Imagine COMMUNICATIONS™

Installation and Operation Manual

# UDC-5212 and DTD-5225

## Digital Time/Date Display Clocks

**Edition D**

**52XX MAN**

Delivering the Moment

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## Publication Information



This publication is designed to assist in the use of the product as it exists on the date of publication of this manual, and may not reflect the product at the current time or an unknown time in the future. This publication does not in any way warrant description accuracy or guarantee the use for the product to which it refers. Imagine Communications reserves the right, without notice to make such changes in equipment, design, specifications, components, or documentation as progress may warrant to improve the performance of the product.

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# UDC-5212 and DTD-5225

## Digital Time/Date Display Clocks

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# Installation and Operation Manual

**Edition D**
**August 2006**

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## Chapter 2: DTD-5225 Series Digital Time/Date Display

## Chapter 3: Supporting Information

# Preface

# Manual Information

## Purpose

This manual details the features, installation, operation, maintenance, and specifications for UDC-5212 and DTD-5225 Digital Time/Date Display Clocks.

## Audience

This manual is written for engineers, technicians, and operators responsible for installation, setup, maintenance, and/or operation of UDC-5212 and DTD-5225 Digital Time/Date Display Clocks.

## Revision History

**Table P-1.** Revision History of Manual

| Edition | Date | Comments |
|---|---|---|
| C | December 1998 | Full release |
| D | August 2006 | Manual reformatted and updated |

# Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

**Table P-2.** Writing Conventions

| Term or Convention | Description |
|---|---|
| **Bold** | Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names |
| *Italics* | Indicates E-mail addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis |
| CAPS | Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE |
| **Code** | Indicates variables or command-line entries, such as a DOS entry or something you type into a field |
| > | Indicates the direction of navigation through a hierarchy of menus and windows |
| hyperlink | Indicates a jump to another location within the electronic document or elsewhere |
| Internet address | Indicates a jump to a Web site or URL |
| **Note** | Indicates important information that helps to avoid and troubleshoot problems |

# Obtaining Documents

Product support documents can be viewed or downloaded from our Web site at www.broadcast.harris.com/leitch (go to **Support> Documentation**). Alternatively, contact your customer service representative to request a document.

# Unpacking/Shipping Information

## Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

## Product Servicing

UDC-5212 and DTD-5225 Digital Time/Date Display Clocks are not designed for field servicing. All upgrades, modifications, or repairs require you to return the product to the Customer Service center.

## Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

# Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive takes effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and "lead-free." (See our Web site, www.broadcast.harris.com/leitch, for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant emblem, as shown in Figure P-1.


**Figure P-1.** RoHS Compliance Emblem

# Waste from Electrical and Electronic Equipment (WEEE) Compliance

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users will be required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See our Web site, www.broadcast.harris.com/leitch, for more information on dates and deadlines for compliance.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant emblem, as shown in Figure P-2.

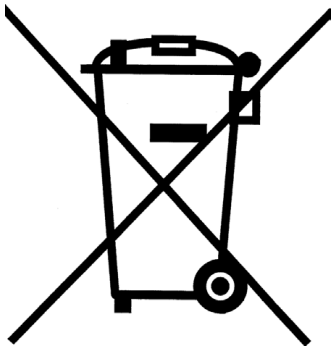

**Figure P-2.** WEEE Compliance Emblem

# Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. If this product is rack-mountable, it should be mounted in an appropriate rack using the rack-mounting positions and rear support guides provided. It is recommended that each frame be connected to a separate electrical circuit for protection against circuit overloading. If this product relies on forced air cooling, it is recommended that all obstructions to the air flow be removed prior to mounting the frame in the rack.

If this product has a provision for external earth grounding, it is recommended that the frame be grounded to earth via the protective earth ground on the rear panel.

***IMPORTANT!*** Only qualified personnel should perform service procedures.

## Safety Terms and Symbols in this Manual

**WARNING**

**Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.**

**CAUTION**

**Statements identifying conditions or practices that can result in damage to the equipment or other property.**

Chapter 1

# UDC-5212 Universal Digital Clock

## Overview

This chapter provides installation and operation information about the UDC-52125 Universal Digital Clock. It includes the following topics:

# Introduction

The UDC-5212 Universal Digital Clock is a silent, digitally controlled, self-setting clock with an analog-looking face. It may operate either stand-alone via power line frequency or internal crystal, or with a SMPTE or EBU serial timecode input as either a clock or a timecode reader.

When provided with a SMPTE or EBU timecode source, the UDC-5212 is instantly self-setting.

In the event of a power failure, the UDC-5212 maintains the correct time internally via a battery-backed timekeeping memory. If power should be restored without timecode, the UDC-5212 will self-set to the correct time as maintained by the battery backup, and then continue to operate on internal crystal or power line timebase.

