

**MDO4000B Series
Mixed Domain Oscilloscopes
Service Manual**



077-0859-00

Tektronix

MDO4000B Series Mixed Domain Oscilloscopes Service Manual

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 all safety summaries prior to performing service.

www.tektronix.com

077-0859-00

Tektronix

Copyright © Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its subsidiaries or suppliers, and are protected by national copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Table of Contents

Important safety information	iv
General safety summary	iv
Service safety summary	vii
Terms in this manual	viii
Symbols and terms on the product	viii
Preface	ix
Manual Conventions	ix
Where to Find Operating Information	1
Theory of Operation	3
Power Supply	3
I/O Board	3
Main Board and Analog Board	3
Front-Panel Board	4
Adjustments	7
Maintenance	9
Preventing ESD	9
Inspection and Cleaning	9
Module Removal	13
Troubleshooting	15
Troubleshooting Procedure	15
Unpacking and Repacking Instructions	19
Replaceable Parts List	21
Parts Ordering Information	21
Using the Replaceable Parts List	22

List of Figures

Figure 1: MDO4000B Series block diagram 5

Figure 2: Removing tabs from the front protective cover..... 13

Figure 3: Module locator 14

Figure 4: Primary troubleshooting procedure 16

Figure 5: AC power supply troubleshooting procedure..... 17

Figure 6: Module isolation troubleshooting procedure..... 18

Figure 7: Exploded view, Front Panel assembly 24

Figure 8: Display, analog board, and main board assembly 26

Figure 9: Rear chassis and connecting modules 28

Figure 10: External parts 29

Figure 11: Rear chassis, showing cables and connectors 30

Figure 12: Main board, showing cable and connectors 31

List of Tables

Table 1: External inspection checklist.....	11
Table 2: Internal inspection checklist	12
Table 3: Parts list column descriptions.....	22
Table 4: Replaceable parts – Front Panel assembly	23
Table 5: Replaceable parts – Display, Analog board, and Main board	25
Table 6: Replaceable parts – Rear chassis and connecting modules	27
Table 7: Replaceable parts – External parts	29
Table 8: Replaceable parts – cable and connectors, rear chassis	30
Table 9: Replaceable parts – Cable and Connectors, Main board.....	31

Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page vii, *Service safety summary*.)

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To avoid fire or personal injury

Use proper power cord. Use only the power cord specified for this product and certified for the country of use.

Do not use the provided power cord for other products.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, make sure that the product is properly grounded.

Do not disable the power cord grounding connection.

Power disconnect. The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Connect and disconnect properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Use only insulated voltage probes, test leads, and adapters supplied with the product, or indicated by Tektronix to be suitable for the product.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not exceed the Measurement Category (CAT) rating and voltage or current rating of the lowest rated individual component of a product, probe, or accessory. Use caution when using 1:1 test leads because the probe tip voltage is directly transmitted to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not float the common terminal above the rated voltage for that terminal.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Use proper fuse. Use only the fuse type and rating specified for this product.

Wear eye protection. . Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product.

Use only the Tektronix rackmount hardware specified for this product.

Probes and test leads

Before connecting probes or test leads, connect the power cord from the power connector to a properly grounded power outlet.

Keep fingers behind the finger guards on the probes.

Remove all probes, test leads and accessories that are not in use.

Use only correct Measurement Category (CAT), voltage, temperature, altitude, and amperage rated probes, test leads, and adapters for any measurement.

Beware of high voltages. Understand the voltage ratings for the probe you are using and do not exceed those ratings. Two ratings are important to know and understand:

- The maximum measurement voltage from the probe tip to the probe reference lead.
- The maximum floating voltage from the probe reference lead to earth ground

These two voltage ratings depend on the probe and your application. Refer to the Specifications section of the manual for more information.



WARNING. *To prevent electrical shock, do not exceed the maximum measurement or maximum floating voltage for the oscilloscope input BNC connector, probe tip, or probe reference lead.*

Connect and disconnect properly. . Connect the probe output to the measurement product before connecting the probe to the circuit under test. Connect the probe reference lead to the circuit under test before connecting the probe input. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement product.

Connect and disconnect properly. . De-energize the circuit under test before connecting or disconnecting the current probe.

Connect the probe reference lead to earth ground only.

Do not connect a current probe to any wire that carries voltages above the current probe voltage rating.

Inspect the probe and accessories. . Before each use, inspect probe and accessories for damage (cuts, tears, or defects in the probe body, accessories, or cable jacket). Do not use if damaged.

Ground-referenced oscilloscope use. . Do not float the reference lead of this probe when using with ground-referenced oscilloscopes. The reference lead must be connected to earth potential (0 V).

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

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

Disconnect power. To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair. Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in this manual

These terms may appear in this manual:



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



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and terms on the product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.



When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



Protective Ground
(Earth) Terminal



Earth Terminal



Chassis Ground



Standby

Preface

This service manual provides information that you need to troubleshoot, disassemble, and replace parts on the following Tektronix oscilloscopes:

Model	Bandwidth	Analog channels	RF frequency
MDO4104B-6	1 GHz	4	6 GHz
MDO4104B-3	1 GHz	4	3 GHz
MDO4054B-6	500 MHz	4	6 GHz
MDO4054B-3	500 MHz	4	3 GHz
MDO4034B-3	350 MHz	4	3 GHz
MDO4014B-3	100 MHz	4	3 GHz

Manual Conventions

This manual uses certain conventions that you should become familiar with before performing service.

Modules Throughout this manual, any replaceable component, assembly, or part is referred to by the term *module*.

Replaceable Parts This manual refers to any field-replaceable assembly or mechanical part specifically by its name or generically as a replaceable part. In general, a replaceable part is any circuit board or assembly, such as the hard disk drive, or a mechanical part, such as the I/O port connectors, that is listed in the replaceable parts list.

Safety Symbols and terms related to safety appear in the *General Safety Summary*.
Information for service procedures appears in both the *General Safety Summary* and the *Service Safety Summary*.

Where to Find Operating Information

For information on installing and operating your oscilloscope, refer to the Tektronix *MDO4000B Series Mixed Domain Oscilloscopes User Manual*, which was provided with your oscilloscope. This manual is available in 11 languages.

Theory of Operation

This chapter describes the electrical operation of the oscilloscope to the module level. The block diagram shows the oscilloscope module interconnections. (See Figure 1 on page 5.)

Power Supply

The Power Supply board converts AC line voltage to +12 V to power for all internal circuits.

I/O Board

The I/O board contains USB ports, an Ethernet port (LAN), a VGA Video port, an AUX OUT BNC connector, and an EXT REF IN BNC connector.

Main Board and Analog Board

The Main and Analog boards contain the following functions:

Acquisition System

The Acquisition system begins with the analog signal path and ends with a digitized signal in memory. The signal enters a channel input, and then passes through an attenuator and preamplifier. The analog signal from each preamplifier goes through a digitizer, and then into acquisition memory. The analog signal from each preamplifier is also distributed to a trigger circuit.

All of the inputs (including RF) are routed to the Analog board. The analog channels are amplified and attenuated through the front-end circuitry, and are output to the Main board. The RF channel is the same except that the RF input signal is routed through an attenuator and a mixer and down converted. The analog board has a controller that is used as an I/O controller for the front-end (Analog board).

Trigger System

The Trigger system digitizes the analog signals from the preamplifiers and routes the digitized signal to the Trigger ASIC. Advanced trigger functions are enabled only when the appropriate application modules and supporting software are installed.

Display System

The Display system combines live waveform data from acquisition memory with menus and text, and stores this information in display memory. It then uses this data to refresh the XGA display module (LCD).

Processor System The Processor system contains a microprocessor that controls the entire instrument. The processor system also contains FLASH ROM, system RAM, and interfaces to USB ports and the Ethernet port.

Power Converter The Main board converts the +12 V power to other voltages used for the analog and digital circuitry throughout the system. The +5 V standby power is used to keep the Front Panel powered up at all times that AC power is connected to the unit.

Front-Panel Board

The Front Panel board contains a microprocessor that reads the front-panel buttons and controls, sends this information to the processor system on the Main board, and controls power to the Main board. The Front Panel board also generates the probe compensation output signal, provides an interface to the application modules, and controls power to the Main board.

