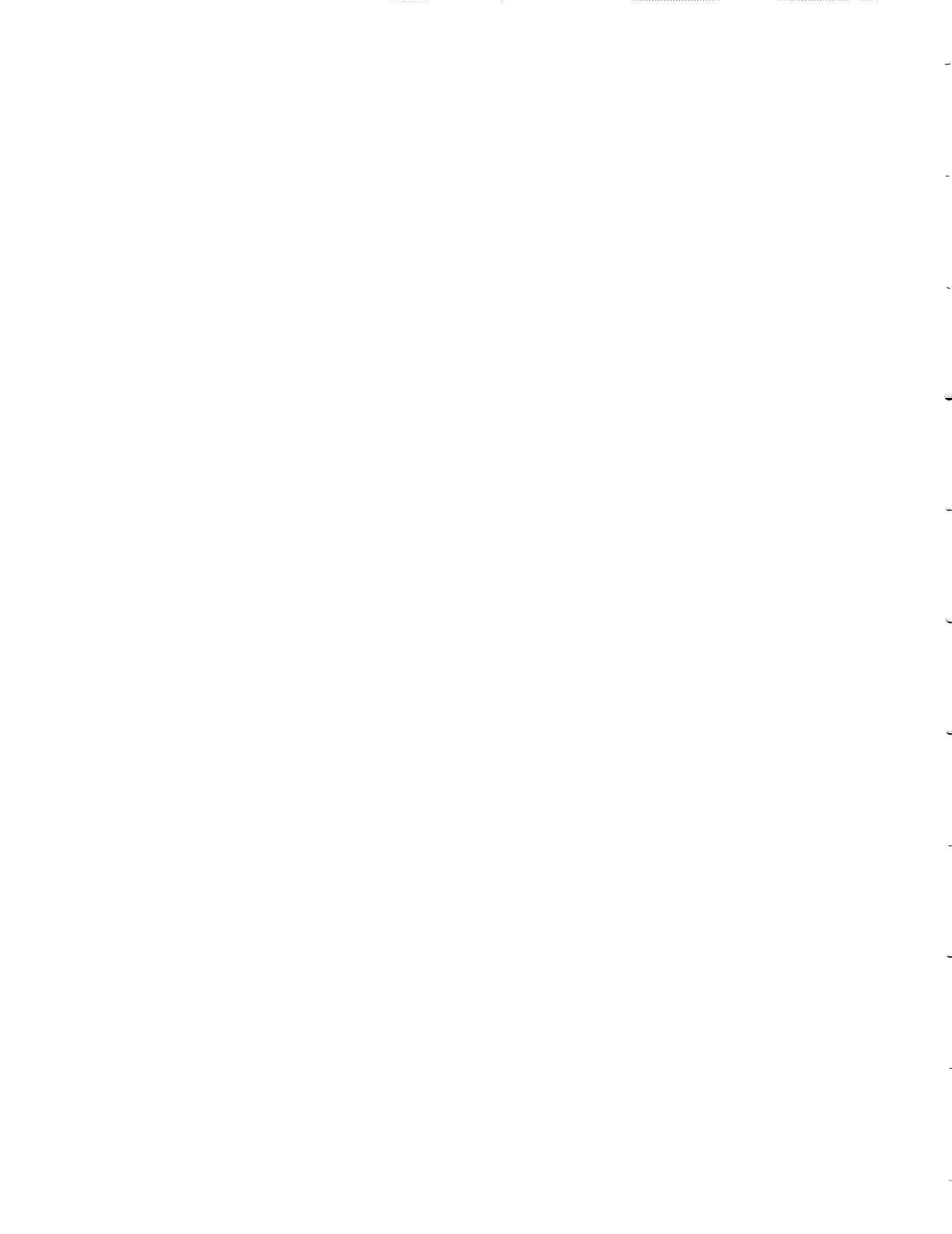
When mounting the supplied slide-out tracks, inspect both assemblies to find the LH (left hand) and RH (right hand) designations to determine correct placement. Install the LH assembly to your left side as you face the front of the rack and install the RH assembly to your right side. Refer to the rackmounting instructions in this manual for complete information.

Plug-in Installation and Removal

CAUTION

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

Check to see that the plastic barriers on the interconnecting jack of the selected power module compartment match the cutouts in the plug-in circuit board edge connector. The right-most compartment is the high power compartment. Align the plug-in chassis with the upper and lower guides (see Fig. 2-10) of the selected compartment. Push the plug-in chassis in and press firmly to seat the circuit board edge connector in the interconnecting jack. Turn the power module on.