The UDC-5212 clock may operate with either a sweep or single step second “hand” as simulated by the perimeter LEDs. The UDC will also automatically decode either SMPTE or EBU timecode inputs. Additionally, the UDC may function as a timecode generator when operated from its internal crystal. Either SMPTE or EBU timecode may be generated and used to drive other clocks.

The UDC-5212 clock is compatible with a user-defined auxiliary offset and date when driven from a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. A local offset can also be programmed for any offset up to 23:59:59. Time display can be in either 12 or 24 hour format and may display hours:minutes:seconds or minutes:seconds.frames. When available, the date may be displayed as month:day:year or day:month:year.

In the event of an input timecode failure, the colon LEDs will flash at the rate of twice per second. The UDC clock will then automatically switch to the user-selected secondary timebase, either power line frequency or internal crystal. (The power line frequency is automatically determined during power-up.)

If timecode operation is not required, the UDC clock may be set to use the secondary timebase permanently, and the colon LEDs will not flash.

If operated as a timecode reader display, the UDC continually tracks the input code and stops when the input fails.

The colon LEDs extinguish when timecode is absent in this mode.

# Installation

## General

This UDC-5212 Universal Digital Clock has been carefully inspected, tested, calibrated, and aligned before shipment to insure years of trouble-free operation. Please check the equipment for any visible damage which may have occurred in shipping.

## Clock Mounting

The UDC-5212 Universal Digital Clock is designed for wall mounting. Rack mounting kits are optional.

The rear panel of the UDC-5212 is provided with four rubber feet and four keyholes. These are dimensioned for #8 screws. The rear panel is recessed for connectors and to allow the clock to be placed close to the wall.

Table 1-1 provides information about the UDC-5212 clock wall mounting and clearance specifications. The minimum clearances, are measured in inches from the mounting keyhole centers to the outside edge of each clock

**Table 1-1.** Clock Wall Mounting and Clearance Specifications

| Overall Dimensions | Mounting Keyhole Centers | Clearances (Inches) |
|---|---|---|
| 14.0×14.0×3.375 in. | 12.0×10.5 in. (4 keyholes) | • Top edge 1.125<br>• Sides 1.0<br>• Bottom edge 2.375 |

**Note**

A convenient template drawing showing the correct mounting centers is included with the clock.

## Rack Mounting

The UDC-5212 clock can be rack mounted with the optional rack mounting kit. The kit is installed by removing the back panel side screws, placing the rack mount in position, and reinstalling the screws. The rack mount kits are designated as 5212RM.

Table 1-2 lists the required rack space for each clock.

**Table 1-2.** Required Space For Rack Mounting UDC-5212

| Rack Units | Inches |
|---|---|
| 8 | 14.0 |

# Rear Panel

The rear panel is provided with two spring-loaded speaker-type connectors. Depending on the configuration, these may be used to accept the serial timecode (SMPTE or EBU) or may be used as the timecode output terminals. The rear panel also indicates the type of operation, that is either MASTER or SLAVE. All clocks are shipped configured for timecode input (slave) operation, unless otherwise specified when ordering. A standard AC power connector and cord are also included.

# Control Modes

Selection of the clock control modes is achieved with the rear panel DIP switches. Figure 1-1illustrates the possible two DIP switch states

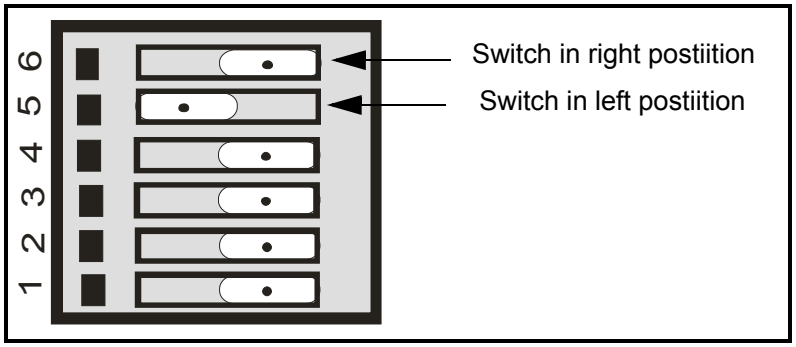


**Figure 1-1.** DIP Switch Positions

Table 1-3 lists the Clock Control mode DIP switch options.

**Table 1-3.** Clock Control Mode DIP switch options

| Dip Switch | Switch Postion Options | |
|---|---|---|
| | **Left** | **Right** |
| 6 | Clock<br>(See "Clock Mode" on page 6) | Timecode<br>(See "Timecode Reader Mode" on page 6) |
| 5 | SMPTE | EBU (Sweep seconds) |
| 4 | Internal | Line |
| 3 | Normal | Use offset (MTG-3901, CSD-3901/3902, or CSD-5300 required)<br>(See "Auxiliary Offset" on page 7) |
| 2 | Normal | Use secondary reference (date if code is present)<br>(See "Secondary Reference Mode" on page 7) |
| 1 | 12 Hour (Clock selected);<br>HH:MM:SS (timecode selected)<br>DD:MM:YY (date selected) | 24 Hour (Clock selected);<br>MM:SS:FF (timecode selected);<br>MM:DD:YY (date selected) |

# Operation

## Clock Mode

To set the UDC-5212 to operate as a timecode reading clock, DIP Switch 6 must be in the CLOCK position. No setting of time is required when input timecode is provided to the UDC-5212 clock. Once valid timecode is detected, either SMPTE or EBU, the clock will instantly self-set.

