

BCD TC-100

Table of Contents

Introduction.....	3
Stand Alone Features.....	3
RS-232 Control.....	3
User Bit Information.....	4
Connections	4
Video Connections.....	4
LTC Connections	4
RS-232 Connection.....	4
Switch Settings.....	4
BCD Technical Support	5
Updates via Internet.....	5
BCD TC-100 Commands.....	5
4 Character Commands	5
BCD TC-100b - Addendum for ‘b’ Version	8
On-Screen Display (OSD).....	8
Setting the Display	8
The SAVE Command.....	9
Firmware Updates	9
Firmware Update Procedure.....	9

Warranty and Disclaimer

BCD Associates, Inc. reserves the right to make changes and improvements in its products at any time without notice.

Warranty: BCD Associates, Inc. makes no warranties, either expressed or implied, regarding the associated hardware/ firmware/ software package, its **merchantability or its fitness for any particular purpose**. In no event shall BCD Associates be liable to customer for any special, indirect, incidental or consequential damages in any way arising out of or relating to the product(s). BCD Associates's liability to customer for direct damages arising out of or relating to these products shall in no event exceed the total amount actually paid by customer for the product(s). Customer's sole remedy within the warranty period is repair or replacement, at BCD's discretion, of a unit deemed by BCD to be defective.

Copyright: This manual and the hardware/firmware/software described are copyrighted and/or trademarked and patented by BCD Associates, Inc. All rights are reserved. This manual may not, in whole or in part, be translated or copied to any other form or medium without the prior written consent from the publisher, BCD Associates, Inc.

© Control Firmware Copyright 1987 - 2007 BCD Associates, Inc. .
Other trademarks are owned by the firms mentioned.



BCD TC-100

Time Code Generator/Reader

Introduction

Thank you for choosing the BCD TC-100 for your Time Code application. This little box is packed with features not found in most single, stand-alone units. Additionally, it supports many additional features using computer/RS-232 control.

This is a short manual because the TC-100 is so easy to use. Please feel free to contact BCD if you have additional questions.

Stand Alone Features

Just add power, connect video with VITC and/or audio LTC time code and you'll get:

- Switch-Selectable VITC or LTC Time Code read.
- Switch-Superimposed time code display
- Auto-translate from VITC to LTC
- Auto-translate from LTC to VITC
- Switch-Selectable TC Generate VITC or LTC
- NTSC/PAL operation (firmware option at order time or customer update)

RS-232 Control

Add a any computer or terminal with RS-232 communication capabilities and you'll get:

Standard communications of 9600 Baud, 8 Data Bits, 1 Stop Bit, No Parity

Switch-Selectable AutoBaud up to 38.4K Baud

Dual command sets: Single-character for fast response & 4-character for enhanced features.

- Enhanced Command Set permits:
 - Polled query for time code in integer format
 - Polled query for time code in SMPTE/EBU format (hh:mm:ss:ff)
 - Auto return of time code in integer format
 - Auto return of time code in SMPTE/EBU format (hh:mm:ss:ff)
- Overlay Display Selections:
 - size of time code overlay display
 - position of time code overlay display
 - character background display: black/white/video background

character color: black/white

User Bit Information

The SMPTE/EBU specification permits 32 bits (4 bytes) per frame of “user data” to be inserted into the time code as it is being recorded. This applies to either VITC or LTC time code. The TC-100 provides for this data insertion as well as reading of encoded data. This is the equivalent of 1200 Baud at 30 frames/second.

Connections

Connecting the TC-100 is straight forward.

Video Connections

Connect video source containing VITC (usually a VCR) to the TC-100 Video In jack. Connect the TC-100 Video Out jack to the TV monitor.

LTC Connections

Connect LTC source (usually a VCR) to the TC-100 TC In jack. Connect the TC-100 to it's destination. Often this is another VCR or another device that can only read LTC.

RS-232 Connection

BCD provides a serial cable with an RJ-11 connector on one end and a standard connector on the other end. The computer end of the cable is either a 9-pin or 25-pin, depending on what was ordered.

Connect the RJ-11 connector to TC-100 RJ-11 jack. Connect the 9-pin or 25-pin connector to the RS-232 serial port of the computer or other controlling device.

Switch Settings

The TC-100 has a 4-position DIP switch on the rear panel for setting certain operational parameters. The default settings are ALL OFF (Down). This provides for :

1. LTC Read (Up = VITC Read)
2. Generate Off (Up = Generate On)
3. Baud (Up = AutoBaud, send several Carriage returns to let the TC-100 determine the baud rate. You will then see the '>>' prompt.)
4. Overlay Display Off (Up = Display On)

In case you forget, this information is duplicated on a label on the bottom of the TC-100 case.

BCD Technical Support

BCD is proud of its technical support services. In most cases, no support is needed, but if you do need help, we're glad to oblige.

