Multicounter CD100

USER MANUAL

CE

⚠ CAUTION

WARNING - Maximum input voltage is 12VDC. Automotive voltages may exceed 12V causing damage to internal circuitry. Damage resulting from excessive input voltage is readily apparent and will not be covered under warranty. Units returned for warranty service that have damage resulting from excessive supply voltages will incur service charges.

WARNING - Maximum antenna input signal is +15dBm (50mW). Under no circumstances should the CD100 be directly connected to an RF transmitter or be used in close proximity to a radio transmitter of more than 5 watts. Damage to the input amplifier circuitry is readily apparent and will not be covered under warranty. Units returned for warranty service that have damage to the input circuitry will incur service charges.

This manual covers connection and operating instructions for the Optoelectronics CD100. The Optoelectronics CD100 is covered under U.S. Patent Number 5,471,402.

Table of Contents

Introduction

The CD100 Multicounter combines an accurate RF frequency counter, and an off-the-air decoder in one hand held unit. Used as a test instrument for checking two-way radios, the CD100 demodulates an FM carrier and decodes CTCSS, DCS, LTR, and DTMF. The two line by 16 character LCD display will display the frequency on the top line and the selected decode mode on the bottom line.

The CD100 has a fixed 100 Hz resolution. It also incorporates digital filtering to ensure that frequencies displayed are real transmitted signals and not noise. A frequency measurement and an associated decode value can be stored in one of 100 non-volatile memories. The measurement data can be downloaded to a PC or recalled to the display.

The CI-5 serial data port can be used to communicate with a PC or to tune a radio receiver to the frequency displayed. The ability to tune a radio from the digitally filtered frequency measurement is known as “Reaction Tuning” which is a patented technique developed by Optoelectronics Inc.

TEST
Press the TEST button at any time to enable the CD100 for testing.

MEAS. SELECT
Press the MEAS. SELECT button to choose between the different decode modes. The CD100 decodes CTCSS, DCS, DTMF, and LTR.

UP Arrow
Press the UP arrow button to store measurements to memory. The UP arrow button also has secondary functions when in FUNCTION mode.

POWER
The POWER button is used to turn the CD100 on and off. The POWER button is also used to enable the EL Backlight by pressing and holding the button down for two seconds.

FUNCTION
The FUNCTION button is used to enter the FUNCTION menu. This menu consists of Memory, Clear Memory, Interface Type, Receiver Type, Auto Power Off, Frequency Display and Test Mode.

DOWN Arrow
Press the DOWN arrow button to store measurements to memory. The DOWN arrow button also has secondary functions when in FUNCTION mode.

Top Panel Connections

Antenna
50 Ohm BNC connector. Do not exceed +15dBm (50mW) signal to the antenna input. Please see our catalog or web site for antenna options. **www.optoelectronics.com**

CI-5
The jack labeled CI-5 on top of the CD100 is used for interfacing to the Optoelectronics Optolinx computer control interface for the purpose of downloading the information saved to memory. The CI-5 jack is also used for interfacing to a compatible radio receiver for the purpose of Reaction Tuning. See page 10 for a list of receivers compatible for Reaction Tuning.

9-12VDC
The connector labeled 9-12VDC on top of the CD100 is used for accepting the plug from the supplied AC90 power adapter. The AC90 is a nominal 9VDC adapter. Plug the AC90 into the CD100 to charge the unit. A full charge will take approximately 8-10 hours. The CD100 will operate approximately 4-5 hours on a full charge.

Squelch Indicator
The Squelch Indicator is the horizontal line on the right side of the top line. With no signal present only the horizontal line is displayed. When a signal is being received by the CD100 the horizontal line turns into a solid box.

Active Decode Indicator
The Active Decode Indicator is indicated by an asterisk "*" when the CD100 is actively decoding CTCSS, DCS or LTR. The asterisk will be present on the right hand side of the display. The tone or code will remain after the signal drops, although the asterisk will disappear from the display. The asterisk does not apply for DTMF decoding.

Low Battery Indicator
A low battery condition will be indicated by the words "LOW BATTERY" on the display. When low battery is indicated the CD100 will turn itself off within 30 seconds. The CD100 will charge while being operated from the AC90. The CD100 takes 8-10 hours to charge. Battery life from a full charge is 4-5 hours. Do not exceed 9VDC unregulated or 12VDC regulated when running the CD100 from an external power source.

Backlight
The backlight is an Electroluminescent (EL) backlight that is turned on by pressing the POWER button down for two seconds. To turn the backlight off, press the POWER button down for two seconds.