If there is a failure or error with the input timecode, the clock will switch to the secondary reference as selected by DIP Switch 4 on the rear panel. Either the clock's own internal crystal or the power line frequency may be selected as the secondary reference. Both will provide the clock with a timebase during the absence of input timecode. (Note that either a 50 Hz or 60 Hz power line frequency is suitable for the timebase, since the clock automatically selects the correct frequency available.)

To signal the failure of the input timecode, the colon LEDs on the clock face will flash at a rate of twice per second. When correct timecode is re-established, the clock will again self-set to the new time, and the colon LEDs will stop flashing.

Similarly, if there is an error in the input timecode, the clock will automatically switch to the secondary reference, and the colon LEDs will flash.

When used in Clock mode, the UDC may display time in either 12- or 24-hour format. DIP Switch 1 selects the display format, 12-hour format uses the AM/PM LEDs, while the 24-hour format does not.

## Timecode Reader Mode

To set the UDC-5212 to operate strictly as a timecode display, DIP Switch 6 must be in the TIME CODE position. In this mode, the UDC-5212 will operate only as a digital reader.

If there is a failure of input timecode, the colons will extinguish, and the last valid time will remain displayed. No switching to a secondary reference occurs.

When used in timecode mode, the UDC always displays time in 24-hour format, without AM and PM indications. The digits may be configured for HH:MM:SS display or MM:SS.FF display using DIP Switch 1.

## Secondary Reference Mode

The UDC-5212 will run as standard wall clock when no input timecode is provided. Rear panel DIP Switch 4 selects the timebase to be used, either the clock's internal crystal, or the power line frequency (50/60Hz). DIP Switch 6 must be in the CLOCK position.

Rear panel DIP Switch 2 should be switched to the RUN ON SECONDARY position when the clock is used in this mode. When in this position, the colon LEDs will not flash. Note that the clock will still function without selecting RUN ON SECONDARY. However, the colon LEDs will flash at the rate of twice per second to indicate the absence of input timecode.

When operating in this mode, the time must be set manually using the rear panel set switches, MANUAL SET, CW, and CCW. Once set, however, the correct time is maintained even in the event of a power failure. Upon the return of external power, the clock will automatically self-set to the correct time. The internal battery-backed timekeeping function will maintain time for up to four years in the absence of external power.

## Seconds Display

The perimeter LEDs may display seconds one at a time or in a sweep fashion—leaving on each successive LED until the top of the minute is reached. To enable the sweep display, use DIP Switch 5 to select EBU (SWEEP SECONDS). For single LED per second display, place DIP Switch 5 in the SMPTE position.

## Auxiliary Offset

DIP Switch 3 allows access to a user-programmed auxiliary offset from the input timecode's user bits. However, the timecode source must have the ability to generate the correct information in the user bits.

The MTG-3901, CSD-3901/3902, and CSD-5300 Master Clock System Drivers are real time timecode source, which can program such an offset into the timecode's user bits. The offset is programmed in 30 minute intervals up to 23 hours and 30 minutes, using 6 bits of the timecode's user bit space.

The offset is encoded using timecode bits 36, 37, 38, 52, 53, and 54. Bit 36 is the least significant bit (LSB), while bit 54 is the most significant bit (MSB).

When DIP Switch 3 on the UDC-5212 clock is in the USE AUX OFFSET position, the auxiliary offset found in the input timecode's user bits is added to the input timecode. The clock then displays the total. If no input timecode is available, DIP Switch 3 has no effect. If the user bits are incorrectly programmed, the offset is disregarded.

A programmed local offset (See -Clock Setting Controls on page 1 of this manual) is still in effect while using the auxiliary offset. The local offset is totally transparent to the input timecode's user bit offset.

If input timecode is removed while USE AUX OFFSET is selected, the clock will retain the time with the offset added, not the original time.

## Date Display

The UDC may display the date on the central digits when used with a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. The perimeter seconds LEDs will continue to follow the time from the input timecode. DIP Switch 2 must be set to the RUN ON SECONDARY (DATE IF CODE PRESENT) position to activate the Date display. DIP Switch 1 is used to select the date display format; either DD:MM:YY or MM:DD:YY may be displayed.

## Timecode Generator Mode

The UDC-5212 clock can also function as real time timecode generator, essentially operating as a master clock. This timecode output may be used to drive other clocks or Time-Code-reading devices.

