

TFC200 FiberChamp

Optical Power
Meter

Operator
Manual

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Revised:

Certificate of the Manufacturer/Importer

We hereby certify that Optical Power Meter Model TFC200 complies with the RF Interference Suppression requirements of Amtsbl.-Vfg 1046/1984. The German Postal Service was notified that the equipment is being marketed. The German Postal Service has the right to re-test the series and to verify that it complies.

TEKTRONIX

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß das Optical Power Meter Model TFC200 in Übereinstimmung mit den Bestimmungen der Amtsblatt-Verfügung 1046/1984 funktentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeraumt.

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NOTICE to the user/operator:

The German Postal Service requires that this equipment, when used in a test setup, may only be operated if the requirements of Postal Regulation, Vfg. 1046/1984, Par. 2, Sect. 1.7.1 are complied with.

HINWEIS für den Benutzer/Betreiber:

Dieses Gerät darf in Meßaufbauten nur betrieben werden, wenn die Voraussetzungen des Par. 2, Ziff. 1.7.1 der Vfg. 1046/1984 eingehalten werden.



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SAFETY INFORMATION

CAUTION flags identify potentials for property damage.

WARNING flags identify hazards to personal safety or potentials for property damage that are not immediately accessible.

DANGER flags identify immediate hazards to personal safety and property.



Protective ground (earth) terminal

Power Sources. The TFC200 is designed to operate from an internal 9-volt non-rechargeable alkaline battery, an optional internal 7.2-volt

rechargeable nickel-cadmium (NiCad) battery, or an external DC Power Adapter.

Battery Power. Do not expose battery to fire or intense heat, nor open or mutilate the battery. Avoid contact with electrolyte which is corrosive and may damage eyes, skin and clothing. Check with local codes for disposal instructions.

External Power. Use only the Power Adapter that is specified for the TFC200 (see Section 5).

Laser Radiation. The TFC200 does not emit laser radiation. However, when making measurements on optical systems, avoid eye exposure to open-ended fibers or optical connectors because they may be connected to laser transmitters.

Safety

Do Not Operate in Explosive Atmospheres.

Do not operate the TFC200 in an explosive atmosphere unless it has been specifically certified for such operation.

Do Not Remove Covers or Panels. Do not remove the TFC200's covers or panels, nor operate it without covers and panels in place.

Repair. Refer all repair problems to qualified service personnel.

Section 1. INTRODUCTION

Attention

Read Safety Information before operating the TFC200.

If you have questions about using the TFC200 or have special application problems, call our toll-free help line 1-800-833-9200 (USA only).

1.1 Contents

Section 1. Introduction. Unpacking and initial inspection. Product description. Display descriptions. Pushbutton descriptions. Other control descriptions.

Section 2. Operator Procedure.

Examples that show how to use the TFC200.

Section 3. Battery/Power

Information. How to: replace the alkaline battery, recharge the optional NiCad battery and use the optional DC Power Adapter. Battery and power information.

Section 4. Troubleshooting.

Troubleshooting suggestions. Detector port and connector cleaning procedures. Messages.

Section 5. Specifications. Standard accessories and options. Power characteristics. Instrument specifications.

1.2 Conventions

TFC200 readouts (text and graphic symbols) are illustrated as they appear on the LDC display.

Boldface, *italic* and underlined typefaces are used for emphasis and explanatory notes.

1.3 Unpacking, Initial Inspection

1.3.1 Unpacking

The TFC200 is shipped to you with the following equipment:

- TFC200 equipped with connector adapters as ordered;
- carrying case;
- Operator Manual;
- Quick-Reference Card;
- alkaline battery, or NiCad battery and DC Power Adapter (depending on power options ordered).

If the contents of the shipping container are incomplete, contact your Tektronix® representative. If shipping resulted in

damage to the TFC200, notify the carrier and your Tektronix representative.

1.3.2 Initial Inspection

The TFC200 was inspected mechanically and electrically before shipment. If it fails to perform satisfactorily, contact your Tektronix representative immediately or telephone toll-free **1-800-833-9200** (USA only).

If the TFC200 must be returned to Tektronix for service:

- 1) Use the original carton, or equivalent with dimensions at least six inches greater than the TFC200 to allow for cushioning.
- 2) Cover the TFC200 with polyethylene sheeting to protect its finish.

- 3) Cushion the TFC200 equally on all sides with packing material. Seal the carton with shipping tape or an industrial stapler.
- 4) Ship insured to Tektronix, Inc., Redmond Division, Attn: Customer Service.

Include name of your company, person to contact and description of problem.

1.4 Product Description

The TFC200 FiberChamp is a lightweight, easy to use, hand-held optical power meter designed to measure the output from an optical power source. Its wavelength range is from 780 to 1550 nm.

A liquid crystal display (LCD) on the front panel (see Fig. 1-2) provides a digital readout of test setups and measurement results, including:

- optical power measurements in dBm (logarithmic) or watts (linear) mode;
- selectable wavelength values;
- dBm reference and dB loss values;
- low-battery warning.