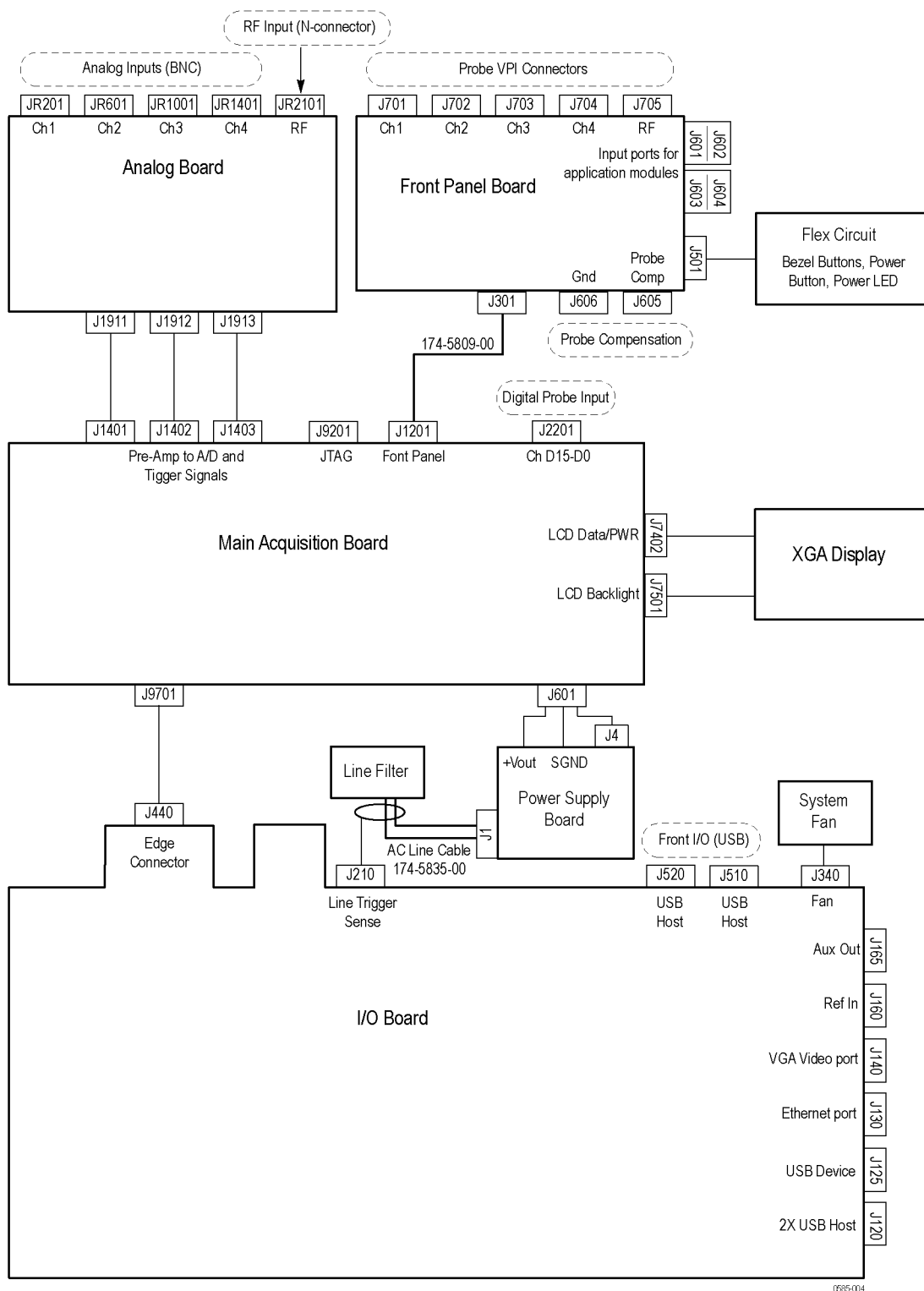


Figure 1: MDO4000B Series block diagram

Adjustments

Please return the instrument to Tektronix if adjustment is required. There are no adjustment procedures (calibrations) that can be performed by the customer. Calibrations can only be performed at a Tektronix service center and require the use of traceable test equipment (signal sources and measuring equipment) to verify the performance of the instrument.

To determine if adjustment is required, use the Performance Verification procedure in the *MDO4000B Series Mixed Domain Oscilloscopes Specifications and Performance Verification* manual, available at www.tektronix.com/manuals. Adjustment is also required after instrument repair.

Maintenance

This section contains the information needed to do periodic and corrective maintenance on the oscilloscope, as well as repackaging instructions for returning the oscilloscope to Tektronix for service.

Preventing ESD

Before servicing this product, read the *General Safety Summary* and the *Service Safety Summary* at the front of the manual, and familiarize yourself with the following electrostatic discharge (ESD) information.



CAUTION. *Static discharge can damage any semiconductor component in this oscilloscope.*

When performing any service that requires internal access to the oscilloscope, adhere to the following precautions to avoid damaging internal modules and their components due to electrostatic discharge:

1. Minimize handling of static-sensitive circuit boards and components.
2. Transport and store static-sensitive modules in their static protected containers or on a metal rail. Label any package that contains static-sensitive boards.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these modules. Service static-sensitive modules only at a static-free work station.
4. Do not place anything capable of generating or holding a static charge on the work station surface.
5. Handle circuit boards by the edges when possible.
6. Do not slide the circuit boards over any surface.
7. Avoid handling circuit boards in areas that have a floor or work-surface covering capable of generating a static charge.

Inspection and Cleaning

Inspection and cleaning are done as preventive maintenance. Preventive maintenance, when done regularly, may prevent oscilloscope malfunction and enhance its reliability.

Preventive maintenance consists of visually inspecting and cleaning the oscilloscope and using general care when operating it.

How often you do maintenance depends on the severity of the environment in which the oscilloscope is used. A proper time to perform preventive maintenance is just before oscilloscope adjustment.

General Care

The cabinet helps keep dust out of the oscilloscope and should normally be in place when operating the oscilloscope.



WARNING. *To avoid injury, power off the instrument and disconnect it from line voltage before performing any procedure that follows.*

Flat Panel Display Cleaning

The display is a soft plastic display and must be treated with care during cleaning.



CAUTION. *Improper cleaning agents or methods can damage the flat panel display.*

Avoid using abrasive cleaners or commercial glass cleaners to clean the display surface.

Avoid spraying liquids directly on the display surface.

Avoid scrubbing the display with excessive force.

Clean the flat panel display surface by gently rubbing the display with a clean-room wipe (such as Wypall Medium Duty Wipes, #05701, available from Kimberly-Clark Corporation).

If the display is very dirty, moisten the wipe with distilled water or a 75% isopropyl alcohol solution and gently rub the display surface. Avoid using excess force or you may damage the plastic display surface.

Exterior Cleaning



CAUTION. *To prevent getting moisture inside the oscilloscope during external cleaning, use only enough liquid to dampen the cloth or applicator.*

Clean the exterior surfaces of the chassis with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, use a cloth or swab dipped in a 75% isopropyl alcohol solution. Use a swab to clean narrow spaces around controls and connectors. Do not use abrasive compounds on any part of the chassis that might damage the chassis.

Clean the power switch using a dampened cleaning towel. Do not spray or wet the switch directly.



CAUTION. Avoid the use of chemical cleaning agents, which might damage the plastics used in this oscilloscope. Use only deionized water when cleaning the menu buttons or front-panel buttons. Use a 75% isopropyl alcohol solution as a cleaner and rinse with deionized water. Before using any other type of cleaner, consult your Tektronix Service Center or representative.

Exterior Inspection

Inspect the outside of the oscilloscope for damage, wear, and missing parts, using the following table as a guide. Immediately repair defects that could cause personal injury or lead to further damage to the oscilloscope.