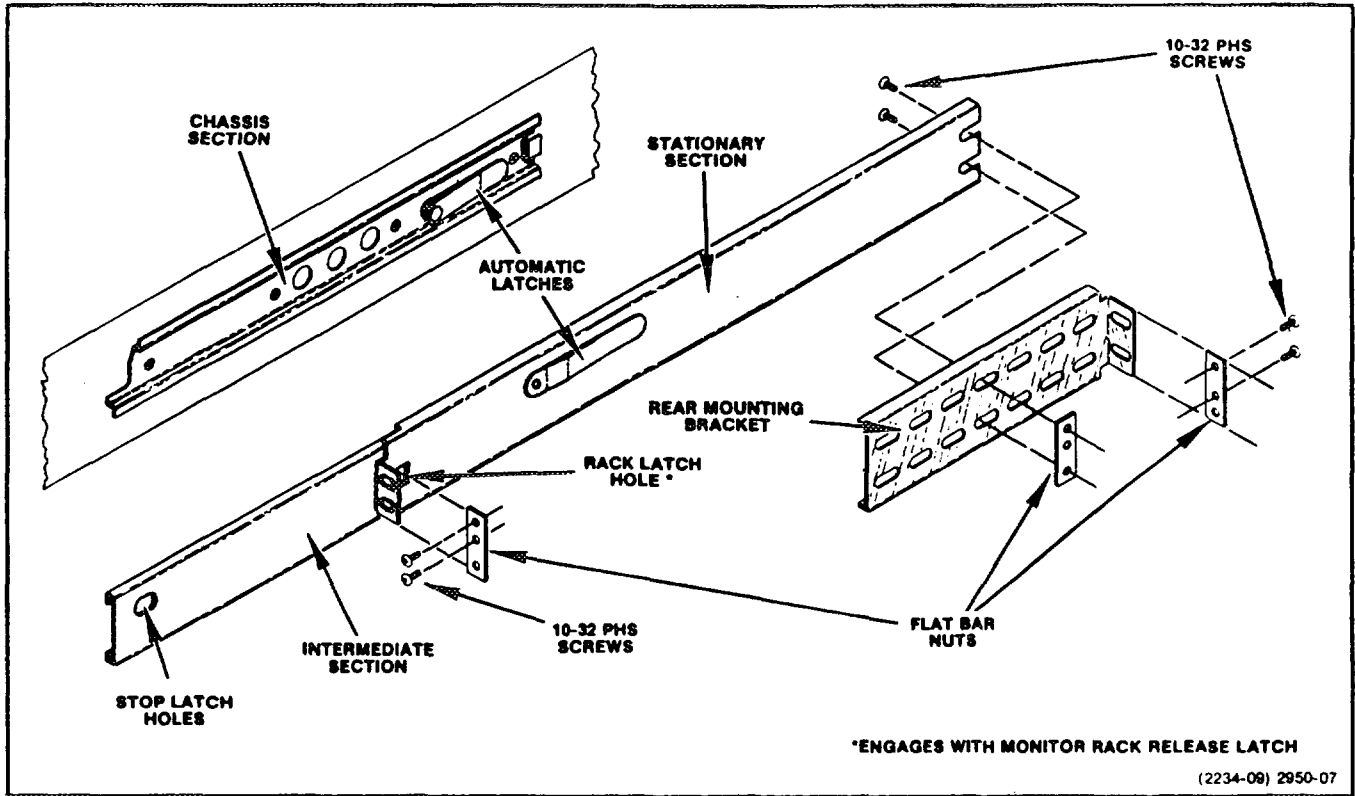


Fig. 2-7. Rackmount slide detail. If the rack has tapped holes, the bar nuts are not required.