To configure the UDC as a timecode generator, an internal connector must be transposed so that the rear panel speaker-type connectors become the timecode output terminals.

To do this, remove the 10 small screws along the outside edge of the clock. Carefully lift the rear panel from the chassis, being sure not to remove the panel as it will remain connected to the display assembly and face.

Follow the two wires from the speaker-type terminals to their connector on the PC board attached to the front chassis. The connector must be removed and reversed. Normally, the wires on the connector are located near the left side of the 10-pin header, at Pin 1. Reversing this will relocate the wires on the connector to Pin 10. When completed, return the rear panel to the chassis and refasten the 10 screws.

After completing this procedure, the rear panel speaker-type terminals will output real time timecode when DIP Switch 4 is set to the INTERNAL position. The clock uses the internal crystal for a timebase when operated in this fashion.

Additionally, DIP Switch 2 must be set to the RUN ON SECONDARY position. This disables the flashing colons.

DIP Switch 5 is used to select the output timecode format: either SMPTE (non-Drop Frame) or EBU.

If EBU timecode output format is selected, the seconds LEDs will switch to sweep display mode. To return to the single step seconds LEDs, move DIP Switch 3 to the USE AUX OFFSET position.

## Brightness Adjustment

The central digit's brightness is incrementally adjusted by holding the **MANUAL SET** and either the **CW** or **CCW** buttons simultaneously. Holding **MANUAL SET** and **CW** increases the brightness one level per second, while holding **MANUAL SET** and **CCW** decreases the brightness. There are 16 levels of brightness.

To adjust the perimeter seconds LEDs, two single-turn variable resistors are located behind the two small holes on the rear panel. A small flat-blade screwdriver may be inserted to adjust the brightness of the outer seconds LEDs and the inner 5th second marker LEDs. Turning the adjustment clockwise (as viewed from the back) increases brightness.

To illuminate all the LEDs, press and hold both the **CW** and **CCW** buttons for ten seconds. Re-power the UDC to return to normal operations.

# Clock Setting Controls

The UDC-5212 Clock may be set using the three push button switches located on the rear panel. The push buttons, labeled **MANUAL SET**, **CW,** and **CCW**, may be used to program a local time zone offset, or to manually set the time.

## Manual Time Setting

To manually set the clock time, follow these steps:

1. Verify that DIP Switch 2 (the second one up from the bottom) is in the NORMAL position.
2. Enter Manual Set Mode by pressing the **MANUAL SET** button until the seconds LEDs become illuminated and the seconds digits flash.
3. Use the **CW** and **CCW** buttons to set the time. The **CW** button increments the displayed value by one, while the **CCW** button resets the value to zero.
4. Press and release the **MANUAL SET** button to move to the next pair of digits from seconds to minutes and minutes to hours.
5. After setting the desired hours value, press and release the **MANUAL SET** button to start the new time.

Manually setting the time in this fashion erases any local offset previously programmed (See “Local Offset Programming”).

## Local Offset Programming

A local time offset may be electronically programmed in order to provide an offset from the input timecode. This is particularly useful for displaying multiple time zones from the same timecode source.

DIP Switch 3 (the third one up from the bottom) MUST be in the USE AUX OFFSET position in order to program the local offset. This switch may be returned to its previous position after programming the offset.

To set a local offset, follow these steps:

1. Enter Manual Set Mode by pressing the **MANUAL SET** button until the seconds LEDs turn off and the seconds digits flash.
2. Use the **CW** and **CCW** buttons to set the offset time value. The **CW** button increments the displayed value by one, while the **CCW** button resets the value to zero.

3. Press and release the **MANUAL SET** button to move to the next pair of digits, from seconds to minutes and minutes to hours.
4. After setting the hours value, press and release the **MANUAL SET** button to complete the programming procedure. The offset will become effective immediately.

The local offset may be used in addition to any AUX. OFFSET as programmed by a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. All offsets are additive.

**Note**

The offset value programmed is always ADDED to the current time. To achieve a -3 hour offset, program an offset value of 21 hours.

# Time Zone Changes

To simplify clock setting for seasonal time zone changes, do one of the following:

- To advance the time by one hour, press and hold the **CW** button for 10 seconds. The clock will automatically self-set to the new time.
- To set the time back by one hour, press and hold the **CCW** button for 10 seconds. The clock will automatically self-set to the new time.

For information on the module that controls the UDC-5212, please See -5100DL Drive Logic Module on page 1 of this manual.

# Specifications

Specifications and designs are subject to change without notice.