Quick Start Guide

1. **Press the POWER button to turn ON. Display defaults to test mode.**
2. **Press POWER button for two seconds to enable / disable EL Backlight.**
3. **Press MEAS. / SELECT button to choose decode modes: CTCSS, DCS, DTMF, LTR.**
4. **Key transmitter for measurement.**
5. **Press UP or DOWN ARROW button to store current measurement to memory.**
6. **Press FUNCTION until MEMORY 00 displayed for Memory Recall.**
7. **Press UP / DOWN ARROW button to scroll through 100 memories.**
8. **Press TEST button at any time to enable test mode.**

DECODE DATA

50 CTCSS Tones, 106 DCS Codes, 16 DTMF Characters (10 characters decoded per second)

LTR
860.9870 MHz
LTR: 0101000125

1.	Area Code	1 digit	0-1	
2.	Go To Repeater	2 digits	00-31	If 31, then turn off code
3.	Home Repeater	2 digits	00-31	
4.	User ID	3 digits	000-255	255 is all call
5.	Free Repeater	2 digits	00-31	Mobile is always 31

Making a Measurement

1. Push the POWER button to turn the CD100 on.
2. Use the MEAS. / SELECT button to select the desired decode mode. Each press of the button will change the decode mode from CTCSS, DCS, DTMF and LTR.
3. Key a transmitter until the frequency and tone/code are displayed. *Note: The frequency measurement may flash while active decoding is taking place. When the CD100 is actively decoding CTCSS, DCS or LTR an "*" asterisk will appear to the right of the data.*

Decode Data: **Refer to page 8 or page 12 for decode data information.**

Storing a Measurement to Memory

1. Press the UP or DOWN ARROW button to store the data showing on the display to memory.
2. Each time the UP or DOWN ARROW button is pressed the current data will be stored to one of the 100 internal memories.

The CD100 will not store a zero (0.0000 MHz) value frequency to memory. However, if the display indicates a valid frequency but no data for the decode mode selected then a zero decode value will be stored to memory.

Memory Recall (100 memories / 00-99)

1. Press the FUNCTION button one time. The top line of the display will read MEMORY 00 and a frequency will be displayed on the bottom line.
2. Press the UP ARROW button one time. The top line of the display will still read MEMORY 00 while the bottom line will display either the CTCSS, DCS, DTMF or LTR tone or code associated with that frequency.
3. Scroll forward through the memories using the UP ARROW button. Scroll backward through memory using the DOWN ARROW button.
4. Exit FUNCTION mode by pressing the TEST button or by pressing the FUNCTION button until test mode is displayed.

Clear Memory

1. Press the FUNCTION button until CLEAR MEMORY is displayed.
2. Press the UP ARROW button twice in rapid succession. The display will read EMPTY.
3. To exit FUNCTION mode press the TEST button or the FUNCTION button until the test mode is displayed.

Reaction Tune

The CD100 can be used to instantly tune a compatible receiver to the frequency it captures using the CI-5 jack located on top of the unit and the proper interface cable.

1. Press the FUNCTION button until INTERFACE TYPE is selected.
2. Press the UP / DOWN ARROW button to select REACTION TUNE.
3. Press the FUNCTION button until RECEIVER TYPE is displayed.
4. Use the UP / DOWN ARROW buttons to select between AR8000 and CI-5. Switch to AR8000 for interfacing to AOR receivers. Use CI-5 when interfacing to ICOM, RADIO SHACK or OPTOELECTRONICS receivers.

Receivers Compatible for Reaction Tuning:

AOR 8000, AOR 8200 ICOM: R10, R7000, R7100, R8500, R9000, RADIO SHACK (OS456 / OS535) OPTOELECTRONICS R11, OPTOCOM

Memory Tune

1. Press the FUNCTION button until MEMORY 00 is displayed.
2. Press the UP / DOWN ARROW key to scroll through memories.
3. Each time a new frequency memory is displayed the receiver will re-tune to that frequency.

Serial Data Interface

The Optoelectronics Optolinx computer control interface is needed in order to download the memories of the CD100. All cables necessary for download are included with the Optolinx.

1. Press the FUNCTION button until INTERFACE TYPE is selected.
2. Press the UP / DOWN ARROW button to select CI-5 COMMAND.
3. Attach the 2.5mm portion of the CBCI5 cable to the CI-5 jack on top of the CD100. Attach the 3.5mm portion of the cable to either jack on the Optolinx labeled A, B, or C.
4. Load program and follow directions in the software.

