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## User's Manual

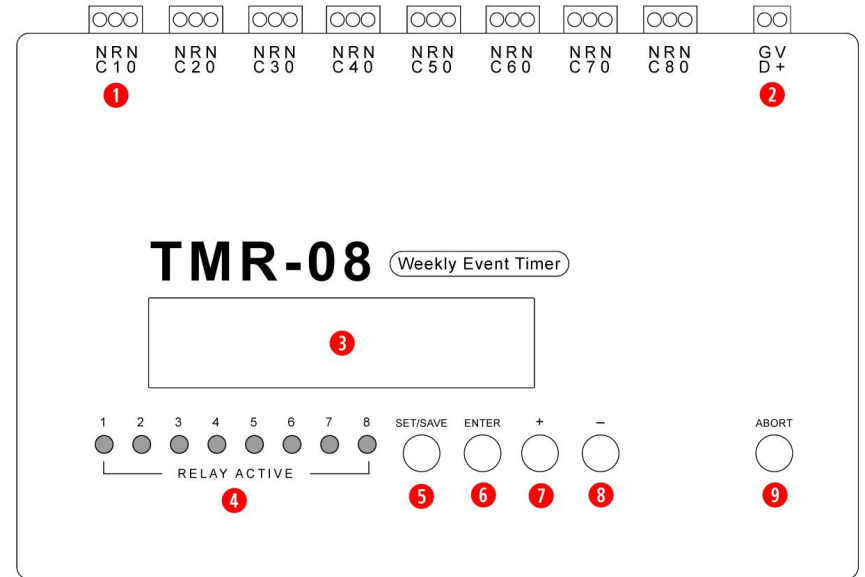
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# 1. Package Contents

- 1 x TMR-08 unit
- 1 x power supply
- 1 x user's manual

Please contact your dealer immediately should any item be missing.

# 2. Panel Descriptions



1. Relay Terminals
2. Power Terminals
3. LCD Panel
4. Relay Indicators
5. SET/SAVE Button
6. ENTER Button
7. PLUS Button
8. MINUS Button
9. ABORT Button

### 1. Relay Terminals

There are eight relays in the unit. Each relay has three terminals:

NC: Normally Closed

Rn: Common (n is a number from 1 to 8)

NO: Normally Open

When the relay is off, NC and Rn are connected together but NO is not. When the relay is on, NO and Rn are connected together but NC is not. Therefore the relay works like a toggle switch with Rn toggling between NC and NO.

### 2. Power Terminals

Please be sure to use the included power supply or the unit may be damaged.

### 3. LCD Panel

The backlit LCD panel is always on.

### 4. Relay Indicators

When a relay is on, the corresponding indicator will light up.

### 5. SET/SAVE Button

Use this button to list configuration items sequentially, one at a time. This button is also used to save changes and exit the current configuration item.

### 6. ENTER Button

Use this button to enter the current configuration item. This button is also used to advance the cursor to the next field within the configuration item.

### 7. PLUS Button

Use this button to increase the value. It is also sometimes used as 'yes'.

### 8. MINUS Button

Use this button to decrease the value. It is also sometimes used as 'no'.

### 9. ABORT Button

Use this button to exit the current configuration item without saving changes.

## 3. Introduction

The TMR-08 is a weekly switch timer with 8 independent relay outputs for general purpose apparatus control. An event, represented by an 8-bit value, turns relays on or off with a resolution of one second. For example:

Event '00000000' = turns all relays off

Event '11111111' = turns all relays on

Event '10000100' = turns relay 1 and 6 on, all others off

A program is a group of events for the same day. Consider the following program which has 5 events:

Event #1 = '00000000' at 00:00:00

Event #2 = '10000000' at 09:05:28

Event #3 = '01100000' at 10:09:52

Event #4 = '01000000' at 10:09:53

Event #5 = '00000001' at 17:00:00

The first event turns all relays off at midnight. The other events turn

Relay #1 on from 09:05:28 to 10:09:52

Relay #2 on from 10:09:52 to 17:00:00

Relay #3 on from 10:09:52 to 10:09:53

Relay #8 on at 17:00:00

Relay #8 will stay on till it's turned off by an event in a subsequent program. Since only one program can be assigned to each day, the earliest time relay #8 may be turned off is the next day.

Like all other configuration items, program data are saved in non-volatile memory inside the unit.

