

User Manual

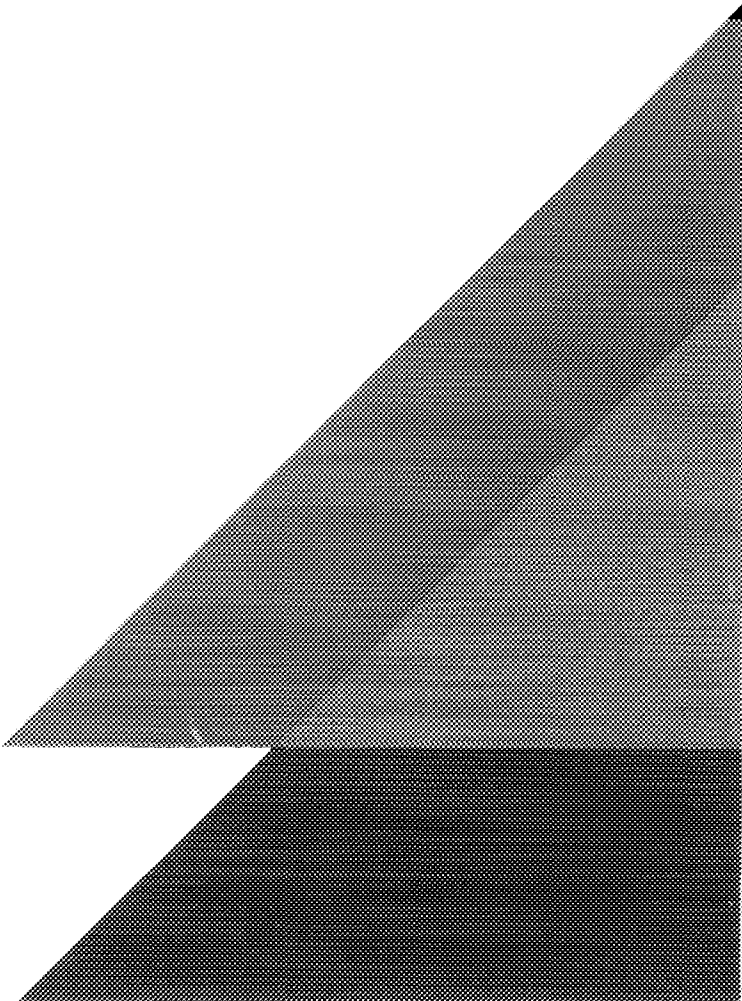
Tektronix



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CFC250
Frequency Counter

070-6742-02

A large, abstract graphic in the bottom right corner of the page. It consists of several overlapping, semi-transparent, shaded triangular and trapezoidal shapes that create a sense of depth and movement. The colors range from light gray to dark gray.



User Manual

Tektronix

CFC250
Frequency Counter
070-6742-02

Preparing the CFC250 Frequency Counter for Use

Check the following items prior to operating the CFC250 Frequency Counter for the first time (see Figure 1 for locations of items):

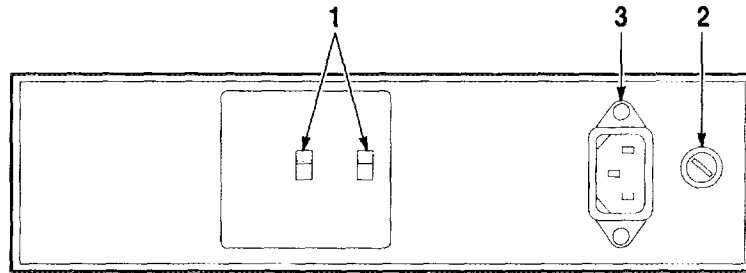


Figure 1: Line Voltage Selectors, Power Input, and Fuse Locations



CAUTION. To prevent damage to the instrument, set the line voltage selectors to the proper voltage setting and install the correct line voltage fuse before operating the equipment.

1. Set the line voltage selectors to the input line voltage. These selectors connect internal wiring for various line voltages. This product is intended to operate from a power source that does not supply more than 250 V_{RMS} between the supply conductors or between either supply conductor and ground. For line voltage ranges, refer to *Appendix A: Specifications* on page 9.
2. Check that the correct line fuse is installed. The line fuse provides protection if the equipment malfunctions or an overload occurs. Refer to *Appendix C: Replaceable Parts* on page 13 for fuse part numbers.



WARNING. To prevent electrical shock, unplug the power cord and disconnect the signal input cable from any signal source before checking or replacing the fuse.

3. Connect the input power cord. Use only the power cords specified for this equipment. Refer to *Appendix C: Replaceable Parts* on page 13 for power cord part numbers.



WARNING. To prevent electrical shock, connect the power cord to a properly grounded power source. The outside (ground) of this connector is connected through the equipment to the power source ground. Do not remove the ground lug from the power cord for any reason.