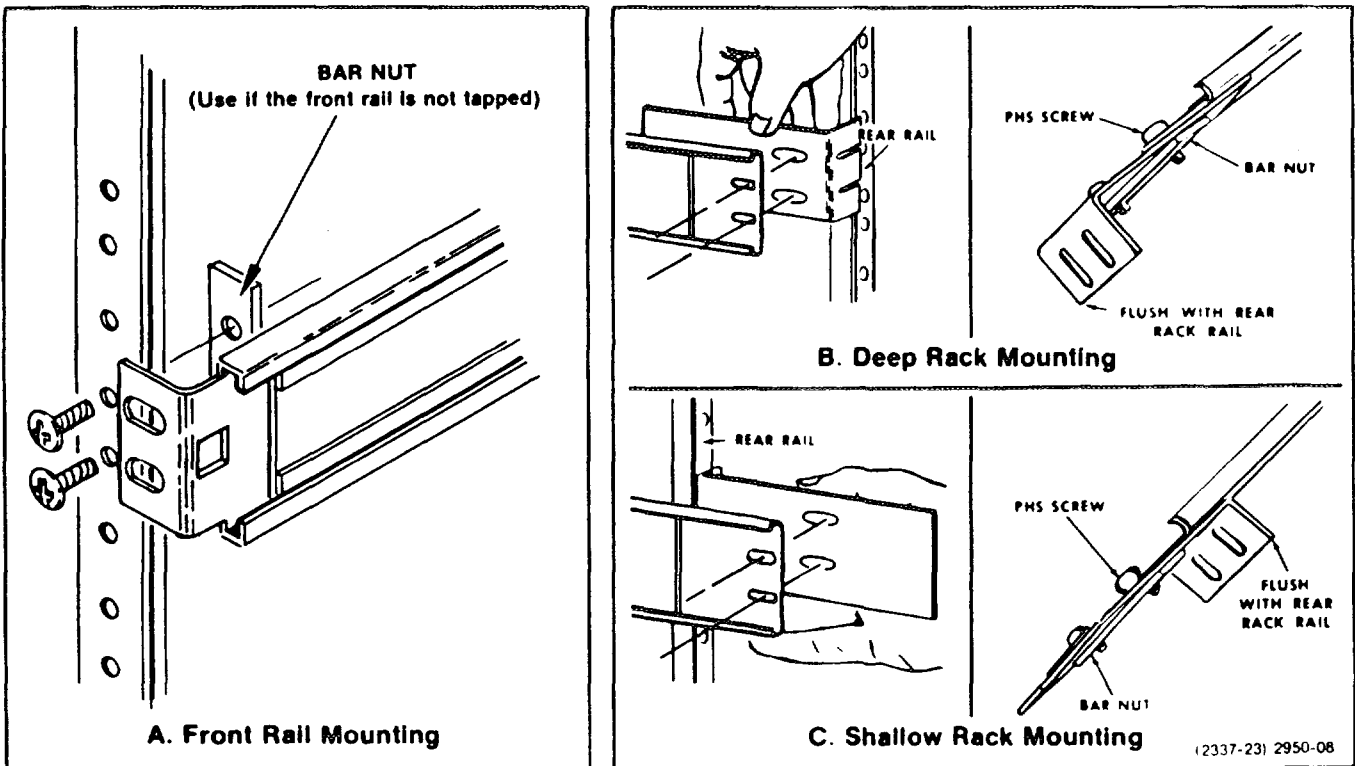
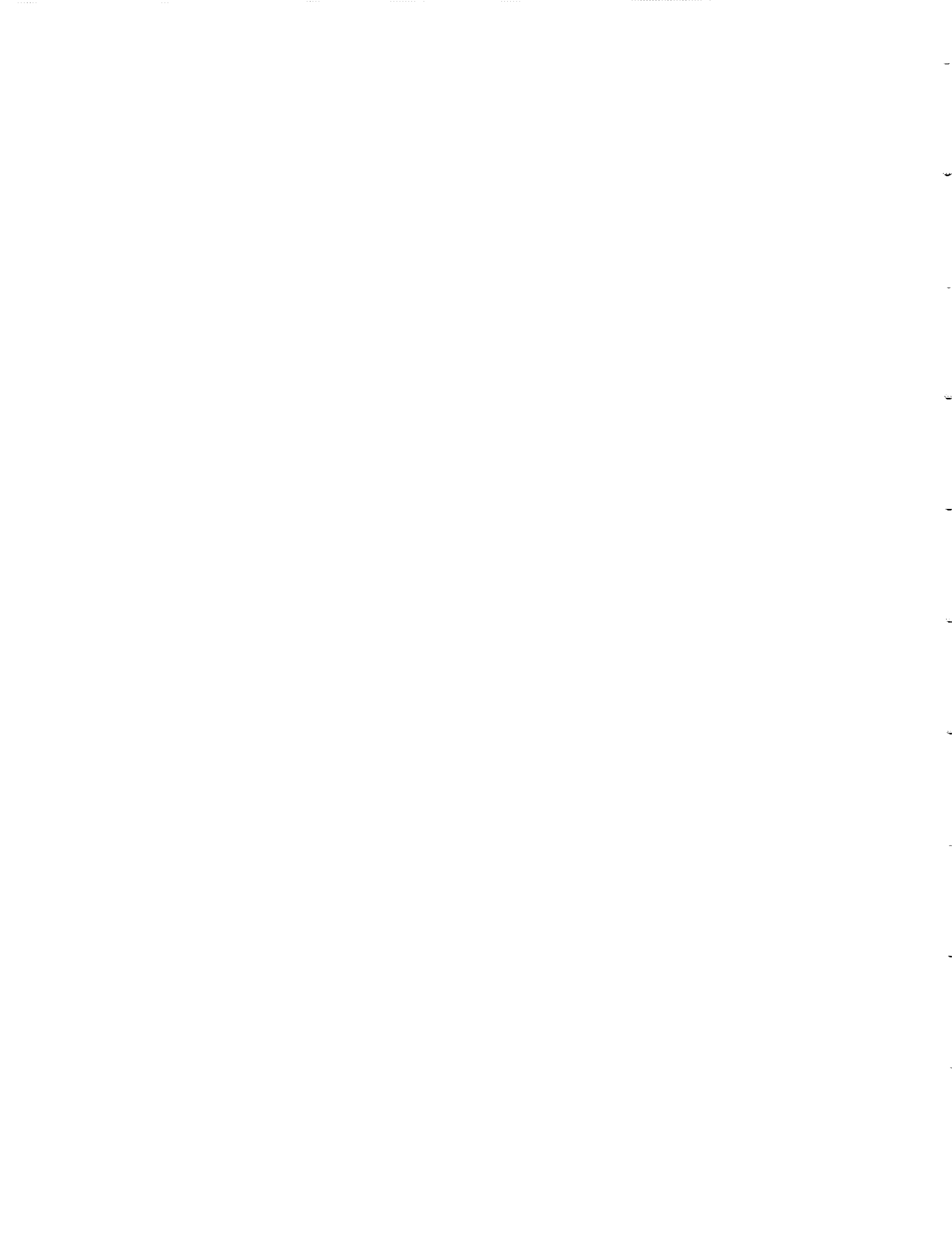