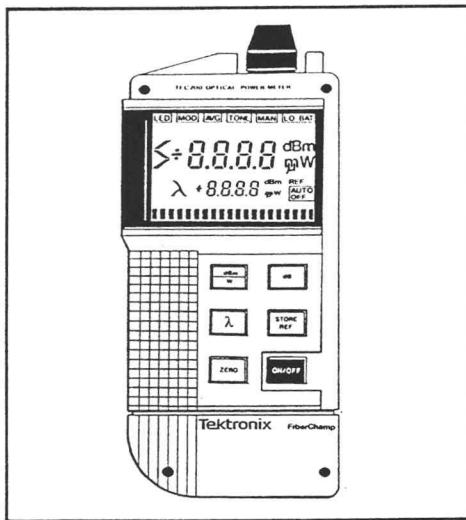


Fig. 1-1. TFC200 FiberChamp.

Test setups and memory contents are non-volatile. Those in effect at power-off are preserved even if the battery is removed.

Six buttons on the front panel control all test functions. Each button-press is answered with a beep. An illegal button-press is answered with three beeps. Optional controls are located on the side panel.

A signal-averaging feature provides 0.01 dBm resolution. And, a threshold control alerts you with a beep when dB loss is within your pre-set threshold value.

The detector port accommodates a variety of connector types, and provides full signal detection on fibers with core diameters up to 200 microns and numerical apertures (NA) up to 0.3.

An analog output socket provides DC output to an external chart recorder.

Power is provided internally by either a non-rechargeable alkaline battery or optional rechargeable nickel-cadmium (NiCad) battery. Or externally by an optional DC Power Adapter. The type of battery option is Tektronix configurable only. See your Tektronix representative to change the type of battery power.

A user-activated backlight enables reading the display in low ambient light conditions.

The TFC200 should be recalibrated by Tektronix annually to guarantee continued accuracy. Call 1-800-833-9200 for recalibration information.

1.5 Display Descriptions

Fig. 1-2 shows the LCD display with all segments activated.

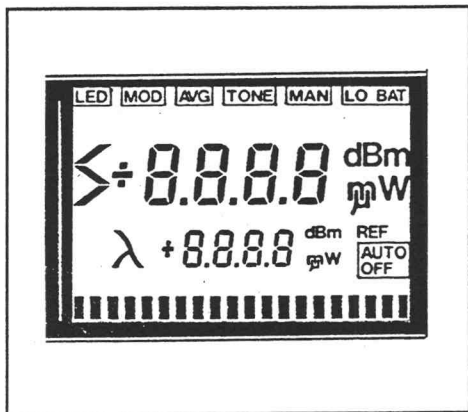


Fig. 1-2. Display Summary.

Upon power-on, all display segments are activated for about one second, followed by a display of optical power measurements.

Included are:

- selectable wavelength values of 780, 820, 850, 1060, 1300, 1310, 1550 nm;
- auto-ranging four-digit display for +10 mW to 100 pW linear power measurement, and +10 to -70 dBm logarithmic power measurement.

Two four-digit displays provide the power measurements and wavelength selections.

The upper display shows power and relative power in dBm or watts.

The lower display shows wavelength, or the stored dBm reference power level used to obtain relative power readings.

1.5.1 Display Definitions

- LED** Not used.
Ignore this indicator.
- MOD** During power-on, you pressed two buttons simultaneously and accessed instrument diagnostics. This is for service personnel only. Exit diagnostics by pressing the OFF button and begin again.
- AVG** Indicates that signal averaging is turned on (AVERAGE ON/OFF control is set to ON). 0.01 dBm resolution is enabled.
- TONE** Indicates that the TONE (dB) control is activated. A tone will

sound when the dB loss is within the threshold set by the TONE (dB) control. Selections are -1, -3, -6, -10, -15, -20, -25, -30, -35 dB plus OFF.

- MAN** During power-on, you pressed the dB and STORE REF buttons simultaneously, putting the instrument in Manual operating mode (see Section 2.6 for further details about using Manual mode).
- LO BAT** Low-battery warning indicator.
- AUTO OFF** Indicates that automatic power-off mode is activated. To conserve battery power, the TFC200 will beep and power itself off

automatically 15 minutes after the last button-press.



Indicator for the user-selected wavelength value (780,820, 850, 1060, 1300, 1310 or 1550 nm).

The value is selected by pressing the λ button. This button is also used to select the six gain ranges when in Manual operating mode.

dBm REF A dBm reference value is in storage (STORE REF button has been pressed).



System failure. Unit requires service.

1.5.2 Messages

Messages that may be displayed when making measurements are: **Err**, **CAP**, **LO**, and **HI**.

See Section 4 for an explanation of these messages.

1.6 Pushbutton Descriptions



ON/OFF

Turns instrument on and off.
Press this button quickly to turn the TFC200 on in

automatic power-off mode (AUTO OFF will be displayed).