Front Panel

Figure 2 shows the front-panel controls, connector, and indicator with brief descriptions of the items following the figure.

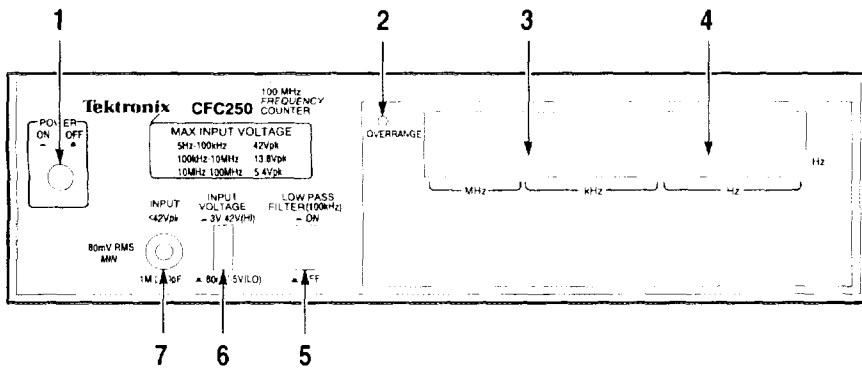


Figure 2: Front Panel

1. POWER button. Powers the CFC250 on and off.
2. OVERRANGE Indicator. Indicates that the input frequency is above equipment specifications.
3. Auto MHz Decimal Point. A decimal point appears when the input frequency is over 1 MHz.
4. LED display.
5. LOW PASS FILTER (100 kHz). Set the button to the in position when checking signals below 100 kHz to prevent high-frequency noise interference.

Getting Started

The Tektronix CFC250 100 MHz Frequency Counter is an instrument that counts the signal frequency of sine, square, and sawtooth (triangle) waves from 5 Hz to 100 MHz at input levels from 80 mV to 42 V peak. A low-pass filter prevents high-frequency interference for signals below 100 kHz.

The Tektronix CFC250 has a locking, multiposition handle that folds under the instrument to allow stacking with other instruments of the same series. The CFC250 is delivered with a 115 V power cord, an installed fuse for 115 V operation, and this manual.

6. **INPUT VOLTAGE** button. This button selects either a X1 or X10 attenuator at the counter input. Set the button to the in position for high level signals, 3 to 42 Vp maximum (30 V_{RMS}). Set the button to the out position for lower level signals, 80 mVp to 5 Vp.



CAUTION. To prevent damage to the equipment, do not exceed the maximum input voltage rating. Refer to Appendix A: Specifications on page 9 for maximum input ratings.

7. **INPUT** connector. BNC connector for signal input. The outside (ground) of this connector is connected through the equipment to the power source ground.

Functional Check

Refer to *Appendix A: Specifications* on page 9 for details about operating parameters. Also, check that the input signal to be measured does not exceed the specified limits.

A test signal may be supplied by the Tektronix CFG250 Function Generator or an instrument of equal quality. The actual waveform being counted could be observed on a Tektronix TAS 475 oscilloscope or a scope of equal quality.

To check that the CFC250 Frequency Counter is functional:

1. Push the **POWER** button in.
2. Set the **INPUT VOLTAGE** button to the **LO** position.
3. Set the function generator for a sine or square wave frequency of 1 kHz and an amplitude of 1 V.
4. Set the oscilloscope **VOLTS/DIV** control for 1 V and the **SEC/DIV** to 0.2 ms.
5. Connect the signal from the generator with a BNC T connector to the oscilloscope and the **INPUT** connector of the CFC250 Frequency Counter as shown in Figure 3.

- Read the frequency on the display, and compare the frequency with the frequency of the waveform displayed on the oscilloscope.

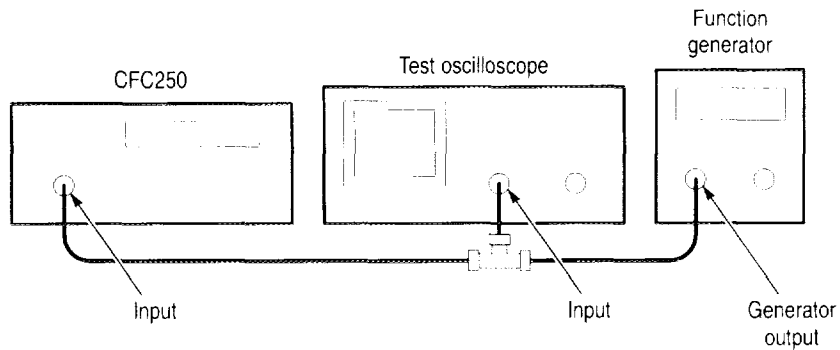


Figure 3: Functional Check Setup



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

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.