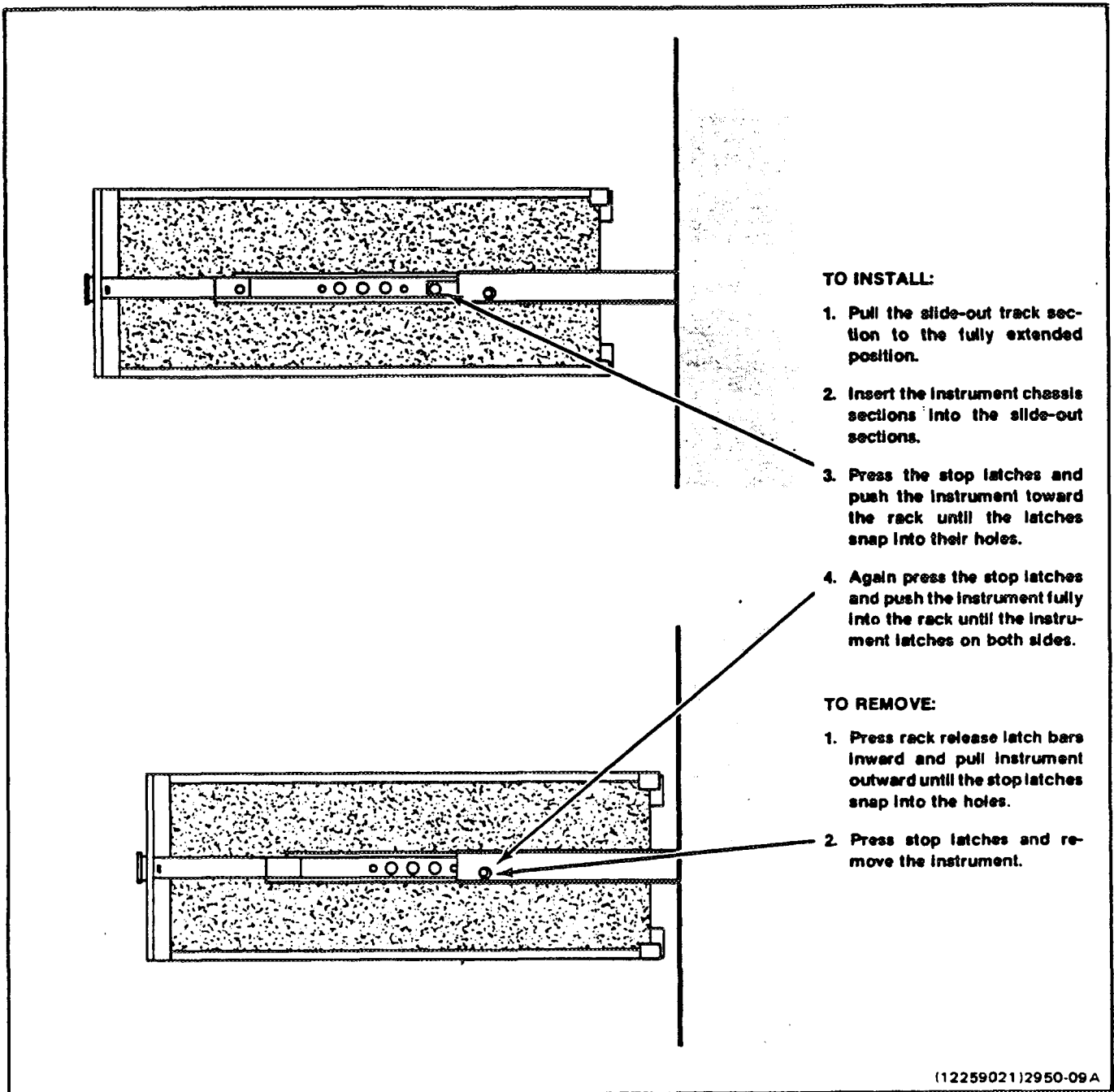