Table 1: External inspection checklist

Item	Inspect for	Repair action
Cabinet, front panel, and cover	Cracks, scratches, deformations, damaged hardware.	Repair or replace defective module.
Front-panel knobs	Missing, damaged, or loose knobs.	Repair or replace missing or defective knobs.
Connectors	Broken shells, cracked insulation, and deformed contacts. Dirt in connectors.	Repair or replace defective modules. Clear or wash out dirt.
Carrying handle, and cabinet feet	Correct operation.	Repair or replace defective module.
Accessories	Missing items or parts of items, bent pins, broken or frayed cables, and damaged connectors.	Repair or replace damaged or missing items, frayed cables, and defective modules.

Interior Inspection

To access the inside of the oscilloscope for cleaning and inspection, refer to the exploded view diagrams. (See page 21, *Replaceable Parts List*.)

Inspect the internal portions of the oscilloscope for damage and wear, using the following table as a guide. Repair any defects immediately.

If any circuit board is repaired or replaced, adjustment is required. (See page 7, *Adjustments*.)



CAUTION. To prevent damage from electrical arcing, make sure that circuit boards and components are dry before applying power to the oscilloscope.

Table 2: Internal inspection checklist

Item	Inspect for	Repair action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Remove and replace damaged circuit board.
Resistors	Burned, cracked, broken, blistered condition.	Remove and replace damaged circuit board.
Solder connections	Cold solder or rosin joints.	Resolder joint and clean with isopropyl alcohol.
Capacitors	Damaged or leaking cases. Corroded solder on leads or terminals.	Remove and replace damaged circuit board.
Wiring and cables	Loose plugs or connectors. Burned, broken, or frayed wiring.	Firmly seat connectors. Repair or replace modules with defective wires or cables.
Chassis	Dents, deformations, and damaged hardware.	Straighten, repair, or replace defective hardware.

Interior Cleaning

1. Blow off dust with dry, low-pressure, deionized air (approximately 9 psi).
2. Remove any remaining dust with a lint-free cloth dampened in isopropyl alcohol (75% solution) and rinsed with warm deionized water. (A cotton-tipped applicator is useful for cleaning in narrow spaces and on circuit boards.)

NOTE. *If, after performing steps 1 and 2, a module is clean upon inspection, skip the following steps.*

If there is still dust or dirt on the module, the oscilloscope may be spray washed using a solution of 75% isopropyl alcohol by following these steps:

- a. Spray wash dirty parts with isopropyl alcohol and wait 60 seconds for the majority of the alcohol to evaporate.
- b. Use hot (120 °F to 140 °F) deionized water to thoroughly rinse them.
- c. Dry all parts with low-pressure, deionized air.
- d. Dry all components and assemblies in an oven or drying compartment using low-temperature (125 °F to 150 °F) circulating air.

Lubrication

There is no periodic lubrication required for this oscilloscope.

Module Removal



WARNING. Only qualified personnel should perform service procedures. Before performing this or any other procedure in this manual, read the *General Safety Summary* and *Service Safety Summary* located at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to electrical components, read *Preventing ESD*. (See page 9, *Preventing ESD*.)

To work on the instrument, place it face down in its protective front cover. You can remove the tabs from the cover if you want to make it easy to move the instrument in and out of the cover while working on it.



Figure 2: Removing tabs from the front protective cover

To remove as assembly, refer to the module locator illustration. (See Figure 3 on page 14.)

You can also refer to the exploded view diagrams and parts lists. (See page 21, *Replaceable Parts List*.) The parts lists show how many of each type of screw is used to attach each replaceable module.

If you are disassembling the instrument for cleaning, refer to the *Inspection and Cleaning* procedure for instructions. (See page 9, *Inspection and Cleaning*.)



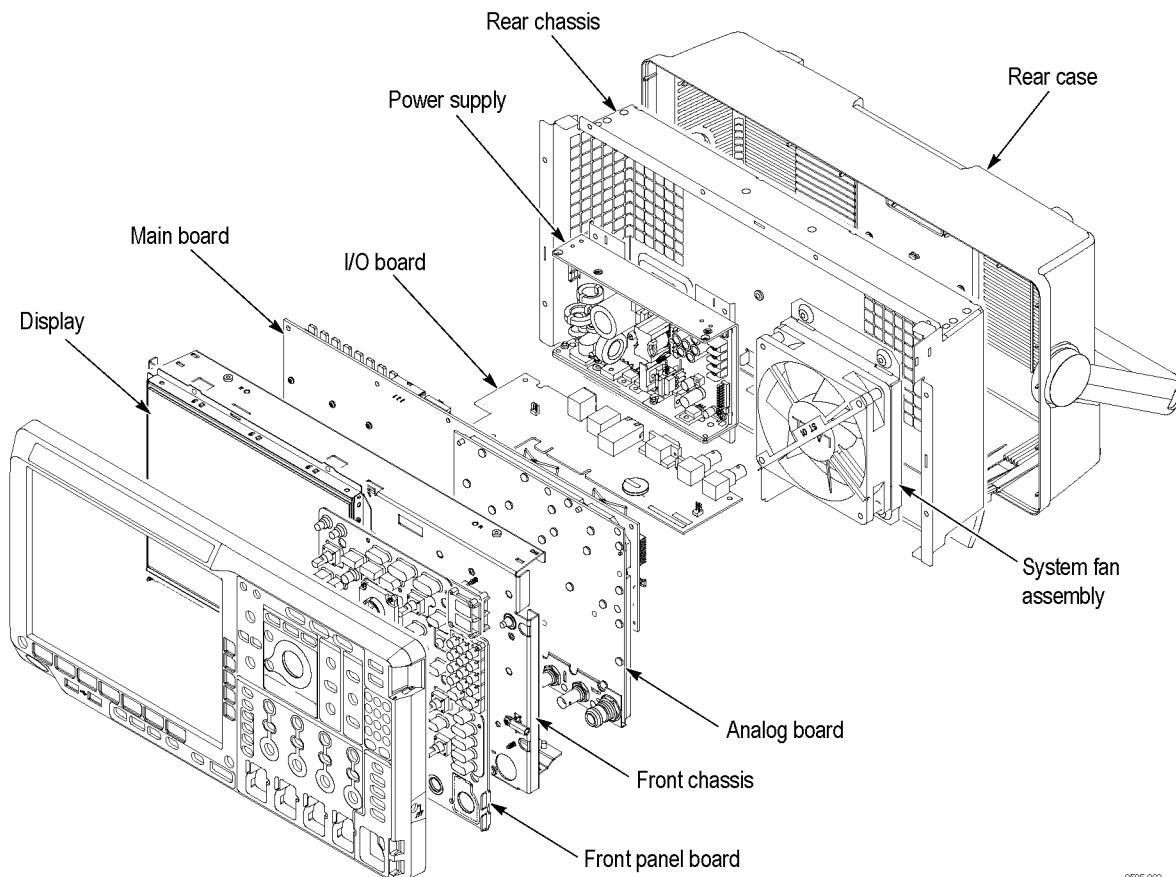
WARNING. Before performing any procedure in this subsection, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.

Required Equipment

You will need a Torx driver with a T-15 Torx tip to remove instrument screws.

To Remove Modules

- To remove any of the instrument modules or assemblies, you must first remove the rear cover and separate the front chassis from the rear chassis.
- To remove the Front Panel board assembly or the front panel case assembly, you must first remove the Main board assembly, the Analog board assembly, and the front chassis.
- To remove or install the keypad, do not touch the switch contacts with your fingers. The oils on your fingers will degrade or damage the switch contacts. To help prevent damage to the keypad, use cotton gloves when removing or installing the keyboard pad.



0695-003

Figure 3: Module locator

Troubleshooting

This section contains information and procedures to help you isolate a defective module in the MDO4000B Series oscilloscopes.



WARNING. Before performing this or any other procedure in this manual, read the General Safety Summary and Service Safety Summary found at the beginning of this manual, and, to prevent possible injury to service personnel or damage to electrical components, read Preventing ESD. (See page 9, Preventing ESD.)

Adjustment After Repair

Instrument adjustment is required after you replace any circuit board. Refer to the *Adjustments* section for information about the adjustment. (See page 7, *Adjustments*.)

Required Tools and Equipment

You need the following equipment to troubleshoot the instrument.

Tools and Equipment	Example
DMM	3.5 digits or above

Test Points

Test points on the Main board are shown in the troubleshooting illustration. (See Figure 5.)

