

TCG-100

SMPTE - EBU & IRIG- B

TIME CODE GENERATOR

FOR PCs



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INTRODUCTION

The TCG-100 is a time code generator plug-in card for ISA bus, IBM-PC's and compatibles. The software provided with the card facilitates robust manual control of time code generation for a variety of test and simulation purposes. This instruction book covers installation and operation of the card using all versions of linear SMPTE and also IRIG-B TC. In many cases references are made to (24, 25 or 30) frames. It should be understood that the reference to 24, 25 or 30 frames per second only applies to the SMPTE TC.

OPERATION MODES

SMPTE operation

The TCG-100 can generate four types of SMPTE time code. SMPTE 30 frames/second, 30 frames/second (drop frame), 25 frames/second (EBU), and 24 frames/second (Film). In SMPTE 30 frames/second drop frame generation mode the drop frame identification bit (bit 10 of the SMPTE frame) will be set to indicate the mode.

IRIG-B operation

The TCG-100 can generate IRIG-B (modulated) format time code. Supported information for the IRIG-B frame is hours, minutes, seconds, and day of year. Control functions and binary time of day is not currently supported.

Default Operation

The card will default, on power-up, to SMPTE 30 frames/second time code with time code registers initialized to 00:00:00 day 1, and in a stopped mode.

CARD CONFIGURATION

Default Configuration/Operation

The TCG-100 is shipped from the factory jumpered at I/O port 310 and interrupt 5 with SMPTE time code output routing selected. You may need to change these settings for your desired operation and/or to ensure non-conflicting operation with add-in cards already in your computer system. Please retain the I/O port and interrupt jumper configurations for the TCG-100(s) in your computer. Some of the TCG-100 setup and software utilities will require this information during configuration or startup.

I/O Port

The P5 and P6 jumpers on the TCG-100 select the I/O port address. Placing a jumper vertically over two pins is ON.

	<u>P5</u>	<u>P6</u>
I/O port 300	ON	ON
I/O port 310	OFF	ON
I/O port 320	ON	OFF
I/O port 330	OFF	OFF

Interrupt select

Any of the following XT and AT interrupts can be jumpered on the TCG-100 card: 5, 7, 10, 11, 12, and 15. Interrupts are not used by the DOS and Windows 3.x/95/98 software provided. Installer may choose not to jumper an interrupt at all for TCG-100 card(s) operating in these environments. An interrupt must be selected for the Windows NT environment.

IRIG/SMPTE output select

This jumper selects whether IRIG-B time code or SMPTE time code signal will be output to the DB-15 connector. Note that this jumper does not configure to card to generate SMPTE or IRIG-B time code. That is a software-selected feature.

INSTALLING AND USING TCG-100 SOFTWARE

The TCG-100 ships with control/demonstration software for DOS, Windows 3.1x/95/98, and Windows NT.

Installing and Using DOS Software

To install TCG-100 DOS software create a subdirectory and copy the files from the \DOS directory on the TCG-100 distribution diskette to the new directory.

For example:

```
C:\>mkdir TCG100
C:\>copy d:\DOS\*.* TCG100
```

(where *d:* is the drive in which you placed the TCG-100 software distribution diskette)

The TCG-100 ships with the following DOS control and demonstration programs:

TCGDEMO

This utility provides user interface for control and demonstration of all TCG-100 features.

- Initiate TCG-100 generate time (jam) from computer clock.
- Initiate TCG-100 generate time from user-provided time.
- Real-time display of time code currently being generated
- Start/Freeze generate time

AUTOTCG

DOS command-line utility that provides one-step TCG-100 operation/initialization of time code generation mode and time data.

The command-line format for AUTOTCG is:

```
AUTOTCG [-pXXX] [[-s30/-s30df/-s25/-s24] [-tHH:MM:SS[/FF]] or [-i [-tHH:MM:SS] [-dMM-DD-YY]]
```

Where:

- -pXXX specifies the I/O port to use
- -sXX or -i selects SMPTE or IRIG-B operation, respectively
- -tHH:MM:SS[/FF] specifies time at which to start generation
- -dMM-DD-YY specifies date at which to start generation (IRIG-B only)

AUTOTCG defaults to the following operation unless overridden by command-line parameters:

- I/O port 310
- SMPTE 30 frames/second operation
- time starting from PC clock, frame starting at zero (0).

For example, to start a TCG-100 installed on I/O port 300 to generating IRIG-B time code at 14:37:22 09/25/1997 enter the following AUTOTCG command:

```
AUTOTCG -p300 -i -t14:37:22 -d09-25-97
```

To start a TCG-100 installed on I/O port 310 generating SMPTE 25 frames/second time code at the current PC clock time enter the following AUTOTCG command:

```
AUTOTCG -s25
```

This program might typically be executed from AUTOEXEC.BAT to place the TCG-100 into desired state of operation each time the computer starts.

FINDTCG

Assists in determining if TCG-100 card(s) are installed in your PC and what I/O ports they are configured for. When found, FINDTCG will display the I/O port the TCG-100 card(s) are configured for and the firmware version of the card.

