



**TBS1000B and TBS1000B-EDU Series
Digital Storage Oscilloscopes
Service Manual**



077-0897-02



TBS1000B and TBS1000B-EDU Series Digital Storage Oscilloscopes Service Manual

Revision A

This document applies to TBS1000B and TBS1000B-EDU models with no display adapter module.

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.

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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 vi, *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 switch disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to disconnect the power switch; 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.

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

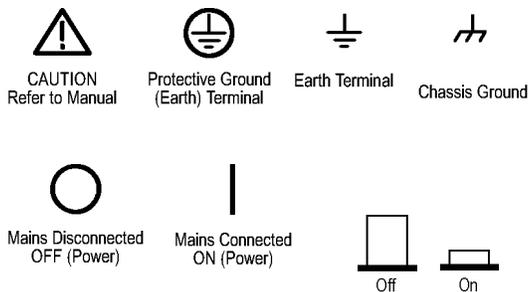
These terms may appear on the product:

- 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:



Preface

This service manual provides information to verify performance of, calibrate, troubleshoot, disassemble, and replace parts on the TBS1000B Series and TBS1000B-EDU Series Digital Storage Oscilloscopes.

Unless noted otherwise, the term "oscilloscope" refers to all models in the TBS1000B series.

Manual Conventions

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

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

A module is composed of electrical and mechanical assemblies, circuit cards, interconnecting cables, and user-accessible controls.

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 *Service Safety Summary* found at the beginning of this manual.

Related Documentation

To read about	Use these documents
Installation and Operation	The oscilloscope user manual, available on the Tektronix Web site. Go to www.tektronix.com/manuals and search for the user manual for your product (available in 11 languages).
Programmer Commands	The oscilloscope programmer manual, available on the Tektronix Web site. Go to www.tektronix.com/manuals and search for the programmer manual for your product.
Product specifications and performance verification procedures	The oscilloscope specifications and performance verification manual, available on the Tektronix Web site. Go to www.tektronix.com/manuals and search for the specifications and performance verification technical reference manual for your product.

Inspection and Cleaning

Inspection and cleaning are done as preventive maintenance. Preventive maintenance, when done regularly, can 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 you use the oscilloscope. A good time to perform preventive maintenance is just before adjustment of the oscilloscope.

General Care

For best performance, follow these recommendations:

- Protect the oscilloscope from adverse weather conditions. The oscilloscope is not waterproof.
- Do not store or leave the oscilloscope where the liquid crystal display (LCD) is exposed to direct sunlight or high humidity for long periods of time.
- The front and rear cases help keep dust out of the oscilloscope and must be in place during normal operation.
- To avoid damage to the oscilloscope or probes, do not expose them to any sprays, liquids, or solvents.

Interior Cleaning

Use a dry, low-velocity stream of air to clean the interior of the chassis. Use a soft-bristle, non-static-producing brush for cleaning around components. If you must use a liquid for minor interior cleaning, use a 75% isopropyl alcohol solution and rinse with deionized water.



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

Exterior Cleaning



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.*

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 may damage the chassis.



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

Clean the On/Standby switch using a dampened cleaning towel. Do not spray or wet the switch directly.

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 Inspection

Inspect the outside of the oscilloscope for damage, wear, and missing part. (See Table 1.) 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
Front and rear case	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 inspection and cleaning, refer to *Diagrams* in this manual.

Inspect the internal portions of the oscilloscope for damage and wear. (See Table 2.) Repair any defects immediately.

If any circuit board is repaired or replaced, check the table to see if it is necessary to adjust the oscilloscope. (See Table 2.)



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.

**Cleaning Procedure,
Interior**

To clean the oscilloscope interior, perform the following steps:

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 then wipe with a lint-free cloth dampened with warm deionized water. A cotton-tipped applicator is useful for cleaning in narrow spaces and on circuit boards.

STOP. If, after performing steps 1 and 2, a module is clean on inspection, skip steps 3, 4, and 5. Proceed with step 6.