Troubleshooting Procedure

The following figures are troubleshooting procedure flowcharts. Use them to troubleshoot an instrument failure. Begin with the Primary troubleshooting procedure flowchart. (See Figure 4.)



WARNING. Before removing the cabinet, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.



CAUTION. When you operate the instrument with the cabinet removed, the system fan will not operate. You must provide an external fan to cool the interior of the instrument. Failure to do so could cause instrument damage.

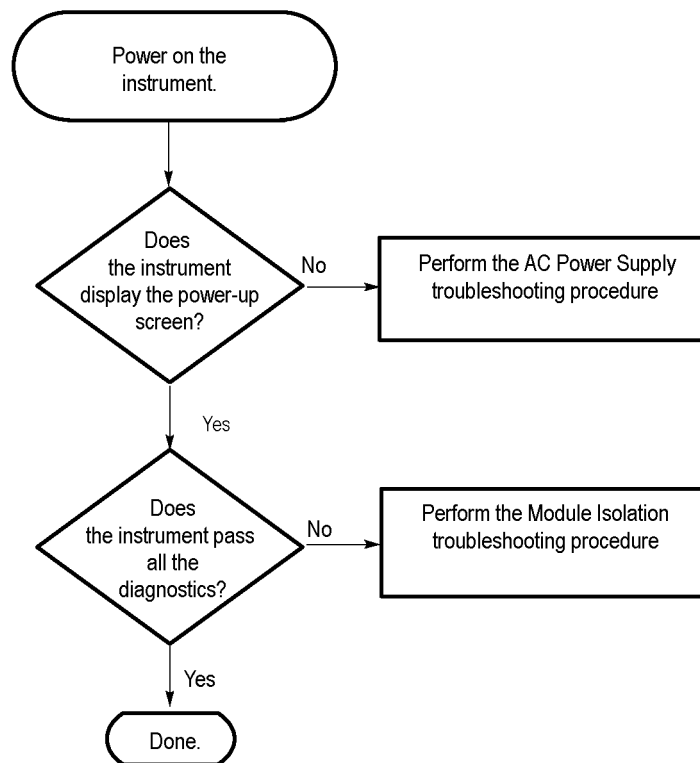


Figure 4: Primary troubleshooting procedure

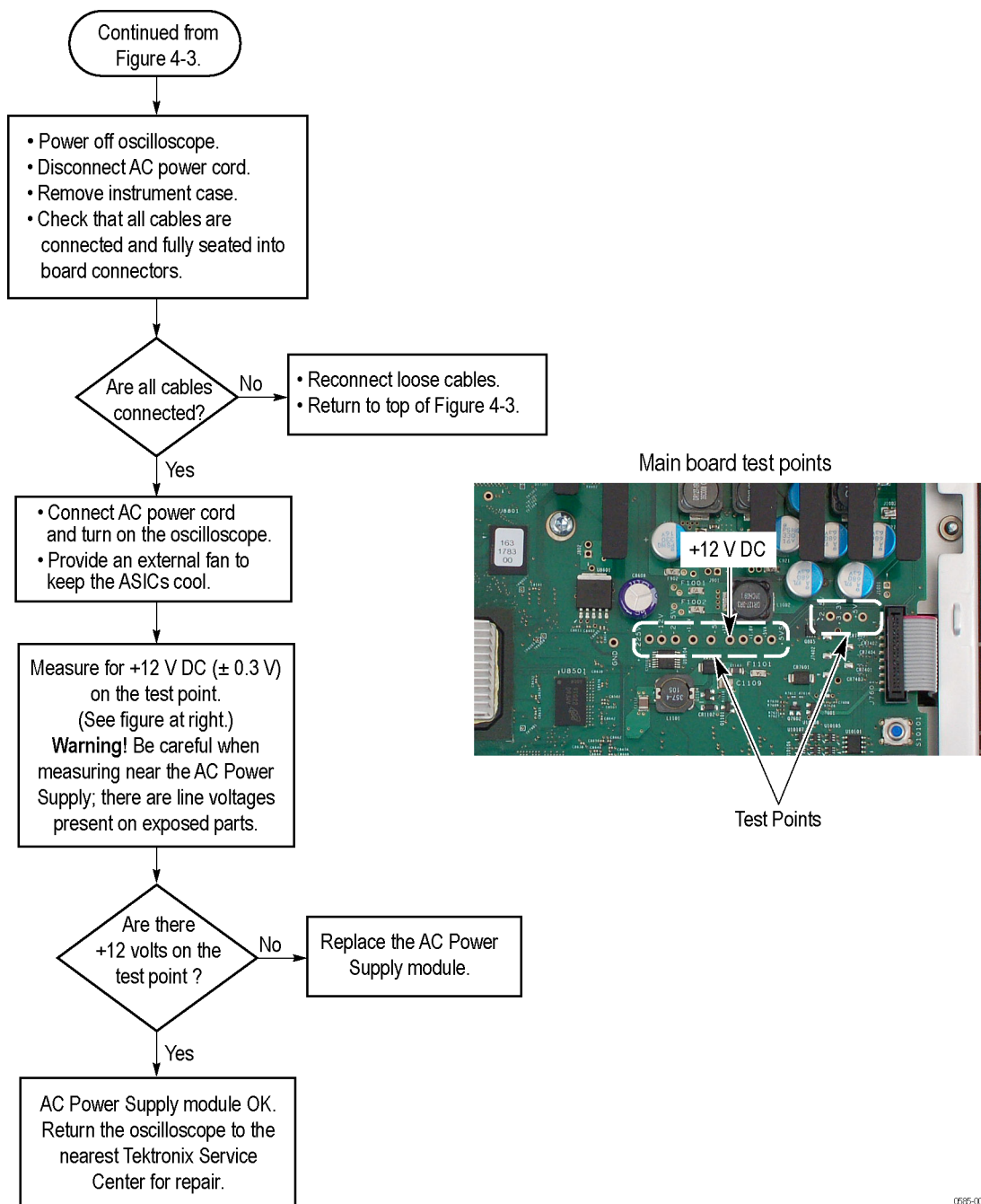


Figure 5: AC power supply troubleshooting procedure

NOTE. The test point voltages are printed on the Main board. From left to right in the illustration, they are: +1.225 V, -1.2 V, -2.5 V, +1.5 V, -5 V, +12 V, +1.8 V, +5 VA, +5 VSB, and +2.5 V, +3.3 V, +5 V.

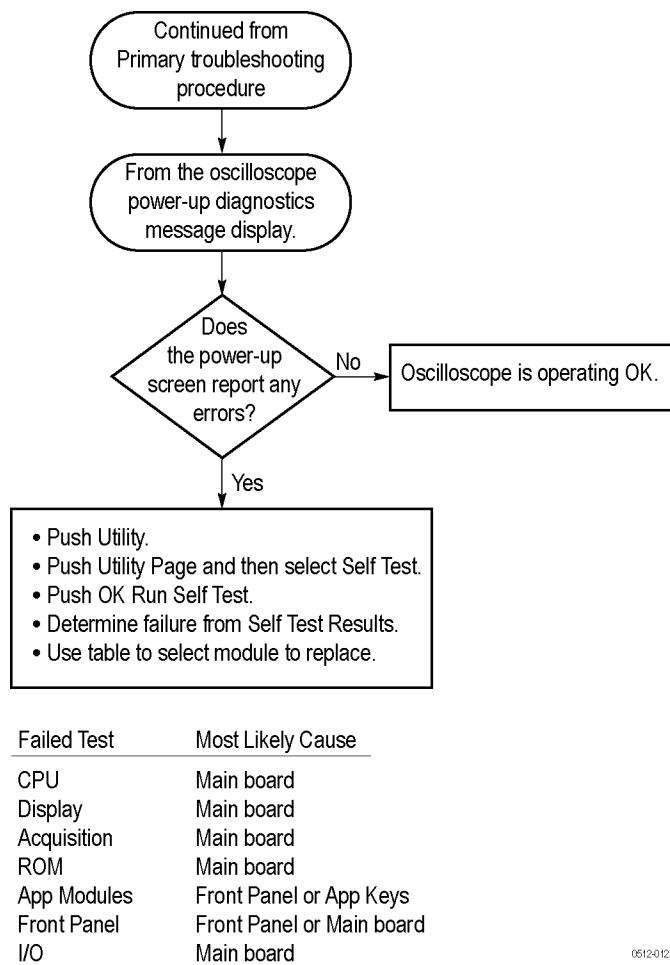


Figure 6: Module isolation troubleshooting procedure

Unpacking and Repacking Instructions

This section contains the information needed to unpack the oscilloscope and repack it for shipment or storage.