Call us at 405-702-6888

Fax us at 405-702-6891

Email: support@bcdusa.com

Updates via Internet

You can check on the latest version of the firmware file on our web site at

<http://www.bcdusa.com/>

in the Support/Downloads section from Main Menu. That page links to appropriate update sites for immediate download.. If your TC-100 is operating properly, you don't need an update, but it's a wise idea to check the site from time to time to see if any new features have been added. We are happy to consider customization. Ask for a quotation.

BCD TC-100 Commands

4 Character Commands

These commands are NOT case-sensitive. Spaces are ignored.

'AAAA'

Test command. Returns 'AAAA command'.

'BURN'

turns on/off display, same as 'D/'d' commands. BURN also accepts a parameter 0-120 to set the vertical TV display line. BURN 100 is at the bottom of the picture. BURN 50 is about in the middle.

'CODE'

Sets or displays current code type. '2' = NTSC LTC, '3'=NTSC LTC Drop Frame, 5 = PAL/EBU, 7 = NTSC VITC, 8 = NTSC Drop Frame, 9 = PAL/EBU VITC

'DBAK'

Sets Video Display Background and Character Color: 0 = white on black , 1 = black on white , 2 = white on video background, 3 = black on video background

'DPOS'

Sets or displays vertical position of Display overlay.

'DSIZ' Sets or displays the size of the Display overlay: 0=small, 1= large

'DEBUG' (0 - 9)

Sets or displays debugging level for time code evaluation. DEBUG by itself returns a number 0 - 9. DEBUG 1 (or any value > 0) enables verbose display of error messages. DEBUG 9 displays evaluation of time code being read: 'o' (lower case o) means good LTC was read. 'O' (upper case O) means good VITC was Read.

'FRAM'

Returns the current frame number or SETS the frame number when issued during Generate.

'LBIT'

sets or displays User Bits when in the LTC Mode.

'LOOP'/'LEND'

Repeats commands that are within the LOOP/LEND delimiters.

Example: LOOP 1000; FRAM; LEND returns the current frame number 1000 times. Note that commands are separated by semicolons (;).

'QUIT'

Quits the 4-character command mode and enters the single-character command mode.

'RLIN'

Sets or displays the current TV line to read VITC code. Default is '41' which means "hunt for good VITC." RLIN sets or displays the VITC read line. Default is 'EHUNT' which means Enabled & HUNT for good VITC. When recording or playing video from broadcast sources, set RLIN to a specific number (10-20 inclusive) to avoid ambigulus readings. See also WLIN

'STOP'

Stops time code generation.

'TIME'

is a convenient delay. TIME 10 is about 1 second.

'UBIT'

sets or returns User Bit Information.

'VBIT'

sets or returns User Bit Information in the VITC mode.

'VERS'

Displays the current ROM version and copyright.

'VINI'

Causes the TC-100 to hunt for good VITC code. It then returns all of the line numbers which contain readable code. Example: '10 12 15 17'.

'WLIN'

Sets or displays the current line number set for VITC writing. The SMPTE standard says that VITC shall be written on 2 non-adjacent lines, so a '10' indicates that lines 10 and 12 are used for VITC writing. See also RLIN

'WRGO'

Causes the TC-100 to generate Time Code according to the selected type. WRGO with no parameters begins generating at 00:00:00:00. WRGO: 20000 begins generating at 00:02:00:00. (Note the colon (:) after the command and before the parameter. WRGO 3600 begins generating at frame 3600 (NTSC 2 minutes).

'ZERO'

resets the counters to 00:00:00:00.

BCD Debugging commands: 'ICS1', 'MISC', 'SMPT'. These may be used by BCD Technical Support Personnel in assisting with Time Code difficulties.



BCD Associates, Inc.

128 N.W. 67th Street
Oklahoma City, OK, 73116
Tel. 405-843-4574 Fax. 405-840-3147
<http://www.bcdusa.com> email: bcd@bcdusa.com

BCD TC-100b - Addendum for 'b' Version

The TC-100b now features flash programmable ROM.
This means that you can save your settings for Display Position, Display Characteristics, and other variables.

This change has made necessary the removal of single-character commands.

On-Screen Display (OSD)

The OSD is turned on and off by **Switch #4** on the rear panel.

Up/On = Display On

Down/Off = Display OFF

The various commands BURN 1 or BURN 0 will temporarily override the current switch position.

BURN 0 = Display Off

BURN 1 = Display ON

Changing Switch #4 will turn the display On or Off.

Setting the Display

You may set the display characteristics with these RS-232 commands:

DLIN and DPOS move the display up and down.

DLIN 17 sets the display near the top of the screen.

DLIN 100 sets the display near the bottom of the screen.

(DPOS is the same command as DLIN)

DCOL moves the display left and right

DCOL 64 makes the display near the center of the screen (if DSIZ = 1).