3. If steps 1 and 2 do not remove all the dust or dirt, all modules in the oscilloscope except the Display Module and Front Panel Module may be spray washed using a solution of 75% isopropyl alcohol.
 - During cleaning of the Acquisition board (Main board), make sure that no residue is left in the attenuators. Debris or residue can cause several problems with signal fidelity that cannot be corrected by calibration. When handling the board, avoid handling the attenuators since skin oils may cause problems.
 - Extensive cleaning of the Display Module is difficult because water must not be trapped between the display shield and the display. The polarizers integrated into the display degrade with long-term exposure to water. The display shield and display must be replaced as an assembly if significant moisture or debris become trapped inside. Cotton tipped applicators and lint-free rags moistened in isopropyl alcohol and/or deionized water offer the best cleaning with the least opportunity for damage to the assembly.
 - The Front-Panel module can be damaged by deposition of film or debris inside the knob encoders. To avoid this, be careful not to drip liquid or blow debris into the encoders.
4. Spray wash dirty parts with the 75% isopropyl alcohol solution and wait 60 seconds for the majority of the alcohol to evaporate.
5. Use hot (49 °C to 60 °C / 120 °F to 140 °F) deionized water to thoroughly rinse the parts.
6. Dry all parts with low-pressure, deionized air.
7. Dry all components and assemblies in an oven or drying compartment using low-temperature (52 °C to 66 °C / 125 °F to 150 °F) circulating air.

Lubrication. Periodic lubrication is not required for the oscilloscope.

Adjustment procedures

This section contains adjustment procedures for the TBS1000B and TBS1000B-EDU series oscilloscopes.

Only qualified personnel should perform service procedures. Read the *Service Safety Summary* and the *General Safety Summary* at the beginning of this manual before performing any service procedures. Refer to the user manual for information about using these oscilloscopes.

NOTE. *The voltage references inside the oscilloscopes are very stable over time and do not require routine updates. Do not perform any procedure in this section unless the oscilloscope does not meet specifications. Refer to the Performance Verification section to check the oscilloscope performance to specifications.*

The Performance and Verification procedures for this product are located in the TBS1000B and TBS1000B-EDU Series Oscilloscopes Specifications and Performance Verification Technical Reference. That manual can be downloaded from the Tektronix Web site (www.tek.com/downloads).

Required equipment

The equipment described in the following table, or a suitable equivalent, is required to complete these procedures. (See Table 3.)

Table 3: Required equipment

Description	Minimum requirements	Example
DC Voltage Source	-20 V to 20 V, $\pm 0.1\%$ accuracy	Wavetek 9100 Universal Calibration System with Oscilloscope Calibration Module (Option 250)
Leveled Sinewave Generator	5 kHz and 200 MHz, $\pm 0.6\%$ amplitude accuracy	Fluke 5500A Multi-product Calibrator with Oscilloscope Calibration Option (Option 5500A-SC)
50 Ω BNC Cable	BNC male to BNC male, ≈ 1 m (36 in) long	Tektronix part number 012-0482-XX
50 Ω BNC Cable (seven)	BNC male to BNC male, ≈ 25 cm (10 in) long	Tektronix part number 012-0208-XX
50 Ω Feedthrough Termination	BNC male and female connectors	Tektronix part number 011-0049-XX
Dual Banana to BNC Adapter	Banana plugs to BNC female	Tektronix part number 103-0090-XX
BNC T (three)	One male and two female BNC connectors	Tektronix part number 103-0030-XX

Adjustment procedure

The adjustment procedure consists of 70 steps for the 2-channel oscilloscope and 106 steps for the 4-channel model. Each step requires an external voltage source for new calibration constants.

Before performing the adjustment procedure, warm up the oscilloscope for at least ten minutes in an ambient temperature between 20 °C and 30 °C. Adjustments performed before warm up or outside this temperature range may result in poor performance.

If all steps in the procedure are completed successfully, a "Pass" message is displayed and the new calibration constants take effect. If any step fails, the procedure is aborted and the current calibration is not affected. You can choose to abort the procedure at any step, without affecting the current calibration, by selecting FCAL ABORT.

NOTE. *While performing the adjustment procedure, keep in mind that some of the steps take a significant amount of time (up to 5 minutes) to complete.*

Equipment setups are shown in the following figure. (See Figure 1 on page 7.) Signal requirements for each step are shown in the following table. (See Table 4 on page 9.)