Unpacking

The oscilloscope and its standard accessories are carefully packed at the factory in a shipping carton. If, upon receipt, damage to the shipping carton is evident, tell the shipper. Tektronix, Inc. is not responsible for damage caused during shipping.

If you have not already done so, carefully remove the oscilloscope and its accessories from the shipping carton and inspect them for damage. Save the shipping carton for repacking or storage.

Repacking

Use a corrugated cardboard shipping carton having a test strength of at least 275 pounds (125 kg) and with an inside dimension at least six inches (15.25 cm) greater than the instrument dimensions.

If the instrument is being shipped to a Tektronix Service Center, enclose the following information:

- The owner's address
- Name and phone number of a contact person
- Type and serial number of the instrument
- Reason for returning
- A complete description of the service required

Seal the shipping carton with an industrial stapler or strapping tape.

Mark the address of the Tektronix Service Center and also your own return address on the shipping carton in two prominent locations. See www.tektronix.com/service to find a service center near you.

Storage

The oscilloscope should be stored in a clean, dry environment. The following environmental characteristics apply for both shipping and storage:

- Temperature range: -4 °F to +140 °F (-20 °C to +60 °C)
- Altitude: To 39,370 feet (12,000 m)

See the Tektronix *MDO4000B Series Mixed Domain Oscilloscopes Specifications and Performance Verification Technical Reference* for a complete listing of the environmental specifications.

Replaceable Parts List

This chapter contains a list of the replaceable modules for these oscilloscopes. Use this list to identify and order replacement parts.

Parts Ordering Information

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

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order:

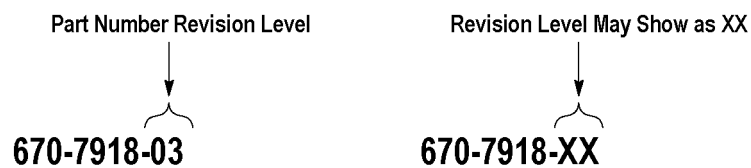
- Part number (see *Part Number Revision Level* below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix 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.

Part Number Revision Level

Tektronix part numbers contain two digits that show the revision level of the part. For some parts in this manual, you will find the letters XX in place of the revision level number.



When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.

Module Servicing

Modules can be serviced by selecting one of the next three options. Contact your local Tektronix service center or representative for repair assistance.

Module exchange. In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules

and meet the same factory specifications. For more information about the module exchange program, call 1-800-833-9200, extension 2.

Module repair and return. You may ship your module to us for repair, after which we will return it to you.

New modules. You may purchase replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

This section contains a list of the mechanical and/or electrical components that are replaceable for the instrument. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

Table 3: Parts list column descriptions

Column	Column Name	Description
1	Figure & Index Number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow the list.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

Abbreviations Abbreviations conform to American National Standard ANSI Y1.1-1972.

Exploded Views Figures 5-1 through 5-8 on the following pages show the module-level exploded views of the oscilloscopes. Each exploded view is indexed by the numbers in the figure.

Table 4: Replaceable parts – Front Panel assembly

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discount'd	Qty	Name & description
7-					FRONT PANEL ASSEMBLY
-1	065-0888-00			1	FRONT CASE ASSEMBLY
-2	366-0861-01			2	ASSEMBLY, KNOB: .925 DIAMETER, SOFT TOUCH
-3	366-0865-02			1	KNOB ASSEMBLY, SHUTTLE AND BUSHING
-4	358-0883-00			1	BUSHING (JOG SHUTTLE KNOB)
-5	366-0867-01			1	KNOB ASSEMBLY, JOG
-6	366-0859-01			6	ASSEMBLY, KNOB: .470 DIAMETER, SOFT TOUCH
-7	366-0860-01			6	ASSEMBLY, KNOB: .685 DIAMETER, SOFT TOUCH
-8	335-2376-00			1	LABEL. FRONT PANEL, OVERLAY, FRENCH
	335-2377-00			1	LABEL. FRONT PANEL, OVERLAY, ITALIAN
	335-2378-00			1	LABEL. FRONT PANEL, OVERLAY, GERMAN
	335-2379-00			1	LABEL. FRONT PANEL, OVERLAY, SPANISH
	335-2380-00			1	LABEL. FRONT PANEL, OVERLAY, JAPANESE
	335-2381-00			1	LABEL. FRONT PANEL, OVERLAY, PORTUGUESE
	335-2382-00			1	LABEL. FRONT PANEL, OVERLAY, SIMPLIFIED CHINESE
	335-2383-00			1	LABEL. FRONT PANEL, OVERLAY, TRADITIONAL CHINESE
	335-2384-00			1	LABEL. FRONT PANEL, OVERLAY, KOREAN
	335-2385-00			1	LABEL FRONT PANEL OVERLAY, RUSSIAN
-9	260-2898-00			1	SWITCH, KEYPAD, ELASTOMERIC, POWER
-10	407-5259-00			1	BRACKET, SUPPORT: POWER SWITCH
-11	211-1273-00			19	SCREW, PT, K35-1.57, PAN HEAD, STL, ZNPL, T-15 TORX DRIVE
					----- DISTRIBUTION OF THE 211-1273-00 SCREWS -----
					2 screws attach the Power switch and bracket to the front case assembly.
					2 screws attach the Utility switch and bracket to the front case assembly.
					10 screws attach the Front panel assembly to the front case assembly – with contact springs (#15).
					5 screws across the bottom of the Front panel assembly attach it to the front case assembly – without contact springs.
-12	260-2858-00			1	SWITCH, KEYPAD, ELASTOMERIC, UTILITY
-13	407-2567-00			1	BRACKET, SUPPORT, UTILITY SWITCH
-14	260-2902-00			1	SWITCH, KEYPAD, ELASTOMERIC, FRONT PANEL
-15	105-1176-00			1	ACTUATOR, SWITCH, 10 KEY
-16	878-0388-01			1	CIRCUIT BOARD ASSEMBLY, FRONT PANEL
-17	131-8139-00			10	CONTACT, SPRING: FRONT PANEL ELEC
-18	351-1026-00			2	GUIDE, KEY; POLY, BAYBLEND FR-110
-19	213-1149-00			2	SCREW, TPG, TF; 2-28 X.5, PLASTITE, FLAT HEAD, PHILLIPS, STL, ZNPL
-20	259-0212-00			1	CIRCUIT, FLEX; 10 KEY
-21	200-5049-00			1	COVER; OPTION KEY DOOR, 0.7270 X 1.2250 X 0.310, PC/ABS, FR110, SILVER GRAY