Symbols on the Product

The following symbols may appear on the product:



DANGER
High Voltage



Protective Ground
(Earth) Terminal



ATTENTION
Refer to
Manual



Double
Insulated

Certifications and Compliances

CSA Certified Power Cords

CSA Certification includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Do Not Operate in Wet/Damp Conditions

To avoid electric shock, do not operate this product in wet or damp conditions.

Do Not Operate in Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Product Damage Precautions

Use Proper Voltage Setting

Before applying power, ensure that the line selector is in the proper position for the power source being used.

Provide Proper Ventilation

To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures

If you suspect there is damage to this product, have it inspected by qualified service personnel.

Safety Terms and Symbols

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.

Reference

Use the CFC250 Frequency Counter for adjustment, test and repair of electrical equipment such as audio instruments, AM/FM radios, TVs, CB radios, computer clocks, amateur radios, and musical instruments. Refer to test and calibration manuals for the specific equipment to locate the points to test for required frequencies.



WARNING. To prevent electrical shock, do not touch exposed wires when performing the following or similar procedures.

General Use

Any frequency counter is best used in conjunction with a good oscilloscope. The oscilloscope gives the operator a true picture of the waveform being counted.

Unwanted transients, radio frequency interference (RFI), or other types of noise that may cause a counting error can be removed with a filter. Filters that match the frequency and impedance characteristics of the circuit under test can be constructed using guidelines and formulas found in electrical engineering texts.

Measuring Frequencies of High Voltage Signals

The maximum input voltage of the CFC250 is 42 V_{peak} or 30 V_{RMS}, so the operator cannot directly measure large signals such as the frequency of power line voltages. If the signal voltage is known to be less than 300 volts, an oscilloscope probe with times ten attenuation (10X) may be used for this procedure. Higher voltages may be measured with a 100X or 1000X attenuation probe. Contact your local your Tektronix representative for probe information.

Measuring Frequencies with Voltages Less than 50 mV

If it is necessary to measure signals below 50 mV, use a low-noise amplifier designed for the frequency range and impedance of the source and frequency counter.

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Injury Precautions

Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this product.

Avoid Electric Overload

To avoid electric shock or fire hazard, do not apply a voltage to a *terminal* that is *outside the range specified for that terminal*.

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, ensure that the product is properly grounded.

Do Not Operate Without Covers

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Use Proper Fuse

To avoid fire hazard, use only the fuse type and rating specified for this product.

Appendix A: Specifications

The following tables list the electrical, physical, and environmental specifications of the CFC250 Frequency Counter.

Characteristics after one hour warm-up time at 23° C ±5° C, 75% RH.

Table 1: General Characteristics

Range	5 Hz to 100 MHz, AC coupled	
Accuracy	± time base accuracy, ±1 count	
Resolution	1 Hz	
Impedance	1.0 MΩ shunted by 40 pF	
Sinewave Sensitivity (Minimum Input Voltage)	5 Hz to 30 MHz	80 mV _{RMS}
	30 MHz to 70 MHz	80 mV _{RMS}
	70 MHz to 100 MHz	80 mV _{RMS}
Maximum Input	5 Hz to 100 kHz	42 V _p
	100 kHz to 10 MHz	13.8 V _p
	10 MHz to 100 MHz	5.4 V _p
Dynamic Range	V _{p-p} < 1 V times Attenuation	
Attenuation (Input Voltage HI/LO)	1X or 10X, selectable	
Filter	Low pass (< 100 kHz, 3 dB) selectable	
Time Base	Crystal-controlled oscillator	
Time Base Frequency	3.579545 MHz	
Gate Time	1 s	
Display	Eight 0.43 inch, seven-segment LEDs indicate the input signal frequency	
Auto MHz	A decimal point appears between the 6th and 7th digits when the input frequency exceeds 1 MHz.	

Table 1: General Characteristics (Cont.)

Overflow Indication	LED indicator flashes when count exceeds 100 MHz
Lead Zero Blanking	For all but the least-significant digit

Table 2: Physical Characteristics

Width	240 mm (9.45 in)
Height	64 mm (2.53 in)
Depth	230 mm (9.0 in)
Weight	2.1 kg (4.6 lb)

Table 3: Environmental Characteristics

Operating Temperature	10° C to 40° C, 75% RH
Storage Temperature	-10° C to 60° C, 80% RH

Table 4: Electrical Characteristics

Line Voltage Range	90 to 110, 108 to 132, 198 to 242, and 216 to 250 VAC at 50–60 Hz
Power Consumption	15 VA, 12 W maximum

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Appendix B: Maintenance

This appendix provides information for the basic maintenance of the CFC250 Frequency Counter.

Cleaning

To clean the frequency counter, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage.

Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents.

Do not use abrasive cleaners on any portion of the frequency counter.