## Electrical

**Table 1-4.** Electrical

| Item | Specification |
|---|---|
| Electrical voltage | 115/230 VAC ±20%, internally selectable |
| Frequency | 50 or 60 Hz, automatic selection |

## Inputs and Outputs

**Table 1-5.** Inputs

| Item | Specification |
|---|---|
| Serial timecode | SMPTE/EBU |
| Impedance | Hi-Z, balanced |
| Level | 4 Vp-p ±8 dB |

**Table 1-6.** Outputs

| Item | Specification |
|---|---|
| Serial timecode | SMPTE/EBU (non-drop frame) |
| Impedance | Lo-Z, balanced |
| Level | +10 dB nominal unloaded -3dB into 180 Ohms |

## Time Base

**Table 1-7.** Time Base

| Item | Specification |
|---|---|
| Timecode | SMPTE/EBU, automatic selection |
| Internal | Crystal, ± 4 sec/month, 0°—50°C |
| Power line | 50 or 60 Hz, automatic selection |
| Battery backup | Crystal, ± 10 sec/month, 0°—50°C |

# Controls

**Table 1-8.** Controls

| Item | Specification |
|---|---|
| Output timecode format | SMPTE/EBU |
| Secondary reference | Internal or power line |
| Second LEDs | Single step or continuous sweep |
| Aux. offset | Requires one of the following system clock drivers:<br>• MTG-3901<br>• CSD-3901/3902<br>• CSD-5300 |
| Date display | M/D/Y or D/M/Y<br>Requires one of the following system clock drivers:<br>• MTG-3901<br>• CSD-3901/3902<br>• CSD-5300 |
| Local offset | Any amount, user selectable |
| Display | 12 or 24 hour format, H:M:S or M:S:F |

# Mechanical

**Table 1-9.** Mechanical Specifications

| Item | Specification |
|---|---|
| Style | Wall-mount |
| Face diameter | 11.5 in. (292 mm) |
| Overall dimensions | 14.0×14.0×3.375 in. (356×356×86 mm) |

Chapter 2

# DTD-5225 Series Digital Time/Date Display

## Overview

This chapter provides installation and operation information about the DTD-5225 series digital time/date display. It includes the following topics:

# Introduction

The DTD-5225 Digital Time/Date Display Clock is a silent, digitally controlled, self-setting clock. It may operate either stand-alone via power line frequency or internal crystal or with a SMPTE or EBU serial timecode input as either a clock or a timecode reader.

When provided with a SMPTE or EBU timecode source, the DTD-5225 is instantly self-setting.

In the event of a power failure, the DTD-5225 maintains the correct time internally via a battery-backed timekeeping memory. If power should be restored without timecode, the DTD-5225 will self-set to the correct time as maintained by the battery backup, and then continue to operate on internal crystal or power line timebase.

The DTD will automatically decode either SMPTE or EBU timecode inputs. Additionally, the DTD may function as a timecode generator when operated from its internal crystal. Either SMPTE or EBU timecode may be generated and used to drive other clocks.

The DTD-5225 clock is compatible with a user-defined auxiliary time offset and date when driven a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. A local offset can also be programmed for up to 23:59:59. Time display can be in either 12 or 24 hour format and may display hours:minutes:seconds or minutes:seconds.frames. When available, the date may be displayed as month:day:year or day:month:year.

In the event of a timecode input failure, the colon LEDs will flash at the rate of twice per second. The DTD clock will then automatically switch to the user-selected secondary timebase, either power line frequency or internal crystal. (The power line frequency is automatically determined during power-up.)

If timecode operation is not required, the DTD clock may be set to use the secondary timebase permanently, and the colon LEDs will not flash.

If operated as a timecode reader display, the DTD continually tracks the input code and stops when the input fails. The colon LEDs extinguish when timecode is absent in this mode.

# Installation

Before installing the clock, see the DTD-5225 Quick Setup Instructions included with this product.

## General

Your DTD-5225 Digital Time/Date Display Clock has been carefully inspected, tested, calibrated, and aligned before shipment to insure years of trouble-free operation. Please check the equipment for any visible damage which may have occurred in shipping.

## Clock Mounting

The DTD-5225 Digital Time/Date Display Clock is designed for wall mounting. Rack mounting kits are optional.

The rear panel of the DTD-5225 is provided with four rubber feet and two keyholes. These are dimensioned for #8 screws. The rear panel is recessed for connectors and to allow the clock to be placed close to the wall. The clocks overall dimensions are listed in the "Specifications" on page 25.

**Note**

A convenient template drawing showing the correct mounting centers is included with the clock.

## Rack Mounting

The DTD-5225 clock can be rack mounted with the optional rack mounting kit. The kit is installed by removing the back panel side screws, placing the rack mount in position, and re-installing the screws. The DTD-5225 requires two rack units of height (2 RU) or 3.5 inches.

## Rear Panel

The rear panel is provided with two spring-loaded speaker-type connectors. Depending on the configuration, these may be used to accept the serial timecode (SMPTE or EBU) or may be used as the timecode output terminals. A label indicates whether the clock is in Master or Slave configuration. All clocks are shipped configured for timecode input (slave) operation, unless otherwise specified when ordering. A standard AC power connector and cord are also included.