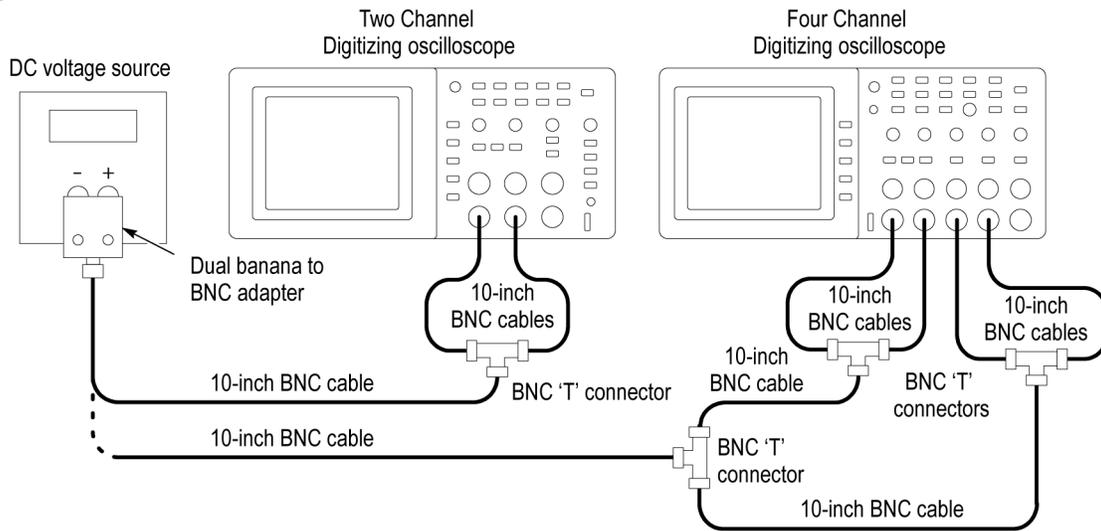
Enable the Service menu

Before performing the adjustment procedure, enable the Service menu as follows (read through all the steps one time to understand the procedure):

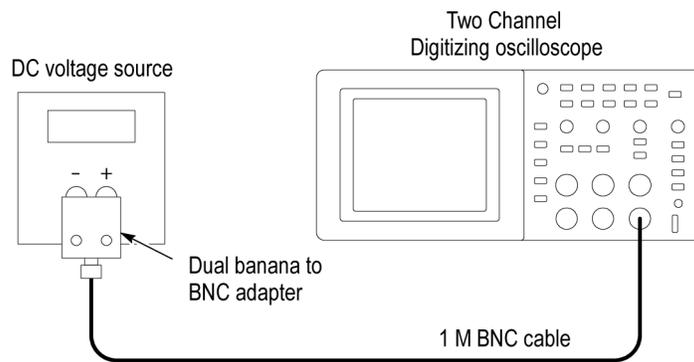
1. Power on the oscilloscope.
2. Push and hold the front-panel **Utility** button for five seconds.
3. While continuing to hold the Utility button, push and hold the front-panel **Function** button for five seconds.
4. While continuing to hold the Utility and Function buttons, push and hold the front-panel **Measure** button for about three seconds, or until a message appears in the lower left corner of the screen showing "Service mode ON."
5. Release all the buttons being pushed.
6. Push the front-panel **Utility** button.
7. Push the **More** option button until the menu lists a **Service** option.
8. Push the **Service** option button to display the service menu.

At completion of the Adjustment procedure, disable the "Service" menu by selecting the **Utility** front panel button, the **Service** option button, and the **Service Mode Off** option button.

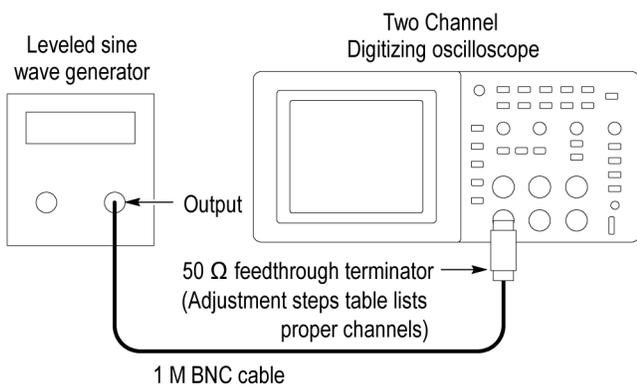
DC voltage setup 1



DC voltage setup 2



Sinewave generator setup



Edge setup

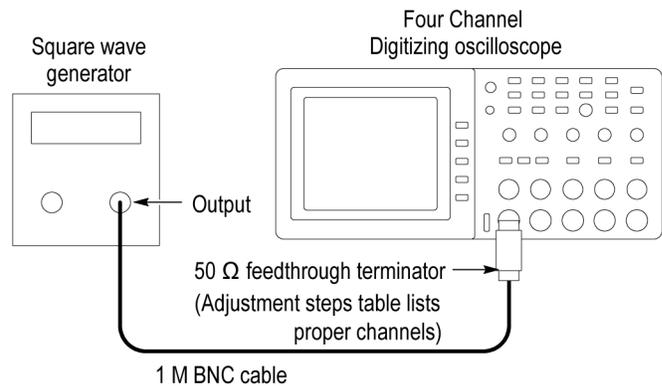


Figure 1: Adjustment setups

Adjustment procedure

Use this procedure to load new calibration constants.