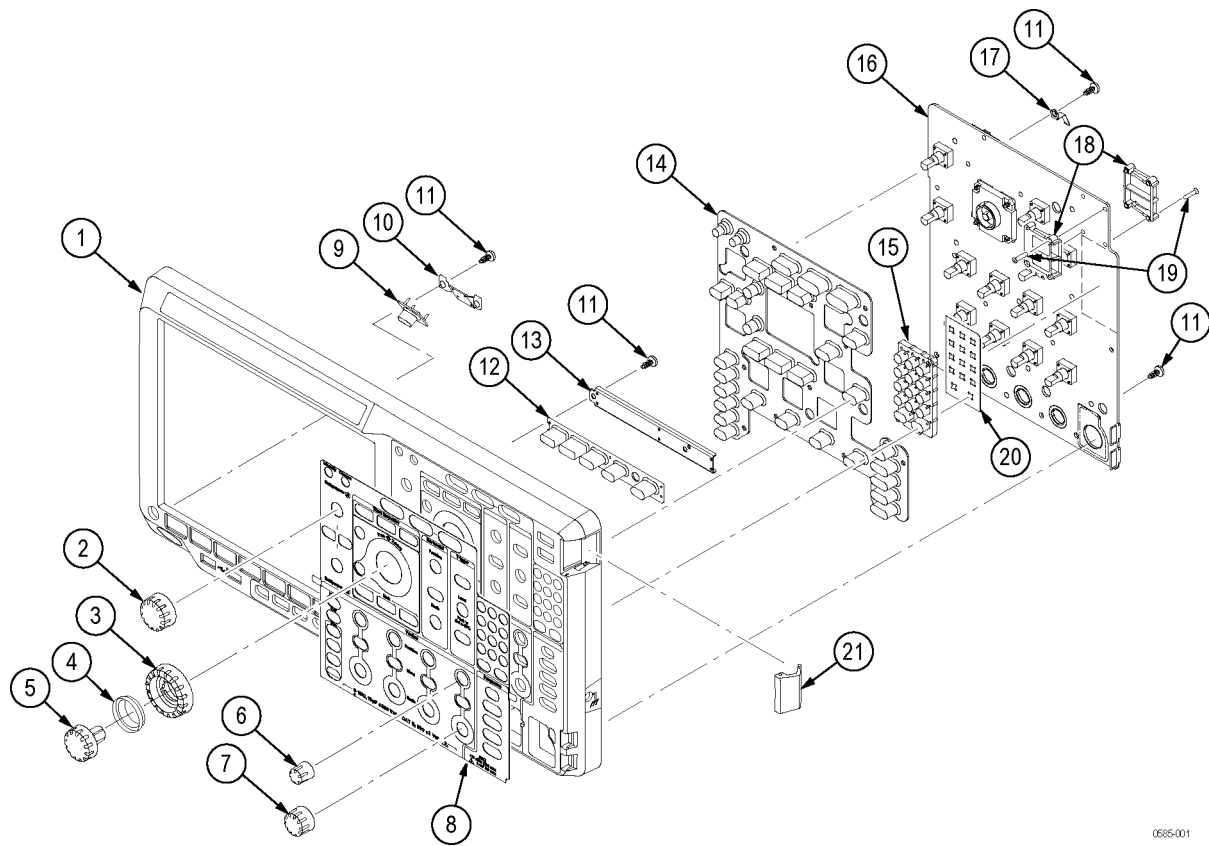
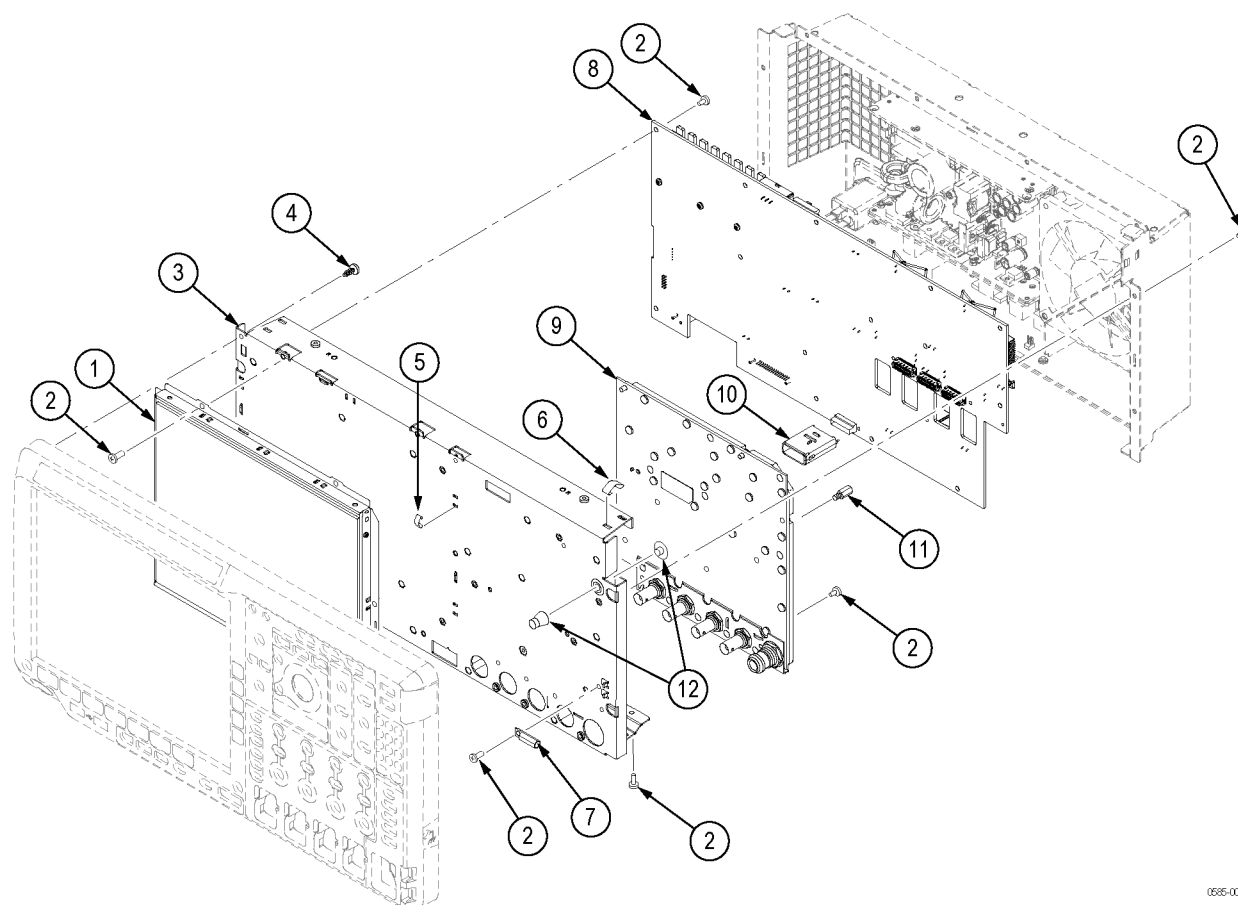


Figure 7: Exploded view, Front Panel assembly

Table 5: Replaceable parts – Display, Analog board, and Main board

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
8-					DISPLAY, ANALOG BOARD & MAIN BOARD
-1	850-0110-00			1	FRAME ASSEMBLY, DISPLAY: LCD
-2	211-1272-00			43	SCREW, MACHINE: 6–32 x 0.250, PNH, STL, ZNPL, T-15 TORX DRIVE ----- DISTRIBUTION OF THE 211-1272-00 SCREWS ----- 9 screws attach the LCD assembly to the front chassis. 15 screws attach the Main board assembly to the front chassis. 6 screws attach the Analog board assembly to the front chassis. 12 screws attach the rear chassis to the front chassis: 4 across the top flange of the rear chassis, 2 on each side flange, and 4 across the bottom flange of the front chassis. 1 screw attaches the ground jack to the front chassis.
-3	441-2608-00			1	CHASSIS ASSEMBLY, FRONT
-4	211-1273-00			8	SCREW, PT, K35–1.57, PAN HEAD, STL, ZNPL, T-15 TORX DRIVE
-5	131-6643-00			6	CONTACT, ELEC: GROUNDING, 0.169 L X 0.250 W X 0.320 D, ELECTROLESS NICKEL PLATE
-6	131-6417-00			4	CONTACT, ELEC: GROUNDING, 0.600 L X 0.250 W X 0.220 D, ELECTROLESS NICKEL PLATE
-7	131-7622-00			1	CONN, RECEPT; GROUND JACK
-8	-----			1	MAIN BOARD ASSEMBLY. Return the instrument to Tektronix for service. The Main board and the Analog board must be replaced together.
-9	-----			1	ANALOG BOARD ASSEMBLY. Return the instrument to Tektronix for service. The Analog board and the Main board must be replaced together.
-10	351-1134-00			1	DIGITAL PROBE GUIDE
-11	129-1693-00			1	SPACER, POST
-12	361-1858-00			1	SPACER, POST