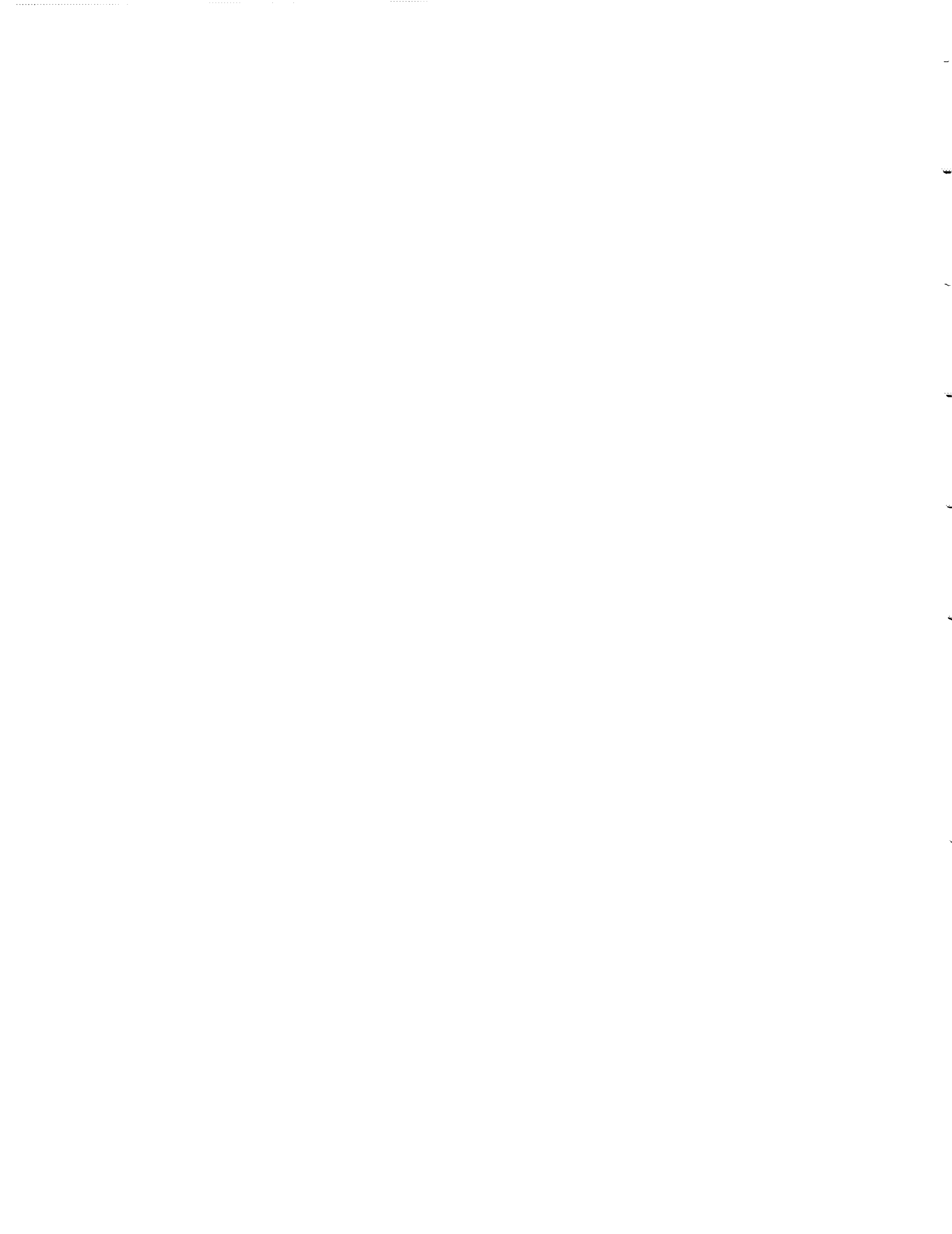
Fig. 2-8. Rackmounting slide details.