The maximum number of events per program is determined by the number of programs the unit is configured to support:

1-program mode = 224 events/program

3-program mode = 64 events/program

7-program mode = 32 events/program

The 7-program mode is most flexible since each day of the week can be assigned with a different program. But it also has the least number of events per program.

The unit can be re-configured for a different number-of-program mode, but all existing programs will be erased at the same time. Therefore the number-of-program mode should be chosen carefully with some headroom for adding more events into a program.

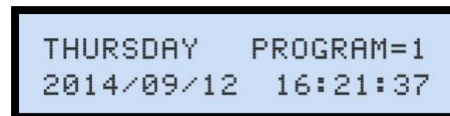
After being set up, programs are assigned to each weekday according to the user's needs. A program may be assigned to one or more weekdays, and a weekday may have no program. For example, program #1 may be assigned to Monday through Friday, program #2 to Saturday, and no program to Sunday. When no program is assigned to a weekday, relays will not change state during that day.

Inside the unit there is a digital clock/calendar to keep time. To accommodate for Daylight Saving Time (DST) the unit allows the user to enter DST data for up to 10 years out. Instead of entering DST data for automatic adjustment, the user may also choose to manually adjust the clock when DST begins/ends.

To facilitate trouble shooting, a function is provided for the user to manually control the relays. When this function is activated, the unit stops doing the program and renders total control to the user. If desirable this function can be activated all the time to allow indefinite manual control.

The unit also provides a "clock tuning" function to offset timing variation due to component aging and other factors.

## 4. Main Screen



```
THURSDAY PROGRAM=1
2014/09/12 16:21:37
```

The main screen shows the current date, time, weekday and assigned program. When and only when showing the main screen, the unit is in the run mode and the assigned program will be executed. The program will be suspended when the unit is in the configuration mode (showing any other screen). Therefore it is important to return to the run mode after configuration is done to ensure proper operation.

On the upper right corner of the screen, if the assigned program is 'X' then no program is assigned for this weekday.

In the run mode, the only functional button is SET/SAVE which puts the unit into the configuration mode. To configure a certain item, just press SET/SAVE multiple times till the desired item is shown on the screen, then press ENTER to enter it.

## 5. Set Date & Time

```
THURSDAY  
2014/09/12 16:25:37
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes, or ABORT to not save changes.

The date format is YYYY:MM:DD. The time format is 24-hour HH:MM:SS. Be sure to set the weekday correctly because the system does not check its correctness.

There is internal backup power that can keep the clock running for several days without power. If the unit has lost power for more than several days, it may be necessary to set the date and time again. However, all other configuration items are saved in the unit's non-volatile memory and therefore not affected by loss of power.

## 6. Set No. of Programs

```
NO. OF PROGRAMS: 7
```

Press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes or ABORT to abort. If SET/SAVE is then pressed, the user will be asked to press PLUS to confirm the operation. At this point the user may either press PLUS to save changes or ABORT to abort the operation.

```
NO. OF PROGRAMS: 7  
PRESS + TO CONFIRM
```

Please note that when SET/SAVE is pressed and confirmed, all existing programs will be erased even if the number of programs was unchanged. For example, if this configuration item is entered by mistake then the user must press ABORT to prevent the erasure of all existing programs.

## 7. Set Program #n

```
ERASE PROGRAM FIRST?  
<+>:YES <->:NO
```

Before setting up a program the user can have it erased first. Erasing the program to start from scratch may save time if there are many changes to the old program. Erasing the program causes all events to be cleared and disabled.

The setup starts from event #1 as shown in the following screen. To skip to another event in the same program, just keep pressing ENTER till it comes on the screen.

```
PROG #1 EVENT #001  
XX:00:00 00000000
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes and go to the next event, or ABORT to abort the current event.

Events can be disabled but not deleted. An event is disabled if its hour value is 'XX' which can be reached by MINUS below 0 or PLUS above 23.

Note that events may be set up in random order, or with disabled events among them. For example, event #3 may have a time earlier than event #1, while event #2 is a disabled one. If there are two or more events with the same time, the event with the lowest number wins (e.g. event #5 overrides event #24).

After a program has been edited a few times, there may be some old and unintended events left in the program. The user should go through the entire program and make sure all unintended events get disabled.

Not all programs need to be set up, only as many as needed. For example, if the unit is configured in the 7-program mode and only 5 programs are needed, then just set up programs 1 to 5 (or any 5).

After being set up, a program may be left unassigned to any weekday. The purpose of setting up an unassigned program is to have it switched with another program in the future, possibly multiple times a year such as seasonal changes.