1. Enable the Service menu. (See page 6, *Enable the Service menu.*)
2. Push the **Service** option button.
3. Push the **Factory Cal** option button.
4. Push the **Warmup Timer** option button.
5. Push the **Start Timer** option button to allow a 10-minute warm up. After 10 minutes, the oscilloscope displays a large black or green cross.
6. Press the front-panel **Utility** button and push the **Service** option button.
7. Push the **Factory Cal** option button.
8. Push the **FCAL INIT** option button to initiate the factory calibration routine. You are now in step 1 of the procedure.
9. As indicated by step 1, connect a 0.0 V_{DC} source to the channel inputs. (See Table 4.)
10. Press **FCAL STEP** to load the calibration constant for step 1.
11. Follow the screen prompts and the Adjustment setup table for the remainder of the routine, applying the proper signal for each step. (See Table 4.)

NOTE. *During some steps, the oscilloscope may appear to be idle for several minutes while it is processing information internally. You must wait for the screen prompt to continue.*

If any step in the procedure fails, the procedure terminates. Failure will result if an incorrect signal source is connected. If this happens, you must start the procedure over from the beginning.

If the procedure completes successfully, a "Pass" message is displayed and the new adjustment takes effect.

12. Compensate the signal path by performing the self-calibration routine.
13. Disconnect all probes and cables from the channel input connectors.
14. Press the **Utility** button and select **Do Self Cal** to confirm that you are ready to proceed.
15. Disable the Service menu option by pushing the **Utility** front-panel button and the **Service** and **Service Mode Off** option buttons.

Table 4: Adjustment steps

Input	Setup diagram	Step number	Signal	Signal source setting
Ch 1 through Ch x	DC voltage 1	1	DC Voltage 1	0.0 V
		2	DC Voltage 1	-20.0 V
		3	DC Voltage 1	-2.0 V
		4	DC Voltage 1	-1.6 V
		5	DC Voltage 1	-1.2 V
		6	DC Voltage 1	-0.8 V
		7	DC Voltage 1	-0.4 V
		8	DC Voltage 1	-0.32 V
		9	DC Voltage 1	-0.2 V
		10	DC Voltage 1	-0.16 V
		11	DC Voltage 1	-0.08 V
		12	DC Voltage 1	-0.04 V
		13	DC Voltage 1	-0.03 V
		14	DC Voltage 1	-0.02 V
		15	DC Voltage 1	-0.015 V
		16	DC Voltage 1	0.015 V
		17	DC Voltage 1	0.02 V
		18	DC Voltage 1	0.03 V
		19	DC Voltage 1	0.04 V
		20	DC Voltage 1	0.08 V
		21	DC Voltage 1	0.16 V
		22	DC Voltage 1	0.2 V
		23	DC Voltage 1	0.32 V
		24	DC Voltage 1	0.4 V
		25	DC Voltage 1	0.8 V
		26	DC Voltage 1	1.2 V
		27	DC Voltage 1	1.6 V
		28	DC Voltage 1	2.0 V
		29	DC Voltage 1	20.0 V
		30	DC Voltage 1	0.0 V
Ext Trig	DC voltage 2	31	DC Voltage 2	-5.0 V
		32	DC Voltage 2	-1.0 V
		33	DC Voltage 2	1.0 V
		34	DC Voltage 2	5.0 V

Table 4: Adjustment steps (cont.)

Input	Setup diagram	Step number	Signal	Signal source setting
Ch 1	Sinewave generator	35	Sinewave Generator, 50 Ω	5 kHz, 1 V _{p-p}
		36	Sinewave Generator, 50 Ω	1 MHz, 100 mV _{p-p}
		37	Sinewave Generator, 50 Ω	1 MHz, 1 V _{p-p}
		38	Sinewave Generator, 50 Ω	50 kHz, 1 V _{p-p}
		39	Sinewave Generator, 50 Ω	20 MHz, 1 V _{p-p}
		40	Sinewave Generator, 50 Ω	BWL, 25 mV _{p-p}
		41	Sinewave Generator, 50 Ω	BWL, 50 mV _{p-p}
		42	Sinewave Generator, 50 Ω	BWL, 100 mV _{p-p}
		43	Sinewave Generator, 50 Ω	BWL, 250 mV _{p-p}
		44	Sinewave Generator, 50 Ω	BWL, 500 mV _{p-p}
		45	Sinewave Generator, 50 Ω	BWL, 1 V _{p-p}
		46	Sinewave Generator, 50 Ω	5 kHz, 2.5 V _{p-p}
		47	Sinewave Generator, 50 Ω	1 MHz, 2.5 V _{p-p}
		48	Sinewave Generator, 50 Ω	50 kHz, 2.5 V _{p-p}
		49	Sinewave Generator, 50 Ω	20 MHz, 2.5 V _{p-p}
		50	Sinewave Generator, 50 Ω	BWL, 2.5 V _{p-p}
		51	Sinewave Generator, 50 Ω	BWL, 5 V _{p-p}
		52	Sinewave Generator, 50 Ω	BWL, 1.6 V _{p-p}
	Edge	53	Edge, 50 Ω .	1 kHz, 0 to -800 mV

Table 4: Adjustment steps (cont.)