Automatic power-off means that, to conserve battery power, the TFC200 will power itself off automatically after 15 minutes unless a front panel button is pressed. A tone will warn you one minute before power-off.

To turn the TFC200 on and disable automatic power-off, press and hold down the ON/OFF button until the power-on all-segment display blanks off (about one second).

Each power-on displays all segments for about one second, followed by the dBm and wavelength in effect at last power-off.

Every legitimate button-press is acknowledged by a beep. If a button-press beeps three times, it is not allowed.



dBm

W

Press to select the readout (test results) in either dBm or watts. The selected wavelength will also be displayed.



dB

Press to display the current input power relative to the stored dB reference value.

Displays the reference value for five seconds, then shows the wavelength. Press to redisplay reference value.



Repeated pressing of this button steps you through the wavelength selections

sequentially, in ascending order.

Selectable wavelength values are: 780, 820, 850, 1060, 1300, 1310 and 1550 nm. The last wavelength selected is retained when the TFC200 is turned off.



Press to load the new dBm reference value into memory. The new reference value will be displayed for five seconds,

followed by the wavelength (there is one stored reference value per wavelength). The reference value is retained when the TFC200 is turned off. STORE REF button is not used in linear power (watts) mode.



Press to calibrate the TFC200 to zero light. The detector port must be capped before pressing

the ZERO button. The display will flash 0000.

Zero the instrument each time before using it, especially if it is subject to ambient temperature changes, such as being taken from a warm into a cool environment.

If the ambient temperature difference is severe, the TFC200 may have to be zeroed a number of times before its temperature matches that of the environment.

If the zero light level is greater than 5%, the CAP discrepancy message will be displayed (see Section 4 for explanation of CAP).

1.7 Other Controls

The following controls are located on the sides of the instrument:

AVERAGE ON/OFF

Turns dBm signal averaging on and off. Averaging on = 0.01 dBm resolution (AVG is displayed). Averaging off = 0.1 dBm resolution.



Press and hold the backlight button down to activate the LCD backlight. This enables reading the display in low ambient light.

TONE (dB) A tone will sound if the dB loss is within the dB threshold selected by this control (TONE is displayed). Selections are -1, -3, -6, -10, -15, -20, -25, -30, -35 dB plus OFF. The tone is actuated only in the dB reference mode (see Section 2.5).

ANALOG OUTPUT A 0 to 1 VDC connection to an external chart recorder or data logger. The uncalibrated output is proportional to full-scale for the gain range. (See Section 2.5 for further information).

DC INPUT Optional external DC Power Adapter connector. The Power Adapter is used to power the TFC200 externally, and recharge the optional NiCad battery.



Section 2. OPERATOR PROCEDURE

2.1 Introduction

This section has examples of how to use the TFC200 to:

- make absolute optical power measurements;
- determine fiber loss;
- make a quick, go/no-go determination of fiber condition using loss thresholds;
- use the TFC200 for extended testing using a chart recorder.

2.2 Power On

You should zero the TFC200 before each use, especially if it has been subject to ambient temperature changes. The recommended power-on procedure is:

- 1) Before connecting the test fiber, cap the detector port and turn on the TFC200 by pressing the ON button.

All display segments will flash for approximately one second, followed by a display of setups in effect at last power off (watts, dBm, dB reference).

Press the ZERO button to calibrate the instrument to zero light. The display will flash 0000.

- 2) Uncap the detector port and connect the test fiber. The fiber connection should be finger tight.

Proceed with testing. Example test procedures are provided on the following pages.

Note

If the LO BAT low-battery warning indicator is display upon power on, replace the alkaline battery or recharge the optional Ni Cad battery before proceeding.

To preserve current instrument setups and memory contents, always turn power off by pressing the ON/OFF button.

Danger

The TFC200 does not emit laser radiation. However, when making measurements, avoid eye exposure to open-ended fibers and optical connectors because they may be connected to laser transmitters.

2.3 Making Absolute Optical Power Measurements

Select your desired wavelength by pressing the Wavelength button (λ).

Absolute optical power measurements appear in the upper display in either dBm (decibels referenced to one milliwatt) or watts (see Fig. 2-1). The scale displayed will be the one in effect at last power off.

To toggle the readout between watts and dBm, press the dBm/W button.

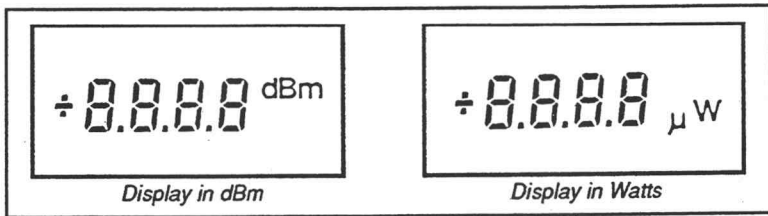


Fig. 2-1. Absolute Measurement Options.