# Control Modes

Selection of the clock control modes is achieved with the rear panel DIP switches. Figure 2-2illustrates the possible two DIP switch states

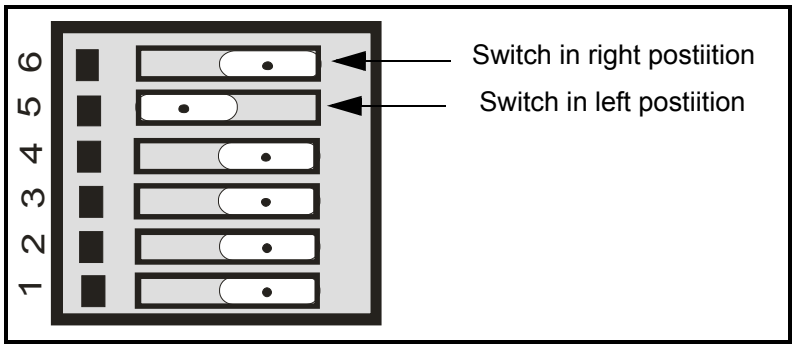


**Figure 2-2.** DIP Switch Positions

Table 2-10 lists the Clock Control mode DIP switch options.

**Table 2-10.** Clock Control Mode DIP switch options

| Dip Switch | Switch Postion Options | |
|---|---|---|
| | **Left** | **Right** |
| 6 | Clock<br>(See "Clock Mode" on page 19) | Timecode<br>(See "Timecode Reader Mode" on page 19) |
| 5 | SMPTE | EBU (Sweep seconds) |
| 4 | Internal | Line |
| 3 | Normal | Use offset (MTG-3901, CSD-3901/3902, or CSD-5300 required)<br>(See "Auxiliary Offset" on page 20) |
| 2 | Normal | Use secondary reference (date if code is present)<br>(See "Secondary Reference Mode" on page 20) |
| 1 | 12 Hour (Clock selected);<br>HH:MM:SS (timecode selected)<br>DD:MM:YY (date selected) | 24 Hour (Clock selected);<br>MM:SS:FF (timecode selected);<br>MM:DD:YY (date selected) |

# Operation

## Clock Mode

To set the DTD-5225 to operate as a timecode reading clock, DIP switch 6 must be in the CLOCK position. No setting of time is required when input timecode is provided to the DTD-5225 clock. Once valid timecode is detected, either SMPTE or EBU, the clock will instantly self-set.

If there is a failure or error with the input timecode, the clock will switch to the secondary reference as selected by DIP switch 4 on the rear panel. Either the clock's own internal crystal or the power line frequency may be selected as the secondary reference. Both will provide the clock with a timebase during the absence of input timecode. (Note that either a 50 Hz or 60 Hz power line frequency is suitable for the timebase, since the clock automatically selects the correct frequency available.)

To signal the failure of the input timecode, the colon LEDs on the clock face will flash at a rate of twice per second. When correct timecode is re-established, the clock will again self-set to the new time, and the colon LEDs will stop flashing.

Similarly, if there is an error in the input timecode, the clock will automatically switch to the secondary reference, and the colon LEDs will flash.

When used in Clock mode, the DTD may display time in either 12- or 24-hour format. DIP switch 1 selects the display format; 12-hour format uses the
AM/PM LEDs, while the 24-hour format does not.

## Timecode Reader Mode

To set the DTD-5225 to operate strictly as a timecode display, DIP switch 6 must be in the TIMECODE position. When input SMPTE or EBU timecode is present, the DTD will follow it directly, either up, down, or paused.

If there is a failure of input timecode, the colons will extinguish and the last valid time will remain displayed. **No switching to a secondary reference occurs**.

When used in timecode mode, the DTD always displays time in 24-hour format without AM and PM indications. The digits may be configured for HH:MM:SS display or MM:SS.FF display using DIP switch 1.

## Secondary Reference Mode

The DTD-5225 will run as standard wall clock when no input timecode is provided. Rear panel DIP switch 4 selects the timebase to be used, either the clock's internal crystal, or the power line frequency (50/60Hz). DIP switch 6 must be in the CLOCK position.

Rear panel DIP switch 2 should be switched to the RUN ON SECONDARY position when the clock is used in this mode. When in this position, the colon LEDs will NOT flash. Note that the clock will still function without selecting RUN ON SECONDARY. However, the colon LEDs will flash at the rate of twice per second to indicate the absence of input timecode.

When operating in this mode, the time must be set manually using the rear panel set switches, **MANUAL SET**, **CW**, and **CCW** (see the Clock Setting Controls section). Once set, however, the correct time is maintained even in the event of a power failure. Upon the return of external power, the clock will automatically self-set to the correct time. The internal battery-backed timekeeping function will maintain time for up to four years in the absence of external power.