Preparing for Shipment

If the original packaging is unfit for use or not available, use the following packaging guidelines:

1. Use a corrugated cardboard shipping carton having inside dimensions at least three inches greater than the instrument dimensions.
2. Put the instrument into a plastic bag or wrap to protect it from dampness and loose packing material.
3. Place the instrument into the box and firmly stabilize it with packing material.
4. Seal the carton with shipping tape.

Troubleshooting

Electronic maintenance on the CFC250 Frequency Counter must be performed by a trained technician. However, an operator can perform some basic and routine maintenance. The CFC250 Frequency Counter will give some indications of problems to aid the operator.



WARNING. To prevent electrical shock, unplug the power cord and disconnect the signal input cable from any signal source before checking or replacing the fuse.

No Display with Power On

If the Digit Display Hz is not displayed, but the POWER button is pushed in and the CFC250 Frequency Counter power cord is plugged into an outlet, do the following steps:

1. Check the line fuse. If the fuse is open, replace it.
2. If the line fuse is good, check the power outlet for proper voltage. If the outlet voltage is incorrect, call service personnel.
3. If outlet voltage is correct, check power cord continuity. If the power cord fails the continuity check, replace the power cord.

Display On but CFC250 Not Counting Frequency

If the display is on, but the CFC250 Frequency Counter does not count, do the following steps:

1. Check INPUT VOLTAGE level button for HI/LO level signal input.
2. If the INPUT VOLTAGE setting does not correct the problem, check the signal input cable for continuity.
3. If the signal input cable is good, check output of circuit or equipment being tested with an AC voltmeter or oscilloscope.
4. If signal input cable is good, check LP FILTER button position if signal frequency to be read is over 100 kHz.

German Postal Information

Certificate of the Manufacturer/Importer

We hereby certify that the CFC250 Frequency Counter and all factory-installed options comply with the RF Interference Suppression requirements of Postal Regulation Vfg. 243/1991, amended per Vfg. 46/1992.

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 CFC250 Frequency Counter und alle fabrikinstallierten Optionen in Übereinstimmung mit den Bestimmungen der Amtsblatt-Verfügung Vfg. 243/1991 und Zusatzverfügung 46/1992 funktentstört sind.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhalten der Bestimmungen eingeräumt.

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NOTICE to the user/operator:

The German Postal Service requires that systems assembled by the operator/user of this instrument must also comply with Postal Regulation, Vfg. 243/1991, Par. 2, Sect. 1.

HINWEIS für den Benutzer/Betreiber:

Die vom Betreiber zusammengestellte Anlage, innerhalb derer dieses Gerät eingesetzt wird, muß ebenfalls den Voraussetzungen nach Par. 2, Ziff. 1 der Vfg. 243/1991, genügen.

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. 243/1991, Par. 2, Sect. 1.8.1 are complied with.

HINWEIS für den Benutzer/Betreiber:

Dieses Gerät darf in Meßaufbauten nur betrieben werden, wenn die Voraussetzungen des Par. 2, Ziff. 1. 8.1 der Vfg. 243/1991 eingehalten werden.

Appendix C: Replaceable Parts

Replaceable parts may be ordered directly from your authorized Tektronix dealer.

Standard Accessories

The following items are shipped with the CFC250 Frequency Counter:

Table 5: Standard Accessories

Accessory	Tektronix Part Number
Fuse, 3AG, 0.125A, 250V, SB (90 – 132 V operation)	159-0313-00
CFC250 User Manual	070-6742-XX
115V power cord	Refer to Table 7

Optional Accessories

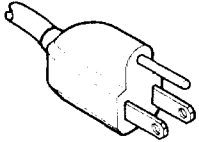
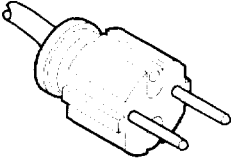
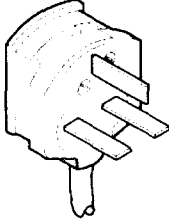
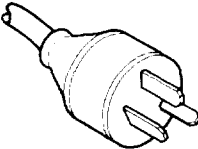
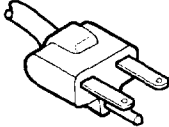
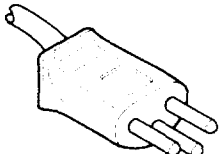
The following items are available as optional accessories:

Table 6: Optional Accessories

Accessory	Tektronix Part Number
Fuse, 3AG, 0.062A, 250V, SB (198 – 250 V operation)	159-0051-00
230V power cords	Refer to Table 7

The following power cords are available.

Table 7: Accessory Power Cords

Plug Configuration	Normal Usage	Tektronix Part Number
	North America 115 V	161-0104-00
	Europe 230 V	161-0104-06
	United Kingdom 230 V	161-0104-07
	Australia 230 V	161-0104-05
	North America 230 V	161-0104-08
	Switzerland 230 V	161-0167-00

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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