2.4 Determining Fiber Loss

There are many ways to determine fiber loss. Here are two examples:

2.4.1 Fiber Terminated in Patch Panels

- 1) Using three test jumpers with interconnect sleeves, connect the optical source to the TFC200 (see Fig 2.2). The test jumpers should be one to five meters long and be the same type as the fiber under test (singlemode or multimode, core and cladding size).

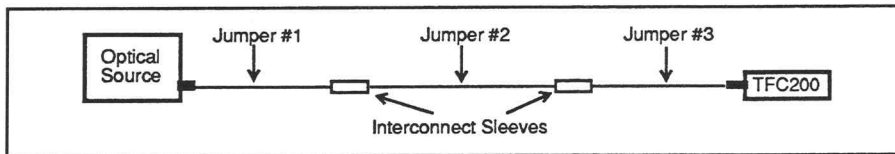


Fig. 2-2. Power Reference Level Setup.

- 2) With everything connected, press the ON button to power-on the TFC200.
Set the upper display to show dBm (press dBm/W button). Turn on the optical source.

The display will show optical power output in dBm.

Press the STORE REF button to store this output as the optical power reference level.

- 3) Turn off optical source and remove the center test jumper (#2) and interconnect sleeves.
- 4) Connect the optical source via its test jumper (#1) to one end of the fiber under test.
- 5) Connect the TFC200 to the other end of the fiber under test via its test jumper (#3) (see Fig. 2-3).

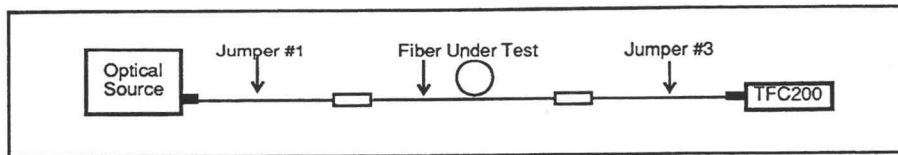


Fig. 2-3. Test Fiber Setup.

- 6) Turn on optical source and press the dB button. Loss of the fiber will be displayed.
If the fiber is used to transmit in both directions, measure the fiber loss in both directions.

2.4.2 Connectorized Spooled Fiber

- 1) Using a test jumper, connect the optical source to the TFC200 (see Fig 2.4). The test jumper should be one to five meters long and be the same type as the fiber under test (singlemode or multimode, core and cladding size).

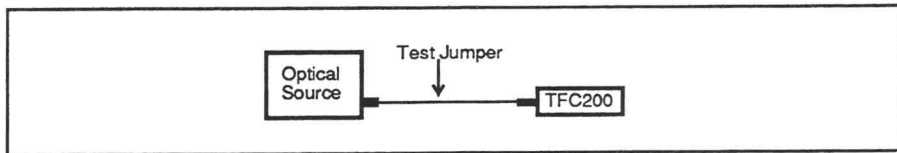


Fig. 2-4. Test Fiber Setup.

- 2) With everything connected, press the ON button to power-on the TFC200. Set the upper display to dBm (press dBm/W button). Turn on the optical source. The display will show optical power output in dBm. Press the STORE REF button to store this output as the optical power reference level.

- 3) Remove the test jumper and connected the fiber under test to the optical source and TFC200 (see Fig. 2-5).

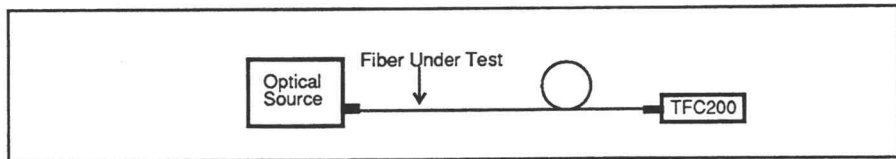


Fig. 2-5. Test Fiber Setup.

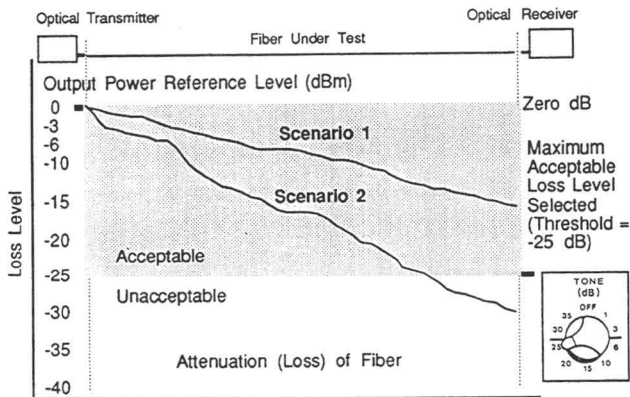
- 4) Press the dB button. Loss of the fiber under test will be displayed.
The fiber loss measurement should be made in both directions.