Input	Setup diagram	Step number	Signal	Signal source setting		
Ch 2	Sinewave generator	54	Sinewave Generator, 50 Ω	5 kHz, 1 V _{p-p}		
		55	Sinewave Generator, 50 Ω	1 MHz, 100 mV _{p-p}		
		56	Sinewave Generator, 50 Ω	1 MHz, 1 V _{p-p}		
		57	Sinewave Generator, 50 Ω	50 kHz, 1 V _{p-p}		
		58	Sinewave Generator, 50 Ω	20 MHz, 1 V _{p-p}		
		59	Sinewave Generator, 50 Ω	BWL, 25 mV _{p-p}		
		60	Sinewave Generator, 50 Ω	BWL, 50 mV _{p-p}		
		61	Sinewave Generator, 50 Ω	BWL, 100 mV _{p-p}		
		62	Sinewave Generator, 50 Ω	BWL, 250 mV _{p-p}		
		63	Sinewave Generator, 50 Ω	BWL, 500 mV _{p-p}		
		64	Sinewave Generator, 50 Ω	BWL, 1 V _{p-p}		
		65	Sinewave Generator, 50 Ω	5 kHz, 2.5 V _{p-p}		
		66	Sinewave Generator, 50 Ω	1 MHz, 2.5 V _{p-p}		
		67	Sinewave Generator, 50 Ω	50 kHz, 2.5 V _{p-p}		
		68	Sinewave Generator, 50 Ω	20 MHz, 2.5 V _{p-p}		
		69	Sinewave Generator, 50 Ω	BWL, 2.5 V _{p-p}		
		70	Sinewave Generator, 50 Ω	BWL, 5 V _{p-p}		
		Ch 3 (4-Ch models only)	Sinewave generator	71	Sinewave Generator, 50 Ω	5 kHz, 1 V _{p-p}
				72	Sinewave Generator, 50 Ω	1 MHz, 100 mV _{p-p}
				73	Sinewave Generator, 50 Ω	1 MHz, 1 V _{p-p}
74	Sinewave Generator, 50 Ω			50 kHz, 1 V _{p-p}		
75	Sinewave Generator, 50 Ω			20 MHz, 1 V _{p-p}		
76	Sinewave Generator, 50 Ω			BWL, 25 mV _{p-p}		
77	Sinewave Generator, 50 Ω			BWL, 50 mV _{p-p}		
78	Sinewave Generator, 50 Ω			BWL, 100 mV _{p-p}		
79	Sinewave Generator, 50 Ω			BWL, 250 mV _{p-p}		
80	Sinewave Generator, 50 Ω			BWL, 500 mV _{p-p}		
81	Sinewave Generator, 50 Ω			BWL, 1 V _{p-p}		
82	Sinewave Generator, 50 Ω			5 kHz, 2.5 V _{p-p}		
83	Sinewave Generator, 50 Ω			1 MHz, 2.5 V _{p-p}		
84	Sinewave Generator, 50 Ω			50 kHz, 2.5 V _{p-p}		
85	Sinewave Generator, 50 Ω			20 MHz, 2.5 V _{p-p}		
86	Sinewave Generator, 50 Ω			BWL, 2.5 V _{p-p}		
87	Sinewave Generator, 50 Ω			BWL, 5 V _{p-p}		
88	Sinewave Generator, 50 Ω			BWL, 1.6 V _{p-p}		
	Edge	89	Edge, 50 Ω .	1 kHz, 0 to -800 mV		