FINDTCG may cause system instability when examining the system for the presence of TCG-100 card(s). FINDTCG may not be able to detect a TCG-100 if an I/O port conflict exists. Resolve any potential I/O port conflicts with other PC cards when initially installing the TCG-100.

FINDTCG can not be used to detect TCG-100 card(s) under Windows NT.

Installing and Using Windows 3.1x/95 Software

Using the Windows File Manager or Explorer, create a directory on the hard drive. Copy the files from the \WIN3195 directory on the TCG-100 distribution diskette to the newly created directory. Create an icon or shortcut to the TCGWIN.EXE file. The TCGWIN program provides the same functionality as the TCGDEMO software for DOS, providing the following capabilities:

- Initiate TCG-100 generate time (jam) from computer clock.
- Initiate TCG-100 generate time from user-provided time.
- Real-time display of time code currently being generated
- Start/Freeze generate time

Installing and Using Windows NT Software

Run the SETUP program from the \WINNT directory on the TCG-100 distribution diskette. Follow the directions given by the SETUP software. You will need to specify the default time code operation desired for the card. You will also be asked for the I/O port and interrupt configuration for your TCG-100 card. Other configuration parameters will be set to defaults suitable for most applications.

The Windows NT drivers and software supports simultaneous management and configuration of multiple TCG-100 generator cards in a single computer system. Currently, up to four cards are supported. See the section entitled *Operating Multiple TCG-100 Devices Under Windows NT* for more information.

Configuration Applet

Changing configuration (including advanced options) or installing additional TCG-100 cards into a Windows NT system is accomplished through the TCG-100 configuration applet located in your Control Panel. The applet displays configurations on a per-device basis (*TCG0*, *TCG1*, etc.) Use the tabs in in each configuration window to select the device you wish to enable/disable or configure.

Hardware

When enabled, indicates to software and drivers that a TCG-100 defined by the given I/O port and interrupt settings is located in your Windows NT computer. Once enabled, you will be able to configure software and (per availability) synchronization options for the device. The setup program will install your first TCG-100 card on device *TCG0*. Devices *TCG1-TCG3* will not be enabled. You can add additional TCG-100 cards into your computer on the unallocated devices. *Note: disabling a TCG-100 device in hardware configuration does not delete that configuration information from the computer, it simply prevents TCG-100 drivers and software from allocating resources for the device.*

Software

Provides general software configuration settings for other TCG-100 generator applications. Select the type of time code a given TCG-100 device will generate here. *Note: to make configuration changes here the given TCG-100 device (TCG0, TCG1, etc.) must be enabled in Hardware Configuration.*

Synchronization

This option is available if the add-on TCGSync software package has been purchased and installed. Please consult your TCGSync-NT software manual for more information.

TCG-100 Device Manager

The device manager displays the current operation status of TCG-100(s) installed in your computer. To monitor or adjust time code generation of a TCG-100 device select it from the list box and click the *MONITOR* button. The Monitor window provides the following manual-control options:

- Initiate TCG-100 generate time (jam) from computer clock.
- Initiate TCG-100 generate time from user-provided time.
- Real-time display of time code currently being generated
- Start/Freeze generate time

In addition, the Monitor window provides integration with the TCGSync add-on option if it has been purchased and installed. Consult your TCGSync-NT software manual for more information.

HARDWARE DETAILS

Time Code Output Level

The output level for the SMPTE time code formats is 0dB (1.6 VPP). The output level for IRIG-B time code is 5 VPP.

DB-15 connector pinout

Time code output is on pin 5 with pin 6 being the associated ground. Also provided is a DB-15 to BNC adapter which breaks the generator pin connections out to a convenient BNC female connection. The shield of the BNC connection becomes ground with the center conductor carrying the time code signal.

Long-Term Accuracy

Using the TCG-100 in place of a master clock system is not recommended. The TCG-100's generator clock will drift over long periods of uninterrupted operation, depending upon crystal tolerances, temperature, and other factors. Furthermore, the TCG-100 does not manage date within the time signal as do most master clock systems. For these reasons, Masterclock, Inc. recommends a master clock, such as the GPS-200A product, for mission-critical time synchronization needs.

Problems - Troubleshooting

All TCG-100 cards are checked for proper operation before shipment and unless physical damage to the card is found it probably functional. The most common problems found during installation are interrupts conflicts, I/O port conflicts, or cabling problems between generator and reader device - in that order.

If a problem with operation is found or suspected, perform the following procedures: *(Note that some of these operations require technical knowledge of PC's)*

- Make sure that the interrupt that is selected on the TCG-100 card agrees with the interrupt that is specified in the software configuration and, most importantly, that no other device in the PC is set to the same interrupt as the card. This includes less obvious devices such as integrated motherboard components (PS/2-style mouse ports, disk controllers, multimedia devices, NIC's, etc.)
- Check that the port address, set with the jumpers on the card, agrees with the port address that is specified in the software configuration and, most importantly, that no other card in the PC is using the same port address as the card.
- Our Windows NT software provides useful troubleshooting/diagnostics information in the Event Log (accessed from the Event Viewer utility) when problems are encountered during startup or operation. Driver-related problems such as I/O port or interrupt conflicts appear in the System portion of the Event Log under the "TCGDrv" heading.

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