2.5 Threshold Testing

Threshold testing uses the same procedures as fiber loss measurements described in Section 2.4, except that the maximum acceptable loss level can be set to a go/no-go threshold by using the TONE dB control on the right side-panel (see Fig. 2-6).

- 1) Connect the TFC200 directly to the transmitter (or source) connector. Turn on the transmitter/source. Press the STORE REF button to store the dBm reference value emitted by the transmitter/source.
- 2) Set the TONE dB control to the maximum acceptable power loss (dB) level desired.
- 3) Disconnect the TFC200 from the transmitter/source. Connect the fiber under test to the transmitter/source.
- 4) Connect the TFC200 to the receiver end of the fiber under test.
- 5) If the required power level is sensed, a tone will sound indicating that the fiber is within the allowable loss range and is transmitting the required optical power.

If a tone does not sound, the fiber is not within the allowable loss range.



Scenario 1: The fiber is within the allowable loss range and is transferring the required optical power. The tone will sound.

Scenario 2: The fiber exceeds the allowable loss range and is not transferring the required optical power. The tone will not sound.

Fig. 2-6. Threshold Testing Example.

2.6 Extended Testing Using a Chart Recorder

The ANALOG OUTPUT port on the right side-panel is used to connect the TFC200 to an external chart recorder for monitoring optical power levels over time. The analog output signal has a range of 0 to 1 volt for the user-selected gain range.

Note

When using the ANALOG OUTPUT port, the TFC200 must be set to Manual operating mode. And, because testing is usually long-term (over 15 minutes), the AUTO OFF feature should be disabled and the instrument powered using the DC Power Adapter (see next page for procedure).

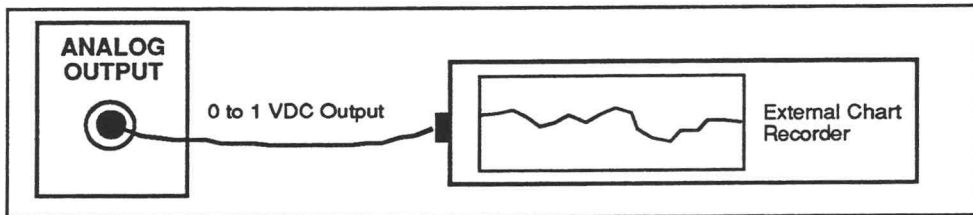


Fig. 2-7. Analog Output Setup.

- 1) Power the TFC200 by using the DC Power Adapter to conserve battery power.
- 2) Power-on the TFC200 in Manual operating mode using this procedure:

Press and hold down the dB and STORE REF buttons simultaneously as you press the ON button. Hold down the ON button until the initial all-segment display blanks off in order to disable the AUTO OFF function.

This invokes Manual operating mode (the MAN segment will show in the display).

The wavelength corrections for detector response and temperature will be turned off, and the upper display will show the meter values that are closest to the analog output voltage.

Gain range selections will be displayed rather than wavelength when you press the Wavelength button (λ). There are six gain ranges.

All other meter functions will operate normally.



Section 3. BATTERY/POWER INFORMATION

3.1 Introduction

The TFC200 has three power options:

- a non-rechargeable 9-volt alkaline battery (standard equipment);
- a rechargeable 7.2-volt nickel-cadmium (NiCad) battery (optional accessory);
- an external DC Power Adapter (optional accessory) which is also used to recharge the optional NiCad battery.

The alkaline battery should be replaced (or the optional NiCad battery recharged) when this low-battery warning appears in the upper right corner of the display:

LO BAT

Caution

Never disconnect or replace the battery unless power to the TFC200 is turned off.

If the external DC Power Adapter is being used to power the TFC200, and there is no battery installed, always turn power off before disconnecting the Power Adapter.

Press the ON/OFF button to turn power off.

3.2 Replacing the Non-Rechargeable Alkaline Battery

Caution

Explosion and fire hazard! Do not attempt to recharge the alkaline battery. Do not expose battery to fire or intense heat. Do not open or mutilate the battery. Avoid contact with released electrolyte which is corrosive and may damage eyes, skin and clothing. Check with local codes for disposal instructions.

Refer all battery problems to qualified service personnel.

To replace the alkaline battery (Fig. 3-1):

- 1) Turn off the TFC200.
- 2) Open the battery compartment door located on the back side of the TFC200.
- 3) Replace the 9-volt alkaline battery.
- 4) Close battery compartment door.
- 5) Power-up the TFC200 and make sure that the low-battery warning is no longer displayed.

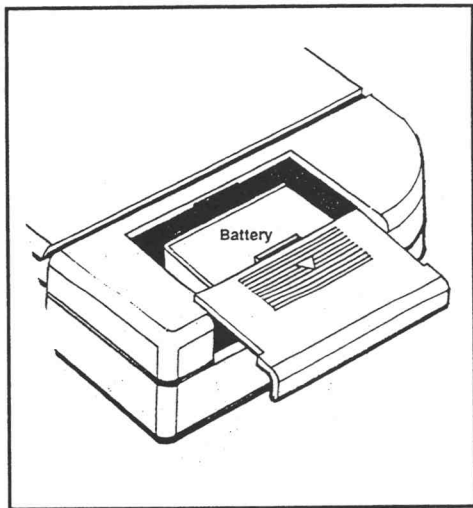


Fig. 3-1. Replacing the Alkaline Battery.