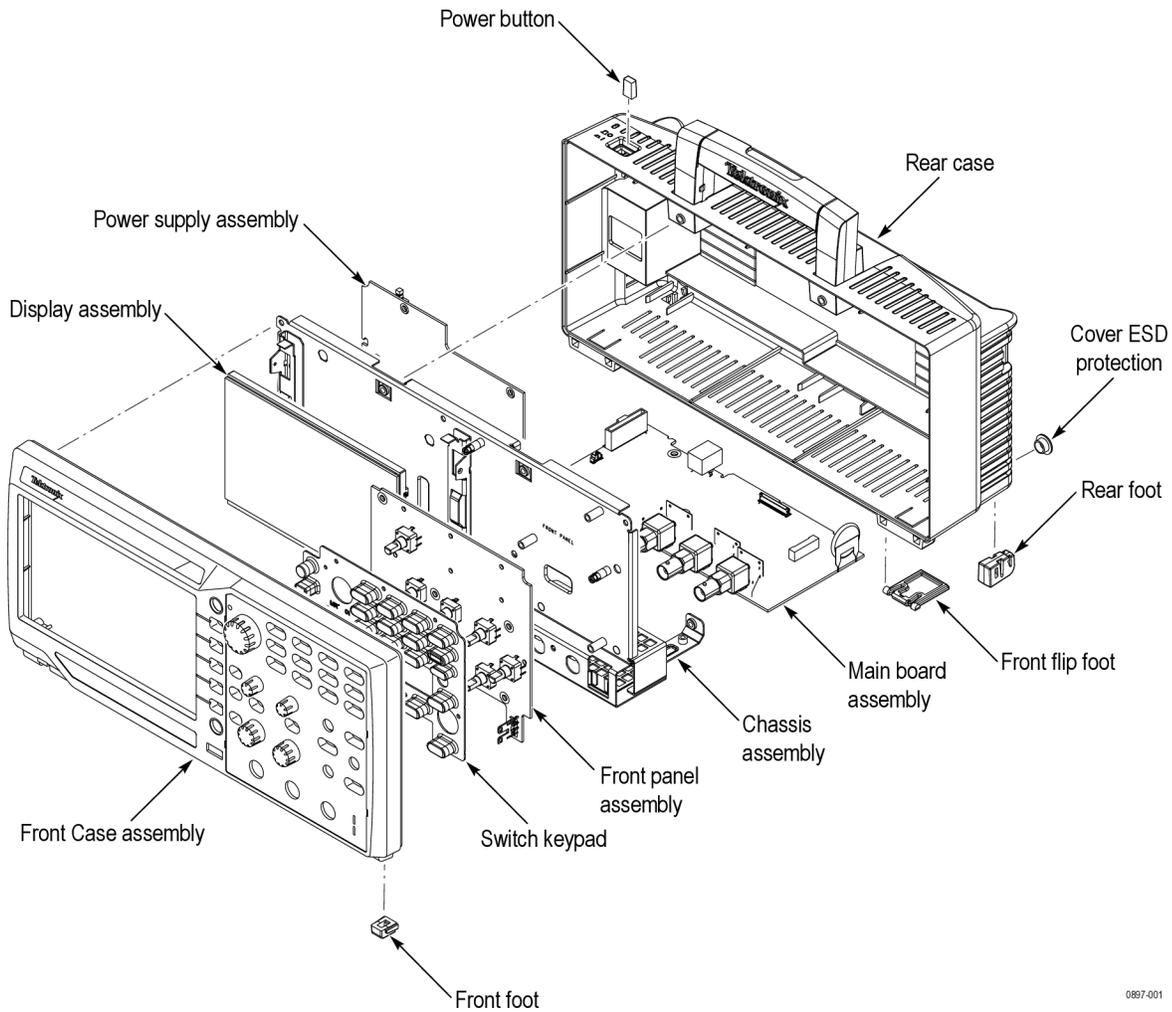
Table 4: Adjustment steps (cont.)

Ch 4 (4-ch models only)	Sinewave generator	90	Sinewave Generator, 50 Ω	5 kHz, 1 V _{p-p}
		91	Sinewave Generator, 50 Ω	1 MHz, 100 mV _{p-p}
		92	Sinewave Generator, 50 Ω	1 MHz, 1 V _{p-p}
		93	Sinewave Generator, 50 Ω	50 kHz, 1 V _{p-p}
		94	Sinewave Generator, 50 Ω	20 MHz, 1 V _{p-p}
		95	Sinewave Generator, 50 Ω	BWL, 25 mV _{p-p}
		96	Sinewave Generator, 50 Ω	BWL, 50 mV _{p-p}
		97	Sinewave Generator, 50 Ω	BWL, 100 mV _{p-p}
		98	Sinewave Generator, 50 Ω	BWL, 250 mV _{p-p}
		99	Sinewave Generator, 50 Ω	BWL, 500 mV _{p-p}
		100	Sinewave Generator, 50 Ω	BWL, 1 V _{p-p}
		101	Sinewave Generator, 50 Ω	5 kHz, 2.5 V _{p-p}
		102	Sinewave Generator, 50 Ω	1 MHz, 2.5 V _{p-p}
		103	Sinewave Generator, 50 Ω	50 kHz, 2.5 V _{p-p}
		104	Sinewave Generator, 50 Ω	20 MHz, 2.5 V _{p-p}
		105	Sinewave Generator, 50 Ω	BWL, 2.5 V _{p-p}
		106	Sinewave Generator, 50 Ω	BWL, 5 V _{p-p}

NOTE. *BWL=full bandwidth for the TBS1032B, 1052B, 1072B, 1102B, 1202B, and the TBS1032B-EDU, 1072B-EDU, 1102B-EDU models.
BWL=180 Mhz for the TBS1152B and TBS1052B-EDU models.*

Diagrams

The following image shows module-level replaceable parts for the TBS1000B and TBS1000B-EDU models. Part numbers for these modules are located in the next section.