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Fig. 2-9. Removing and installing TM 506A in rack slides.



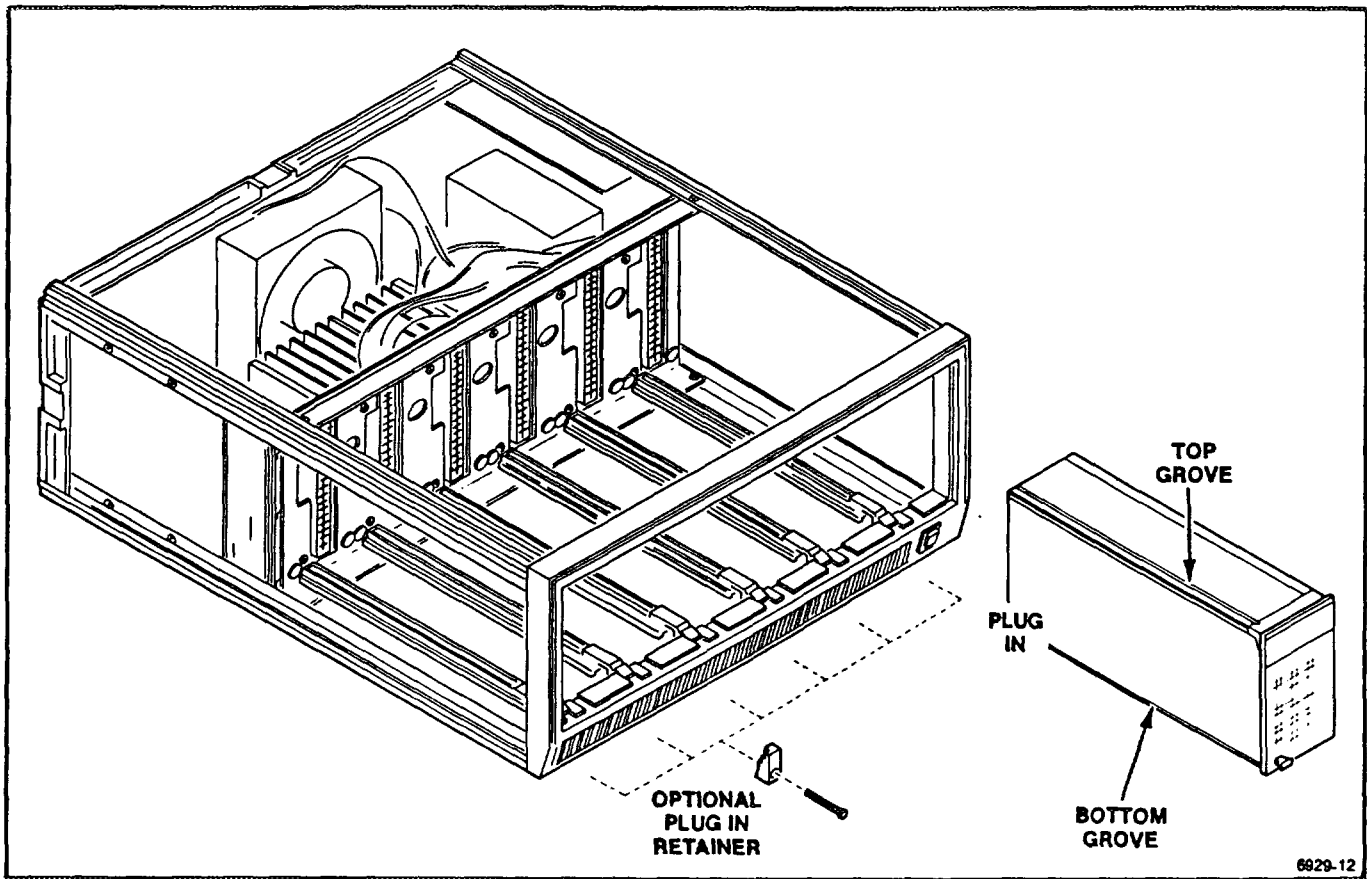


Fig. 2-10. Plug-in installation and removal.

Family Compatibility

Mechanically, TM 500 plug-in modules are very similar to other Tektronix product families. However, they are not electrically compatible. Therefore, the TM 506A interface has barriers on the mating connectors between pins 6 and 7 to ensure that incompatible plug-ins cannot be inserted. See Fig. 2-11. 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.