3.3 Recharging the Optional NiCad Battery

Use the DC Power Adapter (optional accessory) to recharge the NiCad battery.

Caution

Use this recharging procedure only if the TFC200 is powered by a rechargeable NiCad battery.

Explosion and fire hazard! Do not expose battery to fire or intense heat. Do not open or mutilate the battery. Avoid contact with released electrolyte which is corrosive and may damage eyes, skin and clothing. Check with local codes for disposal instructions. Refer all battery problems to qualified service personnel.

To recharge the NiCad battery (Fig. 3-2):

- 1) Turn off the TFC200.
- 2) Plug the Power Adapter into an AC power source and the DC INPUT pin connector on the side of the TFC200.

From full discharge, recharging time is approximately 14 hours. However, the battery may be recharged indefinitely without harm.

Charging the battery at temperatures below 0°C or above 45°C will decrease battery life.

- 3) After recharging, disconnect the Power Adapter. Power-up the TFC200 and make sure that the low-battery warning is no longer displayed.

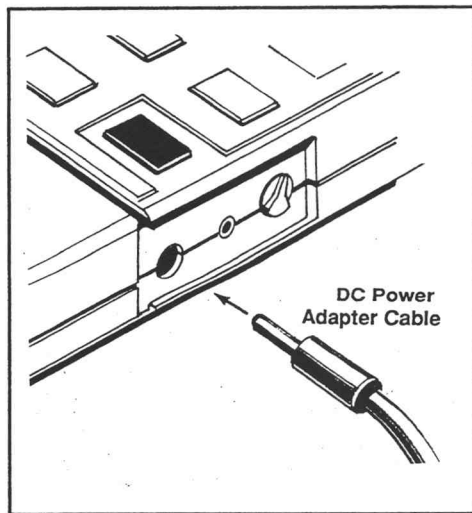


Fig. 3-2. NiCad Battery Recharge.

Danger

If the TFC200 is configured for NiCad battery power, never substitute an alkaline battery in its place. Applying an external charge to the alkaline battery via the DC Power Adapter can result in explosion and fire hazard.

Using the Power Adapter together with an alkaline battery is safe only when the TFC200 is configured for alkaline battery power.

3.4 Using the Optional DC Power Adapter

The TFC200 may be powered by using the external DC Power Adapter, an optional accessory. The Power Adapter will override either alkaline or NiCad battery power. *The battery does **not** have to be removed before using the Power Adapter.*

To use external power, plug the Power Adapter into an external AC power source, and into the pin connector on the side of the TFC200 per Fig. 3-3.

Note

The Power Adapter is also used to charge the optional NiCad battery (see Section 3.3).

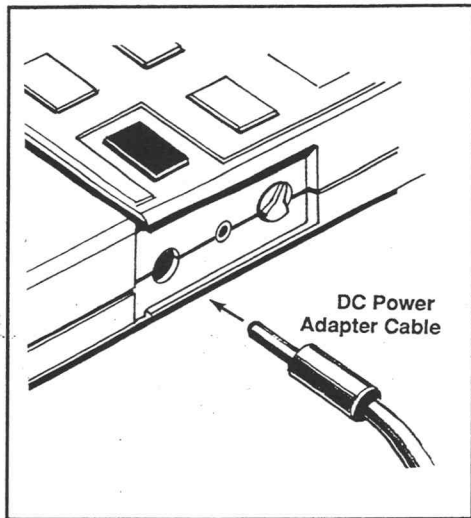


Fig. 3-3. Using the Power Adapter.

3.5 Battery Information

3.5.1 Low-Battery Warning Indicator

The low-battery warning LO BAT appears in the upper right corner of the display when the battery has about 10% charge remaining.

When LO BAT appears, the TFC200 will operate for approximately 30 minutes before powering itself down automatically to prevent false readings.

3.5.2 Automatic Shutdown

To conserve battery power, the TFC200 will power itself down automatically after 15 minutes unless a front panel button is pressed to continue activity.

A five-second warning beep will alert you one minute before power-down.

3.5.3 Battery Life

The alkaline battery (standard equipment) is rated at 9 volts and has a typical useful life of 35 hours when making continuous measurements with occasional use of the backlight. The alkaline battery should be replaced when discharged.

The NiCad battery (optional accessory) is rated 7.2 volts, 100 mA/h. Typical useful life is 9 hours when making continuous measurements with occasional use of the backlight. The NiCad battery should be fully recharged before use and after periods of prolonged storage.

3.5.4 Fully Recharge the Optional NiCad Battery

For optimum performance, recharge the optional NiCad battery fully using the optional DC Power Adapter.

