

**TCR-200I**

**IRIG-B(1) TIME CODE READER**



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## **INTRODUCTION**

The model TCR-200I is an IRIG time code reader for ISA bus IBM- ATs and compatibles.

## **OPERATIONAL MODES**

There are two modes of operation for the TCR-200I. The card can read time code, displaying the code on the screen as hours, minutes, seconds or read time code and lock the PC clock to the external time code.

### Time Code Reader

On the support software distribution disk the program irig.exe allows the card to be used as a time code reader. Running this program brings up a menu. At the bottom of the menu the current time code as read is displayed. If there is no time code being fed to (or read by) the card, the words NO IRIG are displayed instead. The program can be exited by using the F10 key.

### Time Code Synchronizer

The TCR can be used to synchronize the PC internal software clock (and optionally the CMOS clock) to external time source distributed via IRIG time code.

## **INTERRUPTS**

Interrupt setting and usage in PCs is somewhat complicated by the fact that different plug-in cards and other functions within the PC can be set to use the same interrupts. Generally this will result in erratic operation or failure of the card or system to operate.

### Available Interrupts

5	Free in ATs
7	LPT 1, first parallel or printer port
10 - 11 - 12 -15	available to all plug-in cards

## **PORT ADDRESS**

As with interrupt, port addressing in PCs is complicated by the fact that other plug-in cards within the PC can be set to use the same port address. Generally this will result in erratic operation or failure of the card or system to operate.

### Default Port Address

The TCR-200I is tested and shipped from the factory set to port address 310h. Should it be necessary to use another address, the jumper pins located on the card can be set to other addresses.

### Alternate Port Address

If an address other than 310h is used, it is necessary to enter the new address in the command line when invoking irigset.com. See section below for details.

## **TIME CODE SYNCHRONIZER**

### PC Clock - When Updated

The internal PC clock (both the software and CMOS) will be set upon first receipt of time code, when time code is regained after being lost and thereafter once per minute at the 30 second point.

## Software Selectable Options

### TCR-200I Interrupts

#### Description

TCR-200I interrupts 5 - 7 - 10 - 11 - 12 and 15 may be selected by jumper J4 on the card. Jumper the card correctly prior to insertion in the machine.

#### Default Mode

Default mode is interrupt 5

#### Command Line Parameter

I (or I)

### Port Address

#### Description

Set the port address. Valid port addresses are 300, 310, 320 & 330. For setup of port address see Hardware Details.

#### Default Mode

Default port address is 310h.

#### Command Line Parameter

P (or p)

### Setting of CMOS Clock

#### Description

When the TCR-200I is used to synchronize the PC clock, synchronization of the CMOS clock can be turned on or off. This entry has no effect on the setting of the software clock which will continue to be set, once per minute, at the 30 second point.

#### Default Mode

Default mode is normally ON (CMOS clock is set)

#### Command Line Parameter

D (or d) CMOS clock set disabled

### Hourly Offset

#### Description

When receiving UTC (universal coordinated time) or time code from a different time zone, a plus or minus hourly offset can be specified. The hourly offset can be set from -11 to +12 hours.

#### Default Mode

Default mode is normally off

#### Command Line Parameter

O (or o) enable hourly offset

### Time Code Validation Sequence:

#### Description

When enabled requires 1 second of consecutive, valid time code before locking PC's clock to time code. Time code is validated when: software is invoked, when time code is lost and then regained and with any card communication failures.

Default Mode

Default mode is normally on

Command Line Parameter

V (or v) used to disable the time code validation sequence

Quiet Startup Option:

Description

Disable display of TSR software settings during startup

Default Mode

Default mode is normally off

Command Line Parameter

Q (or q) used to enable quiet startup feature

IRIGSET.COM

The program irigset.com sets the PCs clocks in accord with the above described software switches. It is invoked by the following command line:

irigset /Ix/D/Pxxx/O-x/Q

where:

- /Ix           = interrupt x
- /D           = CMOS clock set disabled
- /Pxxx       = Port Address xxx (in hex)
- /Ox          = hour offset
- /Q           = quiet startup

Example:

irigset /I5/D/P300/O-4/Q

where:

- /I5           = interrupt 5
- /D           = CMOS clock set disabled
- /P300       = Port Address set to 300 (hex)
- /O-4         = hour offset set to minus (-) 4 hours
- /Q           = no display of irigset parameters

All of these software switches are optional. If none are entered after irigset, the software will:

- - default to interrupt #5
- - CMOS clock set to on
- - default to port address = 310
- - no hourly offset
- - irigset software parameters will be displayed at startup

Show Command-Line Software Switches/Options

For operator convenience while setting up the irigset program the command irigset/? will display all of the command line options that are available.

### IRIGSET Memory Requirements

Once started, the IRIGSET program remains in memory, occupying approximately 2.5K of memory. It keeps the PC clock time equal to the received time with an accuracy of  $\pm$  several milli-seconds.

### Automatic Starting of IRIGSET.COM

The irigset program can be started automatically each time the computer is booted by using the AUTOEXEC.BAT file of the computer. If irigset.com is invoked by the AUTOEXEC.BAT file the computer clock will be automatically locked to the external time code signal (if available) each time the system is turned on or rebooted.

### Runs Under DOS & Windows

IRIGSET will load as a TSR and run under all current versions of DOS and Windows including Windows for Workgroups. It can be relocated (under DOS) to run in high memory.

## **HARDWARE DETAILS**

### Input/Out Connections

The time code input is balanced. Pins 2 and 3 of the DB-15 connector are for input, with pin 1 used for ground. Polarity is not important on the input or output. If an unbalanced input or output is used, ground the other pin.

(An optional DB-15 male plug to unbalanced BNC female adapter is available from C&A.)