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Replaceable Parts

This chapter contains a list of the replaceable modules for the TBS1000 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.

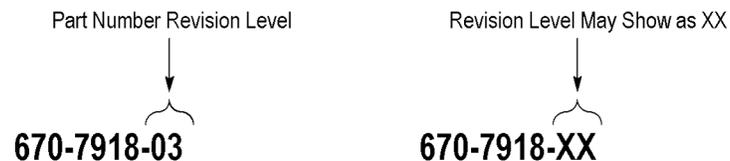
Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- 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.

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 following two 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 and select option 2.

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 oscilloscope. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

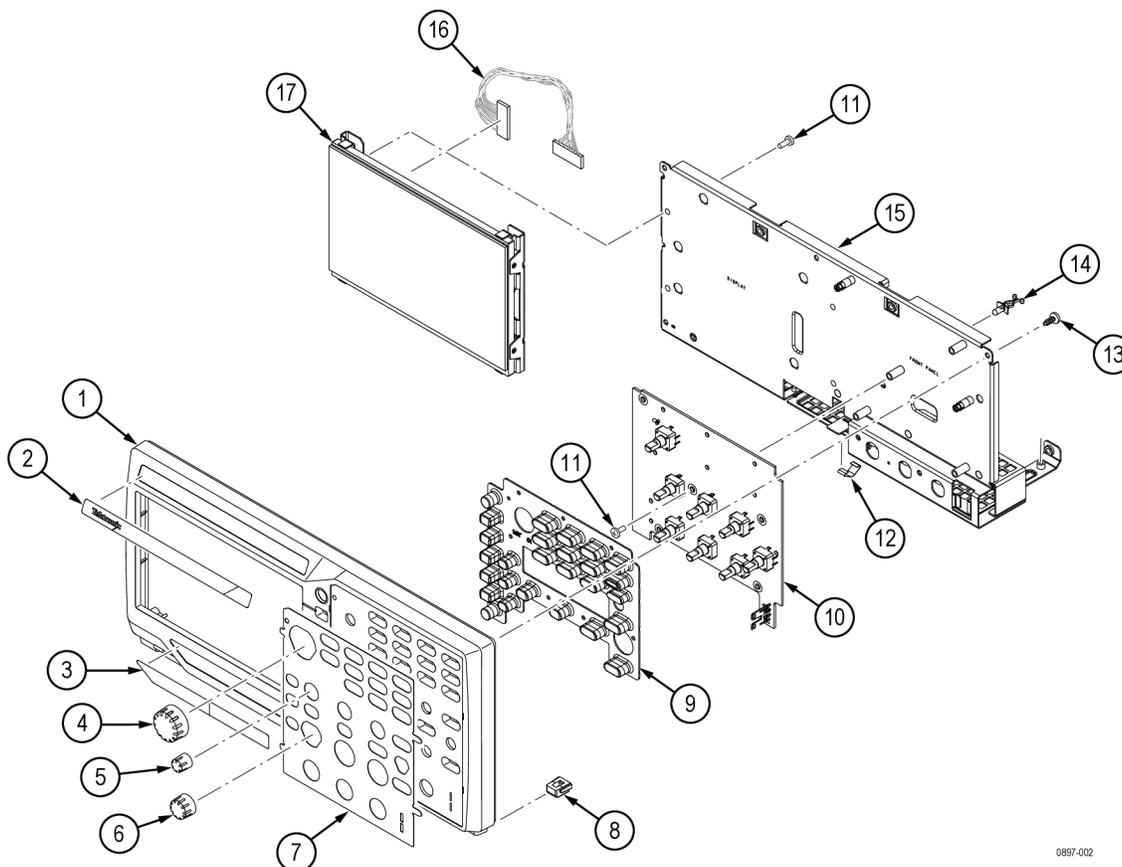
Table 5: Replaceable parts list

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.
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.

Parts Lists and Exploded Views

The following tables show the module-level exploded views of the TBS1000B oscilloscopes. Following each exploded view is the list of components, indexed by the numbers in the figure.