Recharging time is approximately 14 hours from full discharge. However the battery may be recharged indefinitely without harm.

Recharge the battery after each day's use.

3.5.5 Environmental Concerns

Extremes in heat and cold will shorten the life of any battery. The battery should be stored at temperatures between -30°C and +50°C.

Shelf life for the alkaline battery is 86% capacity after three years at 20°C.

Shelf life for the NiCad battery is 80% capacity after one month at 20°C; 50% capacity after one month at 50°C.

Section 4. TROUBLESHOOTING

4.1 Introduction

This section describes what to do about messages that are displayed, and other problems that affect the operation of the TFC200.

Caution

Do not remove the TFC200's covers. Refer repair problems to qualified service personnel.

Note

The TFC200 should be recalibrated once each year to maintain accuracy. Recalibration by Tektronix is required. Call 1-800-833-9200 (or your local Tektronix office) for recalibration information.

4.2 No Power On

If the TFC200 will not power on, the most likely cause is a discharged battery. Replace the alkaline battery (or recharge the NiCad battery), or try powering the TFC200 with the optional DC Power Adapter. If this does not solve the problem, consult service personnel.

Note

To conserve battery power, the TFC200 will sound a warning beep and power itself down automatically after 15 minutes unless a front panel button is pressed to continue activity.

4.3 Cleaning Detector Port and Connectors

4.3.1 Detector Port

If the detector port is contaminated with dust or dirt, unscrew the fiber adapter and blow clean, canned air through the fiber adapter only from the inside toward the outside.

Caution

Do not touch or attempt to clean the detector that is exposed in the instrument when the fiber adapter is removed. Do not use swabs or cleaning solutions to clean the fiber adapter. Use clean, canned air only.

Otherwise, consult service personnel.

4.3.2 Connector

To clean the end of a fiber connector, first try and remove the contaminant by blowing with clean, canned air.

If air alone isn't effective, dampen a lint-free swab with electronics-grade isopropyl alcohol. Gently wipe across the end of the connector. Then blow completely dry with clean, canned air.

Otherwise, consult service personnel.

Caution

Do not use cotton swabs, abrasives or unclean compressed air to clean the fiber adapter and connector.

4.4 Messages

Any of the following messages may be displayed during testing:

CAP High Offset During Zeroing
The zero offset is outside of the correction range. Make sure that the detector port is capped, then press the ZERO button to properly zero the TFC200.

Err Error Message
A serious error has occurred. The low display will show an error code and the TFC200 will beep continuously. Note the error code. Turn off the TFC200 and contact qualified service personnel.

HI High Measurement Out of Instrument Range
dBm >10 dBm
mW >9.99 mW

LO Low Measurement Out of Instrument Range
dBm <-70 dBm



Section 5. ACCESSORIES, OPTIONS, SPECIFICATIONS

5.1 Standard Accessories*

Item	Part No.
•Operator Manual	070-7913-00
•Quick Reference Card	063-0809-00
•Carrying Case	016-1078-00
•Alkaline Battery	146-0094-00
•Choice of one connector option	(see 5.2)

* Included with instrument.

5.2 Options

Item	Part No.
5.2.1 Connector Options	
•Option 20 Biconic	131-5078-00
•Option 21 FC	131-4728-00
•Option 22 NEC D4	131-5080-00
•Option 24 ST®	131-5073-00
•Option 25 DIN 47256	131-5181-00
•Option 27 SMA 905/906	131-5072-00
•Option 28 SC	131-5735-00

5.2.2 Rechargeable Power Options*

- USA/Canada 110 V Option 0C
- European 220 V Option 1C
- UK 240 V Option 2C

5.3 DC Power Adapters

Item	Part No.
•USA/Canada 110 V	119-2731-00
•European 220 V	119-2712-00
•UK 240 V	119-2713-00

* Includes NiCad battery and DC Power Adapter. Rechargeable power can be added to an existing unit. Call 1-800-833-9200 (or your nearest Tektronix office) for details.

5.4 Power Characteristics

Power

Internal Battery

9-V alkaline, IEC 6LF22/6LR61
Optional 7.2-V NiCad, Varta V6/8R
12 to 20 VDC, 100 mA

DC Power Adapter
Consumption

External Power: 3 watts maximum
Battery Power: 0.1 watt typical

Battery Life

Normal Use

Alkaline battery: 28 hours (w/o backlight)
Optional NiCad battery: >8 hours (w/o backlight)

Shelf Life

Alkaline battery:
85% capacity after 3 years @ 20 °C
Optional NiCad battery:
80% capacity after 1 month @ 20 °C
50% capacity after 1 month @ 50 °C