## Auxiliary Offset

DIP switch 3 allows access to a user-programmed auxiliary offset from the input timecode's user bits. The timecode source, however, must have the ability to generate the correct information in the user bits.

The MYG-3901, CSD-3901/3902, and CSD-5300 Master Clock System Drivers are real time timecode source which can program such an offset into the timecode's user bits. The offset is programmed in 30 minute intervals up to 23 hours and 30 minutes, using 6 bits of the timecode's user bit space.

The offset is encoded using timecode bits 36, 37, 38, 52, 53, and 54. Bit 36 is the least significant bit (LSB), while bit 54 is the most significant bit (MSB).

When DIP switch 3 on the DTD-5225 clock is in the USE AUX OFFSET position, the auxiliary offset found in the input timecode's user bits is added to the input timecode. The clock then displays the total. If no input timecode is available, DIP switch 3 has no effect. If the user bits are incorrectly programmed, the offset is disregarded.

A programmed local offset is still in effect while using the auxiliary offset. The local offset is totally transparent to the input timecode's user bit offset.

If input timecode is removed while USE OFFSET is selected, the clock will retain the time with the offset added, not the original time.

## Date Display

The DTD may display the date when used with a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. DIP Switch 1 is used to select the date display format; either YY:MM:DD or DD:MM:YY may be displayed.

## Timecode Generator Mode

The DTD-5225 clock can also function as real time timecode generator, essentially operating as a master clock. This timecode output may be used to drive other clocks or timecode reading devices.

To configure the DTD as a timecode generator, an internal connector must be transposed so that the rear panel speaker-type connectors become the timecode output terminals.

To do this, remove the 4 small screws along the outside edge of the clock. Carefully lift the out rear panel from the chassis.

Follow the two wires from the speaker-type terminals to their connector on the PC board. The connector must be removed and reversed. Normally, the wires on the connector are located at pin 1. Reversing this will relocate the wires on the connector to pin 10. When completed, return the rear panel to the chassis, and re-fasten the 4 screws.

After completing this procedure, the rear panel speaker-type terminals will output real time timecode when DIP switch 4 is set to the INTERNAL position. The clock uses the internal crystal for a timebase when operated in this fashion.

Additionally, DIP switch 2 must be set to the RUN ON SECONDARY position. This disables the flashing colons.

DIP switch 5 is used to select the output timecode format: either SMPTE (non-Drop Frame) or EBU.

## Brightness Adjustment

The digit's brightness is incrementally adjusted by holding the **MANUAL SET** and either the **CW** or **CCW** buttons simultaneously. Holding **MANUAL SET** and **CW** increases the brightness one level per second, while holding **MANUAL SET** and **CCW** decreases the brightness. There are 16 levels of brightness.

# Clock Setting Controls

The DTD-5225 Clock may be set using the three push button switches located on the rear panel. The push buttons, labeled **MANUAL SET**, **CW,** and **CCW**, may be used to program a local time zone offset, or to manually set the time.

**Note**

If this operation is attempted while input timecode is available, NO time change will occur. The clock will automatically reset itself according to the input timecode.

## Manual Time Setting

To manually set the clock time, follow these steps:

1. Verify that DIP Switch 2 (the second one up from the bottom) is in the NORMAL position.
2. Enter Manual Set Mode by pressing the **MANUAL SET** button until the seconds LEDs become illuminated and the seconds digits flash.
3. Use the **CW** and **CCW** buttons to set the time. The **CW** button increments the displayed value by one, while the **CCW** button resets the value to zero.
4. Press and release the **MANUAL SET** button to move to the next pair of digits from seconds to minutes and minutes to hours.
5. After setting the desired hours value, press and release the **MANUAL SET** button to start the new time.

Manually setting the time in this fashion erases any local offset previously programmed (See “Local Offset Programming”).

To simplify clock setting for seasonal time zone changes, follow these steps to make one hour time changes:

- To advance the time by one hour, press and hold the **CW** button for 10 seconds. The clock will automatically self-set to the new time.
- To set the time back by one hour, press and hold the **CCW** button for 10 seconds. The clock will automatically self-set to the new time.

# Local Offset Programming

A local time offset may be electronically programmed in order to provide an offset from the input timecode. This is particularly useful for displaying multiple time zones from the same timecode source.

DIP Switch 3 (the third one up from the bottom) MUST be in the USE AUX OFFSET position in order to program the local offset. This switch may be returned to its previous position after programming the offset.

To set a local offset, follow these steps:

1. Enter Manual Set Mode by pressing the **MANUAL SET** button until the seconds digits flash.
2. Use the **CW** and **CCW** buttons to set the offset time value. The **CW** button increments the displayed value by one, while the **CCW** button resets the value to zero.
3. Press and release the **MANUAL SET** button to move to the next pair of digits, from seconds to minutes and minutes to hours.
4. After setting the hours value, press and release the **MANUAL SET** button to complete the programming procedure. The offset will become effective immediately.