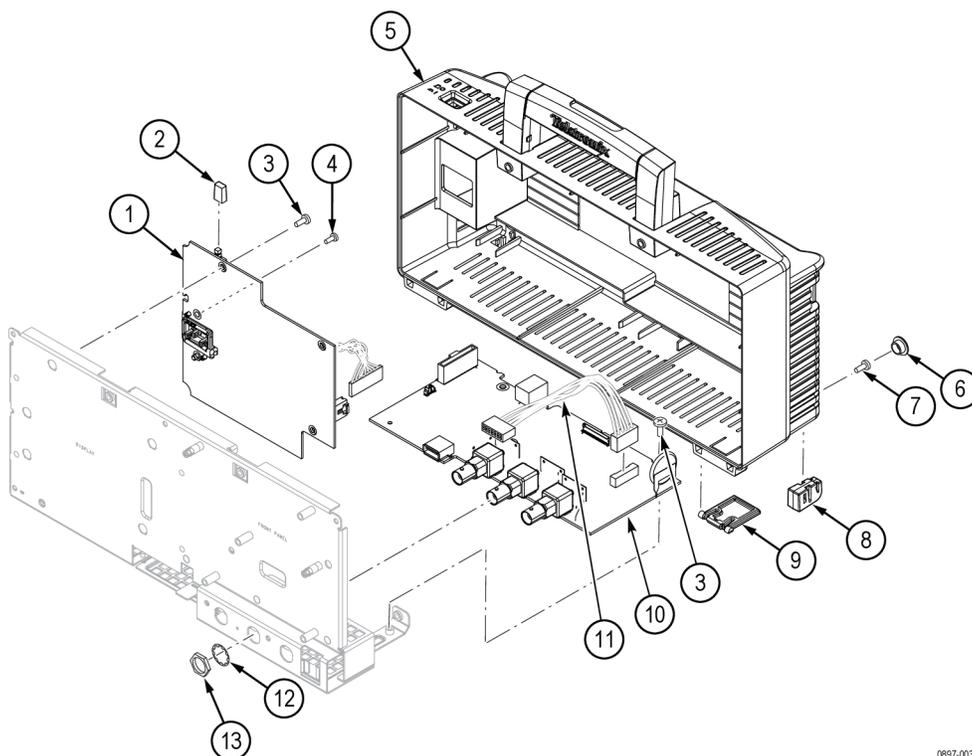
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Table 6: Replaceable parts — (LCD, Front panel, and Front case)

Figure and index no.	Tektronix part no.	Qty.	Name and description
-1	202-0513-xx	1	Front case
-2	335-3187-xx	1	Tektronix Instrument ID, top bezel label
-3	335-3204-xx	1	Lower bezel label
-4	366-0854-xx	1	Knob (large), Multipurpose
-5	366-0850-xx	1	Knob (small), Position
-6	366-0852-xx	1	Knob (medium), Scale
-7	335-3215-xx	1	English, front panel overlay (see the product datasheet)
-8	348-2085-xx	2	Foot; front,Santoprene,black,55 Derometer,textured

Table 6: Replaceable parts — (LCD, Front panel, and Front case) (cont.)

Figure and index no.	Tektronix part no.	Qty.	Name and description
-9	260-2980-xx	1	Key pad, polymer, front panel
-10	878-0910-xx	1	Front panel board
-11	211-1272-xx	3	Front panel board mounting screw
-12	131-6417-xx	1	Ground clip
-13	211-1143-xx	6	Chassis screw, self-threading
-14	343-1673-xx	1	Cable clamp
-15	441-2749-xx	1	Chassis
-16	174-6316-xx	1	LCD to main board cable assembly
-17	850-0237-xx	1	Display assembly



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Table 7: Replaceable parts — (Power supply, Main board, Rear case)

Figure and index no.	Tektronix part no.	Qty.	Name and description
1	119-7609-xx	1	AC-DC power supply
-2	366-0856-xx	1	Power switch push button cap
-3	211-1272-xx	3	Machine screws; 6 - 32 x 0.250, panhead

Table 7: Replaceable parts — (Power supply, Main board, Rear case) (cont.)

Figure and index no.	Tektronix part no.	Qty.	Name and description
-4	211-1275-xx	2	Threadlocking screws; power supply adapter; 6 - 32 x 0.312, panhead
-5	202-0438-xx	1	Rear case
-6	200-5105-xx	2	Rubber ESD covers
-7	211-1272-xx	5	Machine screws; 6 - 32 x 0.250, panhead
-8	348-2086-xx	2	Foot; rear,Santoprene,black, ,55 Derometer
-9	348-1703-xx	2	Flip-up feet
-10	870-0913-xx	1	Main board
-11	174-4658-xx	1	Front panel cable assembly
-12	210-1039-xx	3	BNC locking washer
-13	220-0265-xx	3	BNC locking nuts