5.5 Specifications

Detector Type	5 mm germanium (750 to 1700 nm)
Calibrated Wavelengths	780, 820, 850, 1060, 1300, 1310, 1550 nm
Input Range	+10 dBm (+10 mW) to -70 dBm (100 pW)
Operating Range	
780 nm	+10 to -60 dBm
820 nm	+10 to -60 dBm
850 nm	+10 to -60 dBm (10 mW to 1 nW)
1060 nm	+10 to -60 dBm
1300 nm	+10 to -67 dBm (10 mW to 200 pW)
1310 nm	+10 to -67 dBm
1550 nm	+10 to -67 dBm

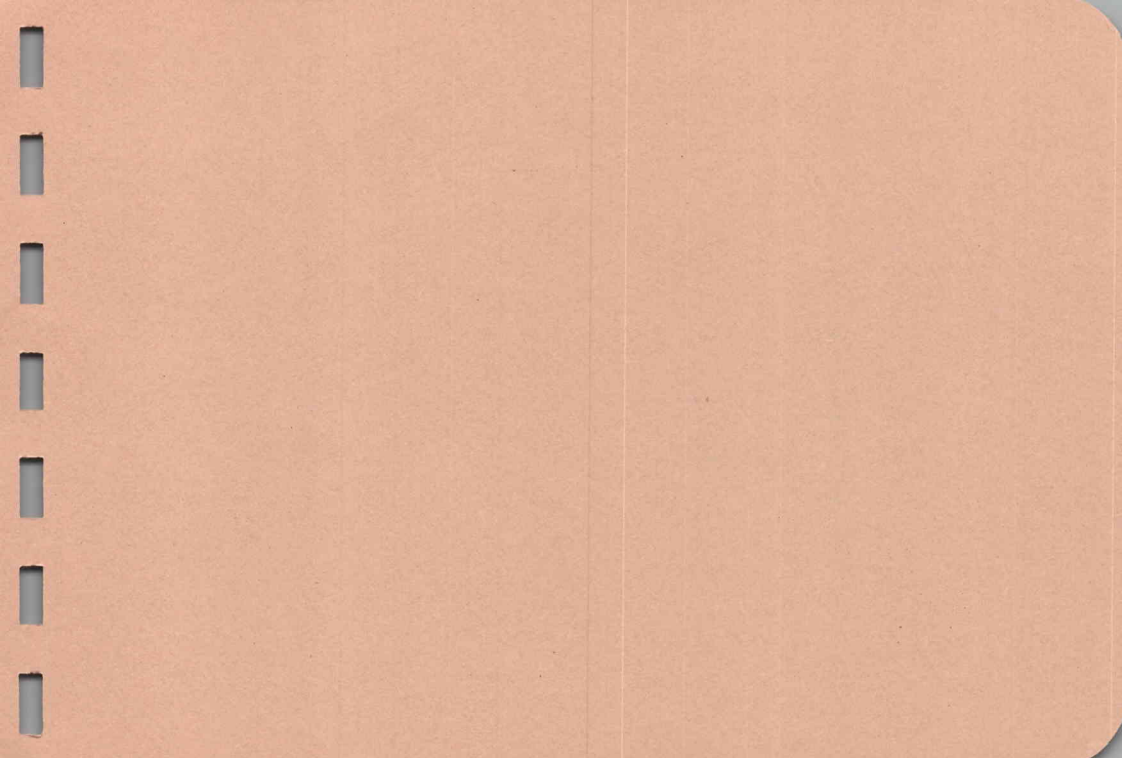
Basic Accuracy (Calibrated Wavelengths)	$\pm 3\%$ (± 0.13 dB) @ -20 dBm, @ 20 °C $\pm 2^\circ$
Overall Accuracy (Calibrated Wavelengths)	$\pm 5\%$ from 780 to 1310 nm $\pm 6\%$ at 1550 nm (At +3dBm to -40 dBm; -5 °C to +45 °C; and 5 to 95% relative humidity, non-condensing).
Measurement Resolution Logarithmic & Relative dB	0.1 dBm (single measurement) 0.01 dBm (averaged measurement)
Linear	9.999 mW, 999.9 μ W, 99.99 μ W, 9.999 μ W, 999.9 nW, 99.99 nW
Precision	95% of measurements fall within stated accuracy

Zero Offset Range	Up to -53 dBm
Warm-Up Time*	<5 seconds
Operating Time after Low-Battery Warning	>30 minutes (backlight off)
Operating Temperature	-5 °C to 45 °C
Non-Operating Temperature	-30 °C to 75 °C
Operating Altitude	To 4,500 m

* +3dBm to -40 dBm. Below -40 dBm, accuracy can be affected by temperature change. Accuracy can be corrected by zeroing the TFC200 periodically while it reaches ambient temperature.

Non-Operating Altitude	To 15,000 m
Recommended Recalibration Period	Once each year. (Call 1-800-833-9200 or your nearest Tektronix office for recalibration information. Calibration by Tektronix is required).
Instrument Weight	0.46 kg
Instrument Dimensions	20.1 by 9.5 by 3.3 cm





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Part No. 070-7913-00
Product Group 22