The local offset may be used in addition to any AUX. OFFSET as programmed by a MTG-3901, CSD-3901/3902, or CSD-5300 Master Clock System Driver. All offsets are additive.

**Note**

The offset value programmed is always ADDED to the current time. To achieve a -3 hour offset, program an offset value of 21 hours.

# Specifications

Specifications and designs are subject to change without notice.

## Electrical

**Table 2-11.** Electrical

| Item | Specification |
|---|---|
| Electrical voltage | 115/230 VAC ±20%, internally selectable |
| Frequency | 50 or 60 Hz, automatic selection |

## Inputs and Outputs

**Table 2-12.** Inputs

| Item | Specification |
|---|---|
| Serial timecode | SMPTE/EBU |
| Impedance | Hi-Z, balanced |
| Level | 4 Vp-p ±8 dB |

**Table 2-13.** Outputs

| Item | Specification |
|---|---|
| Serial timecode | SMPTE/EBU (non-drop frame) |
| Impedance | Lo-Z, balanced |
| Level | +10 dB nominal unloaded -3dB into 180 Ohms |

## Time Base

**Table 2-14.** Time Base

| Item | Specification |
|---|---|
| Timecode | SMPTE/EBU, automatic selection |
| Internal | Crystal, ± 4 sec/month, 0°—50°C |
| Power line | 50 or 60 Hz, automatic selection |
| Battery backup | Crystal, ± 10 sec/month, 0°—50°C |

# Controls

**Table 2-15.** Controls

| Item | Specification |
|---|---|
| Output timecode format | SMPTE/EBU |
| Secondary reference | Internal or power line |
| Second LEDs | Single step or continuous sweep |
| Aux. offset | Requires one of the following system clock drivers:<br>• MTG-3901<br>• CSD-3901/3902<br>• CSD-5300 |
| Date display | M/D/Y or D/M/Y<br>Requires one of the following system clock drivers:<br>• MTG-3901<br>• CSD-3901/3902<br>• CSD-5300 |
| Local offset | Any amount, user selectable |
| Display | 12 or 24 hour format, H:M:S or M:S:F |

# Mechanical

**Table 2-16.** Mechanical Specifications

| Item | Specification |
|---|---|
| Style | Wall-mount |
| Face diameter | 11.5 in. (292 mm) |
| Overall dimensions | 14.0×14.0×3.375 in. (356×356×86 mm) |

Chapter 3

# Supporting Information

## Clock Battery Replacement Procedure

Typically, the battery will last for more than four years of actual use; the battery is only in use when AC power is removed from the unit. Once battery failure has occurred, the clock will NOT self-set when AC power is restored.

The battery is a Duracell CR2032. It should be replaced only with a battery of the same type and size. Before installation, verify that the new battery voltage is 3.0 Volts or greater. To replace the battery, follow these steps:

1. Remove AC power from the clock and remove the back panel.
2. Remove the old battery B1 from its socket, being careful not to damage other components.
3. Carefully short U4 Pin 16 to GROUND.
4. Short U4 Pin 10 to GROUND.
5. Install the new battery (B1) in the holder, noting the proper polarity.
6. Momentarily short U4 Pin 10 to GROUND.
7. Replace the back panel. Do NOT re-install the screws at this time.
8. Re-apply AC power to the clock, and confirm start-up (LED remains on, hands do NOT move).
9. Remove AC power from the clock, and again remove the back panel.

10. Confirm that U4 Pin 9 is exactly at GROUND. Any voltage greater than zero is not allowable, even a few tenths of a Volt. If a non-zero voltage is observed, remove AC power, remove battery B1, and repeat this procedure from the beginning.
11. Confirm that the voltage of battery B1 is still 3.0 Volts or greater.
12. Re-attach the back panel completely, re-installing all screws.
13. Apply AC power to the clock. The LED will remain ON. Immediately perform the Local Offset procedure described in "Clock Setting Controls" for the appropriate model of clock.

# 5225DB Display Module

The 5225DB Display module communicates with the microcontroller on the 5100DL board via a high speed serial bus. The digits data is transferred from the microcontroller to a MAX7219 8x8 display driver IC.

This display driver IC generates all the control functions to drive the multiplexed digit displays. The segment control lines are fed to a pair of LM339 voltage comparators. These comparators perform a level-shift of the display driver output voltage (5 V) to a higher voltage (12 V) required by the LEDs. This higher voltage signal is then used to turn on the 2N4401 transistors which provide the current to actually drive the LED segments.

Similarly, the display driver IC directly controls the sink transistors for each LED digit. These 2N5323 transistors are capable of passing the large amounts of current supplied to the LEDs.

The voltage regulator provides 12 Volts for half of the digits, while the regulator on the 5100DL board provides this voltage for the other half of the digits.


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