

# Krontek KT2010 Dual Circuit Signal Controller



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## INTRODUCTION

The Krontek KT2010 Signal Controller is a Programmable Controller with an auto-sensing 10/100Mbit Ethernet Interface. It provides two output control relays and two programmable control inputs. Circuit 2 may be configured to function as a master clock control to synchronize analogue or digital slave clocks to network time.

The Controller operates “stand alone”, that is, it does not require any external support for normal operation, such as a PC or other device that can be switched off inadvertently. During a network failure the Controller will continue to operate as programmed.

The Controller derives its time from the network via an SNTP Server. SNTP time can be sourced from the Internet or from timeservers such as the Krontek KT2000 GPS Time Server. The Controller contains a battery backed Real Time Clock that will maintain the time for a period of 4 days in the event of a power failure.

The Controller can be programmed from any PC on the network via a telnet session. The output relays may also be manually controlled via the network.

The Controller has three individual, one hundred entry, signal control programs that may be selected manually or automatically via a programmable calendar schedule. Signal and Calendar schedules are stored in non-volatile (permanent) memory with a minimum data retention period of 100 years.

With its unique calendar control schedule the Controller is ideal as a “time signal” and clock controller for education facilities and industry but of course is equally suitable for other time based control such as lighting, pumps etc.

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## Communicating with the Controller

Before you can communicate with the Controller you must know its IP address.

The Controller is shipped with its IP address set to 192.168.0.128, however this may not be suitable for your network. If not, copy the utility DeviceDetector.exe from the floppy disk that shipped with the product to your PC. When you launch the program it will scan the network for Krontek Network Time devices (irrespective of their IP address) and list them. Click on the device you wish to configure. The IP address, Subnet Mask and Gateway address will be presented for editing.

After you update the settings the Controller will reboot. You will need to run DeviceDetector again to find the Controller and ensure the new address is correct.

Once you have set the address you can establish a telnet session using a telnet communications program such as HyperTerminal, HyperTerminal is usually included with your PC operating system. Use windows 'start' -> 'help'-> 'search' and type in HyperTerminal to locate it on your machine. If it is not installed it is available from [www.hilgraeve.com](http://www.hilgraeve.com).

When using HyperTerminal use the TCP/IP connect option, the Controllers IP address and port 23.

An advantage of using a program like HyperTerminal is the ability to cut and then paste to a text program the lists of signal and calendar entries (see list commands). These can then be stored as a reference.

An alternative to HyperTerminal is to open a DOS command window and type in "telnet xxx.xxx.xxx.xxx" (where x is the IP address you have assigned the Controller). The Controller uses the default telnet port 23 for the connection.

**Important:** Ensure you disconnect from the telnet session either by closing the terminal window or exiting the Controller menu using "99". Failure to do this will inhibit another session from being opened as only one session can operate at one time.

## Programming Overview

Before programming the Controller for the first time, take some time to read the following. It provides an insight into the operation of the signal schedule, the calendar schedule and the interaction between the two as well as providing some programming examples.

The Controller has three signal schedules numbered 1,2 and 3 and one calendar schedule.

### The Signal Schedule:

The function of the signal schedule is to operate either circuit 1 or 2 at a preprogrammed time on preprogrammed days of the week.

There are three (3) signal schedules each consisting of 100 entries numbered 0 to 99. Each of these entries can contain the time of day and day of week to operate a circuit, the circuit to operate and the operation code.

The operation codes are:

Code	Operation
00	- Circuit Off
99	- Circuit On
01 to 98	On for 1-98 seconds

The days of the week are entered numerically as:

1. Monday
2. Tuesday
3. Wednesday
4. Thursday
5. Friday
6. Saturday
7. Sunday
8. Holiday

Day number 8 is defined as a holiday day and will enable the control circuit to also operate during a holiday period. See the holiday schedule for further information on the holiday settings.

The Calendar Schedule:

The calendar schedule has two main functions:

1. It can select the signal schedule to run; and
2. It can flag the current day as a programmed holiday

The calendar schedule consists of 100 entries numbered 0 to 99. Each of these entries can contain the month and day of month to execute an operation and the operation codes to perform. The operations take place at midnight (00:00Hrs) or when the calendar schedule is edited and the edit changes the state of the Controller.

The Controller will default to using program 1 unless there is a calendar entry that changes it.

