TBSRB01 Quick Reference Guide

Contents

1. Introduction

This document gives an overview on the extended SDI-12 commands to control the relay box.
It is assumed that the user is familiar with the basics of the SDI-12 protocol.
The relay box requires to be connected to a serial or to a USB to SDI-12 interface or to a telemetry unit with SDI-12 interface or any other device capable of issuing SDI-12 commands.

For more details refer to the official SDI-12 standard which can be downloaded from:

SDI-12 Support Group
(Technical Committee)
165 East 500 South
River Heights, Utah
435-752-4200
435-752-1691 (FAX)
http://www.sdi-12.org

The latest standard is V1.3 and dates from July 18th 2005.

2. Power supply considerations

The TBSRB01 relay & timer box does not need to be connected to a continuous supply voltage when using it for standard relay control. It is sufficient, if the relay box will be powered in parallel to the activity on the SDI-12 bus.
The relay box uses latching relays which are toggled with a short current pulse and then hold the contact position.
In case of using the timer functionality of the relay box, continuous supply voltage is required. Though the real time clock is buffered with a supercap and can keep its time over months, the remaining circuitry needs to be powered to be able to wake up and drive the relays in case of a timer event. The current consumption is however in the micro Amp range for most of the time, except when waking up and toggling relays.

3. Commands overview

3.1 Supported standard SDI-12 commands

Following standard SDI-12 commands are supported by the relay box:
a represents the sensor address, **<CR>** represents carriage return and **<LF>** represents line feed.

Command	Description	Response
a!	Acknowledge Active	**a<CR><LF>**
aI!	Send Identification	**allccccccccmmmmmmvvvxxxxxxxxxxxxx<CR><LF>** Identification information
aAb!	Change Address	**b<CR><LF>** Changing the relay box SDI-12 address
?!	Address Query	**a<CR><LF>**

3.2 Extended SDI-12 commands for basic relay control

Command	Description	Response
aXSR,1,X,X,X!	Close switching contacts of Relay1 [a] is the sensor address; 0...9, a…z, A…Z The four characters in the argument of the aXSR command represent the contacts of the four relays. A "1" in the argument means close contact A "0" in the argument means open contact "X" means - leave the contact of the corresponding relay in its current state.	**aX_OK<CR><LF>**
aXSR,X,1,X,X!	Close switching contacts of Relay2	**aX_OK<CR><LF>**
aXSR,X,X,1,X!	Close switching contacts of Relay3	**aX_OK<CR><LF>**
aXSR,X,X,X,1!	Close switching contacts of Relay4	**aX_OK<CR><LF>**
aXSR,1,1,X,X!	Simultaneously close switching contacts of Relay1 and Relay2	**aX_OK<CR><LF>**
aXSR,1,X,1,X!	Simultaneously close switching contacts of Relay1 and Relay3	**aX_OK<CR><LF>**
aXSR,1,X,X,1!	Simultaneously close switching contacts of Relay1 and Relay4	**aX_OK<CR><LF>**
. . . .	. . . .	**aX_OK<CR><LF>**
aXSR,1,1,1,1!	Simultaneously close switching contacts of Relay1, Relay2, Relay3 and Relay4	**aX_OK<CR><LF>**
aXSR,0,X,X,X!	Open switching contact of Relay1 [a] is the sensor address; 0...9, a…z, A…Z The four characters in the argument of the aXSR command represent the contacts of the four relays. A "1" in the argument means close contact A "0" in the argument means open contact "X" means - leave the contact of the corresponding relay in its current state.	**aX_OK<CR><LF>**
. . . .	. . . .	**aX_OK<CR><LF>**
aXSR,0,0,0,0!	Simultaneously open switching contacts of Relay1, Relay2, Relay3 and Relay4	**aX_OK<CR><LF>**

3.3 Extended SDI-12 command to query the switching state of relays

Command	Description	Response
aXGR!	Query the status of the contacts of Relay1, Relay2, Relay3, Relay4 [a] is the sensor address	**aw,x,y,z<CR><LF>** [w]: state of Relay1 [x]: state of Relay2 [y]: state of Relay3 [z]: state of Relay4 Possible values of w, x, y, z: 0 or 1 0 ≡ contact open 1 ≡ contact closed

3.4 Extended SDI-12 commands for date and time setting

In order to use the timer functionality of the relay box, continuous supply voltage is required. Though the real time clock is buffered with a supercap and can keep its time over months, the remaining circuitry needs to be powered to be able to wake up and drive the relays in case of a timer event.