0585-002

Figure 8: Display, analog board, and main board assembly

Table 6: Replaceable parts – Rear chassis and connecting modules

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
9-					REAR CHASSIS, POWER SUPPLY, I/O BOARD
-1	119-7597-00			1	POWER SUPPLY; ROHS COMPLIANT; SAFETY CONTROLLED
-2	211-1272-00			15	SCREW, MACHINE: 6–32 x 0.250, PNH, STL, ZNPL, T-15 TORX DRIVE ----- DISTRIBUTION OF THE 211-1272-00 SCREWS ----- 1 screw attaches the I/O board to the rear chassis. 4 screws attach the Power supply circuit board to the Power supply bracket. 4 screws attach the Power supply bracket to the rear chassis. 2 screws attach the line filter to the rear chassis. 4 screws attach the system fan (#12) to the rear chassis.
-3	407-5462-00			1	BRACKET, POWER SUPPLY BOARD MOUNT
-4	878-0278-01			1	I/O BOARD ASSEMBLY
-5	119-7086-00			1	FILTER, EMI, AC LINE CONNECTOR
-6	065-0960-00			1	CHASSIS ASSEMBLY, REAR W USB EMI GASKET
-7	131-6417-00			1	CONTACT, ELEC: GROUNDING, 0.600 L X 0.250 W X 0.220 D, ELECTROLESS NICKEL PLATE
-8	214-3903-00			2	SCREW, JACK; 4-40 X 0.312 LONG, 0.188 H HEX HEAD STAND OFF
-9	210-1039-00			2	WASHER, LOCK; 0.521 ID, INT, 0.025 THK, STEEL, ZINC FINISH
-10	220-0265-00			2	NUT, PLAIN, HEX; 0.5-28 X 0.625
-11	065-0961-00			1	SYSTEM FAN ASSEMBLY, 120 MM, TUBEAXIAL, 12 VDC; SAFETY CONTROLLED, WITH BRACKET
-12	335-1910-00			1	MARKER, IDENT: SERIAL NUMBER LABEL
-13	335-2248-00			1	LABEL, IO, REAR

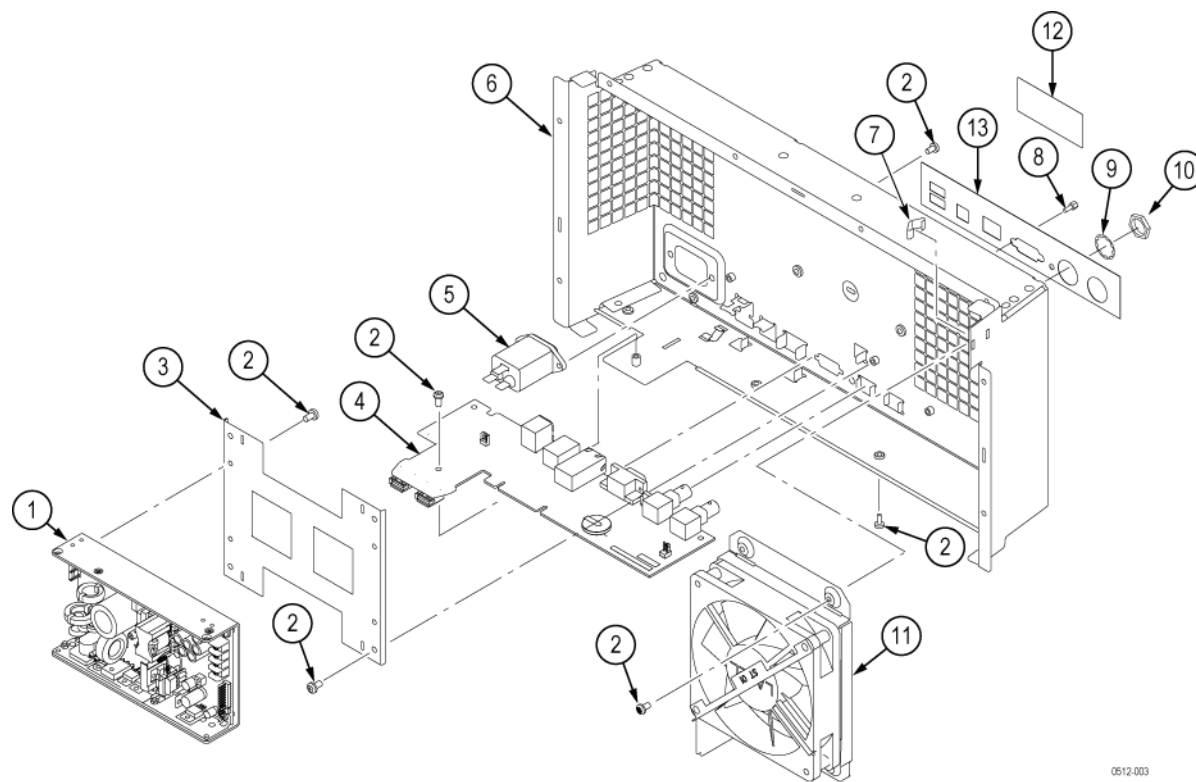
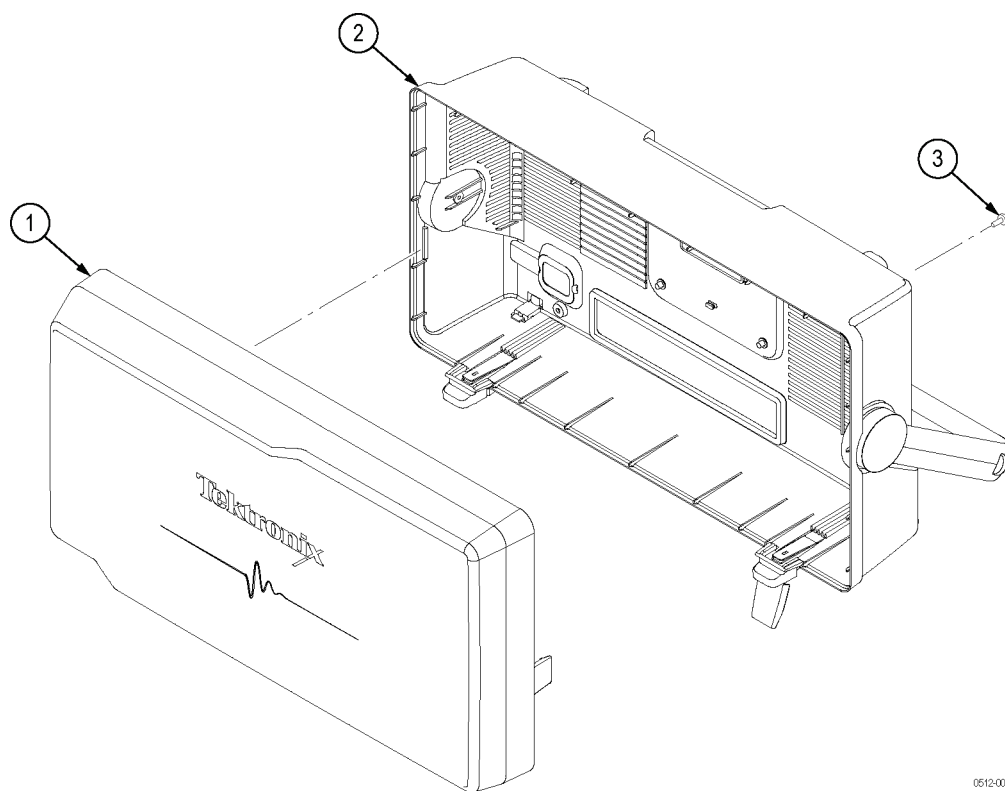


Figure 9: Rear chassis and connecting modules

Table 7: Replaceable parts – External parts

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
10-					EXTERNAL PARTS
-1	200-5130-00			1	FRONT PROTECTIVE COVER
-2	065-0856-00			1	REAR CASE ASSEMBLY
-3	211-1272-00			4	SCREW, MACHINE: 6-32 x 0.250, PNH, STL, ZNPL, T-15 TORX DRIVE



0512-004

Figure 10: External parts

Table 8: Replaceable parts – cable and connectors, rear chassis

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
11-					CABLES, REAR CHASSIS
-1	174-5835-00			1	CABLE ASSEMBLY, LINE INPUT
-2	343-1736-00			2	CLAMP, CABLE