Customizing the Interface

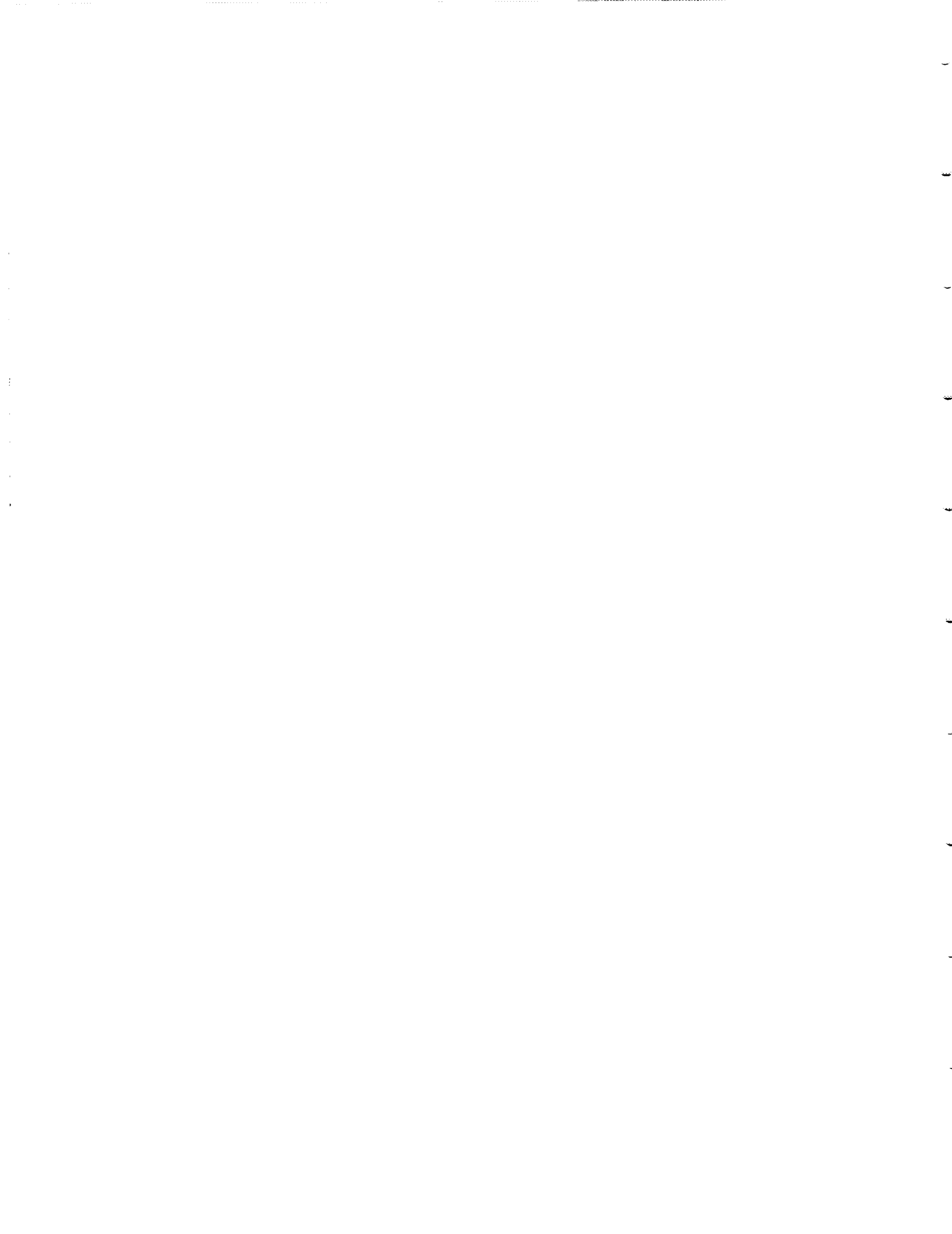
The modularity of this instrumentation system provides for many different functions to be performed by the plug-in modules. Specific functions are grouped into families or classes, of which there may be several plug-in module members. For instance, some classes are Power Supplies, Signal Sources, Measurement, 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 506A user can select one or more compartments to accept only members of that family, by installing a second barrier in the interface connector to match the module's slot

location. An entire TM 506A can be set up in this manner for specific work functions. For extra barriers, order Tektronix Part No. 214-1593-02.

Jumper wires can be used to further specialize the interface. Compartments can communicate with one another by connecting jumpers on the back side of the interface board, using pins 14 through 28 (both A-side and B-side) of the interconnecting jacks. See the following description of Option 02. Refer to each plug-in module manual for the I/O assignments of each pin at the rear interface. Once interconnections of a specialized nature are made, it is recommended that barriers be installed on the interconnecting jacks to ensure module compatibility with the customized wiring.

Rear Panel

The rear panel has a connector mounting plate for bnc and multi-pin connector mountings. Customer or factory-installed connectors and wiring (Option 02) can provide external access to the interface. This feature makes the TM 500-Series Modular Instrumentation System very flexible in bench-top or rackmounted systems.