There are 6 operation codes:

Code      Operation

1. Select signal schedule 1
2. Select signal schedule 2
3. Select signal schedule 3
4. Holiday On
5. Holiday Off
6. Single day holiday

Codes 1 to 3 determine the selection of the currently executing signal schedule.

Example:

You have a specific signal control sequence that requires execution during the Easter holiday period. This sequence could be programmed into signal schedule 2. The start date and signal schedule 2 is programmed into the calendar schedule and at midnight the Easter signal schedule 2 would be selected. At the end of Easter you would reselect signal schedule 1.

Codes 4 and 5 turn the holiday flag on and off respectively. The holiday on/off flag is checked by the currently active signal schedule to determine if it should operate a circuit during a holiday period.

Example:

A school has its class period signals programmed to operate from Monday to Friday. When a school holiday period is programmed into the calendar schedule the holiday flag will inhibit the signals from operating for the duration of the holiday.

Code 6 turns on the holiday flag for a single day only. The holiday flag is automatically turned off 24 hours later (midnight the next day).

### Example:

A business has its start, stop and lunchtime signals programmed for Monday to Saturday. There are known single day public holidays during the year, Labour Day for example. These can be programmed into the calendar schedule at the start of each year and will inhibit the operation of the signal for those days.

## Main Menu

After making the telnet connection you will be presented with the following menu:

```
-- Main Menu --  
  
1 - Activate/Cancel Transient Signal  
2 - Activate/Cancel ALERT  
  
3 - Programming menu  
4 - System Setup Menu  
  
99 - End telnet session
```

Select ?

### 1 - Activate/Cancel Transient Signal

The Controller displays:

```
[A]ctivate or [C]ancel Transient Signal, A or C ?
```

This function initiates or cancels a preprogrammed signal duration and period.

Pressing 'A' will activate the operation, pressing "C" will cancel it.

See *Configure Transient Signal* in the System Setup section for further information.

### 2 - Activate/Cancel ALERT

The Controller displays:

```
[A]ctivate or [C]ancel Alert Signal, A or C ?
```

This is a manual control that initiates or cancels the alert signal.

Pressing 'A' will activate the signal, pressing "C" will cancel it.

This periodic cycle is fixed at 0.5 seconds 'on', 4.5 seconds 'off'.

The cycle will continue until it is cancelled.

Note: This signal is not, and must not be used as, a substitute for any danger signal specified or mandated by any Standard or Building Code.

### 3 - Programming menu

-- Program Menu --

- 1 - Edit Signal Schedule
- 2 - Edit Calendar Schedule
- 3 - Manually Select Program
- 4 - Manually Control Circuits
- 5 - Display Status
  
- 9 - Exit

Select

Select one of the 6 functions.

A description of each function follows:

#### 1 - Edit Signal Schedule

This allows you to add new entries or edit existing ones.

There are three independent Signal Schedules, however only one is operational at any particular time, this depends on the calendar schedule or a manual selection. Each schedule contains 100 locations (or entries) numbered 0 to 99.

After selecting this option you will be asked to choose the schedule you wish to edit. Choose 1, 2 or 3.

Select Program to Edit: 1,2,or 3

-- Signal Schedule Menu --

\*\* Editing Program n \*\* (n = 1,2 or 3)

- L - List locations Lnn
- E - Enter or Edit location Enn
- D - Delete location Dnn
- S - Select program to edit
- X - eXit

Select

## L - List locations Lnn

The list option allows you to view one or a range of locations. Only active entries will be displayed.

To list a single location, type Ln where n is the location number.

To list a range insert a dash, type Ln-e where n is the first location and e is the last.

To list all location use just 'L' or L00-99

It is recommended to use the command 'L' periodically while programming to check all entries as you may use location 77 instead of 7 by mistake. This command will display that error.

Below is a display example from the command "L00-99", although we scanned the complete program there is only one active entry.

Pr	Loc	Time	Mo	Tu	We	Th	Fr	Sa	Su	Hol	Cir	Code	Description
1	03	13:45	x								1	05	Pulse 05 secs

## E - Enter or Edit location Enn

The Enter/Edit option allows you to enter a new entry or edit an original one.

If you select an unused (or deleted) location the fields will be displayed blank.

If you are editing a previous entry the current setting will be displayed.

Enter the time in 24 hour format, i.e. 1.30pm is 1330.

Enter the days that the operation should take place, 1 to 7 is Monday to Sunday respectively, day 8 is a holiday.

Select the circuit you wish to operate, 1 or 2.