Auto Power Off

The Auto Power Off function can be enabled or disabled. Enabling this function allows the CD100 to automatically shut itself off after 2 minutes of inactivity.

1. Press the FUNCTION button until AUTO POWER OFF is displayed. (Default: Enabled)
2. Press the UP / DOWN ARROW button to select ENABLED or DISABLED.
3. Press the FUNCTION button or the TEST button to exit FUNCTION mode.

Frequency Display

Press the FUNCTION button for Frequency Display then press UP / DOWN arrow to changeto:

1. Channel: This displays the actual channel that the trasnmitter is on. EX: 454.1250
2. Measured: This displays the actual frequency that is being trasnmitted. EX: 454.1247

Specifications

Frequency Range	10MHz - 1GHz
Sensitivity	<5mV @ 450MHz
Resolution	Fixed 100Hz
Measurement Time	10mS
Input Impedance	50 Ohm
Maximum Input	+15dBm (50mW) / 50V AC+DC
Time Base	Frequency: 10MHz Accuracy: 1ppm
Display	2x16 alphanumeric LCD with EL backlight
Memory	100 (Frequency and either CTCSS, DCS, DTMF or LTR)
Decode	50 CTCSS tones, 106 DCS codes 16 DTMF characters (10 characters per second) LTR: 10 digits and 5 fields of information. Area Code, Go To Repeater, Home Repeater, User ID, Free Repeater
Power	9-12VDC at <100mA from AC90 adapter
Power Connector	2.1mm coax, center positive
Battery	Internal 5 cell AA shrink wrapped NiCad pack
Size	5.25”H x 3”W x 1.5”D / 133mm H x 76mm W x 38mm D
Weight	12 oz. / 340 grams

ANTENNAS
The small dual band, VHF/UHF DB32 antenna and rubber duck BB85 are very good multi-purpose antennas capable of picking up a wide range of frequencies from 100MHz to 2GHz. There are other antennas available that are useful for specific frequency ranges.

RD27	26-150MHz
RD150	144-165MHz
RD440	440-480MHz
RD800	500MHz-1GHz
BB85	100MHz-2GHz
DB32	150MHz-1GHz
TA100S	100-600MHz

FILTERS
The N100 FM broadcast notch filter will remove the influence from local FM stations.

SERIAL DATA INTERFACE
The Optolinx computer control interface is needed for downloading of memories from the CD100.

For more information on these and other products contact Optoelectronics.

Factory Service

PRODUCT WARRANTY
Optoelectronics, Inc. warrants all products and accessories for one (1) year against defects in materials and workmanship to the original purchaser. Products returned for warranty service will be repaired or replaced at Optoelectronics' option.

Specifically excluded are any products returned under this warranty that upon examination, have been modified, had unauthorized repairs attempted, have suffered damage to the input circuitry from the application of an excessive input signal, have suffered damage to the charging circuitry or internal batteries from the application of excessive voltage, or show other evidence of misuse or abuse. Optoelectronics reserves sole right to make this determination.

No other warranties are expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Optoelectronics, Inc. is not liable for consequential damages.

WARRANTY
Products under warranty must be returned, transportation prepaid, to Optoelectronics' service center. All parts replaced and labor performed under warranty are at no charge to the customer.

NON-WARRANTY
Products not under warranty must be returned, transportation prepaid, to Optoelectronics' service center. Factory service will be performed on a time and materials basis at the service rate in effect at the time of repair. A repair estimate prior to commencement of service may be requested. Return shipping will be added to the service invoice and is to be paid by the customer.

RETURN POLICY

The Optoelectronics Service Department will provide rapid turnaround of your repair. No return authorization is required. Enclose complete information as follows:

1. Copy of sales receipt if under warranty.
2. Detailed description of problem(s).
3. Complete return address and phone number (UPS street address for USA).
4. Proper packaging (insurance recommended). Note: Carriers will not pay for damage if items are improperly packaged.
5. Proper remittance including return shipping, if applicable (Visa/MasterCard number with expiration date, Money Order, Company PO, etc.). Note: Personal checks are held for a minimum of two weeks before shipment.

Address all items to:

Optoelectronics, Inc.
Service Department
160 West Camino Real #233
Boca Raton, FL 33432

If in question, contact the factory for assistance. Service Department: (954) 642-8997.
Monday - Friday 8:30 AM to 5:00 PM Eastern Time.

OPTOELECTRONICS ®
160 West Camino Real #233
Boca Raton, FL 33432
Telephone: 954-642-8997
Fax: 954-636-3533
Email: sales@optoelectronics.com
Internet: www.optoelectronics.com