### Setting the Input Level

The input level control, R6, is adjusted at the factory for a nominal input level of approximately 0dB (as measured with an audio voltmeter) or 1.6 VPP. This setting gives an input range of approximately - 15 to + 15 dB. Should field adjustment be necessary use the following procedure.

- Run the program irig.exe and place the card in the reader mode.
- Supply the card with a IRIG time code signal with an input level within the range of -15 and +20dB.
- The incoming time code should be read and displayed on the screen without any hesitations or jumps.
- If the incoming time is not displayed, adjust the input level control R6 until a stable, smooth flowing time display is achieved. No further adjustments should be required unless there is a major change in input level.

### Port Select

The TCR time code card is set at the factory to an address of 310h and the software defaults to that address. If another address is used the pin jumpers must be set correctly and a new port address must be entered on the irigset.com command line.

### Pin Jumper Connections

The correct jumper installation, should the pin jumpers be accidentally changed on J5 & J6 or for using other port addresses are:

<u>Pin Jumper Location</u>	<u>P5</u>	<u>P6</u>
<u>Port 300h</u>	jumper	jumper
<u>Port 310h</u>	no jumper	jumper
<u>Port 320h</u>	jumper	no jumper

Port 330h

no jumper

no jumper

The software supplied with the card supports only the above port addresses. ***The address selected by the jumpers and the address entered on the irigset.com line must agree and be one of the above listed ports. If the addresses are set incorrectly the TCR-200I card will not work and the computer could lock up or operate erratically.***

#### Problems - Troubleshooting

All TCR-200I cards are checked for proper operation before shipment and unless physical damage to the card is found, the TCR-200I is probably functional. The most common problems found during installation are interrupts, port conflicts and input signal levels 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 TCR-200I card agrees with the interrupt that is specified in the command line and that no other card in the PC is set to the same interrupt as the card.
- Check that the port address, set with the pin jumpers on the card, agrees with the port address that is specified in the command line and that no other card in the PC is using the same port address as the card.
- If it is certain that there is no conflict with the interrupt or port address verify that the input level is within capture range of the card.
- Feed IRIG time code into the TCR-200I and run the program irig.exe from the DOS prompt. With this program running the TCR menu will come up.
- Select F1 to start the TCR-200I in a reader mode.
- The menu will either say No IRIG or display the incoming time code. The time code display should be continuous and smooth, without any hesitations or jumps.
- If the time is not displayed properly, adjust the input level control, first clockwise then and counter clockwise to see if a stable time display can be found.
- If no IRIG time display can be found, either the card is not functioning, something is wrong with the PC or the incoming time code is invalid.
- If, after adjustment, the IRIG time display is OK, the IRIG.exe program is executing properly and the irigset.com program will also execute properly.

If these steps do not resolve the problem, contact the factory.

#### **OTHER SOFTWARE ACCESSIBLE FEATURES**

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### Customized Programming Enviroment

#### Interrupt:

- The interrupt is jumper setable on the card and is usually set to 5.
- I/O Address: 300, 310, 320 or 330h (Switch selected) one address only.
- The interrupt is generated immediately following completion of time code reception (once per minute at the 30 second point).
- Additional interrupt options are available at beginning and end of time code and upon response to the PC system.
- Interrupts are also generated when timecode is lost and regained.

#### TCR-200I Commands:

The process for sending a command to the TCR-200I is:

- Output command to 310h (or appropriate port)
- Read 310h and wait the commands response. This step is required if you are using a fast PC. The response time for messages is several milliseconds.
- To avoid busy waiting for command response, the card can be set to generate an interrupt upon response, allowing for a fully interrupt driven support routine.

#### Commands:

```
; Name :      commandPC
;
; Description :  Receives commands from the PC and executes them.
;
; Commands :
;
;      28h - Clear enhanced (29-2f) features      28h
;      29h - Set host interrupt on each response  29h
;      2ah - Set host interrupt at end of time code  2ah
;      2bh - Set host interrupt at start of time code  2bh
;
;      e8h - Rec Time read request                e8h
;      eah - Set stopped mode                      eah
;      ebh - Set receive mode                      ebh
;      edh - Get current mode                      eah, ebh
;
;      2 dummy commands are for synchronization
;      eeh - Dummy command                        eeh
;      efh - Dummy command                        efh
;
;      'x' indicates valid data bits
;
```

```

;      68h - read rsecu  seconds units      0000|xxxx
;      69h - read rsect  seconds tens      0001|0xxx
;      6ah - read rminu  minutes units     0010|xxxx
;      6bh - read rmint  minutes tens     0011|0xxx
;      6ch - read rhru   hours   units     0100|xxxx
;      6dh - read rhrt   hours   tens     0101|00xx
;      6eh - read rdayu  days   units     0110|xxxx
;      6fh - read rdayt  days   tens     0111|xxxx
;;     a8h - read rdayh  days   hundreds  1000|00xx

```

; Interrupt status values:

```

;;     68h - Time set interrupt (seconds=30, frames=0)
;     69h - Gained time code
;     6ah - Lost time code
;     6bh - End of time code interrupt (After user group 8)
;     6ch - Start of time code interrupt (After last sync bit)
;
; no IRIG is indicated by a seconds unit of h'f (normally impossible)

```

The processes for initializing the card is:

- Send Set Receive Mode (ebh).
- Set interrupt vector in PC.
- Activate interrupt vector in PC. (unmask)

Interrupt handler does this:

- Read timecode from card
- Set PC clock from timecode.

Read timecode is:

- Rec Time read request (e8h). This causes the current time to be copied into a reading area. This is done to allow accurate asynchronous reads.
- Read IRIG-B1 timecode groups using commands 68h-a8h.

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