Enter the function code, 0 for "off", 99 for "on", or 1 to 98 seconds pulse.

You will then return to the Signal Schedule menu.

## D - Delete location Dnn

The (D)delete command allows you to delete one or a range of entries.

To delete a single entry, enter Dnn where nn is the entry number, to delete a range of entries enter Dss-ee where ss is the start entry and ee is the end.

You will be asked to confirm the deletions before proceeding.

You will then return to the Signal Schedule menu.

## S - Select program to edit

The (S)elect command allows you to select the current program to edit.

Note: This does not change the program currently being executed by the Controller.

You will then return to the Signal Schedule menu.

## X – e(X)it

(E)xit will return you to the Programming Menu.

## 2 - Edit Calendar Schedule

This allows you to add new entries or edit existing ones.

The calendar schedule contains 100 locations (or entries) numbered 0 to 99.

-- Calendar Schedule Menu --

```
L - List locations Lnn
E - Enter or Edit location Enn
D - Delete location Dnn
X  e(X)it
```

Select

### L - List locations Lnn

The list option allows you to view one or a range of locations. Only active entries will be displayed.

To list a single location, type Ln where n is the location number.

To list a range insert a dash, type Ln-e where n is the first location and e is the last.

To list all location use just 'L' or L00-99

Below is a display example from the command 'L'

Loc	day/mth	Op	Desc
00	05/05	4	Hol Start
01	09/05	5	Hol End
02	11/11	1	Prog 02
03	12/11	1	Prog 01

In the example above:

Location 00 starts a holiday period at the start of the 5<sup>th</sup> of May. This means only signal entries that have day 8 (holiday) selected will operate during this period.

Location 01 ends the holiday period at the end of the 9<sup>th</sup> of May.

Location 02 switches the Controller to run program 2 on November 11<sup>th</sup>.

Location 03 switches the Controller to run program 1 on November 12<sup>th</sup>.

#### E - Enter or Edit location Enn

The Enter/Edit option allows you to enter a new entry or edit an original one.

If you select an unused (or deleted) location the fields will be displayed blank.

If you are editing a previous entry the current setting will be displayed.

Enter the date in ddm format, i.e. The 12<sup>th</sup> of February would be entered as 1202.

Enter the operation that should take place, 1 to 3 is program 1 to 3 respectively, 4 will start a holiday period, 5 will end it, 6 will initiate a one day holiday.

You will then return to the Calendar Schedule menu.

Note: The calendar schedule does not have to be entered in date order. The Controller scans the calendar schedule from beginning to end and updates it's status to the most current date, wherever that may be in the schedule.

#### D - Delete location Dnn

The (D)delete command allows you to delete one or a range of entries.

To delete a single entry, enter Dnn where nn is the entry number, to delete a range of entries enter Dss-ee where ss is the start entry and ee is the end.

You will be asked to confirm the deletions before proceeding.

You will then return to the Calendar Schedule menu.

#### X – eXit

(E)xit will return you to the Programming Menu.

#### 3 - Manually Select Program

This command allows you to change the current signal program. You may require an alternative program for certain unpredictable events, such as changes in the weather.

Selecting an alternative program will override any program selection in the Calendar Schedule until midnight when the Calendar Schedule will regain control. To manually give control to the Calendar Schedule, select 0 (auto).

Select 0,1,2 or 3 (0 = auto)

#### 4 - Manually Control Circuits

This command allows you to manually control a circuit. If a circuit is manually turned on (code 99) it will stay in that state until manually changed again or the Signal Schedule has an entry that changes its state.

Enter Circuit 1 or 2

You will be asked to confirm the operation.

#### 5 - Display Status

This command lists the current status of the Controller. An example is displayed below:

One particularly useful statistic is the last Time Server Poll. This should be checked periodically to ensure the Time Server selected is operational.

```
Time: 12:30:07 Date: 28-Sep-2005 Day: 3 Wednesday
Current Program: 1
Holiday mode is: Off
Circuit 1 is: Off
Circuit 2 is: Off
Time Server poll period is: 1 hr
Last Time Server poll: 12:13:16
Daylight Saving Region is: AUSTRALIA EASTERN
Transient Signal: 5 secs, Delay 2 mins
```

#### 4 - System Setup Menu

```
-- System Menu --
```

- 1 - Set Time Server IP address
- 2 - Set Time Server poll period
- 3 - Set Time Zone Offset
- 4 - Set Daylight Savings
- 5 - Set Circuit 2 Options
- 6 - Configure Transient Signal
- 7 - Set Time & Date
- 8 - Set Controller IP address
  
- 9 - Exit

Select?