The real time clock of the timer is factory set to GMT + 8hrs as part of the manufacturing process, however it needs to be re-programmed to the applicable time zone or in case that the relay box was on the shelf for long time.
It can be set before installation in the field, using a serial or USB to SDI-12 interface connected to a PC or it can be set through the radio telemetry device.
Furthermore, the timer could be used without any SDI-12 device connected in the field: After setting date, time and timer event, the device will start executing the programmed timer events without any further outside command.

Command	Description	Response
aXSDT,YYYY,MM,DD,HH,MM,SS!	Set date and time [a] is the sensor address YYYY,MM,DD,HH,MM,SS is year, month, day, hour, minute (24 - hour format)	**aX_OK<CR><LF>**
aXGDT!	Read date and time	**a+YYYY+MM+DD+HH+MM+SS<CR><LF>**

3.5 Extended SDI-12 commands for timer assignment

The relay box provides two independent timer channels.
The relays can be arranged in up to two groups, each group linked to a timer channel.

Assignment example1: Relay1 and Relay2 linked to Timer1
Relay4 linked to Timer2
Relay3 not used or controlled by extended SDI-12 commands

Assignment example2: Relay1, Relay2, Relay3, Relay4 linked to Timer1

Timer events can be overruled by extended SDI-12 commands. If the relay contacts were closed by the timer, they can be opened using an extended SDI-12 command. However the timer continues its operation and will close the relay again at the next timer event.

Command	Description	Response
aXCTA!	Clear all timer assignments	**aX_OK<CR><LF>**
aXGRT1,1!	Assign Relay1 to Timer1	**aX_OK<CR><LF>**
aXGRT1,1,2!	Assign Relay1 and Relay2 to Timer1	**aX_OK<CR><LF>**
aXGRT1,1,2,3!	Assign Relay1, Relay2 and Relay3 to Timer1	**aX_OK<CR><LF>**
. **.** **.** **.**	. . . .	**aX_OK<CR><LF>**
aXGRT2,4!	Assign Relay4 to Timer2	**aX_OK<CR><LF>**
Example aXGRT1,1,2,3! aXGRT2,3,4!	Relay3 is assigned to two timer channels simultaneously. This configuration is not allowed. Either the assignment command for Timer1 or Timer2 needs to be corrected and re-issued	**aX_NOK<CR><LF>**
aXGRT!	Query the timer assignments [a] is the sensor address	**aw,x,y,z<CR><LF>** **[w]:state of Relay1** **[x]: state of Relay2** **[y]: state of Relay3** **[z]: state of Relay4**

		Possible values of w, x, y, z: 0,1 or 2 **0 ≡ non assign** **1 ≡ assign to timer1** **2 ≡ assign to timer2**

3.6 Extended SDI-12 commands for timer setting

Command	Description	Response
aXCT!	Clear Timers (no timer operation)	**aX_OK<CR><LF>**
aXCT1!	Clear Timer1 (no operation of Timer1)	**aX_OK<CR><LF>**
aXCT2!	Clear Timer2 (no operation of Timer2)	**aX_OK<CR><LF>**
aXST1,HH,MM,mmmm!	Set Timer1 [a] is the sensor address; 0...9, a…z, A…Z HH,MM; hour, minute; starting time of the event mmmm; duration of the event in minutes (4 digits, maximum value = 1439) At the time set for the timer event, the contacts of the relays assigned to Timer1 will be closed for mmmm minutes.	**aX_OK<CR><LF>**
aXST2,HH,MM,mmmm!	Set Timer2 [a] is the sensor address; 0...9, a…z, A…Z HH,MM; hour, minute; starting time of the event mmmm; duration of the event in minutes (4 digits, maximum value = 1440)	**aX_OK<CR><LF>**

It is possible to set several events per day for each timer. The events should however not overlap in time. If the device detects an overlapping event, the response for the setting command will be NOK.

Note: max. 20 slots per day can be assigned for each timer. If the number of time slots exceeds this limit or in case of configuring overlapping time slots, the sensor will response NOK.
Upon clearing the timer, all time slots will be reset.

4. HISTORY

Version	Date	Author	Changes
V 1.0	07.07.2013	Michael Mayerhofer	Creation of the document
V 1.1	02.10.2013	Michael Mayerhofer	update