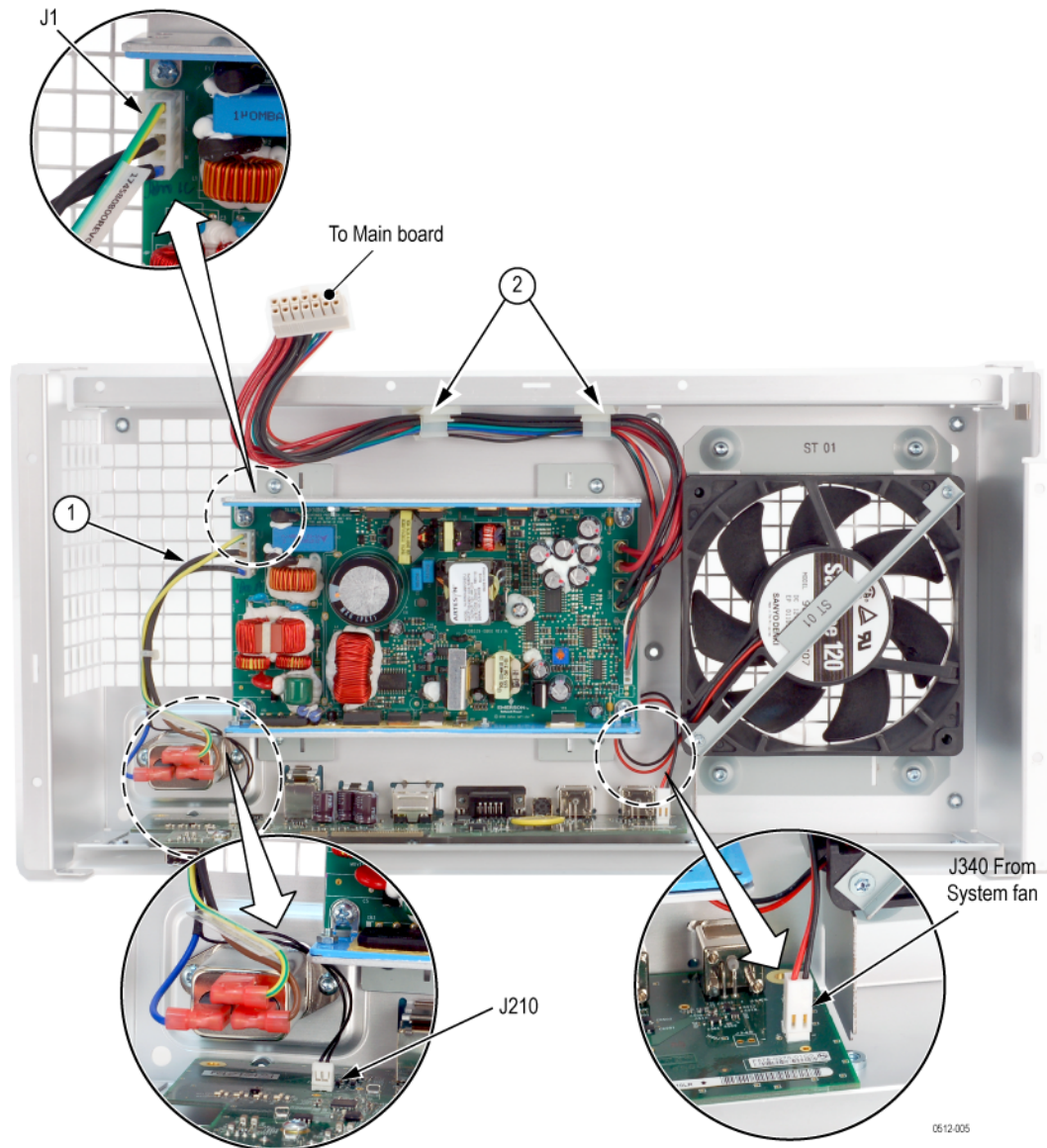
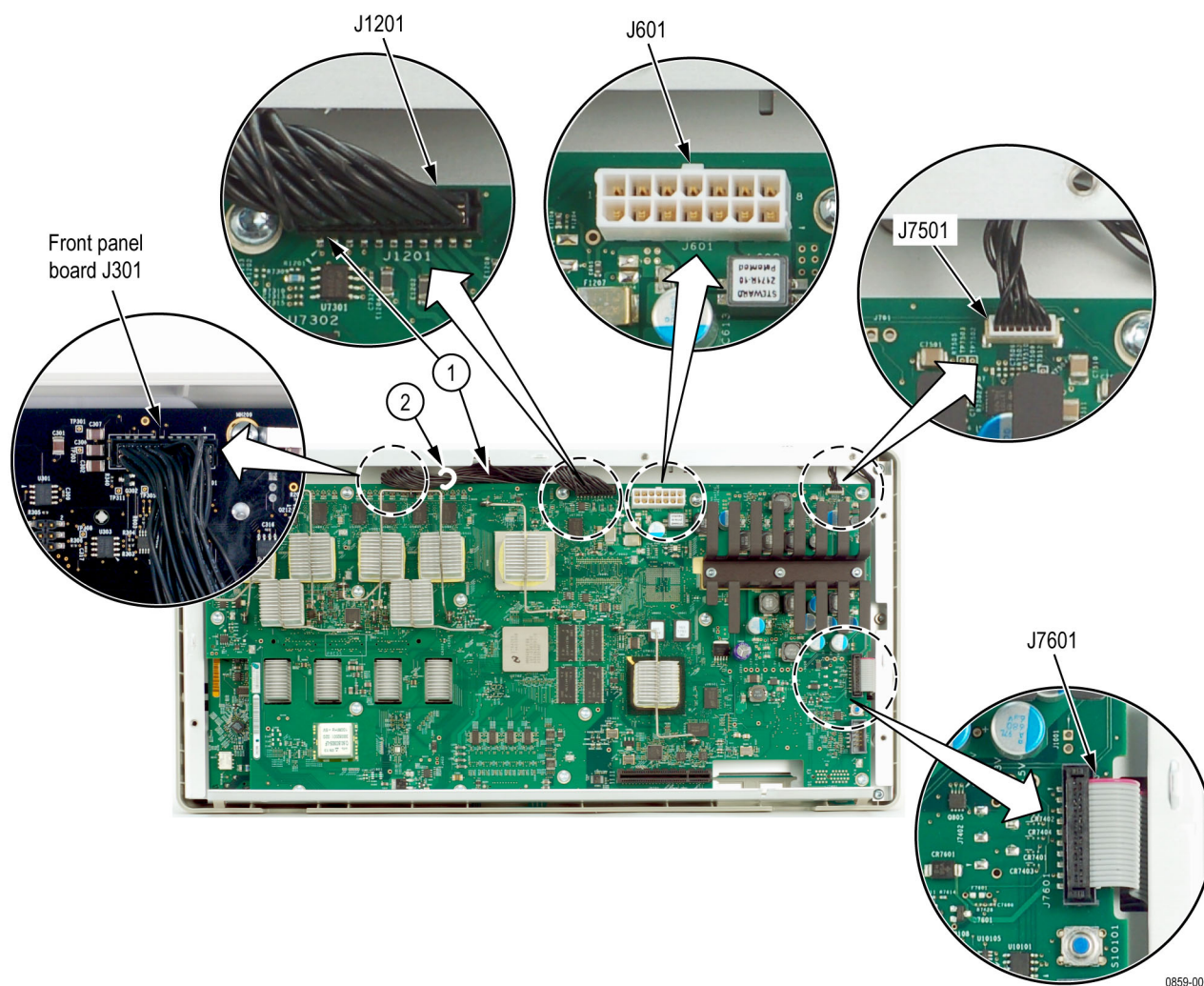


Figure 11: Rear chassis, showing cables and connectors

Table 9: Replaceable parts – Cable and Connectors, Main board

Figure and index no.	Tektronix part no.	Serial no. effective	Serial no. discont'd	Qty.	Name and description
12-					Cable, Main Board
-1	174-5809-00			1	CABLE, MAIN BOARD TO FRONT PANEL BOARD
-2	346-0120-00			1	STRAP, TIEDOWN; 5.5 L MIN, PLASTIC, WHITE



0859-006

Figure 12: Main board, showing cable and connectors