We will visit each of these settings in sequence.

### 1 - Set Time Server IP address:

Select this to set the IP address of your network Time Server.

The Controller will display:

```
Current Time Server address: 192.168.000.070
```

```
Change Y/N?
```

If you opt to change you will be prompted with each 3 number field in brackets, you may change it or press enter to skip to the next field.

```
(192)220 .(168)150 .(000)0 .(070) 75
```

In the above example we changed the address to 220.150.000.075

The Controller will display the new address and ask for confirmation to save it.

### 2 - Set Time Server poll period:

The Controller displays:

```
Current Time Server poll period 4 hours
```

```
Enter new period 0-48 hrs or <CR> to exit
```

This is the time period between calls to the network Time Server. Select a period of 0 to 48 hours. Default is 4.

Zero will disable the polls to the Time Server and allow the time and date to be set manually.

This menu item has the additional feature of force polling the timeserver, you do not have to enter a time – just press Enter <CR> to exit. This provides a facility to force an update to the Controller's time and test the network time server (see 'Display Status' for poll results). The poll timer is restarted each time this menu item is executed.

### 3 - Set Time Zone Offset

The Controller displays:

```
Current Time Zone Offset: 10.0 hours
```

```
Enter offset -13 to +13 or <CR> to exit ?
```

Time Servers provide time based on UTC (also referred to as GMT or Zulu), that is, the time at the Earth's zero meridian. Therefore you must add or subtract the time of the time zone you are in to set the local time.

Note: Use standard time - do not use daylight savings time.

Enter your time zone offset from UTC.

Then the Controller displays:

```
Add half hour Y/N ?
```

This allows you to add a further 30 minute offset. For instance Adelaide, Australia is UTC +9.5 hours.

Examples: London is 0, Paris is -1, New York is -5, Sydney is +10.

The Controller will display the new offset and ask for confirmation to save it.

#### 4 - Set Daylight Savings

Daylight Saving options:

Select: 0 to Disable, 1 to Define your own

Or choose from the following table:

	----- Start -----	----- End -----	----- Region -----
2 - Last	Sun in Oct at 02:00	Last Sun in Mar at 03:00	AUSTRALIA EASTERN
3 - First	Sun in Oct at 02:00	Last Sun in Mar at 03:00	AUSTRALIA TASMAINIA
4 - Last	Sun in Mar at 02:00	Last Sun in Oct at 03:00	EUROPE
5 - First	Sun in Oct at 02:00	3rd Sun in Mar at 03:00	NEW ZEALAND
6 - Last	Sun in Mar at 02:00	Last Sun in Oct at 01:00	UK
7 - First	Sun in Apr at 02:00	Last Sun in Oct at 02:00	USA
8 - 2nd	Sun in Mar at 02:00	First Sun in Nov at 02:00	USA NEW

Current Settings:

```
Starts: First Sun in Oct at 02:00
Ends   : Last  Sun in Mar at 03:00
Region: AUSTRALIA EASTERN
```

Enter option or <CR> to exit

If you require daylight saving then either choose an entry from the table, or enter 1 and The Controller will allow you to configure a unique daylight saving period not available from the table – just follow the prompts.

Selecting 0 will disable daylight saving.

#### 5 - Set Circuit 2 Options

The Controller displays:

```
Currently Circuit 2 is available for Normal operation
```

```
Change configuration: 0 = Normal, 1 = Master Clock or <CR> to
exit
```

Select

Selecting 1, Master Clock, enables the Controller to operate as a master clock. The correction format is known as "Sync Wired" and will correct slave clocks compatible with this format such as the Krontek KT160C digital calendar clock.

If Master Clock operation is selected circuit 2 will ignore any programmed control functions.

The "Sync Wired" correction format is an hourly correction pulse from 57' 54" to 58' 02". At 05:57:58 and 18:57:58 this pulse is extended a further 4 seconds to 58' 08".

## 6 - Configure Inputs

The Controller has two inputs named A and B. These inputs are fully programmable and can affect either output circuit. The options menu for Input A is equivalent to that of Input B so we shall only describe programming of Input A.