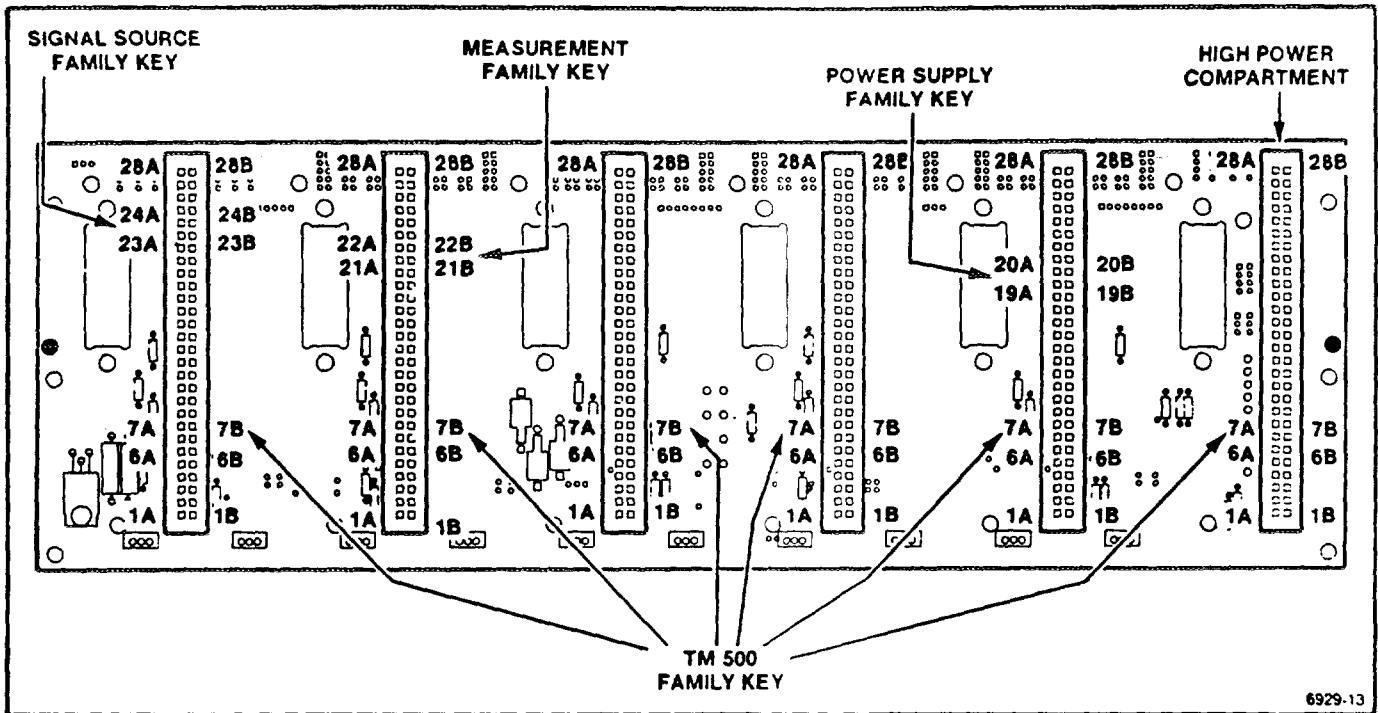


Fig. 2-11. Keying assignments for family functions. One of the many possible sequence combinations.

Option 02

This option adds six BNC connectors and a 50-pin connector to the rear panel to allow external access to the interface for external I/O control. These connectors are not prewired. Instead, prepared jumpers, strip pins, coaxial cables, and interconnection jack barriers are included in a kit. This gives the system designer as much flexibility as possible. Refer qualified service personnel to the Maintenance section of this manual for Option 02 installation information.

Plug-in Retainer Installation

The retainer is used to ensure that an installed plug-in module 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 installed.

To install the retainer, stand the power module on end. Install the retainer as shown in Fig. 2-10. A T-20 Torx bit is required.

Turn-On Procedure

After completing the power module preparation and plug-in module installation instructions, install the power cord and connect to the proper power outlet. Some plug-ins

have independent power switches, usually labeled OUTPUT, that control application of mainframe power to the plug-in.

Repackaging Information

If the Tektronix instrument is shipped to a Tektronix Service Center for service or repair, attach a tag showing owner (with address) and the name of an individual at your firm to contact. Include the complete instrument serial number, option number and a description of the service required.

Save and reuse the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

Surround the instrument with polyethylene sheeting to protect the instrument finish. Obtain a carton of corrugated cardboard of the correct carton strength having inside dimensions of no less than six inches more than the instrument dimensions. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between carton and instrument on all sides. Seal the carton with shipping tape or an industrial stapler.

The carton test strength for this instrument is 350 pounds per square inch.