DCOL 64 makes the display near the left of the screen (if DSIZ = 0).

DBAK 0 makes white on black characters

DBAK 1 makes black on white characters

DBAK 2 makes white on video characters

DBAK 3 makes black on video characters

DSIZ 0 makes a small display

DSIZ 1 makes a large display

The SAVE Command

Use the SAVE command to save your settings.

Using Windows *Hyperterminal* or BCD's DOS *BCDComm.exe* program, type the command SAVE. The system will erase the old values and save the new values.

Firmware Updates

In the event that features are added or (perish the thought) bugs or errors are detected in the TC-100 firmware, you can easily update the controller firmware.

This requires that the Programming Switch be placed in the "On" position. The Programming Switch is located *inside* the TC-100. Remove the two screws in the bottom sides and remove the cover. When you face the front of the unit, the Programming Switch is just behind the red LED.

To reprogram, you will need the *FlashMagic* program from esacademy.com. *FlashMagic* is designed to reprogram the control processor used in the TC-100. *FlashMagic* is available directly from the www.esacademy.com website or from the download section of www.bcdusa.com

You will need:

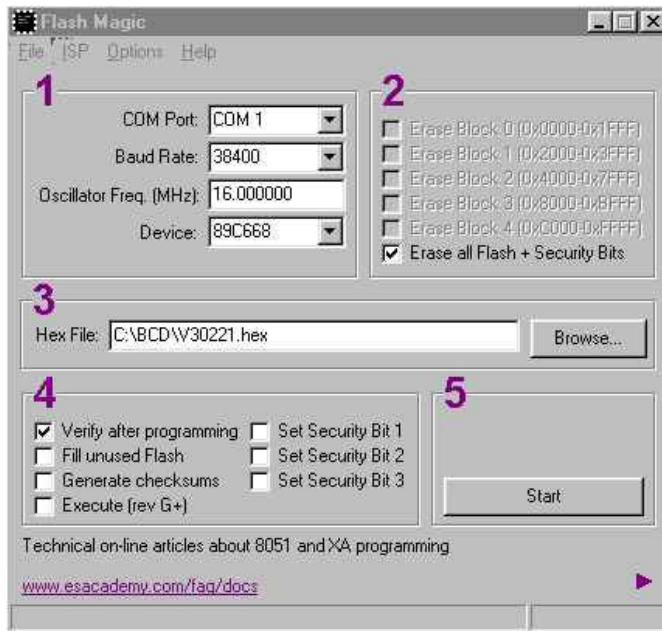
- A BCD Hex File, downloaded from www.bcdusa.com or sent to you via email. New hex files and *FlashMagic* are both available by email or at BCD's website www.bcdusa.com
- *FlashMagic* from Embedded Systems Academy – www.esacademy.com
- The BCD Programming Dongle, inserted into the **lower** DB-9 jack.

Firmware Update Procedure

Download the desired firmware from bcdusa.com. From the web page Main Menu→Support→Downloads, choose TC-100 and download the file. Uncompress the "zip" file on your computer at a location you can remember.

FlashMagic is a Windows™ program for programming the microcontroller used in the TC-100.

- After downloading *FlashMagic* from www.bcdusa.com or www.esacademy.com, install it in a Windows™ computer.
- Run the *FlashMagic* program.



The FlashMagic™ Window

- Set the COM Port to agree with your computer
 - Set the Baud to 38400 or 19200
 - Set Oscillator Freq. defaults to 16.
 - Set Device to 89C668
 - Checkmark “Erase all Flash...”
 - Browse for the BCD Hex file
 - Checkmark Verify
- UNCheck all other checkboxes

Configure the program by setting set the COM Port of the FlashMagic program to be the same as the serial port used to

control the TC-100 or faster. A fast Baud Rate is desirable, like 38.400 or 19,200. The **Processor Type** is 89C668. **Verify** should be checked. **Erase All Flash + Security** bits should be checked. Other checkboxes, empty.

(When reprogramming the unit, your computer’s Baud Rate that you regularly use to communicate with the TC-100 **does not matter**. The Baud Rate you previously set in the TC-100 **does not matter**.)

- Unplug the Power connector from the TC-100.
- Turn Programming Switch ON for Programming (OFF for normal use.)
- Plug in the TC-100 power.
- Click the Browse button on the FlashMagic Screen to select the BCD <filename>.hex file
- Click the Flashmagic **Start** button to begin programming.
- The program will briefly display “Finished” when programming is complete.
- Unplug the TC-100 power.
- Turn the Programming Switch OFF for normal use.
- Turn on the controller.
- Verify proper operation
- Replace the cover and screws

Now you’re ready to go.

If, for some reason, programming fails, just do the procedure again. The microprocessor in the TC-100 has its own Boot ROM, and we do not believe that you can harm the system by mis-programming if someone disconnects the computer from power or for any other reason.