## 8. Assign Programs

```
MO TU WE TH FR SA SU  
1 1 1 1 1 2 2
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes, or ABORT to not save changes.

A day has no program assigned if its value is 'X' – relays would not change state on that day. Value 'X' can be reached by MINUS below 1.

## 9. Manual Control

```
MANUAL CONTROL  
00000000
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value (0 = relay off, 1 = relay on). When done, press SET/SAVE to save changes or ABORT to not save changes and turn off all relays on exit.

The leftmost digit represents relay #1, the second digit represents relay #2, and etc. Pressing ENTER beyond the last digit will move cursor back to the first digit.

## 10. Clock Tuning

```
CLOCK TUNING  
OFFSET = 0
```

Press PLUS or MINUS to change the offset: increment it by one to make the clock run 68 seconds slower per year, decrement it by one to make the clock run 68 seconds faster per year. When done, press SET/SAVE to save changes, or ABORT to not save changes.

The clock may need tuning under the following circumstances:

- The unit operates in an environment much hotter/colder than 25 degrees Celsius.
- The unit has been operating for a few years (components aging).

Ranging from -63 to +63, the offset value, like all other system parameters, is stored in the unit's non-volatile memory. Due to factory calibration the offset may be set to a non-zero value on a brand new unit.

## 11. Set DST Shift Times

```
>SET DST SHIFT TIMES  
SPRING:2AM FALL:3AM
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes, or ABORT to not save changes.

The DST shift time is the hour at which the DST is to be adjusted. It varies from region to region and may be different for Spring and Fall.

There is no mechanism to enable or disable DST, it is always enabled. However, if all DST entries are either invalid or outdated then DST is essentially disabled.

## 12. Set DST #n

```
>SET DST #1  
2014/03/10 TO 10/26
```

Press ENTER and move cursor to the desired field, then press PLUS or MINUS to change the value. When done, press SET/SAVE to save changes, or ABORT to not save changes.

Up to 10 DST entries can be stored in the unit's non-volatile memory. Each entry consists of the year, the month/day for the Spring shift, and the month/day for the Fall shift. DST entries can be entered randomly, out of the yearly order. If there are two or more entries with the same year, the entry with the lowest number wins (e.g. entry #2 trumps entry #7).

The default value for a DST entry is "2000/00/00 to 00/00" which is actually an invalid one because 00/00 is not a valid month/day. If DST is not to be observed then just leave these entries as is. An invalid or outdated entry has no effects.

There is no mechanism to enable or disable DST, it is always enabled. However, if all DST entries are either invalid or outdated then DST is essentially disabled.



## 13. Specifications

**Max. No. of Programs:** 1, 3 or 7 (user configurable)

**Max. No. of Events/Program:** 224 (1 program), 64 (3 programs), 32 (7 programs)

**Event Timing Resolution (Min. Event Duration):** 1 second

**No. of Relays:** 8

**Relay Type:** mechanical, SPDT (with both NO and NC terminals)

**Relay Contact Rating:** 12A @ 120VAC, 10A @ 240VAC/24VDC

**Power Supply:** 12VDC, 1A

**Physical Dimensions:** 143mm (W) x 92mm (L) x 24mm (H) excluding brackets

## 14. Application Notes

### A. How to turn an apparatus on and off?

The relay has three terminals: Common, N.C. (Normally Closed) and N.O. (Normally Open). When the relay is off, Common and N.C. are connected together. When the relay is on, Common and N.O. are connected together.

To turn an apparatus on and off, connect the hot/positive wire of the apparatus' power supply to the relay's Common terminal, and the cold/ground wire to the cold/ground power terminal on the apparatus. Then connect either the N.C. or the N.O. terminal to the hot/positive power terminal on the apparatus in the following manner:

- To turn on the apparatus when the relay is on, connect N.O. to the apparatus.
- To turn on the apparatus when the relay is off, connect N.C. to the apparatus.

The relay is good for controlling both AC and DC apparatus, but be sure to keep the load within the relay's current capacity which can be found in Specifications.

### B. How to trigger a QuikWave audio repeater?

Connect the relay's Common terminal to the QuikWave's trigger input, and the relay's N.O. terminal to the QuikWave's ground. Create an event to turn on the relay at the target time, and another event to turn the relay off one second later. This is good for triggering a QuikWave configured in the default (DNC) mode. The events may need to be modified if the QuikWave is configured in other modes.