The Controller displays the following:

Input A: is not used (or the current programmed configuration)  
Input B: is not used (ditto)

Configure Input A:

- 0 - Disable
- 1 - Circuit 1 ON
- 2 - Circuit 2 ON
- 3 - Circuit 1 OFF
- 4 - Circuit 2 OFF
- 5 - Initiates the transient signal
- 6 - Cancels the transient signal
- 7 - Activates the alert signal

Select or <CR> to skip

Selections:

- 0 - Will disable any input operation
- 1 - Circuit 1 will be forced on when this input is held at 0v
- 2 - Circuit 2 will be forced on when this input is held at 0v
- 3 - Circuit 1 will be forced off when this input is held at 0v
- 4 - Circuit 2 will be forced off when this input is held at 0v
- 5 - Momentarily pulsing the input to 0v will initiate the Transient Signal
- 6 - Momentarily pulsing the input to 0v will cancel the Transient Signal
- 7 - The alert signal will be generated while this input is held active

After configuring input A the input B menu will be displayed

See the back page for switch wiring examples.

## 7 - Configure Transient Signal

The Transient Signal feature has been provided for a situation where you cannot predict when a morning tea or lunch break period will begin. An example of this is when a service such as a meals or snack vehicle visits your building for the morning tea break. In this case the break will start at some random time i.e. when the vehicle arrives. In such an event you want to sound a signal indicating the start of the break and then have it sound again after a predetermined interval (the break period). This is achieved using the Transient Signal Function.

The Transient Signal requires manual activation, this is done via telnet or one of the control inputs (see Configure Inputs).

The Controller displays:

```
Transient Signal
```

```
Current Signal Period: 5 secs  
Enter new signal period, 0 (off) to 30 secs or <CR> to exit
```

Enter the duration of the signal.

```
Current Delay until next signal : 2 mins  
Enter new delay period, 1 to 60 mins or <CR> to exit
```

Enter the time period before the signal operates again.

## 8 - Set Time and Date:

The time and date can only be set if the timeserver poll period is disabled (set to 0).

Note: The ability to set the time and date is to enable the functional testing of the time and calendar schedules. It is not recommended that the Controller operate in this mode over an extended period as the internal clock relies on a timeserver for accuracy.

The Controller displays:

```
Enter time as HHMMSS in 24hr format or <cr> to skip
```

*Example: 2:43:35pm is entered as 144335*

```
Enter date as DDMMYY or <cr> to skip
```

*Example: 2<sup>nd</sup> Jan 2005 is entered as 020105*

Press enter to return to the Setup Menu

## 9 - Set Controller IP address:

Select this to set the IP address of the Controller.

This is an alternative to using the DeviceDetector utility.

Be warned, if you change anything but the last 3 digits you will not be able to communicate with the Controller again unless your PC is set to the same host IP settings.

The Controller will display:

```
Current Time Server address: 192.168.000.128
```

```
Change Y/N?
```

If you opt to change you will be prompted with each 3 number field in brackets, you may change it or press enter to skip to the next field.

```
(192) .(168) .(000) .(128) 220
```

In the above example we changed the last field to 220

The Controller will display the new address and ask for confirmation to save it.

Note: If you change the IP address the Controller will reboot and you will need to re establish a connection using the new IP address.

## Technical Specifications

Ethernet: Auto-sensing 10/100Mbit, RJ45 Interface

Ethernet Connection Indicators: Orange 10Mbit, Green 100Mbit

SNTP Protocol: Compliant with RFC 2030

Telnet Port: 23

Power Led: On when power is applied

Active Led: Flashes once per second when operational

Power Supply Requirements: 9-12 volts DC, 500mA

Output Relays: Contact rating 100mA at 50VDC, see note\*

VDC Output Supply: Equal to input supply voltage, current limited to 300mA

Inputs A & B: Minimum input 0v, max input 3.3VDC

Schedule Memory: Non-volatile flash, 100 year data retention

Internal Clock: 4 day battery backup, 1 second per day accuracy

Program Schedule: 3 schedules, 100 locations each

Calendar Schedule: 1 schedule, 100 locations

Dimensions: Length 87mm, Width 57mm, Height 27mm

\*Note: The Controller output relays are designed for low voltage (less than 50v) low current (less than 100mA) applications. When switching higher loads a 12V interface relay will be required.

In the case of switching high AC voltages i.e. greater than 100VAC, then a Solid State Relay (SSR) should be utilized to reduce any AC arcing that may affect controller operation.

# Wiring and Configuration Examples

